

# **THE SOUTH FLORIDA BUILDING CODE**

As adopted by the BOARD OF COUNTY COMMISSIONERS,  
BROWARD COUNTY, FLORIDA, with amendments as follows:

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Adopted by Resolution 6-21-60  
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Adopted by Resolution 9-14-65

1965 EDITION OF THE SOUTH FLORIDA BUILDING CODE  
WITH AMENDMENTS THROUGH SEPTEMBER 14, 1965  
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1)

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud.

2. The second part of the document outlines the specific requirements for record-keeping, including the need to maintain original documents and to ensure that all records are stored in a secure and accessible location. It also discusses the importance of regular audits and the role of internal controls in ensuring the accuracy of the records.

3. The third part of the document discusses the consequences of non-compliance with the record-keeping requirements. It notes that failure to maintain accurate records can result in the loss of financial data, which can have significant implications for the organization's operations and its ability to meet its financial obligations. It also discusses the potential for legal action and the impact on the organization's reputation.

4. The fourth part of the document provides a summary of the key points discussed in the document and offers recommendations for ensuring compliance with the record-keeping requirements. It emphasizes the importance of ongoing monitoring and the need for regular updates to the record-keeping policies and procedures.

2)

3)

**THE SOUTH FLORIDA BUILDING CODE**  
**as adopted for**  
**BROWARD COUNTY, FLORIDA**

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**FOREWORD**

"The South Florida Building Code" was adopted by the Board of County Commissioners of Dade County on October 29, 1957, and pursuant to the Home Rule Charter of Dade County, was made effective on December 31, 1957, as the building code for both the incorporated and unincorporated areas of Dade County, Florida.

"The South Florida Building Code" was copyrighted by the Board of County Commissioners of Dade County, who granted permission to the Board of County Commissioners of Broward County to adopt and reprint all or any part thereof for use in Broward County. Because of certain statutory limitations, the Board of County Commissioners of Broward County was precluded from adopting certain administrative, organizational and enforcement sections contained in "The South Florida Building Code." Therefore, these provisions have been deleted from "The South Florida Building Code" adopted by the Board of County Commissioners of Broward County.

Attention is accordingly directed to the fact that "The South Florida Building Code" applicable to the unincorporated areas of Broward County differs in this respect from "The South Florida Building Code" applicable in Dade County.

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## PREFACE

The "South Florida Building Code" is dedicated to the development of better building construction and greater safety to the public through uniformity of building laws, to the granting of full justice of all building materials on the fair basis of true merit of each material, and to the development of a sound economic basis for the future growth of the area through unbiased and equitable structure design, inspection and the protection of human life and property from fire and other hazards.

The preparation of this code was sponsored by the Dade League of Municipalities with the cooperation of the Dade County Commission.

In addition to those trade associations whose standards have been adopted herein, in whole or in part, the following trade associations have given time, effort and counsel to the preparation of this work:

Miami Builders' Exchange  
Associated General Contractors of America—So. Fla. Chapter  
Southern Pine Association  
Home Builders Association of South Florida  
American Iron and Steel Institute  
Douglas Fir Plywood Association  
Plumbing Industry Program  
National Electrical Contractors Association—So. Fla. Chapter  
Structural Engineers Council of Miami  
South Florida Roofing and Sheet Metal Contractors Assn.  
Metal Lath Manufacturers Association  
Perlite Institute  
Gypsum Association  
Florida Home Heating Institute  
South Florida Concrete and Products Assn.  
Gas Institute of Miami  
Air Conditioning and Refrigerating Assn. of Florida, Inc.  
National Elevator Manufacturers Industry  
Bureau of Lathing and Plastering, Inc.  
Prestress Concrete Institute  
Gunitite Contractors Association  
Assn. of Glass and Glazing Contractors of So. Florida, Inc.  
Assn. of Steel Fabricators  
Building Officials Committee of South Florida  
Fire Marshal Section of National Fire Prevention Assn.

Acknowledgment is made for useful data taken from the "Building Exits Code" of the National Fire Protection Association, the "Uniform Building Code" of the Pacific Coast Building Officials, and the "National Building Code" of the National Board of Fire Underwriters.

Appreciation is acknowledged to the following for their time and effort:

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# **PART I – ADMINISTRATIVE**

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  - 102 PURPOSE**
  - 103 SCOPE**
  - 104 APPLICATION TO EXISTING BUILDINGS**
  - 105 MAINTENANCE OF BUILDINGS AND PROPERTY**
- 

### **101 TITLE**

This compilation of rules shall be known as "The South Florida Building Code," may be cited as such, or as the "Building Code" (Prefixing the name of the legislative body adopting it by ordinance) and will be referred to hereinafter as "this Code."

### **102 PURPOSE**

The purpose of this Code is to provide certain minimum standards, provisions and requirements for safe and stable design, methods of construction and uses of materials in buildings and/or structures hereafter erected, constructed, enlarged, altered, repaired, moved, converted to other uses or demolished, to provide for the safety of workers and others during these operations and to regulate the equipment, materials, use and occupancy of all buildings and/or structures. The provisions of this Code shall be deemed to supplement any and all State laws of the State of Florida relating to building.

Wherever reference books, standards or pamphlets are designated herein, the edition in force and effect shall be that specified in the 'List of Code Standards' contained in this Code.

### **103 SCOPE**

**103.1** New Buildings and structures hereafter erected in any jurisdiction in which this Code has been adopted and structures moved into or within such jurisdiction shall conform to the requirements of this Code.

**103.2** Additions, alterations, repairs and changes of use or occupancy in all buildings and structures shall comply with the provisions for new buildings and structures except as otherwise provided in Sections 104 and 503 of this Code.

**103.3** A previously issued lawful permit shall be valid on the terms of the Code under which it was issued, provided, however, that such permit shall be subject to the limitations as specified in Section 304.

### **104 APPLICATION TO EXISTING BUILDINGS**

**104.1 GENERAL:** Existing buildings or structures to which additions, alterations, repairs or changes of occupancy are proposed or intended shall be made to comply with all of the requirements for new buildings or structures of like area, height, type and occupancy, except as provided in this section.

**104.3 FROM 25 PERCENT TO 100 PERCENT:** Alterations and repairs exceeding 25 percent of the value of an existing building or structure may be made within any 12-month period without making the entire existing building or structure comply, provided such alterations and repairs comply with the requirements of this Code and such addition conforms to the requirements of this Code for a new building of like area, height and occupancy. Such entire building or structure, including the new addition, shall not exceed the areas and heights specified in this Code.

**104.4 STRUCTURAL WORK OF 25 PERCENT OR LESS:** Structural alterations and repairs to any portion of an existing building within any 12-month period, the cost of which does not exceed 25 percent of the value of the existing building or structure, shall comply with all the requirements for new buildings or structures, except that minor structural additions, alterations and repairs, when approved by the Building Official, may be made with the same material of which the building or structure is constructed. Such building or structure, including new additions, shall not exceed the areas and heights specified in this Code.

**104.5 NON-STRUCTURAL WORK OF 25 PERCENT OR LESS:** Non-structural alterations or repairs, the cost of which does not exceed 25 percent of the value of an existing building or structure, and which does not affect egress or fire-resistive standards of safety, may be made with the same material of which the building or structure is constructed.

**104.6 ROOFING:** Not more than 25 percent of the roof covering of any building or structure shall be replaced in any 12-month period unless the entire roof covering is made to conform to the requirements of this Code.

**104.7 VALUE DETERMINATION:** For the purpose of this section, the value of a building or structure shall be the estimated cost of constructing a new building of like size, design and materials at the site of the original structure, assuming such site to be clear and deducting therefrom an amount for depreciation, deterioration and damage before such proposed new construction is started. For the purpose of this section, cost of additions, alterations and repairs shall be construed as the total cost of labor, materials and services, based on current prices for new materials.

**104.8 STRUCTURAL DETERMINATION:** For purposes of this section, structural shall mean any part, material or assembly of a building or structure which affects the safety of such building or structure and/or which supports any dead or designed live load and the removal of which part, material or assembly could cause, or be expected to cause, all or any portion to collapse or to fail.

**104.9 CHANGE OF OCCUPANCY:** Any existing building which has its use or occupancy changed in any way from its former or existing use or occupancy shall be provided with stairways, exits and fire-extinguishing apparatus, as specified in this Code for buildings hereafter erected for similar uses and occupancies.

## **105 MAINTENANCE OF BUILDINGS AND PROPERTY**

**105.1 BUILDINGS:** (a) The requirements contained in this Code, covering the maintenance of buildings, shall apply to all buildings and/or structures now existing or hereafter erected. All buildings and/or structures and all parts thereof shall be maintained in a safe condition, and all devices or safeguards which are required by this Code shall be maintained in good-working order.

(b) This sub-section shall not be construed as permitting the removal or non-maintenance of any existing devices or safeguards, unless authorized by the Building Official.

**105.2 PROPERTY:** No debris of any kind shall remain on any lot or on a sidewalk or street contiguous thereto, resulting from a fire, windstorm or from demolition or partial demolition of any building; nor shall any equipment, excess building materials, storage sheds or debris remain upon any such lot, sidewalk or street, upon completion of any new building upon such lot; nor shall any equipment, materials, toolsheds or debris be stored on any vacant or partially vacant lot, except as provided for in the Zoning Ordinances. It is hereby made the duty of the owner or his agent to remove or cause to be removed from such sidewalk, street and/or lot all such equipment, materials, toolsheds and debris within five days after written notice by the Building Official. For failure to comply with such notice after such period of five days, the owner and/or permit holder is subject to the penalties specified herein, the Certificate of Occupancy for the structure or structures may be revoked and the Building Official shall have the work done and public property restored and shall notify the legal authority, who shall institute the necessary action to have the costs placed as a lien against the property.

**105.3 HURRICANE PRECAUTIONS:** During such periods of time as are designated by the United States Weather Bureau as being a hurricane warning or alert, the owner, occupant or user of a property shall take precaution for the securing of buildings and equipment. Canvas awnings and swing signs shall be lashed to rigid construction, tents shall be taken down and stored or lashed to the ground, and such other precautions shall be taken for the securing of buildings or structures or material or equipment as may be reasonably required, and all glass where storm shutters are required as set forth in Paragraph 3508.2(a) shall be protected by storm shutters complying with Section 3511.

## NOTES



**NOTES**

The first part of the report discusses the general principles of the proposed system. It is based on the assumption that the system will be used in a large number of cases. The second part of the report describes the details of the system, including the hardware and software requirements. The third part of the report discusses the results of the experiments conducted to evaluate the system. The fourth part of the report discusses the conclusions and recommendations for further work.

## Chapter 2 — Organization and Enforcement

- 201 BUILDING AND ZONING DEPARTMENT
  - 202
  - 203 BOARD OF RULES AND APPEALS
  - 204 ALTERNATE MATERIALS AND TYPES  
CONSTRUCTION
  - 205 VIOLATIONS AND PENALTIES
- 

**201 BUILDING AND ZONING DEPARTMENT:** This Code shall be administered by the Broward County Building and Zoning Department. All references in this Code to the "Building Official" shall mean the "Broward County Building and Zoning Department."

**201.1** The appointing authority shall designate certain members of the Building and Zoning Department as "Building Inspectors," "Plumbing Inspectors" and "Electrical Inspectors."

**201.2 RIGHT OF ENTRY:** Upon presentation of proper credentials, the Building Official or his duly authorized representative may enter any building, structure, or premises, while under construction, repair, remodeling or alteration, at reasonable times, for the purpose of inspection or to prevent violation of this Code.

**201.3 STOP-WORK ORDERS:** Whenever any building work is being done contrary to the provisions of this Code or is being done in an unsafe or dangerous manner, the Building Official may order such work stopped, or may order the violation corrected within a reasonable period of time, by notice in writing served on the person or persons engaged in the doing or causing, of such work to be donen and such persons shall immediately stop such work until arrangements, in compliance with the provisions of this Code and satisfactory to the Building Official, have been made, at which time he may authorize the work to proceed.

**201.4 CONCEALED WORK:** The Building Official may order portions of the structural frame of a building and/or structure to be exposed for inspection when, in his opinion, there are good reasons to believe that a building or portion thereof is in an unsafe or dangerous condition or that there is willful or negligent concealment of a violation of this Code.

**201.5 OCCUPANCY:** Whenever any building or portion thereof is being used or occupied contrary to the provisions of this Code, the Building Official shall order such use or occupancy discontinued and the building or portion thereof vacated. Such order shall be by notice in writing, served on the person or persons using, or causing to be used, such building or portions thereof. Within a reasonable period of time after receipt of such notice or order, such building or portion thereof shall be made to comply with the requirements of this Code.





203 The following Board is established by the Board of County Commissioners:

**BOARD OF RULES AND APPEALS**

**203.1 MEMBERSHIP:** (a) Membership of the Board of Rules and Appeals shall consist of one architect, two general contractors, one structural engineer, one mechanical engineer, one master electrician and one master plumber, all qualified in their respective professions and trades and examined and registered or licensed in the State of Florida, in their respective fields, and all residents of and having their principal business within the area of any jurisdiction adopting this South Florida Building Code as modified and adopted by Broward County.

(b) Board members shall be appointed to serve at the pleasure of the Board of County Commissioners.

(c) The Board of County Commissioners of Broward County may, in their discretion, remove any member of the Board.

(d) A vacancy in the membership of the Board occurring during term, shall be filled by appointment of a member from the same field.

**203.2 COMPENSATION:** There shall be no compensation to members serving on the Board of Rules and Appeals.

**203.3 MEETINGS:** (a) Meetings of the Board of Rules and Appeals shall be held regularly or at the call of the Chairman, and at such times as the Board may determine.

(b) The Board shall select one of its members to serve as Chairman and one to serve as Vice-Chairman, to act in the absence of the Chairman. The Building Official may provide a Secretary to the Board. A detailed record of all proceedings shall be kept on file in the office of the Building Official. The Board shall establish rules and regulations to be approved by the Board of County Commissioners for its own procedure.

(c) All hearings shall be open to the public, and any person whose interest may be affected by the matter on appeals shall be given an opportunity to be heard. The hearing shall be informal and need not be conducted according to technical rules relating to evidence and witnesses.

(d) No member of the Board shall sit as a voting member in any hearing involving any question in which he has personal financial interest.

(e) Four members of the Board shall constitute a quorum. Recommendations shall be at least four favorable votes. The Board shall make recommendations without unreasonable or unnecessary delay.

**203.4 DUTIES:** (a) **INTERPRET CODE AT REQUEST OF BUILDING OFFICIAL:** The Board may make recommendations on all matters pertaining to this South Florida Building Code as modified and adopted by Broward County and referred to the Board by the Building Official for interpretation or clarification.

**(b) REPORT AND RECOMMENDATIONS** The Board of Rules and Appeals may recommend to the elected officials of the jurisdiction adopting this South Florida Building Code, as modified and adopted by Broward County resolutions, prescribing the fee for examinations, permits, inspections of boilers and elevators, the testing of materials, and all other such work required by the South Florida Building Code, as modified and adopted by Broward County. The Board of Rules and Appeals may recommend to the elected officials any desired amendments or revisions to the South Florida Building Code, as modified and adopted by Broward County. The Board of Rules and Appeals may report to the elected officials on the operation of this South Florida Building Code, as modified and adopted by Broward County, with respect to its enforcement, its effect on general building trends, the effect on buildings and other results.

**203.5 POWERS:** (a) The Board of Rules and Appeals may recommend interpretation of the provisions of the South Florida Building Code, as modified and adopted by Broward County, to cover a special case if it appears that the provisions of the South Florida Building Code, as modified and adopted by Broward County, do not definitely cover the point raised, or that the intent of the South Florida Building Code, as modified and adopted by Broward County, is not clear, or that ambiguity exists in the wording. The use of alternate materials or types of construction, not clearly comparable with the materials and types of construction specified in the South Florida Building Code, as modified and adopted by Broward County, may not be recommended by the Board of Rules and Appeals but the Board, if favorable to such use, may recommend to the elected officials an amendment to this South Florida Building Code, as modified and adopted by Broward County, to make such use lawful.

(b) When it is deemed necessary by the Board, it may request experienced and technical advice on any specific subject or subjects from any qualified person or persons, and such request may be for attendance at Board Meetings or for written analysis of the specific problem. The Board may establish Panels of Industry, either standing or temporary, for technical analysis of specific subjects but shall not obligate the County to any expense thereby.

**203.6 RECIPROCITY:** (a) The Board of Rules and Appeals may meet with similarly constituted and authorized boards for the purposes of discussion, decision and similar matters of area wide industry concern.

(b) Decisions of the majority of all members at joint meetings, as referred to herein, shall not be binding on the Board of Rules and Appeals. The decisions or joint meetings with other boards may be accepted or rejected or accepted with modifications.

## **204 ALTERNATE MATERIALS & TYPES OF CONSTRUCTION**

The provisions of this Code are not intended to prevent the use of types of construction or materials or methods of designs as an alternate to the standards herein set forth, but such alternates may be offered for approval, and their consideration shall be as specified in this section and chapter.

**204.1 STANDARDS:** The types of construction or materials or methods of design referred to in this Code shall be considered as standards of quality and strength. New types of construction or materials or methods of design shall be at least equal to these standards for the corresponding use intended.

**204.2 APPLICATION:** (a) Any person desiring to use types of construction or materials or methods of design not specifically mentioned in this Code shall file with the Building Official authentic proof in support of claims that may be made regarding the sufficiency of such types of construction or materials or methods of design and request approval and permission for their use.

(b) The Building Official shall approve such alternate types of construction or materials or methods of design if it is clear that the standards of this Code are at least equalled. If, in the opinion of the Building Official, the standards of this Code will not be satisfied by the requested alternate, he shall refuse approval.

**204.3 APPEAL:** Any person whose request for alternate types of construction and materials or method of design has been refused by the Building Official, may appeal to the Board of Rules and Appeals by written request to the secretary of the Board, and such written request shall be transmitted to the Board at once.





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## 205 VIOLATIONS AND PENALTIES

Violation of any provision of this Code shall be a misdemeanor.  
(See Sec. 13, Chapter 30613, Laws of Florida, Acts of 1955.)

### Chapter 3 — Permits and Inspections

- 301 PERMITS REQUIRED
- 302 APPLICATION
- 303 PERMIT FEES
- 304 CONDITIONS OF PERMIT
- 305 INSPECTIONS
- 306 CLEANUP OF SITE
- 307 CERTIFICATE OF OCCUPANCY

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#### 301 PERMITS REQUIRED

It shall be unlawful to construct, enlarge, alter, repair, move, remove or demolish any building, structure, or any part thereof; or any equipment, device, or facility therein or thereon; or to change the occupancy of a building from one use Group to another requiring greater strength, exit, fire and sanitary provisions; or to change to an unauthorized or prohibited use; or to install or alter any equipment for which provision is made or the installation of which is regulated by this Code, without having first filed application and obtained a permit therefor from the Building Official; except that for general maintenance or repairs which do not change the Occupancy, the value of which does not exceed twenty-five (\$25.00) dollars labor and material, as determined by the Building Official, no permit shall be required in this or any of the following sections.

301.1 Permits, to be issued by the Building Official, shall be required for the following operations:

(a) The erection or construction of any building or structure, the adding to, enlarging, repairing, improving, altering, covering or extending of any building or structure.

(b) The moving of any building or structure within, into, through or out of the area of jurisdiction, or the moving of a building or structure on the same lot.

(c) The demolition of any building or structure.

(d) The installation, alteration or repair of any sanitary plumbing, water supply, or gas supply system, as provided in Part XII.

(e) The installation, alteration or repair of any electrical wiring or equipment, as provided in Part XI.

(f) The installation, alteration or major repair of any elevator or hoist, as provided in Chapter 32.

(g) The installation, alteration or major repair of any boiler, pressure vessel, furnace, steam-actuated machinery or heat-producing apparatus, including the piping and appurtenances thereto, as provided in Parts VIII and XII.

(h) The erection, remodeling, relocating, repair, altering, or removal of any sign, as provided in Chapter 42.

(i) The erection, alteration or repair of any awning or similar appurtenance, as provided in Chapter 43 and 44.

(j) The storage and use of all volatile inflammable liquids, gases and materials, but such permits shall not be issued without the endorsement of the Fire Chief, as provided in Chapter 40.

(k) The application, construction or repair of any roof covering, as provided in Chapter 34.

(l) The installation, alteration, or repair of any air conditioning or refrigeration apparatus, as provided in Chapter 49.

(m) The installation, alteration or repair of any apparatus producing air contaminants, as provided in Chapter 41.

(n) The installation, alteration or repair of a swimming pool, as provided in Chapter 50.

(o) The installation, alteration or repair of any structure or facility on private property defined by this or any other regulation as being within the scope of work of an engineering contractor.

### 302 APPLICATION

Any person desiring a permit to be issued by the Building Official, as required hereby, shall file an application therefore in writing on a form furnished by the Building Official for that purpose. Each such application shall describe the land on which the proposed work is to be done, by legal description and address; shall show the use or occupancies of the building; shall be accompanied by plans and specifications as required hereafter; shall state the value of the proposed work; shall give such other information as reasonably may be required by the Building Official; and shall be signed by the permittee or his authorized agent, who may be required to submit evidence to indicate such authority.

**302.1 QUALIFICATION OF APPLICANT:** Application for permits will be accepted only from contractors currently licensed in their respective fields and for whom no revocation or suspension of license is pending; and from owner-builders as established in Chapter 30613, Laws of Florida, Acts of 1955.

**302.2 PLANS AND SPECIFICATIONS** (a) Each application for a permit shall be accompanied by two sets of plans and specifications when required by the Building Official.

(b) For buildings and/or structures, alterations, repairs or improvements, replacements and additions, costing ten thousand (\$10,000) dollars\* or over, not to include carport, utility or garage, as specified herein, the plans and specifications shall be prepared and approved by, and each sheet shall bear the impress seal of an Architect or Professional Engineer, either of whom must be duly registered in the State of Florida; provided that for any work involving structural design, the Building Official may require that plans be prepared by and bear the seal of a registered Professional Engineer, regardless of the cost of such work.

(c) Plans for work which is preponderantly of architectural nature shall be prepared by and bear the seal of a registered Architect, and such work which involves extensive computation based on structural stresses shall, in addition, bear the seal of a registered Professional Engineer.

Plans for work in which definite mechanical or electrical problems are involved shall, at the discretion of the Building Official, be prepared by and bear the seal of a registered Professional Engineer.

(d) Plans for work which are preponderantly of a structural nature shall be prepared by and bear the seal of a registered Professional Engineer.

(e) Plans shall be mechanically reproduced prints on substantial paper or cloth with the main details drawn to scale of not less than one-fourth inch equals one foot, and showing completely all foundations, wall sections, floor plans, roof plans, elevations and details, together with the use or occupancy of all parts of the building, a plot plan showing all occupied and unoccupied portions of the lot or lots, and complete structural, mechanical, plumbing and electrical plans, and such other reasonable information as may be required to clearly show the nature, character and location of the proposed work. Computations, stress diagrams, shop drawings, results of site tests, floor plans of existing buildings to which additions are proposed and other data necessary to show compliance with this Code, the correctness of the plans and the sufficiency of structural and mechanical design shall be included when required by the Building Official. Any specifications in which general expressions are used to the effect that "work shall be done in accordance with the Building Code" or "to the satisfaction of the Building Official" shall be deemed imperfect and incomplete, and every reference to this Code shall be by section or subsection number applicable to the materials to be used, or to the methods of construction proposed. Plans shall be adequately identified.

(f) Application for permit for new construction and addition shall be accompanied by a registered land surveyor's certificate and plan in duplicate on which shall be clearly indicated the property-corner stakes, property-line dimensions, existing structures and their location, existing right-of-way, sidewalks, easements, street zoning and property zoning of record, critical elevations and building setbacks required by law, general block plan and other pertinent survey data which may be required. The Building Offi-

cial may waive the requirements for such survey when property-line stakes are existing and known to be in place, and the work involved is minor and/or is clearly within building lines.

(g) The Building Official may authorize the issuance of a permit without plans and specifications for small or unimportant work, but in no instance where the work is of a structural nature.

**302.3. PRECONTRACT EXAMINATION OF PLANS:** When proposed construction is of such nature as to require the plans to be prepared by and bear the seal of a registered Architect or registered Professional Engineer, preliminary plans should be submitted to the Building Official by the designer before a contract for the proposed work is entered into by the owner. It is the duty of the Building Official to cooperate with owners, designers and contractors to provide precontract examination of plans and specifications, to insure the sufficiency and Code compliance of such plans before final contracts for construction are made. Application for permit may not be required for such examination.

**302.4 EXAMINATION OF PLANS:** The Building Official shall examine all plans and applications for permits and amendments thereto. Plans and applications shall be examined in the order received, except that plans previously given precontract examination shall be examined first. If the applications or the plans do not conform to the requirements of all pertinent laws, the Building Official shall reject such applications in writing, stating the reasons therefor. Plans which are rejected, as stated hereinabove, may be returned for correction of the tracings. Penciled notations on such plans may be accepted for only minor corrections. Plans thus corrected and resubmitted shall be treated as plans having been previously given precontract examination. If the application, plans and specifications, upon examination, are found to comply with the requirements of this Code, the plans shall be signed and stamped "APPROVED."

**302.5 PARTIAL APPROVAL:** Pending the completion of checking of plans and specifications, the Building Official, at his discretion, and upon payment of the total required fee, may authorize the issuance of a temporary permit for site preparation, excavation and construction below grade, but the holder of such temporary permit shall proceed only at his own risk and without assurance that a permit for the superstructure will be granted.

**302.6 MOVING OF BUILDINGS AND STRUCTURES:** (a) Before a building permit for moving a building or structure within or into the jurisdiction adopting this Code shall be approved or issued, such building or structure shall be inspected by the Building Official; upon request of the owner or his agent, and the Building Official shall ascertain that this Code and all other laws or ordinances applicable thereto shall be satisfied.

(b) Application for permit shall be submitted in such form as the Building Official may prescribe and shall be accompanied by such plans or other data as, in the opinion of the Building Official, is necessary to show compliance with the Code or the zoning regulations, specifically including the following:

- (1) Pre-Moving inspection fee
  - (2) Official certificate of property ownership, tax, and lien status of present building location.
  - (3) Releases of lien holders (if any) on building to be moved.
  - (4) Route plan.
  - (5) Clearance from utility companies when loaded height of moving operation is 18 feet or more.
  - (6) Copy of building bill of sale.
  - (7) Plot plan of proposed location of building with continuous foundations, stem walls and anchorage plan as required in Section 2405.2(B) 'Exception'.
  - (8) Pictures of building at present location, and of proposed location showing adjacent development.
  - (9) Public and private property damage bond or moving company must possess sufficient insurance coverage performance bond to assure the suitable remodeling and repairing of moved building.
- (c) A written notice shall be submitted to the owners of property within 300 feet of the proposed location of building to be moved.
- (d) Where application is made by party other than the record title holder of the property, the application shall be supported by a certificate showing that the owner of the property joins in the application for the Permit.

15,000 To 20,000 - \$46.00

+ \$1.00 per 1000' For Each Additional Thousand

## Roof Permit

1000' = 8.00

+ \$1 per 1000' For Each Additional Thousand



(e) The application shall be referred to the Board of County Commissioners. If approved by the Board, the Building Official may proceed to issue the permit, subject to any requirements of the Board, all such requirements must be completed within 90 days after approval by the Board.

**302.7 DEMOLITION:** Application for building permits for the work of demolition of building or structures, if such building or structure is over 12 feet in extreme height above grade or any wall of which is over 40 feet in horizontal length shall be accepted from only demolition contractors or general contractors holding current licenses as such, and for which a certificate of insurance covering the work of demolition is filed with the Building Official.

### **303 PERMIT FEES**

Any person desiring a permit to be issued shall, in addition to filing an application therefor and before such permit is issued, pay a permit fee as required.

**303.2 BASIS OF PERMIT FEE:** The Building Official may require an estimate of cost and/or other descriptive data as a basis for determining the permit fee.

**303.3 EXTRA FEE:** When work for which a permit is required is started before the required permit is obtained, a fee, in addition to other required permit fees, will be charged for inspection and investigation to determine that work already accomplished is in compliance with this Code.

**303.4 APPROVED PLANS:** (a) The Building Official shall retain one set of the approved plans and the other set shall be kept at the building site, open to inspection of the Building Official at all reasonable times. The Building Official may stop the work if such plans are not available at the building site.

(b) Approved plans and/or amendments thereto retained by the Building Official shall become a part of the public record, provided, however, that they be considered instruments of service and confidential records of their author, that they shall be open to the public only for inspection, that the Building Official may permit bona fide owners or designers, employed by such owners to inspect the plans when not available from their author or the Building Official may permit the plans to be copied by the owner in event of the author's death or inability of the author to supply copies.

### **304 CONDITIONS OF PERMIT**

**304.1 PERMIT CARD:** Upon approval of plans, specifications and application for permit and the payment of the required fee, the Building Official shall issue a permit therefor. With each such permit, the Building Official shall issue a weatherproof permit card which shall bear the description of the property, the nature of the work being done, the name of the owner and contractor and other pertinent information; and such card shall be maintained in a conspicuous place on the front of the premises affected thereby during the entire time that the work authorized by the permit is in progress.

The Building Official may, whenever there is a delay in approval of plans or other similar special circumstances, permit the placing, on the site, of tool sheds, materials, batterboards and construction equipment, preliminary to actual construction, or may permit, exploratory uncovering of concealed structural elements of existing buildings for design information, pending completion of plans for proposed alterations.

**304.2 COMPLIANCE WITH CODE:** The issuance or granting of a permit shall not be deemed or construed to be a permit

for, or an approval of, any violation of this Code. No permit presuming to give authority to violate or cancel any of the provisions of this Code shall be valid because the use or work which it authorizes is unlawful.

The issuance of a permit, upon plans and specifications, shall not prevent the Building Official from thereafter requiring the correction of errors in such plans and specifications, or from preventing building operations being carried on thereunder, when in violation of this Code or of any other regulations applicable thereto.

**304.3 TIME LIMITATION:** (a) Every permit issued by the Building Official under the provisions of this section shall expire by limitation and become null and void if the work authorized by such permit is not commenced within 90 days from the date of such permit or if work authorized by such permit is suspended or abandoned at any time, after the work is commenced, for a period of 90 days. Work shall not be deemed to have started, or shall be deemed to have been suspended, when such work is being done intermittently.

(b) Before work, for which the permit has, for any reason, become void, may be subsequently commenced or recommenced, a new permit shall first be obtained. A voided permit may be renewed, for a pro-rated amount of the original fee, provided the proposed work conforms with all requirements, ordinances, rules and regulations effective at the time of such renewal.

**304.4 REVOCATION OF PERMIT:** (a) The Building Official may revoke a permit or approval issued under the provisions of this Code in case of any false statement or misrepresentation of fact in the application or on the plans on which the permit or approval was based.

(b) Whenever the work for which a permit has been issued is not being performed in conformity with plans, specifications or descriptions, or approved plans are not being kept at the site, it shall be the duty of the Building Official to notify the contractor or owner or their agent, in writing, that the permit is suspended. Written notice shall be mailed or given to the permit holder or his agent, and it shall be unlawful for any person or persons to perform any work in or about the building or structure except such work as may be required for the correction of the expressed violations. And if, in the judgment of the Building Official, there is imminent danger that requires immediate action, the permit may be revoked or suspended verbally and written notice served later.

(c) When a permit has been suspended it shall not be reinstated until all existing violations have been corrected. Written notice of reinstatement shall be given the permit holder if requested.

### 305 INSPECTION

**305.1 GENERAL:** (a) When deemed necessary, the Building Official shall examine or cause to be examined all buildings and structures for which an application has been received for permit to enlarge, alter, repair, move, demolish or change the occupancy thereof. He shall inspect all buildings and structures from time to time during and upon completion of the work for which a permit was issued. He shall make a record of every such examination and inspection and of all violations of this Code, and the correction or disposition of such violations.

(b) The Building Official shall have authority to appeal to the Board of Rules and Appeals, as set forth in Section 203, such product approval to manufacturers and fabricators when it is determined the products supplied or method of installation do not comply with the requirements of this Code.





(c) The Building Official shall make the inspections called for by these requirements or he may accept reports of inspectors or recognized qualifications for special inspections; except that no certificate called for by any provisions of this Code shall be based on such reports unless the same are in writing and certified.

(d) The Building Official shall periodically, and as nearly as practicable once each year, inspect all buildings and structures, except buildings having only Group I occupancies and public-work structures, for compliance with this Code.

(e) No inspection shall be made until sanitary facilities have been provided, as required in Chapter 33 and set forth in Sub-section 4603.20.

(f) When the services and reports of testing laboratories are required by this Code, only such services and reports shall be accepted as are submitted from impartial testing laboratories having a registered engineer with training and experience in the techniques of testing in active responsible charge of the work of sampling and testing. Testing laboratories located outside of this State and under the supervision of a registered Engineer legally qualified to practice engineering in his own State, maybe permitted to submit reports as required by this Code.

**305.2 MANDATORY INSPECTIONSE** (a) The Building Official, upon notification from the permit holder or his agent, shall make the following inspections and shall either approve that portion of the work completed or shall notify the permit holder or his agent wherein the same fails to comply:

**Foundation Inspection:** To be made after necessary excavations have been made, forms erected and reinforcing steel placed.

**Pile InspectionE** To be made during the driving of the piles and after all piles are driven and forms and reinforcing steel are in place and tied, and before placing any concrete.

**Reinforcing InspectionE** To be made after any reinforcing steel is in place and before placing concrete.

**Frame InspectionE** To be made at each floor level and after all framing, fire blocking, furring and bracing are in place, and plumbing and electrical work are roughed in.

**Roofing Inspection:** To be made after anchor sheet or sheets have been tincapped and before cap sheet is mopped on. (See Chapter 34)

**Lathing InspectionE** To be made after lathing and before plastering, where plastering is a requirement for fire protection, or where suspended overhead.

**Plumbing Inspection:** To be made of the ground work and at each floor. All plumbing work shall be left uncovered and convenient for examination until inspected and approved. Floors shall be left up in all bathrooms and elsewhere above all sanitary plumbing, water-supply and gas-supply piping and other plumbing work until it shall have been examined, tested and approved.

**Electrical InspectionE** To be made at each floor level; and no conduit, boxes, panels or other electrical appurtenances shall be covered or concealed until approval shall have been received from the Building Official.

**Special Inspections:** To be made of all mechanical installations, signs and awnings immediately upon completion and at such intervals during the progress of the work as the Building Official or this Code may require.

**Other Inspections:** To be made as the owner or contractor or Building Official may reasonably request.

**Final Inspection:** To be made after the work is completed and the structure ready for use or occupancy.

(b) No work shall be done on any part of a building or structure or any plumbing, electrical or mechanical installation beyond the point indicated hereinabove for each successive inspection until such inspection has been made and the work approved and the inspector has so indicated on the approved plans or permit card at the job site.

(c) No reinforcing steel or structural framework of any part of any building or structure shall be covered or concealed in any manner whatsoever without the approval of the Building Official.

(d) Inspection requests shall be made to the office of the Building Official and shall provide reasonable time for such inspection to be made. Rejection or refusal to approve the work for reasons of incompleteness, Code violation or inadequacy shall nullify that request for inspection. The work shall be made to comply and the request for inspection repeated as outlined herein. It shall be assumed that the responsible individual or individuals in charge of the work shall have themselves inspected the work and found it to be in compliance with Code requirements before request for inspection is made.

**305.3 SPECIAL INSPECTOR:** (a) On new buildings or additions of Type I Construction, on all major structural welding, on major structural alterations, on concrete work where the design is based on f'c in excess of 2500 pounds per square inch, on buildings of area greater than 20,000 square feet, on buildings more than two stories in height, and on buildings and structures of unusual design or methods of construction, the Building Official may require the owner to employ a special inspector for the inspection of the structural framework, and such special inspector shall be present at all times that work is in progress on the structural frame. The Building Official may require a special inspector on pile driving.

(b) Such special inspector shall be a registered Professional Engineer or his accredited employee who shall be responsible for the control of the materials and methods of construction. He shall be responsible for compliance with this Code and shall submit weekly progress reports of daily inspections to the Building Official.

(c) At the completion of the construction work or project, the special inspector shall submit a certificate of compliance to the Building Official, stating that the work was done in compliance with this Code and in accordance with the approved plan or plans and his duties shall end with the submission of such certificate. Final inspection shall be made by the Building Official before a Certificate of Occupancy is issued.

**305.4 INSPECTION REPORTS:** The Building Official shall keep records of inspections, Certificates of Compliance, results of tests, plans, surveys and Certificates of Occupancy for a period of not less than seven years. Such records shall become a part of the public records and open to public inspection, except as may be elsewhere specifically stipulated.

**305.5 SPECIAL HURRICANE INSPECTIONS:** (a) During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, all furniture, display racks, material and similar loose objects in exposed outdoor locations,

shall be lashed to rigid construction or stored in buildings. Orders shall be oral or written and shall be given to any person on the premises most logically responsible for maintenance and such orders shall be carried out before winds of hurricane velocity are anticipated.

(b) After winds of hurricane velocity are experienced and have subsided, the Building Official shall investigate to determine if damage has occurred to buildings or other structures.

(c) No building or other structure or assembly or part thereof, which was damaged or collapsed or out of plumb or line shall be repaired or altered or otherwise returned to its original position without inspection and approval by the Building Official.

### **306 CLEANUP OF SITE**

Upon completion of the proposed work, the permit holder shall leave the site cleared of rubbish, debris, construction sheds or materials of construction. In the event there has been damage to public property or that rubbish, debris, construction sheds or materials of construction have been left at the site, then the Building Official shall refuse to make final inspection and shall notify the permit holder to correct the condition of violation within five days.

### **307 CERTIFICATE OF OCCUPANCY**

**307.1 WHEN REQUIRED:** No building hereafter erected, altered or enlarged, nor existing building involving a change of Occupancy shall be used or occupied in whole or in part until a Certificate of Occupancy shall have been issued by the Building Official, certifying that the building and Occupancy are in accordance with the provisions of this Code and all other ordinances and laws applicable theretoe except that any use or occupancy which has not been discontinued during the work of alteration or enlargement shall be discontinued within 30 days after the completion of the work unless the required certificate is secured from the Building Official. If the building or part thereof complies with the provisions of all pertinent laws and regulations, the Building Official shall issue the Certificate of Occupancy. A Certificate of Occupancy for places of assembly shall indicate thereon and make record of the number of persons for which such certificate is issued.

**307.2 EXISTING BUILDINGS:** If an occupancy which does not comply with the requirements of this Code has existed prior to the adoption of this Code, the Building Official shall issue a Certificate of Occupancy therefor, unless the building and use, in his opinion, constitute a serious hazard to life, limb or property. If an application for a Certificate of Occupancy is not approved, such occupancy shall not be started or shall be discontinued.

**307.3 REVOCATION** The Building Official shall have the authority to revoke a Certificate of Occupancy for any building which is occupied, in whole or in part, for any use not authorized or which is changed in Occupancy to a classification where such Occupancy does not comply with this Code, or for any building where the live loads imposed on any floor or the number of persons permitted to assemble therein or thereon exceed those authorized in said Certificate.

**307.4 TEMPORARY OCCUPANCY:** A temporary Certificate of Occupancy may be issued by the Building Official for the temporary use of a portion of a building, prior to the completion of the entire building.

**307.5 CONNECTION OF SERVICES:** It shall be unlawful for any public-service corporation or agency to begin service to a building, except temporary service for use during building operations and for testing purposes, until a Certificate of Occupancy has been issued and/or notice posted on the premises.



## PART II — DEFINITIONS

### Chapter 4 — Definitions

Unless otherwise expressly stated, all words other than herein defined shall have the meanings implied by their context in this Code or their ordinarily-accepted meanings in the construction industry; words used in the present tense shall include the future; words in the masculine gender shall include the feminine and neuter; the singular number shall include the plural and the plural number shall include the singular.

**ACCESSIBLE:** Reasonable and adequate clearance on sides and above for inspection, service, repair and replacement, without removing permanent construction; or visible, unobstructed and within physical reach.

**ACCESSORY USE:** A building or structure, the use of which is incidental to the main building or structure, and is located on the same lot, or on a contiguous lot fronting on the same street as the lot or lots on which the main building is located and the use of which is manifestly incidental to that of the main building.

**ADDITION:** An extension or increase in floor area or height of a building.

**ALLEY:** Any public space, public park or thoroughfare, 20 feet or less, but not less than ten feet in width, which has been dedicated or deeded to public use.

**ALTERATION:** Any change or modification of construction, space arrangement and/or occupancy of a building, or decreasing or not increasing the area or cubic contents thereof.

**APARTMENT:** One or more rooms occupied as a home or residence for an individual or a family or a household. The existence of, or the installation of, sink accommodations and/or cooking facilities within a room or suite of rooms shall be deemed sufficient to classify such room or suite of rooms as an apartment. The floor area of an apartment shall be not less than required by applicable Zoning Regulations.

**APARTMENT HOTEL:** A building, usually under resident supervision, made up of three or more apartment units, arranged with common corridors and exits and maintaining an inner lobby or foyer, through which persons pass for access to the apartments.

**APARTMENT HOUSE:** A Building made up of three or more apartment units so arranged that each unit has direct access, without common corridors, to a means of egress from the building, and which may or may not maintain an inner lobby for its tenants.

**APPOINTING AUTHORITY:** The legally constituted body adopting this code such as, but not limited to, a county or city commission or council; or a person designated by such legally constituted body as having authority to appoint.

**APPROVED:** Approved by the Building Official or other authority given jurisdiction by this Code.

**ARCADE:** Is an avenue or passageway, roofed over and enclosed except at the ends and serving as a common entrance and exit for shops, stores and similar places of business located thereon.

**AREA:** As applied to the dimensions of a building, means the horizontal projected area of the building at grade.

**AREAWAY:** Is an open, subsurface space, adjacent to a building for access to, or for light or ventilating basements.

**ASSEMBLY BUILDING:** A building used in whole or in part, for the gathering together of persons for such purposes as deliberation, worship, entertainment, amusement or awaiting transportation.

**ATTIC:** Shall be taken to mean any space immediately under the roof rafters and above the ceiling joists of the story nearest to the roof.

**AUTOMATIC:** Applied to a door, window or other opening protective or protective device, means that such protective is so constructed and arranged that when actuated by a predetermined temperature or rate of rise in temperature, such opening protective will close if open, or such protective device will operate as intended. Not requiring manual operation.

**AWNING:** (See Chapters 43 and 44 herein.)

**BALCONYE** That portion of a seating space of an assembly room, the lowest part of which is raised four feet or more above the level of the main floor. An open exterior path of egress overhanging an exterior wall.

**BASEMENT:** A level of a building, the floor of which is two feet or more below grade and the ceiling of which is not more than four feet and six inches above grade.

**BAY WINDOW:** Is a rectangular, curved or polygonal window supported on a foundation extending beyond the main walls of a building.

**BRICK:** A solid masonry unit not larger than 16x4x8 inches.

**BUILDING** A structure which encloses space; a structure which gives protection or shelter for any occupancy. The term "building" shall be construed as if followed by the phrase "or part thereof." When separated by fire walls, each portion so separated shall be deemed a separate building.

**BUILDING LINE** The line established by law, beyond which a building shall not extend, except as specifically provided herein.

**BUILDING OFFICIALE** Shall mean the Chief Building Official or any regularly-authorized assistants such as, but not limited to, the Chief Zoning Inspector, Chief Plumbing Inspector, and Chief Electrical Inspector.

**BULKHEAD:** (a) That portion of the exterior walls of a building which is located immediately under show-windows.

(b) A structure above the roof of any building, enclosing a stairway, tank, elevator machinery or ventilating apparatus, or such part of a shaft as extends above a roof.

(c) A retaining type structure.

**BUNGALOW COURTS:** A group of three or more detached, one-story, single-family dwellings, arranged with common utilities and accessories under a common ownership.

**CABANAS:** Shall mean bath cabins, together with only such accessories as boardwalks, terraces, sun decks, rubbing rooms and toilet rooms.

**CANOPY:** (See Chapters 43 and 44 herein.)

**CARPORTEE** A covered area for sheltering a motor vehicle and which is not more than 75 percent enclosed by walls.

**CELLAR:** That portion of a building between floor and ceiling which is wholly or partly below grade and so located that the vertical distance from grade to floor below is equal to or greater than the vertical distance from grade to ceiling.

**COMBUSTIBLEE** Capable of igniting and continuing to burn

or glow with a flame at or below a temperature of 1200 degrees Fahrenheit.

**CORRIDOR:** A path of egress connecting more than one room or occupied space on any one floor; a hallway.

**COURT:** Is an open, unoccupied space, bounded on two or more sides by the walls of the building. An inner court is a court entirely within the exterior walls of a building. All other courts are outer courts.

**DEAD LOAD:** The weight of the structure and all permanent parts incorporated into the construction thereof.

**DINING ROOM:** Any building or part thereof, or any room or part thereof, in which food is dispensed or served.

**DORMITORY:** Shall mean a room having separate sleeping accommodations for more than four persons and used as an accessory to Group "D", "C", "H", and "I" occupancies.

**DWELLING:** A building occupied exclusively for residential purposes and serving not more than two housekeeping units used for cooking, living, or sleeping purposes.

**ELEVATOR:** A device used for carrying persons or things upward or downward.

**ESCALATOR:** A moving, inclined stairway for passengers.

**EGRESS:** A means of egress.

**FAMILY:** Is any number of persons living together under one head as a single housekeeping unit, whether related to each other legally or not; and shall be deemed to include servants, but shall not include paying guests.

**FIRE-DIVISION:** A portion of a building so separated from the rest by fire-walls that it may be erected to the maximum height and area allowed for the governing Occupancy and the Type of Construction, independently of adjoining Occupancies or Types of Construction.

**FIRE DOOR:** A door and its assembly so constructed and placed as to give protection against the passage of fire.

**FIRE ESCAPES:** A single or series of steel framed balconies attached to the exterior walls at windows or doors and connected to each other and to the ground by flights or steel stairs.

**FIRE-RESISTIVE:** Ability to resist fire and prevent its spread as regulated in this Code.

**FIRE-RESISTANCE RATING:** The time in hours that a material or construction will withstand a standard fire exposure as defined in this Code and its adopted standards.

**FLAMEPROOF:** The property of a material, usually decorative fabric, whether treated or not treated to not burst into flames or support combustion when subjected to flame for a period of 30 seconds.

**FLOOR AREA:** Is the gross floor area on any one floor included within exterior walls or within exterior walls and fire walls of a building. In theatres, assembly halls and similar occupancies, balconies, galleries and stages shall be considered as adding to the floor area. Mezzanine floors which are not enclosed as required for vertical openings under Types of Construction in Part III, shall be considered as adding to the floor area. The upper floors of residential-type apartments shall be considered as adding to the floor area of a unit, but not to the total area of that floor.

**FOYER:** Is an area or space within a building and located between a lobby and main entrance and the main floor.

**GALLERY:** Is that portion of the seating capacity of a theatre or assembly room having a seating capacity of more than ten persons and located above a balcony.

**GARAGE:** A building, shed or enclosure, or part thereof, in which a motor vehicle containing a flammable liquid in its fuel tank is housed or stored or repaired.

**GRADE:** (a) The elevation of the public sidewalk at the center of the wall, or the average elevations of the public sidewalks where the property abuts on more than one street, or the average level of the proposed ground surface at the center of walls which do not abut on, or are more than 15 feet from, a public sidewalk. In the absence of sidewalks or proposed sidewalks, the elevation of the center of the public street shall be used.

(b) When used in connection with lumber, means a division of sawn lumber into quality classes with respect to its physical and mechanical properties, as defined by the association under whose rules the lumber is controlled.

**GROUND FLOORE** Is a floor located not more than two feet below, nor more than six feet above "grade."

**GUEST:** (a) In connection with multiple-family occupancies means a person hiring a room for living and/or sleeping purposes.

(b) In connection with single-family and two-family occupancies means a person sharing single-family accommodations without profit on those accommodations.

**GUEST HOUSEE** (a) As a part of multiple-family occupancies means a detached single-family dwelling occupied or intended to be occupied for hire.

(b) As a part of a single-family and two-family occupancies means a detached portion which provides rooms and necessary appurtenances for the sleeping accommodation and/or entertainment of non-paying guests and their servants; but not provided with means for the general and regular serving of meals.

**GUEST ROOM:** (a) In connection with multiple-family occupancies means a room in a building, occupied or intended to be occupied for hire.

(b) In connection with single-family and two-family occupancies means a room in the main or an accessory building occupied or intended to be occupied by non-paying guests.

**HABITABLE ROOM:** A room in a residential unit used for living, sleeping, eating or cooking, but excluding baths, toilets, storage spaces or corridors.

**HEIGHT, BUILDING:** The vertical distance from grade to the highest finished roof surface of a flat roof or to the average level of a gable, hip or roof.

**HEIGHT, STORYE** The vertical distance from top to top of two successive floors or floor and roof.

**HEIGHT, STRUCTUREE** The height of a structure erected on the ground shall be the vertical distance from grade to the highest point thereof, and for roof structure shall be the vertical distance from the mean level of the roof to the highest point of such structure. In general, the height of a structure shall be its overall height.

**HOTELE** Is any building containing ten or more rooms, intended or designed to be used or which are used, rented or hired out to be occupied, or which are occupied by persons for sleeping purposes by paying guests.

**INCOMBUSTIBLE** Is a material which will not ignite nor support combustion in a surrounding temperature of 1200° F during the exposure of not more than one cubic inch for five minutes in a muffle furnace.

**JOISTS:** Are secondary horizontal supporting members in floor, ceiling or roof construction.

**JURISDICTION:** Shall mean the legally-constituted authority which has adopted this Code as law or ordinance.

**LINTEL:** The beam or girder placed over an opening in a wall which supports the construction above.

**LIVE LOADE** Any load imposed, or capable of being imposed, on a structure other than dead load or wind load.

**LOBBY:** Is an enclosed vestibule, directly accessible from the main entrance.

**LODGING HOUSE** Is any building containing less than ten rooms, intended or designed to be used or which are used, rented or hired out, or which are occupied for sleeping purposes by two or more paying guests.

**LOT:** A portion or parcel of land considered as a unit.

**LOT LINE** A line dividing one lot from another or from a street or other public space.

**MARQUEE** A cantilevered or otherwise supported projection from a major building constructed to be, or appear to be, an integral part thereof by being of similar material and intended for the weather protection of the main entrance and extending on each side of the opening a distance not greater than the projection from the building. An appurtenance erected for the principal purpose of a display sign and constructed of light-gage metals is not classified as a marquee.

**MASONRY** Brick, stone, plain concrete, hollow block, solid block or other similar materials or units bonded together with mortar. Reinforced concrete is not classified as masonry.

**MEZZANINE** Is an intermediate floor placed in any story or room. When the total area of any such mezzanine floor exceeds 33½ percent of the total floor area in that room or story in which the mezzanine floor occurs, it shall be considered as constituting an additional story. The clear height above or below a mezzanine floor construction shall be not less than seven feet.

**MULTIPLE-FAMILY** As in a building, meaning more than two families or households living independently of each other and doing cooking within their living quarters; includes apartments, tenements and flats.

**NOMINAL DIMENSION:** The dimension or size in which such material, part or unit is usually manufactured or supplied.

**NONCONFORMING:** Shall apply to any building or structure which does not comply with the requirements set forth in this Code, or amendments thereto.

**OCCUPANCY:** As used in this Code, pertains to and is the purpose for which a building is used or intended to be used. Occupancy is not intended to include tenancy or proprietorship.

**OCCUPIED:** Shall be construed as though followed by the words, "or intended, arranged, or designed to be occupied."

**ORIEL WINDOW:** Is one that projects from the main line of an enclosing wall of a building and is carried on brackets or corbels.

**OWNER:** The term shall include his duly authorized agent, a

purchaser, devisee, fiduciary, property holder or any other person, firm or corporation having a vested or contingent interest, or in case of leased premises, the legal holder of the lease contract, or his legal representative, assign or successor.

**PARAPET:** That part of a wall entirely above the roof line.

**PARKING GARAGE:** Parking garages for passenger vehicles involving only the parking or storing of automobiles and not including automobile repair or service work or the sale of gasoline or oil.

**PARTITION:** A non-load bearing vertical separation between rooms or spaces. If such separating construction closes less than three-fourths of the area from wall to wall and floor to ceiling, it shall be considered a decorative separation and not a partition.

**PATH OF EGRESS:** The course taken by an occupant to effect exit to a public space.

**PENTHOUSE:** An enclosed roof structure extending not more than 12 feet above the roof of a building and covering not more than 25 percent of the area. A penthouse shall not be construed as a story.

**PERMIT:** A written authorization by the Building Official to proceed with construction, alteration, repair, installation or demolition.

**PERSON:** Includes individual, co-partnership and corporation.

**PLATFORM:** A portion of an assembly room which may be raised above the level of the assembly floor and which may be separated from the assembly space by a wall and proscenium opening provided the ceiling above the platform shall be not more than five feet above the proscenium opening.

**PORTE-COCHEREE:** Is a one-story porch under which vehicles may be driven for the purpose of providing shelter for either the vehicles or persons and which is open, full width, front and rear in the direction of vehicle travel, and open not less than 50 percent on the outer side.

**PREFABRICATED:** Fabricated prior to installation or erection.

**PRIMARY MEMBER:** Columns and beams, girders and trusses spaced more than four feet apart; or supporting load over spans exceeding 40 feet. Load bearing masonry walls and flat slabs supporting more than 160 square feet of floor or roof deck shall be considered primary members.

**PROFESSIONAL ENGINEER OR ARCHITECT:** A person technically qualified and professionally licensed by the State of Florida to practice engineering or architecture.

**PUBLIC SPACE:** For the purpose of determining allowable floor areas and/or exit arrangement of buildings, such open spaces as public parks, rights-of-way, waterways, public beaches and other permanently unobstructed yards or courts having access to a street, and a width of not less than set forth in the Chapter on Occupancy, may be considered a street.

**RAFTERS:** Are secondary inclined supporting members in roof construction.

**REMOTE:** As applied to exits shall mean that persons shall have alternate paths of egress from any point or space in a building, and such paths of egress shall be separated by distance, construction, assemblies, or arrangement.

**REQUIRED:** A mandatory provision of this Code.

**REPAIR:** The replacement of existing work with the same

kind of material for the purpose of its maintenance, but not including additional work that would affect structural, sanitary or fire resistive safety or exit facilities.

**RESTAURANTE** Every building or part thereof and all out-buildings used in connection therewith, or any place or location, kept, used, maintained as, advertised as, or held out to the public to be a place where meals, lunches or sandwiches are prepared and/or served, either gratuitously or for pay.

**ROOF JOISTS:** Where roof members are nearly horizontal and are supported from bearing to bearing without an intermediate ridge, such members shall be termed roof joists

**ROOFING** The covering applied to the roof for weather protection, fire resistance or appearance.

**ROOM** Every compartment in any building, including parlors, dining-rooms, sleeping rooms and porches, kitchens, offices, stores, sample-rooms, living-rooms, but not including halls, bath-rooms, closets, pantries or storage or equipment spaces.

**SEATING CAPACITY** Shall mean, where seats are fixed, the number of persons for whom seats are provided, and where seats are not fixed, or provided, shall be calculated on the basis of the areas given herein.

**SECONDARY MEMBER:** Beams or joists spaced not more than four feet apart or not spanning more than 40 feet.

**SELF-CLOSING:** As applied to a fire door or other opening protector, means normally closed and equipped with an approved device which will insure closing after having been opened for use.

**SERVANT'S QUARTERS:** (a) As accessory to multiple-family occupancies means accommodations for such number of servants and other employees as are required by the main occupancy and which accommodations may be detached and may or may not include separate cooking facilities.

(b) As accessory to single-family occupancies means accommodations for such number of servants in personal service and/or for the maintenance of the premises as could be reasonably required and which accommodations may be detached, but shall not have separate cooking facilities except in connection with properties which have a ground area of 10,000 or more square feet.

**SERVICE STATIONS:** A building or portion thereof where gasoline, oil and greases are supplied and dispensed to the motor vehicle trade, also where tire, battery, washing, polishing and lubrication services are rendered and minor adjustments are made.

**SHALL:** As used in this Code means mandatory.

**SHAFT** A vertical opening or passage through two or more floors of a building or through floors and roof.

**SPECIFICATIONS:** Wherever the specifications of governing authorities are mentioned in this Code, the reference shall be to the most recent editions of the specifications so mentioned in effect at the time of passage of this Code.

**SPRINKLERED:** Equipped with approved automatic sprinkler system properly maintained.

**STADIUM:** A structure providing seating for spectator events and which is not more than 50 percent enclosed by walls.

**STAGE** A partially enclosed portion of an assembly room wherein scenery drops or other effects may be installed and used, and which is cut off from the audience section by a proscenium wall, and where there is more than five feet of open space above and on the stage side of the proscenium opening.



**STAIRWAY:** One or more flights of steps and the necessary landings connecting them to form a continuous and uninterrupted passage from one story to another in a building.

**STORY:** Means that portion of a building included between the upper surface of any floor and the upper surface of the floor next above, including a mezzanine if it exceeds 33½ percent of the area of the floor immediately below, but not including a penthouse, except that the top-most story shall be that portion of a building included between the upper surface of the top-most floor and the ceiling or roof above. If the finished floor level directly above a basement is more than six feet above grade, such basement shall be considered as a story. In a residential type apartment in which the upper floor does not exceed two-thirds of the main floor, such upper shall not be considered as a story.

**STREET:** Any public thoroughfare such as, but not limited to, street, avenue, lane, place, terrace, and roof, and which is more than 20 feet in width and dedicated or deeded to the public for public use.

**STRUCTURE:** Is that which is built or constructed, or any piece of work artificially built up or composed of parts joined together in some definite manner, the use of which requires more or less permanent location on the ground, or which is attached to something having a permanent location on the ground. The term shall be construed as followed by the words "or part thereof."

**STRUCTURAL FRAME:** All the members of a building or structure required to transmit loads to the ground.

**TENANCY:** As used in Chapter 45, tenancy shall mean one or more occupants, i.e. tenants, lessees, owners, etc.

**THEATRE:** Is a building or part thereof which contains an auditorium having a stage which may be equipped with curtains and/or permanent stage scenery or mechanical equipment adaptable to the showing of plays, operas, performances, spectacles, and similar forms of entertainment, or is such building or portion thereof containing an auditorium having a platform, screen, and mechanical equipment adapted to the showing of motion pictures.

**VALUEE** Of a building shall be the estimated cost to replace the building in kind.

**WALLS:**

**Bearing:** A wall which supports any vertical load in addition to its own weight.

**Exterior:** Shall include any wall not protected from fire or wind pressure by enclosure.

**Faced Wall:** Is a wall in which masonry facing and backing are so bonded as to exert a common action under load.

**Fire Partition:** A partition for the purpose of restricting the spread of fire or to provide an area of refuge but not necessarily vertically continuous from floor to floor.

**Fire Wall:** A wall for the purpose of sub-dividing a building or separating buildings to restrict the spread of fire and which starts at the foundation and extends continuously through all stories to and above the roof, or to the roof if such slab is of concrete.

**Foundation:** Shall mean those exterior walls between the foundations and the first floor above grade, or any other walls below the first floor above grade which are in contact with or receive lateral earth pressure.

**Interior:** Is a wall entirely surrounded by the exterior walls of the building.

**Non-Bearing:** Is a wall which supports no load other than its own weight.

**Panel:** Is a non-bearing wall in skeleton construction built between columns and wholly supported at each story.

**Party:** A wall used or adapted for joint service between two buildings and hereby specifically prohibited if such buildings are separately owned.

**Retaining:** Is any wall used to resist lateral displacement of any material.

**Veneered:** Is a wall in which the veneering of brick, stone, concrete or tile is provided for the purpose of ornamentation, protection or insulation, but which is not bonded to the backing in such manner as to be counted on as adding strength to the wall.

**WATERWAY:** A channel of water not less than 50 feet wide and navigable by small boats. For the purpose of determining allowable floor areas, but not exit arrangement, of buildings, waterways shall be considered as streets.

**WINDERS:** Are any stairway steps which have variations in the width of the treads of more than three-fourths inches per one foot of stair width.

**WRITING:** The term includes printing, typewriting, or other forms of reproduction of legible symbols.

**YARDS:** Mean the open spaces required adjacent to lot lines, under the Zoning Regulations, for the control of the density of building; and such yards shall be unobstructed from the ground to the sky except as provided herein.

**ZONING** The reservation of certain specific areas within a community or city for buildings or structures for use of land for certain specified purposes with other limitations such as height, lot coverage and other stipulated requirements.



# **PART III — REQUIREMENTS BASED ON OCCUPANCY**

## **Chapter 5 — Classification and General Requirements**

<b>501</b>	<b>GENERAL REQUIREMENTS</b>
<b>502</b>	<b>OCCUPANCY CLASSIFIED</b>
<b>503</b>	<b>CHANGE IN USE</b>
<b>504</b>	<b>OCCUPANT CONTENTS</b>
<b>505</b>	<b>ADJOINING OCCUPANCY</b>
<b>506</b>	<b>FIRE DIVISIONS</b>
<b>507</b>	<b>PARTY WALLS</b>
<b>508</b>	<b>OCCUPANCY SEPARATIONS</b>
<b>509</b>	<b>HAZARDOUS UTILITIES</b>
<b>510</b>	<b>EXIT FACILITIES FOR MIXED OCCUPANCIES</b>
<b>511</b>	<b>LOCATIONS ON THE PROPERTY</b>
<b>512</b>	<b>SANITATION</b>
<b>513</b>	<b>CEILING HEIGHTS</b>
<b>514</b>	<b>ALLOWABLE AREA</b>
<b>515</b>	<b>FACILITIES FOR PHYSICALLY HANDICAPPED</b>

### **501 GENERAL REQUIREMENTS**

**501.1** The intent of this Code is that buildings shall be of the Type of Construction required for the occupancies contained therein.

**501.2** No building or structure shall be erected nor shall any lot or portion of a lot be subdivided or sold nor any lot line moved by sale of land or otherwise in such a manner as to eliminate, nullify or reduce any required spaces for light and ventilation or for exit purposes or in any way to create violations of any of the provisions of this code.

### **502 OCCUPANCY CLASSIFIED**

**502.1** Every building, or portion thereof, whether existing or hereafter erected, shall be classified by the Building Official according to its use or the character of its occupancy, as a building of Group A, B, C, D, E, F, G, H, I or J Occupancy, as defined in Chapters 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15, respectively.

Minor accessory buildings not exceeding 10 percent of the area of the ground floor of the primary building, nor 1500 square feet, whichever is larger, and constructed of unprotected incombustible materials may, where complying with sub-section 1701.6 herein, be constructed without changing the limiting areas based on Group of Occupancy classification.

**502.2** Any occupancy not specifically mentioned shall be classified by the Building Official in the Group it most nearly resembles.

**502.3** Unless otherwise classified, accessory buildings shall conform to the requirements of the Occupancy Group to which the building is accessory.

### **503 CHANGE IN USE**

**503.1** No change shall be made in the character of occupancy or use of any building which would place the building in a different Group of Occupancy, unless such building is made to comply with the requirements of this Code for that Group; except that the character of the occupancy of existing buildings may, subject to the approval of the Building Official, be changed and occupied for purposes in other groups without conforming to all the requirements of the Code for those groups, provided that the new or proposed use is not more hazardous, based on life and fire risk, than the existing use.

**503.2** No change in the character of occupancy of a building shall be made without a Certificate of Occupancy, as required in Section 307 of this Code.

**503.3** Buildings in existence at the time of the passage of this Code may have the existing use or occupancy continued, if such use or occupancy is legal at the time of passage of this Code, provided such continued use is not dangerous to life.

#### **504 OCCUPANT CONTENTS**

**504.1** The occupant content shall be computed as set forth in Section 3101.3.

#### **505 ADJOINING OCCUPANCY**

**505.1** Adjoining units of the same or different occupancies within a fire division shall be separated by a separation at least as fire-resistive as specified in Section 508; except that space within a unit of occupancy used for a purpose customarily incidental to that occupancy and under the same management and control shall not be considered a separate unit of occupancy, provided that Group E and I occupancies shall not be considered incidental to any other occupancy for this purpose.

**505.2** Two or more units of different Occupancies may be contained within a fire division, but all such units shall conform to the provisions of Chapters 6 through 15 for the most restricted of the Occupancies so contained.

#### **506 FIRE DIVISIONS**

**506.1** A fire division, whether occupying the whole or a part of a building, shall be limited as to Type of Construction, height, and area, as provided in Chapters 6 through 15 inclusive herein, according to its most restricted Occupancy.

**506.2** Adjoining fire divisions in a building shall be separated by fire walls at least as fire-resistive as specified for separation of Occupancies in Section 508, or as required for the exterior walls of the most restrictive Type of Construction so separated, and provided that no required fire wall shall be of less than two-hour fire-resistive construction.

**506.3** Two adjoining fire divisions may be of different types of construction, within the limits provided in Chapters 6 through 15 inclusive herein; except that no construction of a required Type shall be supported wholly or in part by construction of any lower Type.

Types of construction may be combined vertically within the allowed limit of height as specified for the least resistive of the Types so combined.

#### **507 PARTY WALLS**

Subject to the filing of a letter of permission to the Building Official from the owner of an existing building, the exterior walls thereof may be used as party walls when conforming to the following requirements

**507.1** Where the Type or Types of Construction used and/or combined floor areas of an existing and a proposed building are

such that a separation into fire divisions is required, such walls shall meet the requirements for fire walls under this Code.

**507.2** Where not required as a fire wall but used to separate occupancies, such wall shall conform with the requirements for separations of Occupancy under this Code.

**507.3** Such wall in all its parts shall conform to the engineering regulations of this Code or shall be made to conform therewith.

### 508 OCCUPANCY SEPARATIONS

Occupancy separations shall be provided between the various Groups and Divisions of Occupancies as specified herein and in Table No. 5-A, but shall be not less fire-resistive than required by the Type of Construction.

**TABLE No. 5-A REQUIRED OCCUPANCY SEPARATIONS, IN HOURS, IN BUILDINGS OF MIXED OCCUPANCY**

Group	B	C	D	E	F	G	H	I	J-1	J-3	J-4
A	2	2	3	4	3	3	2	2	2	2	2
B		0	3	4	3	3	2	2	2	2	2
C			0	4	3	3	2	2	2	2	2
D				4	3	3	2	2	2	2	2
E					2	2	4	4	2	4	4
F						2	2	2	2	2	2
G							1	1	2	2	2
H								1	2	2	2
I									*	2	1
J-1										2	2
J-3											2

\*See Sec. 1507.2

**508.1 FORM OF OCCUPANCY SEPARATION** Separations, as specified in this Chapter, may be vertical, horizontal or inclined, depending upon the relative position of the portions to be separated, and shall consist of a system of walls, partitions, floors or other construction of such materials and construction, so arranged as to provide a complete, secure and continuous fire break of the required fire-resistive rating between the portions of the building so separated.

**508.2 CLASSIFICATIONS OF OCCUPANCY SEPARATION:** Separations between Occupancies within a fire division and between fire divisions shall be classified, each classification designated by the number of hours of fire rating as follows hereafter.

(a) A four-hour fire-resistive separation shall be of not less than four-hour fire-resistive construction for vertical separations, and shall have no openings therein, and three-hour fire-resistive construction for horizontal or inclined construction with three-hour fire-resistive construction for enclosure of openings.

(b) A three-hour fire-resistive separation shall be of not less than three-hour fire-resistive construction for vertical separations and two-hour fire-resistive construction for horizontal or inclined separations.

All openings in walls forming vertical separation shall be protected on each side thereof by Class A fire doors normally kept closed. The total width of all openings in any three-hour fire-resistive separation wall in any one story shall not exceed 25 percent of the length of the wall in that story, and no single opening shall have an area greater than 120 square feet.

All openings in floors forming a three-hour fire-resistive separation shall be protected on each side thereof by Class A fire doors normally kept closed.

ration shall be protected by enclosures of not less than two-hour fire-resistive construction.

(c) A two-hour fire-resistive separation shall be of not less than two-hour fire-resistive construction for vertical, horizontal, and inclined separations.

All openings in vertical separations shall be protected by Class B fire doors equipped with self-closing devices. The total width of all openings in any two-hour fire-resistive occupancy separation wall in any one story shall not exceed 33-1/3 percent of the area of the wall in that story, and no single opening shall have an area greater than 200 square feet.

All openings in floors shall be protected by enclosures of not less than two-hour fire-resistive construction.

(d) A one-hour fire-resistive separation shall be of not less than one-hour fire-resistive construction.

All openings in vertical separation shall be protected with Class C fire doors equipped with self-closing devices; provided that where such openings do not exceed 25 square feet, a self-closing, tight-fitting, solid wood door not less than one and three-eighths inches thick may be substituted.

All openings in floors shall be protected by enclosures of not less than one-hour fire-resistive construction.

**508.3 DESIGN AND MATERIAL OF OCCUPANCY SEPARATION:** Walls which form separations between occupancies or between fire divisions shall also conform with the provisions of PART VI as they pertain to design and material.

#### **509 HAZARDOUS UTILITIES**

**509.1 GENERAL:** Individual feeders and shut-offs shall be provided for every separate fire division in every building.

**509.2 ELECTRIC:** Where electricity is served to separated fire divisions or occupancies, there shall be individual switches, properly designated. Switches together with the meter or meters shall be in an independent room not less than three feet by five feet by seven feet high, nor less than required to adequately house the necessary equipment, enclosed with one-hour fire-resistive construction. The floor of such room shall be ventilated by a louvered door. The room shall be so located as to be readily accessible from the exterior of the building.

Installation shall be as set forth in PART XI, ELECTRICAL.

**509.3 GAS:** Where gas is served to separated fire divisions or occupancies, there shall be individual valves, and valves and meters shall be located on the exterior of the building in a conspicuous and accessible place.

Installation shall be as set forth herein.

**509.4 OTHER:** Other utilities which may constitute hazards shall, in general, be governed by the provisions of this Section and shall be subject to such additional requirements as the Building Official may prescribe.

#### **510 EXIT FACILITIES FOR MIXED OCCUPANCIES**

**510.1** Where two or more Occupancies, having exit width based on different occupant contents, occur on the same floor and have common exits, the number of units required for each such occupancy shall be calculated separately, and the units of width combined and proportioned two or more exits as required by travel distance limitations of the most restricted Occupancy.

**510.2** Where two or more Occupancies, having exit width based on different occupant contents, occur on different floors of the same building, the combined width of exits at any floor, other than the first or ground floor, shall not be less than required for the occupant content of that floor.

### **511 LOCATION ON PROPERTY**

**511.1** The location of all buildings and/or structures shall conform to the provisions of the Zoning Ordinance.

**511.2** The location of all buildings and the protection of certain openings shall conform to the requirements of the Group of Occupancy in which such building is classified in this Code, according to the use or the character of the occupancy.

### **512 SANITATION**

**512.1 WASTE STORAGEE** Adequate permanent enclosures shall be provided for the storage of waste within the lines of the lot or lots occupied.

**512.2 TOILET ROOMS:** (a) Toilet facilities shall be provided on each floor for each sex using that floor and shall be located to be readily accessible except that in a building where the two lower levels, such as, a first floor and mezzanine or the first floor and second floor where there is no mezzanine, are occupied by a single tenancy and the toilet facilities are not for public use, the combined total toilet facilities required for these two levels may be located on either the first or second level. **EXCEPTION:** Toilet facilities for public use in Group A or B Occupancies, restaurants, bars, transportation terminals and similar locations shall be provided on each floor for each sex.

(b) Minimum toilet facilities shall be a toilet room having one water closet and one lavatory, which may serve both sexes but not more than nine persons.

(c) Water closets for public use shall be equipped with open-front seats and shall be separated from the rest of the room, and from each other, by stalls of impervious materials. Such stalls shall be equipped with self-closing doors and shall be open at the top and at least 12 inches from the floor for ventilation.

(d) The floors and walls of public toilet rooms, to a height of five feet, shall be tile or similar impervious materials.

(e) Toilet rooms connected to rooms where food is prepared, stored, or served to the public shall be separated therefrom by a vestibule with close-fitting doors. Such vestibules shall not be common to toilet rooms of both sexes.

(f) Toilet room connected to public rooms or passageways shall have a vestibule or shall otherwise be arranged or screened to insure decency and privacy.

(g) Public toilets shall bear signs plainly indicating for which sex and/or group such room is intended.

(h) Required facilities in public buildings shall be available to employees and the public without charge.

**512.3 SCREENINGE** Food storage and preparation rooms shall have outside openings screened with 18-mesh-wire screening. Screen doors shall be equipped with self-closing devices.

Public dining rooms, restaurants, tearooms and similar places for serving food to the public shall be completely screened with



18-mesh-wire screenings or such places may be equipped with a system of fans, so arranged as to effectively prevent the entrance of insects. This requirement for screening or installation of fans in public dining rooms shall not be construed to prevent the serving of food to the public in outdoor areas.

#### **513 CEILING HEIGHTS**

The minimum ceiling heights for areas of human occupancy in buildings of other than Group H and I Occupancy shall be not less than seven feet and two inches, clear vertical distance.

#### **514 ALLOWABLE AREA**

The allowable areas as set forth in chapters 6 through 15 herein may be increased or decreased by the percentage shown, each percentage to be applicable to the base figure and percentage may not be compounded.

#### **515 FACILITIES FOR PHYSICALLY HANDICAPPED**

Where buildings or facilities or parts thereof are to be designed to be accessible to, and usable by, the physically handicapped, the "American Standard Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped, ASA A117.1—of the American Standards Association" may be used as a guide and is accepted as a standard of good practice.

## **Chapter 6 — Requirements for Group A Occupancy**

### **601 GROUP A OCCUPANCY DEFINED**

### **602 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE**

### **603 LOCATION ON PROPERTY**

### **604 EXIT FACILITIES**

### **605 LIGHT AND VENTILATION**

### **606 ENCLOSURE OF VERTICAL OPENINGS**

### **607 STAGES AND PLATFORMS**

### **608 MOTION-PICTURE-MACHINE BOOTHS**

### **609 FIRE PROTECTION AND HAZARDS**

### **610 PLUMBING AND SANITATION**

### **611 EXCEPTIONS AND DEVIATIONS**

### **612 MIXED OCCUPANCY**

### **601 GROUP A OCCUPANCY DEFINED**

Group A Occupancy shall include assembly uses such as theatres, auditoriums, motion-picture houses, exhibition halls, skating rinks, gymnasiums, bowling alleys, pool rooms, armories, restaurants, churches, dance halls, club rooms, night clubs, meeting rooms, passenger rooms, recreation piers, sand similar uses having an occupant content of 1000 or more persons.

### **602 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE**

Buildings, or parts of buildings, classed in Group A because of use or occupancy shall be of Type I construction and shall not be limited as to occupant content, height or area.

### **603 LOCATION ON PROPERTY**

Buildings with Group A Occupancy shall front directly upon a public street or on a clear and permanently unobstructed yard or court not less than 30 feet in width and connected to such public street.

The main floor shall be located at or near grade.

Exterior walls shall have fire-resistance and opening protection determined by location on property, as set forth for the Type of Construction in Part V.

### **604 EXIT FACILITIES**

Exit facilities for Group A Occupancy shall be as set forth in this Section and in Chapter 31.

**604.1 OCCUPANT CONTENT:** The occupant content shall be taken as not less than one person for each 15 square feet of aggregate gross area of all floors or parts of the building used for assembly purposes including lobbies, corridors, dressing rooms, toilets and other commonly used connecting rooms and service areas used in conjunction with the assembly occupancy, and the occupant content of rooms or spaces of the following or similar uses shall be separately taken as not less than one person for the areas set forth as follows, without subtraction for aisles:

Seating spaces with fixed seats 7 square feet per person.

Seating spaces with movable seats 10 square feet per person.

Stock exchange, night clubs and restaurants 10 square feet per person.

Standing and waiting spaces 3 square feet per person.

Areas not subject to assembly occupancy such as the surface of swimming pools and bowling alleys or the baggage and freight rooms of passenger stations may be excluded or otherwise reasonably separately considered.

**604.2 WIDTH OF EXITS:** Every place of assembly and every individual room used as a place of assembly shall have exits sufficient to provide for the total capacity as follows

(a) Areas served by doors or horizontal exits leading to the outside of the building and not more than 21 inches above or below grade or where served by ramps as set forth in Section 3103, one 22-inch unit of exit width for each 100 persons or fraction thereof.

(b) Areas served by stairs or other type of exit not set forth in (a) above, one 22-inch unit of exit width for each 75 persons or fraction thereof. Minimum exit width shall be 44 inches.

**604.3 MAIN-FLOOR EXITS:** (a) **GENERAL:** Not less than one-half of the required main-floor exit widths shall be to a main entrance and exit, and the remainder shall be proportioned to side exits except that for Group A Occupancies not more than two-thirds of the required exit width shall lead through a single public lobby.

All required exits of Group A Occupancy shall serve no other occupancy.

Exits, not less in width than the full width of the aisles leading therein, shall be provided at the rear of the main-floor assembly, and such exits shall lead into a foyer or into a passageway to the street.

A ticket booth may be installed in the main entrance and exit, provided such booth does not decrease the required width.

There shall be not less than 2 remote exits from any Group A Occupancy.

(b) **MAIN ENTRANCE AND EXIT:** Changes in elevation from the public sidewalk to the back of the main-floor assembly or foyer shall be by ramps having a slope of not more than one in ten.

The most obvious and direct exit to the public street shall be unobstructed, and no ticket-collection stands or turnstiles shall be installed therein unless such stands are securely fastened to the floor and provide unobstructed width of two or more 22-inch units of exit width between stands.

(c) **FOYER:** In occupancies having a balcony or gallery, a foyer shall be provided between the main entrance and the assembly spaces, except that an open court or unenclosed canopy

may substitute for such foyer where ticket taking is not customary or where such substitute provides equal space separation and area between the ticket collection point and the main assembly. Where a foyer is provided, such foyer shall have a floor area of not less than one square foot for each person in such assembly spaces. Such foyer, if not abutting directly on a public street, shall have a straight and unobstructed passage to the public street not less in width than required for the main entrance and exit.

The width of the foyer at any point shall be not less than the combined width of aisles, stairways, and passageways exiting therethrough.

A foyer shall be separated from the assembly spaces and from other adjoining rooms by partitions having a fire-resistive rating of not less than two hours.

The foyer shall be at the level of the back of the auditorium.

(d) **WAITING SPACES:** Where persons are admitted to the building at times when seats are not available and are allowed to wait in a lobby or similar space, such lobby or waiting space shall not encroach on the required clear width of paths or egress. Such waiting spaces shall be separated from the required paths of egress by substantial, permanent partitions or by fixed, rigid railings not less than 42 inches high.

(e) **SIDE EXITS:** One half of the required main-floor exit widths shall be proportioned to side exits and when more than one side exit is required, shall be equally divided in full units of exit width to each side.

(1) The number of side exits shall be not less than required by distance limitations, and as set forth in the following table:

PERSONS	NUMBER OF SIDE EXITS
0 to 600	One
601 to 999	Two
1000 or more	Four

(2) Where two or less side exits are required, such exits shall be located at the front of the assembly space remote from main floor exits, and where four or more exits are required, the additional exits shall be proportionately spaced along the length of the side walls.

(3) Exits shall be so arranged that the maximum distance, as measured along the line of travel to the nearest floor exit from any point, shall not exceed 150 feet.

(4) Side exits shall be to public spaces, passageways or exit courts.

**604.4 BALCONY AND GALLERY EXITS:** (a) **BALCONIES:** Exits from balconies shall be as specified for main-floor exits except as follows:

(1) Balconies having an occupant content of less than 30 persons may be served by one 44-inch stair, and for 30 persons or more at least two exits shall be provided.

(2) Not less than one-half of the required exits shall be by enclosed stairways, or by open exterior stairways separated not less than 50 feet from the building line of any contiguous lot or any building on the same lot, leading directly to a public street or to an exit court or passageway to a public street.

(3) Stairways and dormitories from a balcony to a foyer need not be enclosed.

(b) **GALLERIES:** Exits from galleries located above the balcony shall be as required for balconies, except that stairways from the public foyer shall be enclosed and without entrance or exit to the main-floor auditorium or any balcony or other gallery, and not less than one-half of the required exits from a gallery shall be by means of smokeproof towers.

**604.5 OTHER EXIT REQUIREMENTS:** Stage exits shall be as specified in Section 607.

Motion picture booth exits shall be as specified in Section 608.

Any accessory room such as an office shall, if exceeding 400 square feet in area, be provided with two remotely located exit doors.

**604.6 BOXES:** Boxes and loges may be served by separate stairways or ramps not less than 36 inches wide, provided that any box having an occupant content of 30 persons or more shall have exits as required for a balcony.

**604.7 SEATING AND AISLES:** (a) **SEATING** Aisles shall be located so that there are not more than 14 seats in any row between aisles nor more than seven seats in any row extending from an aisle to a wall.

Permanent seats shall be securely fastened to the floor. Temporary or folding seats for assemblies of 500 or more persons where arranged to focus audience attention on a central point shall be fastened together in banks of six or more.

Seats in boxes or balconies, serving not more than ten persons, will not be required to be banked or fastened.

The spacing of rows of seats from back to back shall be not less than 33 inches, and there shall be a clear, unobstructed horizontal width of not less than 12 inches between the back of one seat and the front of the seat immediately behind.

(b)  **AISLES:** (1) No aisle having seats on both sides shall be less in width than 40 inches, and no aisle having seats on one side shall be less in width than 30 inches, nor shall any aisle have a width along the direction of exit travel toward the foyer or main entrance or exit of less than one 20-inch unit of width for each 150 seats served thereby.

(2) There shall be a cross aisle leading from the center aisle or aisles directly to each side exit as required in Paragraph 604.3 (e). Cross aisles shall be not less than 44 inches in width.

(3) Steps shall not be used in the main auditorium floor or in other aisles where differences of level can be overcome by ramps not exceeding one in five. Where steps are used in aisles, such steps shall have a rise of not more than seven and one-half inches, shall extend across the full width of aisles and shall be illuminated.

**604.8 EXIT DOORS:** All doors in paths of egress, normally closed and latched, shall be equipped with panic hardware.

No single door shall be more than three feet and four inches in width, and double doorways shall be not less than five feet wide.

**604.9 RAILINGS:** The facias of boxes, balconies and galleries which overlook the main assembly floor shall have substantial guard rails not less than 32 inches, nor less than 36 inches at the end of aisles or at the foot of steps, above the floor, the bottom 18 inches of which shall be solid. Cross aisles, except where the backs of seats on the front of the aisle project 24 inches or more above the floor of the aisle, shall be provided with guard rails not less than 26 inches high.

Where loose seats are arranged on platforms or successive tiers, guard rails shall be provided as specified in Section 3108.

#### **605 LIGHT AND VENTILATION**

**605.1 GENERALE:** All portions of Group A Occupancies customarily used by human beings and all dressing rooms shall be provided with light and ventilation by means of windows or skylights with an area not less than one-eighth the total floor area, one-half of which shall be openable, or shall be provided with electric light and with a mechanically operated ventilating system as set forth in Chapter 48. Ducts for mechanical ventilation system shall serve no other Group of Occupancy.

**605.2 ARTIFICIAL LIGHTING:** Auditorium lights shall be as set forth in Section 4505.4 and emergency lighting shall be provided in all paths of egress as set forth in Section 4505.5.

**605.3 HAZARDS:** Registers or vents supplying air back stage, supplying a projection booth or passing through a fire wall shall be equipped with automatic closing devices with fusible links and supply-air fans shall be controlled with a temperature sensing device.

**605.4 MECHANICAL VENTILATION:** (a) Mechanical ventilation shall be provided where the requirements of Sub-sections 605.1 and 605.2 for required window openings are not met, and shall be as specified in Part XIII.

(b) Toilet rooms shall be ventilated by windows having an area not less than 15 percent of the floor area, or by force ventilation supplying a change of air every two minutes.

**605.5 HAZARDS:** (a) Registers or vents supplying air back stage, supplying a projection booth or passing through a fire wall shall be equipped with automatic fire doors or shutters.

(b) Ducts for mechanical ventilation systems shall serve no other occupancy or purpose.

## 606 ENCLOSURE OF VERTICAL OPENINGS

Vertical openings shall be enclosed as set forth in Part V for the Type of Construction, and in Section 604 and Chapter 31.

Elevators which serve dressing rooms, gridiron and fly galleries need not be enclosed above the stage level.

There shall be no openings in required stair or ramp enclosures except entrances, exits and openings for ventilation.

## 607 STAGES AND PLATFORMS

Stages, platforms and accessory features thereof shall be designed and constructed as set forth herein.

**607.1 STAGES:** (a) **STAGE CONSTRUCTION:** All parts of the stage shall be designed to support not less than 125 pounds per square foot and shall be of Type I construction. The room directly under the stage shall not be used for any purpose other than the working of traps and mechanical apparatus necessary for a performance on the stage.

Openings through stage floors shall be equipped with tight-fitting trap doors or incombustible material or of wood not less than two inches thick.

(b) **GRIDIRONSE** Gridirons, fly galleries and pin rails shall be constructed of incombustible materials, but fireproofing of metal shall not be required.

(c) **ACCESSORY ROOMSE** Dressing rooms, workshops, and storerooms shall be located on the stage side of the proscenium wall and shall be separated from each other and from the stage by two-hour fire-resistive construction.

(d) **PROSCENIUM WALLS:** The proscenium wall separating the stage portion from the auditorium shall be not less than four-hour fire resistive construction and shall extend not less than four feet above the roof. The proscenium wall shall not be finished or covered with combustible materials. Proscenium walls may have in addition to the main proscenium opening, one opening at the orchestra-pit level and not more than two openings at the stage-floor level, each of which shall be not more than 25 square feet in area. Such openings shall be equipped with self-closing fire-resistive doors.

(e) **PROSCENIUM CURTAINS:** The main proscenium opening shall be provided with a self-closing, tight-fitting, fire-resistive curtain. Such curtain may be of woven asbestos with not more than ten percent by weight of cotton or other combustible materials, with interwoven wires of monel metal, nickel, brass or equivalent heat and corrosion-resisting metals. Such curtain shall be of one-ply thickness and shall weigh not less than three pounds per square yard and shall be painted with a mineral paint so brushed into the cloth that no light or smoke can come through. Proscenium curtains of incombustible materials other than fabric may be used, with the approval of the Building Official.

Proscenium curtains, 35 feet or less in width, shall have a rigid metal member, not less than the equivalent of a two-inch standard steel pipe, at the top and the bottom edges, protected by the fabric on both the stage and auditorium sides. Curtains over 35 feet in width shall have a rigid metal frame, protected on both sides against fire and such frame shall be designed for a wind pressure of not less than 15 pounds per square foot.

The proscenium curtain shall extend into non-combustible and smokeproof guides at the sides, a distance not less than 12 inches. The curtain shall overlap the top of the proscenium opening not less than 24 inches, and the bottom edge shall have a yielding pad of incombustible materials not less than four inches deep to form a seal against the floor.

The proscenium curtain shall be rigged and counter-balanced with not less than six three-eighths-inch flexible steel cables and six safety stop chains of one-quarter-inch straight link-welded chain and shall be so arranged that it can be quickly released to descend by gravity and completely close the opening. The releasing device and its location shall be approved by the Building Official.

The proscenium curtain shall be raised and lowered at least once before every performance, and the operating of the curtain by means of the releasing device shall be tested semi-annually.

(f) **STAGE VENTILATORS:** There shall be one or more ventilators constructed of metal or other incombustible materials near the center and above the highest point of any permanent stage, raised above the roof and having a total ventilating area equal to at least five percent of the floor area within the stage walls. Doors or covers for ventilators shall open by gravity and shall be held closed and manually operated by means of cords extending to each side of the stage. These cords shall be equipped with three fusible links, one of which shall be placed in the ventilator above the main roof level and the other two at approved points, not affected by sprinkler heads. Such links shall fuse and separate at 160 degrees Fahrenheit. Each ventilator shall be opened and closed at least once before each performance. Glass, if used in such ventilators, shall be wire glass.

(g) **FLAME-RETARDING REQUIREMENTS:** No combustible scenery, drops, decorations or other combustible effects shall be placed on any stage or enclosed platform unless it is treated with an effective fire-retardant solution and maintained in a non-flammable condition as approved by the Fire Department, and scenery shall be inspected before the opening of each new production, or annually if the production continues for more than one year.

(h) **STAGE EXITS:** At least one exit two feet six inches wide shall be provided from each side of the stage opening, directly or by means of a passageway not less than three feet in width, to a street or exit court. An exit stair not less than two feet six inches wide shall be provided for egress from each fly gallery.

Each tier of dressing rooms shall be provided with two remote paths of egress, each not less than two feet six inches wide, and where dressing rooms are provided more than one tier above the stage floor, stairways to all tiers shall be enclosed.

Stage exits shall be as set forth in Chapter 31 except as otherwise required in this sub-section.

(i) **OTHER REQUIREMENTS:** There shall be no enclosed structure for human occupancy located above a stage.

**607.2 PLATFORMS:** (a) **PLATFORM CONSTRUCTION:** The platform shall be constructed entirely of incombustible materials, except that where the auditorium floor extends under the full area of such platform, construction may be of Type II, omitting the fireproofing on the beams and girders.

(b) **SIZE OF PLATFORM:** The platform shall not extend from the rear wall a distance greater than 18 feet, measured to the greatest projection of the platform, nor shall the ceiling over any platform be more than five feet above the screen.

(c) **ACCESSORY ROOMS:** No dressing or other rooms for human occupancy shall be located on, under or above such platform unless such rooms shall be completely separated therefrom by not less than two-hour fire-resistive construction.

(d) **SCREEN:** The screen shall be rigidly attached to the platform and to the rear wall, and a clear passageway, not less than 20 inches wide, shall be provided between the screen or the sound equipment and the rear wall.



(e) **COMBUSTIBLE MATERIALS REGULATED:** No combustible scenery, drapes, decorations or other combustible effects shall be placed on any platform.

### **608 MOTION-PICTURE-MACHINE BOOTHS**

All booths constructed for the projection or showing of motion-picture films shall be as set forth herein.

**608.1** Every motion-picture machine, using nitro cellulose or other inflammable films together with all electrical devices, rheostats and sewing machines used in connection therewith, and all such films, shall be enclosed in a booth large enough to permit the operator to walk freely on either side or back of the machine; and such room shall be not less than seven feet high and shall have a floor area of not less than 50 square feet for each motion-picture machine in such booth.

**608.2** The floors, walls and ceiling of such booth shall be of incombustible materials of not less than two-hour fire-resistive construction as specified in Chapter 37.

**608.3** The entrance to the booth shall be equipped with tight-fitting, self-closing doors of fire-resistive construction. Such door shall open outward and shall not be equipped with any latch. Booths exceeding 200 square feet in area shall have two means of exit therefrom, and doors shall be remotely located. Any required exit door from a motion-picture booth shall be not less than two feet six inches in width.

**608.4** Machine and observation ports in machine-booth walls shall be of three kinds: projection ports, observation ports and combined observation and spotlight ports. These ports shall be limited in size and number as follows: there shall be not more than one projection port for each machine head, including stereopticon machines, having an area of not more than 120 square inches. There shall be not more than one observation port for each projection port, having an area of not more than 150 square inches. There shall be not more than three combination observation and spotlight ports, and they shall not exceed 30 inches by 24 inches. There shall be not less than one foot of wall space between openings. Each port in the projection-booth wall shall be completely covered with a single pane of plate glass and each such opening, together with all fresh-air inlets, shall be provided with automatic shutters of not less than ten - U. S. gage sheet metal large enough to overlap at least one inch on all sides and arranged to slide shut by gravity without binding. These shutters shall be held normally open by means of chains equipped with approved 160-degree-Fahrenheit fusible links, all so arranged that the shutters may be easily released by hand or automatically by the fusible links and close smoothly without noise. Every booth shall be equipped with a ventilating inlet not less than 30 square inches in area, placed near the floor and protected by two layers of copper gauze, one of 18 meshed per inch and the other of ten meshed per inch, in addition to the shutter as specified above. At the top of every booth there shall be at least a ten-inch-diameter vent for each motion-picture machine. Such vent shall be constructed of not less than 24-U. S. gage sheet metal and shall connect into a masonry flue or go directly through the roof and 12 inches above, and shall be provided with an exhaust fan which will produce a complete change of air in the booth every two minutes. No wood or other combustible materials shall be allowed to come closer than four inches to such vent, and there shall be not more than one elbow or change of direction of this metal vent in any attic space. No such vent shall pass through any occupied room unless encased in not less than four inches of solid masonry.

**608.5** All shelves, furniture and fixtures within the booth shall be constructed of metal or other incombustible materials.

**608.6** Every motion-picture machine shall be securely fastened to the floor to prevent overturning.

**608.7** The rewinding machine shall be located in a fireproof compartment within the booth, and all films not in actual use shall be kept in individual metal boxes with tight-fitting covers and must be stored, each in its individual box, in a fireproof cabinet, which cabinet shall be divided into compartments having a capacity of not more than ten such film boxes in each compartment. Each compartment shall have a separate tight-fitting, self-closing cover of not less than ten-U. S. gage sheet metal, arranged to close automatically. No solder shall be used in the construction of such metal boxes, compartments or cabinets.

### **609 FIRE PROTECTION AND HAZARDS**

**609.1** Automatic sprinkler systems, fire extinguishers, fire-alarm systems and standpipes shall be as set forth in Chapter 38.

**609.2** Chimneys, flues and vents shall be as set forth in Chapter 39.

**609.3** Heat-producing apparatus shall be as set forth in Chapter 40.

**609.4** The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto. Any gas service to the stage portion of the building shall be separated from any other service to the building, and every gas service shall be provided with a shut-off valve at a convenient and conspicuous place outside the building, and adequately marked.

**609.5** Electrical installations shall be as required herein and as specified in Part XI.

**609.6** Transformer vaults shall be as set forth in Section 4101.

**609.7** The storage of flammable materials shall be as set forth in Chapter 41.

### **610 PLUMBING AND SANITATION**

**610.1** Plumbing shall be installed as set forth in Part XII.

**610.2** (a) Sanitation shall be as set forth in Section 512.

(b) For Group A occupancies having a stage, separate toilet facilities shall be provided back-stage for personnel.

### **611 EXCEPTIONS AND DEVIATIONS**

Existing buildings not fully complying with the requirements of this chapter may be used for Group A occupancies, if the requirements of Sections 602, 604, 609 and 610 are fully complied with and providing there is not less than a two-hour fire separation between such buildings and any other occupancies.

### **612 MIXED OCCUPANCY**

Separation of Group A occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be specified in Chapter 5.

## Chapter 7 — Requirements for Group B Occupancies

- 701 GROUP B OCCUPANCY DEFINED
- 702 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE
- 703 LOCATION ON PROPERTY
- 704 EXIT FACILITIES
- 705 LIGHT AND VENTILATION
- 706 ENCLOSURE OF VERTICAL OPENINGS
- 707 STAGES AND PLATFORMS
- 708 MOTION-PICTURE-MACHINE BOOTHS
- 709 FIRE PROTECTION AND HAZARDS
- 710 PLUMBING AND SANITATION
- 711 MIXED OCCUPANCY

### 701 GROUP B OCCUPANCY DEFINED

Group B Occupancy shall include assembly uses such as:

**DIVISION 1:** Assembly uses as set forth in Section 601 having an occupancy content of 200 to 1000 persons.

**DIVISION 2:** Assembly uses as set forth in Sections 601 having an occupant content of less than 200 persons except that the occupancy of any room or space for assembly purposes by less than 100 persons in a building of other occupancy and incidental to such other occupancy shall be classed as part of the other occupancy and subject to the provisions applicable thereto.

### 702 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

**702.1 GENERAL:** Buildings, or parts of buildings, classed in Group B because of use or occupancy shall be limited in height and area as follows:

TYPE	ALLOWABLE HEIGHT	AREA PER FLOOR
I	Not Limited	Not Limited
II	60 feet (4 stories)	15,000
III (Protected)	30 feet (2 stories)	13,500
III (Unprotected)	20 feet (1 story)	9,000

Areas of buildings located with public streets on two sides may be increased 25 percent, and if on three or more sides, may be increased 50 percent.

A side or rear yard providing access not less than 30 feet in width to a public street may be considered a public street for the purpose of determining the allowable area of a church where zoning or other regulations require that such yard be permanently unobstructed.

**702.2 SPECIAL PROVISIONS:** (a) Buildings or parts of buildings shall be of not less than one-hour fire-resistive construction throughout except that a fire-resistive ceiling shall not be required in the assembly space of churches and gymnasiums in one-story buildings, every part of the roof structure of which is 18 feet or more above any floor or above any balcony or gallery seating 50 or more persons.

(b) Group B assembly rooms having an occupant content of 100 or more shall not be located in a basement.

(c) In gymnasiums, dance halls, and similar occupancies, floors and running tracks may be of wood.

(d) Balconies, and the exits therefrom, shall be a minimum of Type II construction.

(e) Basements shall be of Type I construction.

### 703 LOCATION ON PROPERTY

Buildings with Group B Occupancy shall front directly upon a public street or on a clear and permanently unobstructed yard or court not less than 30 feet in width and connected to such public street.

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type of Construction in Part V.

### 704 EXIT FACILITIES

Exit facilities for Group B Occupancies shall be as set forth in this Section and in Chapter 31.

The requirements, as specified for exit facilities of Group A Occupancies in Section 604, shall apply to Group B Occupancies unless otherwise specified.

**704.1 OCCUPANT CONTENT:** The occupant content shall be computed as set forth in Section 604.1.

**704.2 WIDTH OF EXITS:** The total width of all exits shall be as set forth in Section 604.2.

**704.3 ARRANGEMENT OF EXITS:** (a) **INTERIOR SPACES:** Exits from rooms or spaces of Group B Occupancies shall be as set forth in Section 604 except that exits for Division 2 Occupancies not having a stage, balcony or gallery may be as follows:

(1) Such rooms may exit into a corridor, stairway, passage-way, or court serving another Group of Occupancy in the same building, provided the total occupant content of the floor or building includes the Group B Division 2 Occupancy.

(2) There shall be not less than 2 exit doors and such doors shall be remote.

(3) The main exit shall be not less than 44 inches in width.

(b) **FLOORS:** Exits from any balcony or gallery shall be as set forth in Section 604.

(c) **DOORS:** Doors in paths of egress, normally closed and latched, and serving more than 50 persons, shall be equipped with panic hardware.

(d) **TRAVEL DISTANCE:** Exits shall be so arranged that the maximum travel distance from any point, or from the door of separated spaces less than 600 square feet, to the nearest floor exit shall not exceed 150 feet for building of Type I Construction or 100 feet for buildings of other types of construction.

**704.4 SEATING AND AISLES:** Where seating is at tables, such as in restaurants and night clubs, aisles shall be located so that there is not more than 28 feet between aisles nor more than

14 feet between an aisle and a wall. There shall be a cross aisle leading from the center aisle or aisles directly to each required side exit. Aisle widths shall be unmistakably maintained, and the Building Official may order seats fastened to the floor, or aisles outlined by rails or ropes or by painting on the floor, to maintain the minimum unobstructed aisle widths.

#### **705 LIGHT AND VENTILATION**

All portions of Group B Occupancies customarily used by human beings shall have light and ventilation as set forth in Section 605.

#### **706 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as set forth in Part V for the type of construction, and in Section 704 and Chapter 31.

There shall be no openings in required stair or ramp enclosures except entrances, exits and openings for ventilation.

#### **707 STAGES AND PLATFORMS**

Stages and platforms shall be as set forth in Section 607.

#### **708 MOTION-PICTURE-MACHINE BOOTHS**

Portable motion-picture machines using slow-burning (cellulose acetate or equivalent) type of film may be used without a motion-picture-machine booth. The slow-burning film shall have a permanent distinctive marker for its entire length, identifying the manufacturer and the slow-burning character of the film stock. Machines shall be marked with the name and/or trade mark of the maker and the voltage and current rating for which they are designed, and shall also be plainly marked: "FOR USE OF SLOW-BURNING FILMS ONLY."

In buildings where the showing of motion pictures is the principal use, motion-picture-machine booths, as set forth in Section 608, shall be provided.

#### **709 FIRE PROTECTION AND HAZARDS**

**709.1** Automatic sprinkler systems, fire extinguishers, fire-alarm systems and standpipes shall be as set forth in Chapter 38.

**709.2** Chimneys, flues and vents shall be as set forth in Chapter 39.

**709.3** Heat-Producing apparatus shall be as set forth in Chapter 40.

**709.4** The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto. Any gas service to the stage portion of the building shall be separated from any other service to the building, and every gas service shall be provided with a shut-off valve at a convenient and conspicuous place outside the building, and adequately marked.

**709.5** Electrical installations shall be as required herein and as specified in Part XI.

**709.6** Transformer vaults shall be as set forth in Section 4101.

**709.7** The storage of flammable materials shall be as set forth in Chapter 41.

#### **710 PLUMBING AND SANITATION**

**710.1** Plumbing shall be installed as set forth in Part XII.

**710.2** Sanitation shall be as set forth in Section 512 and where persons are engaged in physical athletic activities, bathing facilities shall be provided.

#### **711 MIXED OCCUPANCY**

Separation of Group B Occupancies or divisions thereof from all other Occupancies or divisions of Occupancies shall be as specified in Chapter 5.

## Chapter 8 — Requirements for Group C Occupancies

- 801 GROUP C OCCUPANCY DEFINED
- 802 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE
- 803 LOCATION ON PROPERTY
- 804 EXIT FACILITIES
- 805 LIGHT AND VENTILATION
- 806 ENCLOSURES OF VERTICAL OPENINGS
- 807 STAGES AND PLATFORMS
- 808 MOTION-PICTURE-MACHINE BOOTHS
- 809 FIRE PROTECTION AND HAZARDS
- 810 PLUMBING AND SANITATION
- 811 EXCEPTIONS AND DEVIATIONS
- 812 MIXED OCCUPANCY

### 801 GROUP C OCCUPANCY DEFINED

Group C Occupancy shall include all schools having classes more than four hours each week and providing facilities for more than ten students or pre-school children.

Accessory uses to schools not exceeding the following minimums may conform to the requirements of this chapter:

Assembly Halls . . . . .	2100 square feet
Dining Rooms . . . . .	3000 square feet
Gymnasiums . . . . .	3000 square feet
Woodworking Shops, Using Power Sanders or More than Ten Power Operated Tools	

Such accessory uses exceeding the above minimums shall conform to the requirements of the occupancy group which includes such use.

### 802 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

802.1 GENERAL: Buildings, or parts of buildings, classed in Group C because of use or occupancy, shall be limited in height and area as follows:

TYPE	ALLOWABLE HEIGHT	AREA PER FLOOR
I	Not limited	Not limited
II	60 feet (4 stories)	18,000
III Protected	30 feet (2 stories)	15,000
III Unprotected & IV	30 feet (1 story)	13,500
V	30 feet (1 story)	8,500

**Area of buildings located with public streets on two sides may**

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(d) Ramps and horizontal exits, one 22-inch unit of exit width for each 100 persons or fraction thereof.

**804.3 ARRANGEMENT OF EXITS:** (a) **ROOMSE** Classrooms, shops and similar small rooms occupied by less than 35 persons may have one door thereto, provided such door is not less than 36 inches in width and located at the teacher end of the room. Classrooms, shops and similar rooms occupied by 35 or more persons shall have not less than two exit doors, not less than 36 inches in width, the combined width of which shall be not less than one 20-inch unit of exit width for each 100 persons or fraction thereof, which doors shall be remote from each other. Rooms with occupant content exceeding 300 persons shall have exits as specified for Group A or B Occupancy.

Classroom exits may be to corridors.

Rooms in basements shall have not less than 50 percent of the required paths of egress therefrom opening directly to the exterior.

(b) **CORRIDORS:** Classrooms, assemblies of less than 300 persons, and other similar subdivisions shall open directly to floor exits or shall connect thereto by means of corridors. Corridors shall have a width of not less than six feet nor less than four inches for every 300 square feet, or major fraction thereof, of floor area served. Room doors or locker doors swinging into corridors shall not at any point in their swing reduce the clear effective width of the corridor to less than six feet, nor shall drinking fountains or other equipment, fixed or movable, be placed to obstruct the required minimum 6-foot width.

(c) **FLOORSE** There shall be not less than two remote paths of egress from each floor.

Floor exits shall be by means of stairways, ramps, horizontal exits, passageways or smokeproof towers, as specified in Chapter 31, or by doors, at or near grade, directly to the exterior.

The upper floors of two-story buildings may have enclosed interior stairways or open exterior stairways.

The upper floors of three-story buildings shall have enclosed interior stairways for not less than one-half the required floor exits. Other upper floor exits may be open exterior stairways or enclosed interior stairways.

The upper floors of buildings which exceed three stories shall have smokeproof towers for not less than one-half the required floor exits. Other upper floor exits shall be enclosed interior stairways.

(d) **DOORS:** Doors in paths of egress, normally closed and latched, and serving more than 50 persons or hazardous occupancies such as woodworking shops, shall be equipped with panic hardware.

The minimum width of any required door in a path of egress shall be 36 inches.

Doors of classrooms serving as required exits may swing against the direction of exit travel when serving an occupant load of less than 35 persons.

(e) **TRAVEL DISTANCE:** The exits shall be so arranged that the maximum travel distance from any point, or from the door of separated spaces less than 800 square feet, to the nearest floor exit shall not exceed the following:



Type I Buildings	100 feet
Type II Buildings	90 feet
Type III (Protected) Buildings	90 feet
Type III (Unprotected) and IV and V Buildings	75 feet

**EXCEPTION:** The travel distance in any room where one exit door is permitted shall not exceed 40 feet.

### 805 LIGHT AND VENTILATION

**805.1 GENERAL:** All portions of Group C Occupancies customarily used by human beings shall be provided with light and ventilation by means of windows or skylights with an area not less than one-eighth of the total floor area, one-half of which shall be openable, or by means of electric light and mechanical ventilation, except that for classrooms and study rooms, the window area shall be not less than 15 percent of the total floor area, 50 percent of which shall be openable.

**805.2 WINDOWS:** In buildings of Group C Occupancies, windows, to meet the requirements for light and ventilation, shall be so located that the wall of no buildings or portions of the same building, which are closer than 50 feet, shall extend above a line at 45 degrees to the horizontal from the sill of such window, nor shall any building be thereafter erected on the same lot or lots which will reduce the light and ventilation of any Group C occupancy below the requirements of this Section. The possibility of a new building or an addition to an existing building on an adjoining lot shall be considered. Such required courts shall be unobstructed except as provided in Chapter 31.

**805.3 OTHER:** Toilet rooms shall be ventilated as set forth in Sub-section 605.4.

### 806 ENCLOSURE OF VERTICAL OPENINGS

Vertical openings shall be enclosed as set forth in Part V for the type of construction, and in Section 804 and Chapter 31.

### 807 STAGES AND PLATFORMS

Stages and platforms shall be as set forth in Section 607, except that platforms or rostrums constructed as part of classrooms and not occupying more than 15 percent of the area of the floor may be constructed of combustible materials.

### 808 MOTION-PICTURE-MACHINE BOOTHS

Where motion pictures, using flammable film or film larger than 16 mm. or using carbon-arc or mercury-arc projectors, are to be shown, such building shall be equipped with a motion-picture-machine booth as set forth in Section 608.

### 809 FIRE PROTECTION AND HAZARDS

**809.1** Automatic sprinkler systems, fire extinguishers, fire-alarms systems and standpipes shall be as set forth in Chapter 38.

809.2 Chimneys, flues and vents shall be as set forth in Chapter 39.

809.3 Heat-producing apparatus shall be as set forth in Chapter 40.

809.4 The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

809.5 Electrical installations shall be as required herein and as specified in Part XI.

809.6 Transformer vaults shall be as set forth in Section 4101.

809.7 The storage of flammable materials shall be as set forth in Chapter 41.

### **810 PLUMBING AND SANITATION**

810.1 Plumbing shall be installed as set forth in Part XII.

810.2 Sanitation shall be as set forth in Section 512 and as follows:

(1) In classrooms with grades below the fourth grade, where facilities and arrangements provide one lavatory under teacher supervision in each classroom and one water closet for each sex for each two 30-student classrooms, such facilities may be computed as part of the general requirements.

(2) In schools having more than 100 students, separate facilities shall be provided for teacher and janitors.

### **811 EXCEPTIONS AND DEVIATIONS**

Except in buildings of Type I construction, school classrooms used for kindergarten, first or second-grade pupils shall be located on the ground floor.

### **812 MIXED OCCUPANCY**

Separation of Group C Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be specified in Chapter 5.

## Chapter 9 — Requirements for Group D Occupancies

- 901 GROUP D OCCUPANCY DEFINED
- 902 CONSTRUCTION, HEIGHT, AND AREA ALLOWABLE
- 903 LOCATION ON PROPERTY
- 904 EXIT FACILITIES
- 905 LIGHT AND VENTILATION
- 906 ENCLOSURE OF VERTICAL OPENINGS
- 907 MOTION-PICTURE-MACHINE BOOTHS
- 908 FIRE PROTECTION AND HAZARDS
- 909 PLUMBING AND SANITATION
- 910 MIXED OCCUPANCY

### 901 GROUP D OCCUPANCY DEFINED

Group D Occupancy shall include all institutional uses as follows:

**DIVISION 1:** Occupancy where inmates' liberties are restricted, such as jails, prisons, reformatories and asylums.

**DIVISION 2:** Occupancy where inmates are under physical limitations, such as hospitals, sanitoriums, homes for the aged and orphanages; and where accommodations are provided for more than six inmates.

### 902 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

**902.1 GENERAL:** Buildings, or parts of buildings, classed in Group D because of use or occupancy, shall be limited in height and area as follows:

DIVISION	TYPE	ALLOWABLE HEIGHT	AREA PER FLOOR
1	I	100 feet (8 stories)	Not Limited
2	I	Not Limited	Not Limited
	II	60 feet (4 stories)	10,000
	III (Protected)	30 feet (2 stories)	7,500

Area of buildings located with public streets on two sides may be increased 25 percent, and if on three or more sides, may be increased 50 percent.

A side or rear yard providing access not less than 30 feet in width to a public street may be considered a public street for the determination of allowable areas where zoning or other regulations require that such yard be permanently unobstructed.

**902.2 SPECIAL PROVISIONS:** (a) Cell blocks and confinement cells in jails, prisons or similar buildings may be constructed of unprotected steel or iron, provided that the entire cell block shall be constructed of incombustible materials.

(b) Basements shall be of Type I construction.

### **903 LOCATION ON PROPERTY**

Buildings with Group D occupancy shall front directly upon a public street or on a clear and permanently unobstructed yard or court not less than 30 feet in width and connected to such public street.

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type of Construction in Part V.

### **904 EXIT FACILITIES**

Exit facilities for Group D occupancies shall be as set forth in this section and in Chapter 31.

**904.1 OCCUPANT CONTENT:** For determining exit requirements of Group D occupancies, the occupant content shall be the area within the perimeter of the building, or fire division, at any floor level, with no deductions for corridors, divided by an area of 150 square feet per person, except that for areas of assembly, hazardous or industrial use, the occupant content thereof shall be determined as for the Group of Occupancy it most nearly resembles.

**904.2 WIDTH OF EXITS:** Exits shall be provided on the basis of one 22-inch unit of exit width for each 30 persons or fraction thereof.

No required exit from the first floor including doors shall have a width of less than 44 inches.

Exits from floors other than the first floor, which serve as egress from hospital and infirmary occupancies, shall be not less than four feet in clear width.

**904.3 ARRANGEMENT OF EXITS:** (a) **ROOMS:** Rooms, cells or wards having an occupant content of more than fifteen persons shall have not less than two remote exits.

(b) **CORRIDORS:** Rooms shall open directly to floor exits or shall connect thereto by means of corridors. Corridors shall have a width of not less than five feet, nor less than four inches for every 400 square feet or major fraction thereof, of floor area.

(c) **FLOORS:** There shall be not less than two remote paths of egress from each floor.

Floor exits shall be by means of stairways, ramps, horizontal exits, passageways or smokeproof towers, as specified in Chapter 31, or by doors, at or near grade, directly to the exterior.

The upper floors of two-story buildings may have enclosed interior stairways or open exterior stairways.

The upper floors of three-story buildings shall have enclosed interior stairways for not less than one-half the required floor exits. Other upper floor exits may be open exterior stairways or enclosed interior stairways.

The upper floors of buildings which exceed three stories shall have smokeproof towers for not less than one-half the required floor exits. Other upper floor exits shall be enclosed interior stairways.

(d) **DOORS:** Doors in paths of egress from hospital and infirmary occupancies shall be not less than 44 inches in clear width or sufficient to permit the free passage of beds. All other required exit doors shall be not less than 36 inches in clear width.

Except in places of forcible detention, doors in paths of egress, normally closed and latched, and serving more than 50 persons, shall be equipped with panic hardware.

(e) **TRAVEL DISTANCE:** The exits shall be so arranged that the maximum travel distance from any point, or from the door of separated spaces less than 600 square feet, to the nearest floor exit shall not exceed the following:

Type I Buildings .....	100 feet
Type II Buildings .....	90 feet
Type III (Protected) Buildings .....	90 feet

**EXCEPTION:** The travel distance in any room where one exit door is permitted shall not exceed 30 feet.

### 905 LIGHT AND VENTILATION

**905.1 GENERAL:** All portions of Group D occupancies customarily used by human beings shall be provided with light and ventilation by means of windows or skylights with an area of not less than one-eighth of the total floor area, one-half of which shall be openable, or by means of electric light and mechanical ventilation.

**905.2 WINDOWS:** Windows for required light and ventilation, 30 feet or less above grade, shall be ten feet or more from the building line of a contiguous lot, or any building on the same lot.

Windows for required light and ventilation, more than 30 feet above grade, shall be not closer than ten feet plus 20 percent of that building height which is more than 30 feet above grade, from the building line of a contiguous lot, or not closer than ten feet plus 30 percent from any building on the same lot.

Measurements shall be from window sills and perpendicular to the wall.

**905.3 ARTIFICIAL LIGHTING:** (a) Emergency lighting for paths of egress shall be on a separate circuit and shall be controlled from the main office or the principal public place of managerial control.

(b) Emergency lighting shall be provided in all paths of egress and shall be as specified in Sub-section 3112.1.

**905.4 MECHANICAL VENTILATION:** (a) Mechanical ventilation shall be provided where the requirements of Sub-sections 905.1 and 905.2 for required window openings are not met and shall be as specified in Part XIII.

(b) Toilet rooms shall be ventilated by windows having an area of not less than 15 percent of the floor area, or by force ventilation supplying a change of air every two minutes.

**905.5 HAZARDS:** Ducts for mechanical-ventilation systems shall serve no other occupancy.

Ducts or vents, where passing through a fire wall, shall be equipped with automatic fire doors or shutters.

## **906 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as specified in Part V for the type of construction, and in Section 904 and Chapter 31.

## **907 MOTION-PICTURE-MACHINE BOOTHS**

Where motion pictures are to be shown regularly, the building shall be equipped with a motion-picture-machine booth as set forth in Section 608.

## **908 FIRE PROTECTION AND HAZARDS**

**908.1** Automatic-sprinkler systems, fire extinguishers, fire-alarm systems and standpipes shall be as set forth in Chapter 38.

**908.2** Chimneys, flues and vents shall be as set forth in Chapter 39.

**908.3** Heat-producing apparatus shall be as set forth in Chapter 40.

**908.4** The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

**908.5** Electrical installations shall be as required herein and as specified in Part XI.

**908.6** Transformer vaults shall be as set forth in Section 4101.

**908.7** The storage of flammable materials shall be as set forth in Chapter 41.

## **909 PLUMBING AND SANITATION**

**909.1** Plumbing shall be installed as set forth in Part XII.

**909.2** Sanitation shall be as set forth in Section 512.

## **910 MIXED OCCUPANCY**

Separation of Group D Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.



## Chapter 10 —Requirements for Group E Occupancies

- 1001 GROUP E OCCUPANCY DEFINED
  - 1002 CONSTRUCTION, HEIGHT, AND AREA ALLOWABLE
  - 1003 LOCATION ON PROPERTY
  - 1004 EXIT FACILITIES
  - 1005 LIGHT AND VENTILATION
  - 1006 ENCLOSURE OF VERTICAL OPENINGS
  - 1007 FIRE PROTECTION AND HAZARDS
  - 1008 PLUMBING AND SANITATION
  - 1009 MIXED OCCUPANCY
- 

### 1001 GROUP E OCCUPANCY DEFINED

Group E Occupancy shall include such hazardous uses as storage and use of highly combustible materials or explosives or flammable liquids or combustible film, dry cleaning plants, grain elevators, woodworking shops having more than four power tools, woodworking shops of schools having power sanders or more than ten power tools, paint spraying, and similar uses.

### 1002 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

**1002.1 GENERAL:** Buildings, or parts of buildings, classed in Group E because of use or occupancy, shall be limited in height and area as follows:

TYPE	ALLOWABLE HEIGHT	AREA OF FLOOR
I	120 feet (10 stories)	15,000
II	40 feet (2 stories)	10,000
III (Protected)	20 feet (1 story)	8,000
IV	20 feet (1 story)	5,000



Area of buildings located with public streets on two sides may be increased 25 percent, and if on three or more sides, may be increased 50 percent.

**1002.2 SPECIAL PROVISIONS:** Floors shall be of incombustible materials protected against saturation and basements shall be Type I construction.

### **1003 LOCATION ON PROPERTY**

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type or Construction in Part V.

### **1004 EXIT FACILITIES**

Exit facilities for Group E Occupancies shall be as set forth in this section and in Chapter 31.

**1004.1 OCCUPANT CONTENT:** For determining exit requirements of Group E Occupancies, the occupant content shall be the area within the perimeter of the building, or fire division, at any floor level, with no deductions for corridors, divided by an area of 100 square feet per person.

**1004.2 WIDTH OF EXITS:** Exits shall be provided as followst

(a) Street floor exits shall be provided based on one 22-inch unit of exit width for each 100 persons or fraction thereof on the street floor plus one and one-half units for each two units of stairway or ramp from upper or lower floor where such floors discharge through the street floor.

(b) Upper or lower floors other than street floors shall have one 22-inch unit of exit width for each 60 persons or fraction thereof except that horizontal exits and smoke towers may serve 100 persons for each 22-inch unit of exit width.

**1004.3 ARRANGEMENT OF EXITS:** (a) **INTERIOR SPACES:** Occupied rooms, including mezzanines, shall have paths of egress so located that travel from such rooms to a floor exit is not subject to hazardous exposure.

Rooms, including mezzanines, 400 square feet or more in area, shall have not less than two remote exits.

(b) **FLOORS:** There shall not be less than two remote paths of egress from each floor.

Floor exits shall be by means of stairways, ramps, horizontal exits, passageways or smokeproof towers, as specified in Chapter 31, or by doors, at or near grade, directly to the exterior.

The upper floors of two-story buildings may have enclosed interior stairways or exterior open stairways.

The upper floors of buildings shall have enclosed interior stairways for not less than one-half the required floor exits. Other upper floor exits may be open exterior stairways or enclosed interior stairways.

The upper floors of buildings which exceed three stories shall have smokeproof towers for not less than one-half the required floor exits. Other upper floor exits shall be enclosed interior stairways.

Where floors are divided in fire divisions, one exit from each such division may be a horizontal exit.

(c) **DOORS:** Doors in paths of egress, normally closed and latched, and serving more than 50 persons, shall be equipped with panic hardware.

(d) **TRAVEL DISTANCE:** Exits shall be so arranged that the maximum travel distance from any point to the nearest floor exit shall be not more than 75 feet.

**EXCEPTION:** The travel distance in any rooms, including mezzanines, where one exit door is permitted shall not exceed 25 feet.

### **1005 LIGHT AND VENTILATION**

All portions of Group E Occupancies customarily used by human beings shall have light and ventilation as set forth in Section 905. All portions of buildings where flammable liquids are used or stored shall be provided with mechanical ventilation as set forth in Chapter 48.

### **1006 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as specified in Part V for the type of construction, and in Chapter 31, and in Section 1004.

### **1007 FIRE PROTECTION AND HAZARDS**

**1007.1** Automatic-sprinkler systems, fire extinguishers and standpipes shall be as set forth in Chapter 38.

**1007.2** Chimneys, flues and vents shall be as set forth in Chapter 39.

**1007.3** Heat-producing apparatus shall be as set forth in Chapter 40.

**1007.4** The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

**1007.5** Electrical installations shall be as required herein and as specified in Part XI.

**1007.6** Transformer vaults shall be as set forth in Section 4101.

**1007.7** The storage or use of flammable materials shall be as set forth in Chapter 41.

**1007.8** No combustion heater shall be installed in Group E Occupancies.

**1007.9** Each machine in dry-cleaning plants which uses a flammable liquid shall have an adequate steam line connected to it, so arranged as to automatically fill the machine with steam in case of fire.

### **1008 PLUMBING AND SANITATION**

**1008.1** Plumbing shall be installed as set forth in Part XII.

**1008.2** Sanitation shall be as set forth in Section 512.

### **1009 MIXED OCCUPANCY**

Separation of Group E Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.

## Chapter 11 — Requirements for Group F Occupancies

- 1101 GROUP F OCCUPANCY DEFINED
- 1102 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE
- 1103 LOCATION ON PROPERTY
- 1104 EXIT FACILITIES
- 1105 LIGHT AND VENTILATION
- 1106 ENCLOSURE OF VERTICAL OPENINGS
- 1107 FIRE PROTECTION AND HAZARDS
- 1108 PLUMBING AND SANITATION
- 1109 MIXED OCCUPANCY

### 1101 GROUP F OCCUPANCY DEFINED

Group F Occupancy shall include storage and industrial uses as follows

**DIVISION 1:** Storage Occupancy shall include warehouses, storage buildings, freight depots, public garages of any size where repair work is done, parking garages for more than four cars, gasoline service stations, aircraft hangars or similar uses.

**DIVISION 2:** Industrial Occupancy shall include factories, assembly and manufacturing plants, processing mills, laboratories, loft buildings and similar uses.

### 1102 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

**1102.1 GENERAL:** Buildings or parts of buildings, classed in Group F because of use or occupancy, shall be limited in height and area as follows

TYPE	ALLOWABLE HEIGHT	AREA PER FLOOR
I	Not Limited	Not Limited
II	60 feet (4 stories)	20,000
III*	30 feet (2 stories)	18,000
IV	20 feet (1 story)	12,000
III** & V	20 feet (1 story)	10,000

\*Protected

\*\*Unprotected

Areas of buildings located with public streets on two sides may be increased 25 percent, and if on three or more sides, may be increased 50 percent.

A side or rear yard providing access not less than 20 feet in width to a public street may be considered a public street for the determination of allowable areas where zoning or other regulations require that such yard be permanently unobstructed.

Area of buildings may be increased 200 percent if the building is provided with an approved automatic fire sprinkler system throughout, provided that this system is not otherwise required in Sub-section 3801.1.

Area of buildings shall not be limited if the building is provided with an approved automatic fire-extinguishing system throughout and is entirely surrounded by public streets or permanently unobstructed yards not less than 60 feet in width.

Where one-hour fire-resistive construction is required by this Code, an approved automatic fire-extinguishing system may be substituted, provided such system is not otherwise required.

**1102.2 SPECIAL PROVISIONS:** (a) Motor vehicle service stations shall be constructed of only incombustible materials and such materials shall be required to be fire-resistive as otherwise set forth herein.

(b) Aircraft hangars shall be of Type I, II, III (protected) or IV construction, and shall have exterior walls of not less than two-hour fire-resistive construction or be surrounded by public streets not less than 60 feet in width.

(c) Parking garages used exclusively for parking and storing of passenger motor vehicles shall be of Type I construction, except that garages not exceeding four stories above grade may have structural framework and floors unprotected and exterior walls of not less than two-hour fire-resistive construction, except as otherwise provided in Section 1804, and garages exceeding four stories but not exceeding eight stories may have structural framework and floors protected by one-hour fire-resistive construction.

(d) Floors shall be incombustible materials protected against saturation.

(e) Where ramps are used for the transfer of vehicles or materials from one floor to another, such ramps shall meet the ground floor level at a point not less than 25 feet from the exit of such building.

### **1103 LOCATION ON PROPERTY**

Exterior walls shall have fire-resistance and opening protection, determining by location on property, as set forth for the Type of Construction in Part V.

### **1104 EXIT FACILITIES**

Exit facilities for Group F Occupancies shall be as set forth in this Section and in Chapter 31 except that exit facilities for parking garages where no persons other than parking attendants are permitted on upper floors shall be as set forth in Paragraph 1104.3te).

**1104.1 OCCUPANT CONTENT:** For determining exit requirements of Group F Occupancy, the occupant content shall be the area within the perimeter of the building, or fire division, at any floor level with no deduction for corridors, divided by an area of 100 square feet per person.

**1104.2 WIDTH OF EXITS:** Exits shall be provided as follows

(a) Street floor exits shall be provided based on one 22-inch unit of exit width for each 100 persons or fraction thereof on the street floor plus one and one-half units for each two units of stairway or ramp from upper or lower floor where such floors discharge through the street floor.

**1104.3 ARRANGEMENT OF EXITS:** (a) **INTERIOR SPACES:** Rooms or spaces shall have not less than two remote exits except that where having an occupant content of less than 25 persons, having direct exit to public space and with travel distance not exceeding 50 feet a single exit may be provided.

(b) **FLOORS:** There shall be not less than two remote paths of egress from each floor except that floors or mezzanines of buildings, not exceeding two stories and having an occupant content of not more than 25 persons may have a single door, or an enclosed stairway, exiting directly to the exterior.

Floor exits shall be by means of stairways, ramps, horizontal exits, passageways or smokeproof towers, as specified in Chapter 31, or by doors at or near grade, directly to the exterior.

Dead ends in exit corridors, beyond a floor exit or other corridor having two remote exits, shall not exceed 20 feet.

The upper floor of two-story buildings may have interior stairways, enclosed where required under Types of Construction, or open exterior stairways.

The upper floors of three-story buildings shall have enclosed interior stairways for not less than one-half the required floor exits. Other upper floor exits may be open exterior stairways or enclosed interior stairways.

The upper floors of buildings which exceed three stories shall have enclosed interior stairways, except that buildings which exceed five stories shall have not less than one-half of the required floor exits by smokeproof towers.

Where floors are divided in fire divisions, one exit from each such division may be a horizontal exit.

(c) **DOORS:** Doors in paths of egress, normally closed and latched, and serving more than 50 persons, shall be equipped with panic hardware.

(d) **TRAVEL DISTANCE** The exits shall be so arranged that the maximum travel distance from any point, or from the door of separated spaces having an occupant content of less than 50 persons, to the nearest floor exit shall not exceed 150 feet.

(e) **PARKING GARAGES:** (1) Where persons other than parking attendants are permitted, stairs and exits shall be as otherwise set forth herein.

(2) Where no persons other than parking attendants are permitted and a ramp for transporting vehicles is constructed, or where cars are mechanically lifted and parked without attendants or passengers, there shall be not less than one stairway for each 10,000 square feet or fraction thereof. Where cars are mechanically lifted and parked by attendants, one additional exit shall be provided where such ramp is omitted. Such ramp shall be considered an exit, and exits shall be remotely located so that the maximum travel distance from any point to a floor exit shall not exceed 100 feet.

(3) Stairs shall not be less than three feet wide and shall be enclosed if more than 50 percent of the periphery of the building is enclosed or if the structure exceeds three stories in height.

(4) Continuous belts or lifts without cages shall be designed to be safe.

## 1105 LIGHT AND VENTILATION

All portions of Group F Occupancies customarily used by human beings shall have light and ventilation as set forth in Section 905. All portions of buildings where flammable liquids are used or stored or where automobiles are stored or handled shall be provided with mechanical ventilation as set forth in Chapter 48, except that the Building Official may waive this requirement when the building is provided with unobstructed openings and/or cross ventilation.

## 1106 ENCLOSURE OF VERTICAL OPENINGS

Vertical openings shall be enclosed as set forth in Part V for the type of construction, and in Section 1104 and Chapter 31, except that, unless otherwise required by Type of Construction, interior stair or ramp exits in buildings two stories in height need not be enclosed.



## **1107 FIRE PROTECTION AND HAZARDS**

**1107.1** Automatic-sprinkler systems, fire extinguishers and standpipes shall be as set forth in Chapter 38.

**1107.2** Chimneys, flues and vents shall be as set forth in Chapter 39.

**1107.3** Heat-producing apparatus shall be as set forth in Chapter 40.

**1107.4** The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

**1107.5** Electrical installations shall be as required herein and as specified in Part XI.

**1107.6** Transformer vaults shall be as set forth in Section 4101.

**1107.7** The storage of flammable materials shall be as set forth in Chapter 41.

## **1108 PLUMBING AND SANITATION**

**1108.1** Plumbing shall be installed as set forth in Part VII.

**1108.2** Sanitation shall be as set forth in Section 512 except that the requirements for facilities on upper storage floors of buildings of warehouse occupancy may be proportionately re-adjusted.

## **1109 MIXED OCCUPANCY**

Separation of Group F Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.





## **Chapter 12 — Requirements for Group G Occupancies**

- 1201 GROUP G OCCUPANCY DEFINED**
  - 1202 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE**
  - 1203 LOCATION OF PROPERTY**
  - 1204 EXIT FACILITIES**
  - 1205 LIGHT AND VENTILATION**
  - 1206 ENCLOSURE OF VERTICAL OPENINGS**
  - 1207 FIRE PROTECTION AND HAZARDS**
  - 1208 PLUMBING AND SANITATION**
  - 1209 MIXED OCCUPANCY**
- 

### **1201 GROUP G OCCUPANCY DEFINED**

Group G Occupancy shall include mercantile and business uses as follows:

**DIVISION 1:** Mercantile occupancy, shall include retail stores, shops, sales rooms, markets, and similar uses.

**DIVISION 2:** Business occupancy, shall include office buildings, banks, civic-administration buildings, telephone exchanges, museums, art galleries, libraries and similar uses.

## 1202 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

1202.1 GENERAL: Buildings, or parts of buildings, classed in Group G because of use or occupancy, shall be limited in height and area as follows:

TYPE	ALLOWABLE HEIGHT	AREA PER FLOOR
I	Not Limited	Not Limited
II	60 feet (4 stories)	22,500
III*	30 feet (2 stories)	20,000
III** & IV	20 feet (1 story)	18,000
V	20 feet (1 story)	12,000

\*Protected

\*\*Unprotected

Area of buildings located with public streets on two sides may be increased 25 percent, and if on three or more sides, may be increased 50 percent.

A side or rear yard providing access not less than 20 feet in width to a public street may be considered a public street for the determination of allowable areas where zoning or other regulations require that such yard be permanently unobstructed.

Areas of buildings may be increased 200 percent if the building is provided with an approved automatic fire sprinkler system throughout, provided that this system is not otherwise required in Sub-section 3801.1.

Area of buildings shall not be limited if the building is provided with an approved automatic fire-extinguishing system throughout and is entirely surrounded by public streets or permanently unobstructed yards not less than 60 feet in width providing access to such streets.

Where one-hour fire-resistive construction is required by this Code, an approved automatic fire-extinguishing system may be substituted, provided such system is not otherwise required.

1202.2 SPECIAL PROVISIONS (a) Basements shall be of Type I Construction.

(b) Buildings on open lots, if used for the dispensing of gasoline, shall be as set forth in Paragraph 1102.2(a)a

## 1203 LOCATION ON PROPERTY

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type of Construction in Part V.

## 1204 EXIT FACILITIES

Exit facilities for Group G Occupancies shall be as set forth in this Section and in Chapter 31.

1204.1 OCCUPANT CONTENT For determining exit requirements of Group G Occupancy, the occupant content shall be the area within the perimeter of the building, or fire division, at any floor level with no deduction for corridors, divided by the specific area per person as given below:

<b>OCCUPANCY</b>	<b>AREA — SQ. FT. PER PERSON</b>
Mercantile Basements and First Floors .....	30
Mercantile Upper Floors .....	60
Mercantile Offices, storage and shipping .....	100
Business: All Floors .....	100

The occupant content of floors or spaces used for assembly purposes shall be computed as set forth in Section 604.1. The occupant content shall be the reasonable maximum capacity based on the intended use as determined by the Building Official.

**1204.2 WIDTH OF EXITS:** Exits shall be provided as follows: (a) Street floor exits shall be provided based on one 22-inch unit of exit width for each 100 persons or fraction thereof on the street floor plus one and one-half units for each two units of stairway or ramps from upper or lower floor where such floors discharge through the street floor.

**1204.3 ARRANGEMENT OF EXITS:** (a) **INTERIOR SPACES:** (1) Rooms or spaces shall have not less than two remote exits except that where having an occupant content of less than 25 persons, having direct exit to public space and with travel distance not exceeding 50 feet a single exit may be provided.

(2) In self service stores no check out stand or associated railing, turnstile or barrier shall obstruct exits, aisles or approaches thereto.

(3) Not less than one-half of the required exits from the first or ground floor of a mercantile occupancy shall be to the main entrance and exit.

(4) In self service stores where wheeled carts or buggies are used by customers, adequate provision shall be made for the transit and parking of such carts to minimize the possibility that they may obstruct exits.

(b) **FLOORS:** There shall be not less than two remote paths of egress from each floor except that floors of buildings not exceeding two stories and having an occupant content of not more than 25 persons may have a single door, or an enclosed stairway, exiting directly to the exterior.

Floor exits shall be by means of stairways, ramps, horizontal exits, passageways or smokeproof towers, as specified in Chapter 31, or by doors, at or near grade, directly to the exterior. Dead ends in exit corridors, beyond a floor exit or other corridor having two remote exits, shall not exceed 20 feet.

The upper floor of two-story buildings may have interior stairways, enclosed where required under Types of Construction, or open exterior stairways.

The upper floors of three-story buildings shall have enclosed interior stairways for not less than one-half the required floor exits. Other upper floor exits may be open exterior stairways or enclosed interior stairways.

The upper floors of building which exceed three stories shall have enclosed interior stairways, except that buildings which exceed five stories shall have not less than one-half of the required floor exits by smokeproof towers.

Where floors are divided in fire divisions, one exit from each such division may be a horizontal exit.

(c) **DOORS:** Doors in paths of egress, normally closed and latched, and serving more than 50 persons, shall be equipped with panic hardware.

(d) **TRAVEL DISTANCE:** The exits shall be so arranged that the maximum travel distance from any point, or from the door of separated spaces having an occupant content of less than 50 persons, to the nearest floor exit shall not exceed 150 feet except that if high hazard commodities are displayed or handled without protective wrappings or containers the travel distance shall not exceed 75 feet.

#### **1205 LIGHT AND VENTILATION**

All portions of Group G Occupancies customarily used by human beings shall have light and ventilation as set forth in Section 905.

#### **1206 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as set forth in Part V for the type of construction, and in Section 1204 and Chapter 31, except that, unless otherwise required by Type of Construction, interior stair or ramp exits in buildings two stories in height need not be enclosed.

#### **1207 FIRE PROTECTION AND HAZARDS**

1207.1 Automatic-sprinkler systems, fire extinguishers and standpipes shall be as set forth in Chapter 38.

1207.2 Chimneys, flues and vents shall be as set forth in Chapter 39.

1207.3 Heat-producing apparatus shall be as set forth in Chapter 40.

1207.4 The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

1207.5 Electrical installations shall be as required herein and as specified in Part XI.

1207.6 Transformer vaults shall be as set forth in Section 4101.

1207.7 The storage of flammable materials shall be as set forth in Chapter 41.A

#### **1208 PLUMBING AND SANITATION**

1208.1 Plumbing shall be installed as set forth in Part XII.

1208.2 Sanitation shall be as set forth in Section 512.A

#### **1209 MIXED OCCUPANCY**

Separation of Group G Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.



## Chapter 13 — Requirements for Group H Occupancy

- 1301 GROUP H OCCUPANCY DEFINED
- 1302 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE
- 1303 LOCATION OF PROPERTY
- 1304 EXIT FACILITIES
- 1305 LIGHT AND VENTILATION
- 1306 ENCLOSURE OF VERTICAL OPENINGS
- 1307 FIRE PROTECTION AND HAZARDS
- 1308 PLUMBING AND SANITATION
- 1309 MIXED OCCUPANCY

### 1301 GROUP H OCCUPANCY DEFINED

Group H Occupancy shall include multiple-residential uses such as hotels, apartment hotels, apartment houses and bungalow courts, and dormitories, rooming houses, fraternity houses, monasteries and similar uses with accommodations for more than six persons, and also shall include any residential units in conjunction with other occupancies.

### 1302 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

Buildings, or parts of buildings, classed in Group H because of use or occupancy, shall be limited in height and are as follows:

TYPE	ALLOWABLE HEIGHT AREA PER FLOOR	
	Not Limited	Not Limited
I	60 feet (4 stories)	15,000
II	30 feet (2 stories)	13,500
III (Protected)	20 feet (1 story)	9,000
III (Unprotected)		

**EXCEPTION:** Type III (Protected) buildings may be three stories in height if the floor level of the third floor is not more than 20 feet above the grade adjacent thereto.

Area of buildings located with public streets on two sides may be increased 25 percent, and if on three or more sides, may be increased 50 percent.

Basements shall be of Type I construction.

### 1303 LOCATION ON PROPERTY

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type of Construction in Part V.

### 1304 EXIT FACILITIES

Exit facilities for Group H Occupancies shall be as set forth in this Section and in Chapter 31.

**1304.1 OCCUPANT CONTENT:** For determining exit requirements of Group H Occupancy, the occupant content shall be the area within the perimeter of the building, or fire division, at any floor level, including all floors of residential apartments, with no deduction for corridors, divided by an area of 125 square feet per person, except that dormitory rooms shall be computed at 30 square feet per person.

**1304.2 WIDTH OF EXITS:** (a) Exits from street or ground floors shall be provided on the basis of one 22-inch unit of exit width for each 50 persons or fraction thereof on the ground floor plus one unit for each unit of exit width exiting through the ground floor from other floors. Exits from upper or lower floors other than the ground floor shall be provided on the basis of one 22-inch unit of exit width for each 30 persons or fraction thereof.

(b) All required paths of egress from floors shall be not less than 44 inches in width, except that where serving floors having not more than four apartment units or eight hotel rooms, one such required path of egress may be not less than 36 inches in width.

(c) The minimum width of exit doors from dwelling units or hotel rooms shall be not less than the following:

<b>AREA OF UNIT</b>	<b>EXIT</b>
Less than 250 square feet . . . . .	One 30-inch exit
251 to 450 square feet . . . . .	One 32-inch exit
451 to 2000 square feet . . . . .	One 32-inch exit and One 30-inch exit

(d) Residential - apartment units in multiple-apartment buildings, having a second floor or balcony contained wholly within the unit, shall have an exit not less than 36 inches in width for upper areas not exceeding 1000 square feet, and an additional exit not less than 30 inches in width for upper areas exceeding 1000 square feet. Width of exits from main floors of residential-apartment units shall be as otherwise set forth in this Section.

(e) Exit courts on lot lines shall have a clear width, not less than required by zoning, but not less than 44 inches, and inner courts shall have a clear width of not less than ten feet.

**1304.3 ARRANGEMENT OF EXITS:** (a) **UNIT EXITS:** Dwelling units and hotel rooms, 450 square feet or more in area, shall have not less than two remote exits, except as otherwise provided for the upper floors of residential-type apartments.

The landing on the upper floor of residential-apartment units shall be directly accessible from all rooms on such upper floor, and the stairway shall discharge on the main floor of the unit in close proximity to a path of egress from the unit. Where the upper floor of such unit has a gross floor area in excess of 1000 square feet, not less than two exits shall be provided, one of which shall be enclosed and shall discharge directly to a path of egress from the floor.

(b) **FLOORS:** There shall be not less than two remote paths of egress from each floor.

Floor exits shall be by means of stairways, ramps, horizontal exits, passageways or smokeproof towers, as specified in Chapter 31, or by doors, at or near grade, directly to the exterior.

Dead ends in exit corridors beyond a floor exit, or other corridor having two remote exits shall not exceed 20 feet.

The upper floor of two-story buildings may have interior stairways, enclosed where required under Types of Construction, or open exterior stairways.

The upper floors of three-story buildings shall have enclosed interior stairways for not less than one-half the required floor exits. Other upper floor exits may be open exterior stairways or enclosed interior stairways.

**EXCEPTION:** Where the floor level of the third floor does not exceed 20 feet above grade, all floor exits may be open exterior stairways.

The upper floors of buildings which exceed three stories shall have enclosed interior stairways, except that buildings which exceed five stories shall have not less than one-half of the required floor exits by smokeproof towers.

Where floors are divided in fire divisions, one exit from each such division may be a horizontal exit.

(c) **DOORS:** Doors in paths of egress, normally closed and latched, and serving more than 50 persons, shall be equipped with panic hardware.

(d) **TRAVEL DISTANCE:** The exits shall be so arranged that the maximum travel distance from any point, or from the door of separated spaces less than 1000 square feet, to the nearest floor exit shall not exceed 100 feet except that the travel distance in any room where one exit door is permitted shall not exceed 50 feet.

### 1305 LIGHT AND VENTILATION

**1305.1 GENERAL:** (a) Rooms used for sleeping or living purposes shall be provided with light and ventilation by means of windows in exterior walls with an area not less than one-eighth of the floor area of such rooms and not less than one-half of the required window area shall be openable. Other spaces for human occupancy such as lobbies, locker rooms, dining rooms, kitchens and toilet rooms shall be provided with light by means of windows as herein set forth or shall be provided with electric light and a mechanically operated ventilating system as set forth in Chapter 48.

(b) Rooms used for sleeping and living purposes, where located as the first-occupied space below a roof, shall be protected from extreme temperatures. The overall coefficient of heat transmission or "U" factor for such roof construction shall not be greater than 0.23.

(c) The floor area for an apartment shall be not less than required by applicable Zoning Regulations.

**1305.2 ROOMS:** (a) **SLEEPING ROOMS:** Rooms used for sleeping shall have a minimum width of eight feet, or a minimum floor area within the immediate enclosing walls, exclusive of closets and toilets, of 100 square feet, and a minimum floor area of 50 square feet for each person occupying such room. Rooms, the floor of which is more than three feet below grade and which depend on natural ventilation, shall not be used for sleeping purposes. The minimum average height of sleeping rooms shall be eight feet, and the least height shall be seven feet.



(b) **LIVING AND DINING ROOMS:** Living and dining rooms shall have a minimum height average of eight feet and a least height of seven feet.

(c) **KITCHENS AND CORRIDORS:** Kitchens and corridors shall have a minimum height of seven feet.

(d) **TOILETS:** Toilets shall have a minimum height of seven feet, a minimum width of three feet, and a minimum area of 15 feet.

### **1306 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as specified in Part V for the Type of Construction, and in Section 1204 and Chapter 31, except that unless otherwise required by Type of Construction, interior stair and ramp exits in buildings two stories in height need not be enclosed.

### **1307 FIRE PROTECTION AND HAZARDS**

**1307.1** Automatic-sprinkler systems, fire extinguishers and standpipes shall be as set forth in Chapter 38.

**1307.2** Chimneys, flues and vents shall be as set forth in Chapter 39.

**1307.3** Heat-producing apparatus shall be as set forth in Chapter 40.

**1307.4** The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

**1307.5** Electrical installations shall be as required herein and as specified in Part XI.

**1307.6** Transformer vaults shall be as set forth in Section 4101.

**1307.7** The storage of flammable materials shall be as set forth in Chapter 41.

### **1308 PLUMBING AND SANITATION**

**1308.1** Plumbing shall be installed as set forth in Part XII.

**1308.2** Sanitation shall be as set forth in Section 512 except as follows:

(a) Toilet rooms serving a one-family unit shall have outside openings, screened with 18-mesh wire screening.

(b) For occupancies with an occupant content of ten or more persons, separate facilities shall be provided for employees.

(c) Separate facilities consisting of a water closet, a lavatory, and a bath or shower shall be contiguous thereto and directly accessible from each hotel room.

(d) Lavatories may be located in rooms, provided there is no conflict with minimum requirements otherwise set forth herein.

**1309 MIXED OCCUPANCY**

Separation of Group H Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.

## Chapter 14 — Requirements for Group I Occupancy

- 1401 GROUP I OCCUPANCY DEFINED
- 1402 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE
- 1403 LOCATION ON PROPERTY
- 1404 EXIT FACILITIES
- 1405 LIGHT AND VENTILATION
- 1406 ENCLOSURE OF VERTICAL OPENINGS
- 1407 FIRE PROTECTION AND HAZARDS
- 1408 PLUMBING AND SANITATION
- 1409 MIXED OCCUPANCY

### 1401 GROUP I OCCUPANCY DEFINED

Group I Occupancy shall include all single-family uses and duplexes, rooming houses, dormitories, fraternity houses, monasteries, and Group C uses for not more than ten persons and Group D-2 uses for not more than six persons, and funeral homes having an assembly space for not more than 100 persons.

### 1402 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE

Buildings, or part of buildings, classed in Group I because of use or occupancy shall be limited in height and area as followse

TYPE	STORIES	AREA OF FLOOR
I	Not Limited	Not Limited
II	Four	15,000
III (Protected)	Two	10,000
III (Unprotected), IV & V	One	7,500

**EXCEPTION:** Type III (Unprotected) and Type V may be two stories in height and the second floor occupants shall be protected by one-hour fire-resistive or heavy-timber construction.

### 1403 LOCATION ON PROPERTY

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type of Construction in Part V.

## 1404 EXIT FACILITIES

Exit facilities for Group I Occupancies shall be as set forth in this Section and in Chapter 31.

**1404.1 OCCUPANT CONTENT:** The occupant content of Group I Occupancy shall be 125 square feet per person. The occupant content for assembly purposes shall be as set forth in Sub-section 604.1.

**1404.2 WIDTH AND ARRANGEMENT OF EXITS:** (a) **FIRST-FLOOR EXITS:** The minimum number and width of exits shall be as follows:

<b>GROUND-FLOOR AREA IN SQUARE FEET</b>	<b>EXITS (Number and width)</b>
450 .....	One 32-inch
451 to 2000 .....	One 32-inch and One 30-inch

Rooms or spaces used for assembly purposes shall comply with Section 704.

(b) **SECOND FLOOR EXITS:** Second floors of single-family residences not exceeding 1500 square feet and of other Group I Occupancies not exceeding 750 square feet, may be served by a stairway not less than 30 inches in width, discharging at or near a ground-floor exit. Second floors of single-family residences exceeding 1500 square feet and of other Group I Occupancies exceeding 750 square feet shall have not less than two stairways, neither of which shall be subject to severe fire exposure.

Duplex units of residential-apartment type shall have exits as set forth in Section 1304.

(c) **THIRD-FLOOR EXITS:** Third floors which may be used for sleeping purposes shall have stairways as provided for a second floor, except that one such stairway shall be enclosed and shall discharge directly to the exterior.

(d) **ARRANGEMENT OF STAIRWAYS:** Stairways shall be arranged to provide the greatest accessibility to landings on floors above the first or ground floor and to provide the shortest and safest practical means of egress to a street or other similar public space.

(e) **TRAVEL DISTANCE:** The exits shall be so arranged that the maximum travel distance to the nearest exit shall not exceed 75 feet.

## 1405 LIGHT AND VENTILATION

**1405.1 GENERAL:** Rooms used for sleeping or living purposes shall be provided with light and ventilation as set forth in Section 1305.1.

**1405.2 SLEEPING ROOMS:** Rooms used for sleeping shall have a minimum width of eight feet, or a minimum floor area within the immediate enclosing walls, exclusive of closets and toilets, of 100 feet, and a minimum floor area of not less than 50 square feet for each person occupying such room, except that where two such sleeping rooms are provided for anyone-family unit additional sleeping rooms need be no larger than 80 square feet in area. The minimum average height of sleeping rooms shall be eight feet, and the least height shall be seven feet.

**1405.3 LIVING AND DINING ROOMS:** Living and dining rooms shall have a minimum average height of eight feet and a least height of seven feet.

**1405.4 KITCHENS AND HALLWAYS:** Kitchens and hallways shall have a minimum height of seven feet.

**1405.5 TOILETS:** Toilets shall have a minimum height of seven feet, a minimum width of three feet, and a minimum area of 15 feet and shall be ventilated as set forth in Section 1305.1.

#### **1406 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as set forth in Part V for the Type of Construction, and in Section 1404 and Chapter 31, except that interior stair or ramp exits in buildings not exceeding two stories in height need not be enclosed.

#### **1407 FIRE PROTECTION AND HAZARDS**

**1407.1** Chimneys, flues and vents shall be as set forth in Chapter 39.

**1407.2** Heat-producing apparatus shall be as set forth in Chapter 40.

**1407.3** Electrical installations shall be as required herein and as specified in Part XI.

**1407.4** The storage of flammable materials shall be as set forth in Chapter 41.

#### **1408 PLUMBING AND SANITATION**

**1408.1** Plumbing shall be installed as set forth in Part XII.

**1408.2 (a)** Sanitation fixtures shall be as set forth in Sub-section 512.4.

(b) Toilet room floors and base shall be impervious materials.

(c) Toilet rooms shall have outside openings screened with 18-mesh-wire screen.

(d) Ample provision shall be made for the storage of waste within the lines of the lot or lots occupied.

#### **1409 MIXED OCCUPANCY**

Separation of Group I occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.



## **Chapter 15 — Requirements for Group J Occupancy**

- 1501 GROUP J OCCUPANCY DEFINED**
- 1502 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE**
- 1503 LOCATION ON PROPERTY**
- 1504 EXIT FACILITIES**
- 1505 LIGHT AND VENTILATION**
- 1506 ENCLOSURE OF VERTICAL OPENINGS**
- 1507 FIRE PROTECTION AND HAZARDS**
- 1508 PLUMBING AND SANITATION**
- 1509 EXCEPTIONS AND DEVIATIONS**
- 1510 MIXED OCCUPANCY**

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### **1501 GROUP J OCCUPANCY DEFINED**

Group J occupancy shall include:

**DIVISION 1:** Garages for four or less motor vehicles, porte-cocheres, and car-portes.

**DIVISION 2:** Tanks, towers and similar structures and fences.

**DIVISION 3:** Stadiums, reviewing stands, grandstands and similar structures.

**DIVISION 4:** Cabanas and bath houses and similar structures.

**DIVISION 5:** Public and private swimming pools and buildings accessory thereto.

**DIVISION 6:** Solariums, sundecks and similar roofless structures.

**DIVISION 7:** Greenhouses and agricultural buildings and accessory uses to agriculture operations when located on the lot of ground so used.

**DIVISION 8:** Open storage yards including lumber yards and contractors' storage yards.

### **1502 CONSTRUCTION, HEIGHT AND AREA ALLOWABLE**

**1502.1 DIVISION 1:** Buildings, or parts of buildings, classed in Group J-1 because of use or occupancy shall be limited to one story in height and 1000 square feet in area, except that Type V buildings shall be limited to 500 square feet in area.

**1502.2** Tanks and towers shall be designed and constructed as set forth in Part VI.

Fences shall be of rot and termite-resistive materials. Fences shall be substantially constructed and secure. Fences may be of steel posts and wire. Fences may be of reinforced concrete or of masonry units or rock, but fences more than two feet high and of loose or casual masonry or rock shall not be permitted. Fences of masonry units shall be as set forth in Sub-section 2704.8. Unless otherwise limited by zoning regulations, property-line fences on property zoned for residential use shall be limited to five feet in height, and masonry fences on property zoned for commercial use shall be designed and constructed as set forth in Part VI.

**EXCEPTION:** Fences for the enclosure of land used for agricultural purposes shall be exempt from the requirements of this Sub-section.

**1502.3 DIVISION 3:** (a) Stadiums, reviewing stands, grandstands and similar structures shall conform to the standard 'Places of Outdoor Assembly' NFPA No. 102 of the National Fire Protection Association which is hereby adopted, excepting that portion in reference to tents, to supplement, but not supersede, the specific requirements set forth herein.

(b) Permanent structures shall be constructed of Type I or Type IV construction. Permanent construction of exposed combustible materials shall not be permitted under public seating. Any enclosed space under public seating not a part of or not actively used in connection with every public assembly in the grandstand shall be separated therefrom as set forth in Section 508.

(c) Temporary structures may be constructed of unprotected steel or wood and shall be not more than one story or 30 feet in height, and not more than 50 feet in width, front to rear.

(d) Where tents are used for public assembly, they shall be as set forth in Section 4306.6.

**1502.4 DIVISION 4:** Buildings in Division 4 of Group J shall conform to the requirements based on location in the fire zone and to the following specific restrictions:

Type	Allowable Height	Area Per Floor
I	Unlimited	Unlimited
II	60 feet (4 stories)	10,000
III (Protected)	30 feet (2 stories)	5,000
III (Unprotected) & IV	20 feet (1 story)	3,000
V	10 feet (1 story)	1,000

**1502.5 DIVISION 5:** (a) Above-grade structures, accessory to pools, shall be limited in height and area as the Group of Occupancy to which they are accessory.

(b) Swimming pools shall comply with the detailed requirements set forth in Chapter 50.

**1502.6 DIVISION 6:** Structures classed in Division 6 of Group J may be located on the roof of a building classed as Group D, F, G, H or I Occupancy. Framework and bracing shall be of incombustible materials.

Horizontal canvas shall be limited to a total of 20 percent of the area for the roof of the building.

**1502.7 DIVISION 7:** Buildings, or parts of buildings, classed in Division 7 of Group J shall be limited to one story in height and may be of any type of construction.

Ordinary glass may be used in the roofs and walls of greenhouses provided the height at the ridge is less than 20 feet above grade. Where the height at the ridge is 20 feet or more above grade, or where such building exceeds 5000 square feet in area, greenhouses shall be of incombustible materials, including the frames of windows and skylights. Metal supporting members, including glass frame and sash bars, where less than three-sixteenths inch in thickness, shall be corrosion resistant.



A structure not exceeding 50 square feet in area, accessory to a single-family residence and complying with Part V of this Code, shall not be limited as set forth herein.

**1502.8 DIVISION 8:** Lots classed in Division 8 of Group J shall be enclosed in a masonry wall, unplastered where abutting private property, and shall be not less than five feet in height, except that where combustible materials are stored, the height of such wall shall be not less than five feet nor less than the height of the material minus one-fifth of the distance from such wall to such stored combustible materials.

**EXCEPTION:** The requirements of this Sub-section shall not supersede applicable zoning regulations.

### **1503 LOCATION ON PROPERTY**

Exterior walls shall have fire-resistance and opening protection, determined by location on property, as set forth for the Type of Construction in Part V.

### **1504 EXIT FACILITIES**

Exit facilities of Group J occupancies shall be as set forth in this Section and in Chapter 31.

**1504.1 DIVISION 1:** There shall be not less than two separate and remote paths of egress from every area of more than 400 square feet, one of which may be the main entrance door or doors.

**1504.2 DIVISION 3:** Exit facilities shall be as set forth in the standard in Paragraph 1502.3 (a)

(a) **EXITS:** No seat shall be more than 150 feet from an exit from a deck or the structure. Such exits shall open directly to a public space or onto a clear and permanently unobstructed court or yard not less than 30 feet in width and providing access to such public space.

For the determination of widths of exit facilities, there shall be not less than one 22-inch unit of exit width for each 100 persons or 700 square feet or fraction thereof, except that passageways when required, shall be not less than five feet in width, and stairways or ramps shall be not less than 44 inches in width.

Stairways shall be as specified in Section 3102 for outside stairways.

There shall be a clear, unobstructed path of egress from every seat to grade, either downward or horizontally, or a combination thereof.

(b) **AISLES:** Seats shall be so arranged that there shall be not more than 20 seats in permanent structures and ten seats in temporary structures of unprotected steel or wood, between any seat and as aisle.

Temporary bleachers, to be used for a period of not more than one week, and rollaway, telescoping and fold-up bleachers, having seats without backs and with not more than eleven rows of seats, need not be provided with aisles if the vertical distance between seats does not exceed 12 inches and where aisles are required, such aisles shall be not less than 42 inches in width.

(c) **SEATS:** Where the seats are not spaced or marked off, a distance of 18 inches along any bench or platform shall be considered one seat.

Seats shall be spaced not less than 26 inches center to center when no backs are provided, and 30 inches center to center when backs are provided.

(d) **GUARD RAILS:** Open-end sections of bleachers shall be provided with substantial guard rails for that portion above the fourth row of seats. Where the back of a bleacher section is not placed against a wall, a substantial guard rail shall be provided at the back of the section.

Where bleacher seats are placed on platforms above the main floor, a cross-aisle and guard rail shall be provided at the front of such sections.

Guard rails shall be as set forth in Section 3108.

**1504.3 DIVISION 4:** There shall be not less than two exits from every room or floor exceeding 450 square feet in area and two separate and remote paths of egress from every room or compartment door.

When such buildings are more than one story in height, exits shall be as set forth in Section 1304.

**1504.4 DIVISION 6:** (a) Structures located on the ground shall have not less than two separate and remote paths of egress to a street or similar public space.

(b) Structures or areas located on the roof of any Group D, F, or H Occupancy shall have exits as set forth in Section 1304 except that where the gross floor area of such structure does not exceed 1000 square feet, one enclosed interior stairway or smoke-proof tower which has a width of not less than 44 inches may serve as required path of egress.

**1504.5 DIVISION 7:** Exits in agricultural buildings shall be located so that no part of such building is more than 150 feet from an exit.

## **1505 LIGHT AND VENTILATION**

**1505.1 DIVISION 1:** Closed garages shall be provided with fixed louvers or screened openings through the exterior walls at or near the floor level, the clear area of which shall be not less than 60 square inches per motor vehicle accommodated.

**1505.2 DIVISIONS 3 and 4:** All portions, customarily used for human occupancy, shall have light and ventilation as provided in the occupancy most suitably applicable. Exit and emergency lighting may be omitted when such occupancies are used only during daylight hours.

## **1506 ENCLOSURE OF VERTICAL OPENINGS**

Vertical openings shall be enclosed as set forth in Part V for the Type of Construction, and in Section 1504 and Chapter 31.

## **1507 FIRE PROTECTION AND HAZARDS**

**1507.1—GENERAL:** (a) Automatic-sprinkler systems, fire extinguishers and standpipes shall be as set forth in Chapter 38.

(b) Chimneys, flues and vents shall be as set forth in Chapter 39.

(c) Heat-producing apparatus shall be as set forth in Chapter 40.

(d) The service of hazardous utilities shall be as set forth in Section 509 and other portions of this Code applicable thereto.

(e) Electrical installations shall be as required herein and as specified in Part XI.

(f) Transformer vaults shall be as set forth in Section 4101.

(g) The storage of flammable materials shall be as set forth in Chapter 41.

**1507.2 REQUIREMENT BY DIVISION: (a) DIVISION 1:**

Where more than three motor vehicles are stored in an enclosed garage, such building shall be equipped with an extinguisher or extinguishers providing not less than one unit of fire protection.

Floors of porte-cocheres and car-portes attached to buildings of other occupancies and floors of enclosed garages shall be of non-absorbent and incombustible material. Asphalt paving shall be permitted in porte-cocheres and carports of Group I Occupancy. When a porte-cochere or carport is enclosed for any purpose the floor shall conform to the requirements of the proposed use.

A garage attached to a residence shall be separated therefrom by not less than one-hour fire-resistive construction. The only openings in such fire separations shall be personnel doors not entering directly into rooms used for sleeping purposes, air conditioning ducts and trap doors to attic spaces. Personnel doors shall be protected on the garage side with not less than 24-gage sheet metal or one-fourth-inch rigid asbestos board, or shall be 1 and 3/4-inch solid-core doors, and such doors shall be equipped with automatic closers. Trap doors to attic spaces shall be fire-resistive. The floor of the main occupancy shall be not less than seven inches above the garage floor.

Where any garage, porte-cochere or car-porte, is located under another occupancy, there shall be not less than one-hour fire-resistive construction, separating such Group J-1 Occupancy from Group I Occupancy and not less than two-hour fire-resistive construction separation from all other occupancies.

No fire dampers will be required in ducts penetrating such wall.

(b) **DIVISION 3:** The space under temporary structures of Division 3 of Group J shall not be used for any purpose whatsoever.

(c) **DIVISION 8:** Where combustible materials are stored, yard hydrants shall be provided as set forth in Section 3805.

**1508 PLUMBING AND SANITATION**

**1508.1** Plumbing shall be installed as set forth in Part XII.

**1508.2** Sanitation shall be as set forth in Section 512 except that the requirement for sanitary fixtures may be proportionately adjusted for relatively small occupant loads, where Sub-section 512.4 is not specific and where sanitary standards are suitably maintained.

**1509 EXCEPTIONS AND DEVIATIONS**

**DIVISION 2:** Isolated tanks for the storage of liquids or gases, radio towers, flag poles and similar structures may be constructed of unprotected steel or iron, and tanks for the storage of water on the roofs of buildings may be of wood or unprotected steel, enclosed with walls and roof as required for the building.

**1510 MIXED OCCUPANCY**

Separation of Group J Occupancies or divisions thereof from all other occupancies or divisions of occupancies shall be as specified in Chapter 5.

**PART IV — (Reserved)**

**Chapter 16 — (Reserved)**















## **PART V — TYPES OF CONSTRUCTION**

### **Chapter 17 — Classification by Types of Construction**

#### **1701 CLASSIFICATION**

#### **1702 EXISTING BUILDINGS**

##### **1701 CLASSIFICATION**

**1701.1** The requirements of Part V are minimum for the various Types of Construction and are intended to represent varying degrees of public safety and resistance to fire. For the purpose of this Code, Type I shall be deemed to be the most fire-resistive and Type V the least fire-resistive Type of Construction.

**1701.2** All buildings and structures shall be classified by the Building Official into one of the Type of Construction set forth in Chapters 18, 19, 20, 21 and 22. In order that a building or structure may be classified in any specific Type of Construction, it is necessary that all the requirements for that Type shall be at least equalled.

**1701.3** No building or portion thereof shall be required to conform to the details of a Type of Construction higher than that Type which meets the minimum requirements based on "Occupancy" (Part III) even though certain features of such building actually conform to a higher Type of Construction.

**1701.4** Where specific materials, types of construction or fire-resistive protection are required, such requirements shall be the minimum requirements, and any materials, types of construction of fire-resistive protection which will afford equal or greater public safety or resistance to fire as specified in this Code may be used, subject to the provisions of Section 204.

**1701.5** When two or more Types of Construction occur in the same building and are separated as required in Chapter 5, each portion so separated may be classified as of the Type of Construction to which it conforms; otherwise, the whole building shall be classified as of the least fire-resistive Type of Construction used and shall be subject to the restrictions imposed upon that Type.

**1701.6** Minor accessory buildings of unprotected incombustible materials not exceeding 10 percent of the ground floor of the primary building, nor 1500 square feet, whichever is larger, may, where separated from the primary building is required in Chapter 5, be constructed without changing the fire-resistive classification of the primary building based on Type of Construction.

##### **1702 EXISTING BUILDINGS**

An existing building which by its construction cannot be definitely classed as of Type I, II, III, IV, or V as defined in this Part shall be deemed, for the purpose of this Code, to belong to the least fire-resistive of the two Types to which it most nearly conforms.

## Chapter 18 — Type I Buildings (Fire-Resistive)

- 1801 DEFINITION
- 1802 GENERAL
- 1803 STRUCTURAL FRAMEWORK
- 1804 WALLS AND PARTITIONS
- 1805 FLOORS
- 1806 ROOFS
- 1807 ENCLOSURE OF VERTICAL OPENINGS
- 1808 STAIRWAYS
- 1809 DOORS AND WINDOWS
- 1810 PROJECTIONS FROM THE BUILDING
- 1811 ROOF STRUCTURES AND SKYLIGHTS
- 1812 COMBUSTIBLE MATERIALS REGULATED

### 1801 DEFINITIONS

The structural frame of Type I buildings or structures shall be of steel or reinforced concrete and walls, permanent partitions, roofs and floors shall be of incombustible fire-resistive construction.

### 1802 GENERAL

- 1802.1 Allowable height and area shall be as specified in Part III.
- 1802.2 Loads and material stresses shall be as specified in Part VI.
- 1802.3 Required fireproofing shall be as specified in Chapter 37.

### 1803 STRUCTURAL FRAMEWORK

1803.1 The primary structural framework shall be of not less than the following fire-resistive construction:

(a) For buildings more than eight stories or 100 feet in height; exterior frame four hours, interior frame three hours.

(b) For buildings eight stories or 100 feet or less in height; exterior frame three hours, interior frame two hours.

(c) **EXCEPTION:** For buildings eight stories or 100 feet or less in height, exterior frame may have the fire-resistance as set forth for exterior walls in Sub-section 1804.1 but not less than two hours for buildings which exceed four stories or 50 feet nor less than one hour for buildings not exceeding four stories or 50 feet.

1803.2 Unless specifically designed as a structural frame, the walls shall be considered as load-bearing and shall be constructed of masonry or re-inforced concrete except that masonry bearing walls shall be limited to 35 feet in height. Bearing walls shall be of fire-resistive construction as set forth in Section 1804 but not less than as set forth for the structural frame in Paragraph 1803.1 (b).

### 1804 WALLS AND PARTITIONS

Distance separations shall be measured at right angles from the wall or opening to the building line of a contiguous lot or any building on the same lot. Where a building line varies by the use of the land, the building line of a contiguous lot shall be taken as that for the use which requires the least set back from the property line but in no case taken as more than five feet from and parallel to the common lot line.

1804.1 (a) Main exterior walls shall be of incombustible four-hour fire-resistive construction.

(1) Main exterior bearing walls of buildings for Occupancies other than Group E, having a distance separation of more than ten feet may be of three-hour fire-resistive construction and where having a distance separation of more than 20 feet may be of one-hour fire-resistive construction.

(2) Main exterior non-bearing walls of buildings for occupancies other than Group E, having a distance separation of more than five feet may be of three-hour fire-resistive construction and where having a distance separation of more than ten feet may be of two-hour fire-resistive construction and where having a distance separation of more than 20 feet may be of one-hour fire-resistive construction.

(3) Main exterior walls of buildings for other than Group E Occupancy having a distance separation of 30 feet may be of unprotected incombustible construction with no limit on the area of openings, or such walls may be omitted.

(4) Main exterior walls of buildings used for parking garages shall be of not less than two-hour fire-resistive construction except that walls having a distance separation of 15 feet or more shall be of incombustible materials or may be omitted as provided in Sub-paragraph 1804.1 (b) (4).

(b) Openings in main exterior walls shall be as follows:

(1) Walls having a distance separation of less than five feet, or walls, except on street fronts, which are less than five feet from the building line of a contiguous lot, shall have no openings.

(2) Openings in walls of buildings other than Group E Occupancy having a distance separation of from five to ten feet shall be protected by fire-resistive doors or windows and the total area of openings in any story shall be limited to 30 percent with no single opening more than ten percent of such wall area and walls having a distance separation of more than ten feet but less than 30 feet shall be protected by ordinary doors or windows not exceeding 50 percent of the wall area in any story.

(3) Openings in walls of buildings of Group E Occupancy having a distance separation from five to 30 feet shall be protected by fire-resistive doors and windows and the total area of openings in any story shall be limited to 20 percent.

(4) Openings in walls of buildings used for parking garages having a distance separation of from five to 15 feet shall be protected by fire-resistive doors and windows and the area of such openings shall not exceed 50 percent of the wall area in any story and where having a distance separation of 15 feet or more shall be protected by ordinary doors and windows provided that where, in the opinion of the Building Official, a fire hazard or noise or light nuisance is not thereby created, the Building Official may waive or vary the enclosure and opening protection requirements for walls having a distance separation of 15 feet or more.

**1804.2** Fire walls shall be of the fire-resistive rating as required in Chapter 5.

**1804.3** Interior bearing walls shall be three-hour fire-resistive construction.

**1804.4** Partitions shall be two-hour fire-resistive construction, except that decorative partitions dividing portions of offices, stores, or similar places occupied by one tenant only may be constructed of wood, provided the space, one-quarter of the floor-to-ceiling height as measured down from the ceiling, shall be open or of opaque or translucent, incombustible material, or such partitions may be of incombustible or one-hour fire-resistive construction.

### **1805 FLOORS**

**1805.1 MATERIALS:** (a) Floor systems shall be of incombustible materials. For buildings exceeding eight stories or 100 feet in height, no precast (nor prestressed) concrete members shall be used. No poured-in-place slabs less than 2½ inches thick on pans or 2 inches thick on tile or block fillers shall be used.

(b) Where wood floors are laid over concrete slabs, the space between the floor slab and the underside of the finish floor shall be filled with incombustible materials.

**1805.2 FIREPROOFING:** Floors for buildings more than eight stories or 100 feet in height shall be of not less than three-hour fire-resistive construction, and for buildings eight stories or 100 feet or less in height shall be of not less than two-hour fire-resistive construction.

### **1806 ROOFS**

**1806.1 MATERIALS:** Roof systems shall be of incombustible materials. For buildings exceeding eight stories or 100 feet in height, no precast (nor prestressed) concrete members shall be used. No poured-in-place slabs less than 2½ inches thick on pans or 2 inches thick on tile or block fillers shall be used.

**1806.2 FIREPROOFING:** Roofs for buildings more than eight stories or 100 feet in height shall be of not less than three-hour fire-resistive construction, and for buildings eight stories or 100 feet or less in height shall be of not less than two-hour fire-resistive construction, except:

(a) Roofs, where every part of the structural framework is 20 feet or more above any part of any floor, balcony, or gallery, need not be fireproofed.

(b) Roofs, where every part of the structural framework is more than 15 feet and less than 20 feet above any part of any floor, balcony, or gallery, shall be protected by a ceiling of not less than one-hour fire-resistive construction.

**1806.3 ROOF COVERINGS:** Roof coverings shall be fire-retardant and as specified in Chapter 34.

**1806.4 ROOF DRAINAGE:** Roof drainage and the disposal of rain water shall be as specified in Part XII. Where parapets or curbs are constructed above the level of a roof, provisions shall be made, such as by scuppers or similar positive overflow arrangements, to prevent rain water in excess of that considered in the design from accumulating on the roof in the event that rain water drains or leaders become clogged. Where scuppers are installed they shall be not less in area than twice the area required for the contributory downspout leaders and the bottom of the scupper shall be not more than 4 inches above the low point of the roof.

**1806.5 FURRED SPACES ABOVE A CEILING:** Access scuttles, not less than 16 inches by 30 inches, shall be provided to all spaces above a furred ceiling having a minimum vertical distance of 36 inches. Such access scuttles shall be from common spaces such as corridors and no part of such furred space shall be more than 100 feet from an access scuttle.

#### **1807 ENCLOSURE OF VERTICAL OPENINGS**

Enclosure of vertical openings shall be of incombustible materials and not less than one-hour fire-resistive construction, and where such openings exceed eight square feet in area shall be of not less than two-hour fire-resistive construction, with fire-resistive doors and/or windows.

#### **1808 STAIRWAYS**

**1808.1** Stairways shall be as required in Part III and Chapter 31.

**1808.2** Stairs, stair platforms, treads and risers shall be constructed of incombustible materials. Unprotected steel or iron stairways may be used only when enclosed.

#### **1809 DOORS AND WINDOWS**

**1809.1** Doors, windows and similar openings in exterior walls, fire walls and enclosure walls shall be protected or entirely prohibited as set forth in this Chapter, Chapter 31, or in Occupancy, Part III.

**1809.2** Doors and windows shall not project over public property or restricted areas except as provided in Chapter 36.

#### **1810 PROJECTIONS FROM THE BUILDING**

Cantilevering projections outside of the main exterior walls of the building shall be of incombustible construction and fire-resistive as specified in this chapter.

One-story porches or canopies outside of the main exterior walls of the building, or marquees, shall be constructed of incombustible materials.

Architectural projections shall be limited as set forth in Chapter 36.

#### **1811 ROOF STRUCTURES AND SKYLIGHTS**

**1811.1** Towers, pylons, masts, signs, and similar structures above a roof, when not enclosed, shall be of incombustible materials.

**1811.2** Roof structures, including bulkheaded areas, shall be limited in total combined area to 30 percent of the area of the roof, shall extend not more than 50 feet above the roof and any enclosure having a floor area of more than 15 square feet, shall be constructed as required for the main portion of the building.

**1811.3** Minor roof structures having an area of 15 square feet or less, housing ventilating shafts or similar openings shall be constructed of incombustible materials.

**1811.4** Water storage tanks and cooling towers may be of wood.

**1811.5** Storage tanks, having a capacity of over 500 gallons shall not be located over stairways or elevators.

**1811.6** Skylights shall be constructed of incombustible materials, and transparent or translucent materials shall be fire-resistive.

1811.7 Where required to control rain water runoff, a curb not less than eight inches in height shall be provided.

1811.8 Where the public has access to roof areas, a guard rail not less than 36 inches above the roof shall be provided around all open wells or shafts and at all exterior walls.

#### **1812 COMBUSTIBLE MATERIALS REGULATED**

Combustible materials shall be permitted for the following uses unless otherwise specifically prohibited:

1812.1 Show-window bulkheads shall be of incombustible materials, but show cases and other movable appurtenances of stores or other buildings may be of wood.

1812.2 Trim, picture molds, furniture and permanent seats, chair rails, wainscoting, baseboards, handrails, show-window backing, temporary partitions as provided in Sub-section 1804.6, floor finishes and sleepers may be of combustible materials. Wood doors or windows or frames may be used except where fire-resistive protection is required.

1812.3 Loading platforms for warehouses, freight depots and similar buildings may be of heavy timber construction with wood floors not less than one and five-eighths inches thick. Such wood construction shall not be carried through the exterior walls.

1812.4 Interior finishes shall be as set forth in Section 3710.





## **Chapter 19 —Type II Buildings (Semi Fire-Resistive)**

- 1901 DEFINITION**
- 1902 GENERAL**
- 1903 STRUCTURAL FRAMEWORK**
- 1904 WALLS AND PARTITIONS**
- 1905 FLOORS**
- 1906 ROOFS**
- 1907 ENCLOSURE OF VERTICAL OPENINGS**
- 1908 STAIRWAYS**
- 1909 DOORS AND WINDOWS**
- 1910 PROJECTIONS FROM THE BUILDING**
- 1911 ROOF STRUCTURES AND SKYLIGHTS**
- 1912 COMBUSTIBLE MATERIALS REGULATED**

### **1901 DEFINITION**

The structural frame of Type II buildings or structures shall be of steel or reinforced concrete and the exterior walls, interior bearing walls, and walls enclosing vertical openings shall be of incombustible fire-resistive construction.

Permanent partitions, floors and roofs shall be of fire-resistive construction but may be of combustible materials as regulated herein.

### **1902 GENERAL**

**1902.1** Allowable height and area shall be as specified in Part III except as otherwise set forth herein.

**1902.2** Loads and material stresses shall be as specified in Part VI.

**1902.3** Required fireproofing shall be as set forth in Chapter 37.

### **1903 STRUCTURAL FRAMEWORK**

**1903.1** The primary structural framework shall be of not less than three-hour fire-resistive construction for members in exterior walls and of not less than one-hour fire-resistive construction for members of the interior frame except that members in the exterior walls may have the fire protection set forth in Sub-section 1904.1 but, where exceeding one story in height, shall be of not less than one-hour fire-resistive construction.

**1903.2** Unless specifically designed as a structural frame the walls shall be considered as load-bearing and shall be constructed of masonry or reinforced concrete, except that masonry bearing walls shall be limited to 35 feet in height.

### **1904 WALLS AND PARTITIONS**

**1904.1** Exterior walls shall be as set forth in Sub-section 1804.1.

**1904.2** Fire walls shall be of the fire-resistive rating as required in Chapter 5.

**1904.3** Interior bearing walls shall be of incombustible one-hour fire-resistive construction.

**1904.4** Partitions shall be of not less than one-hour fire-resistive construction, except that decorative partitions dividing portions of offices, stores, or similar places occupied by one tenant only may be constructed of wood, provided the space, one-quarter of the floor-to-ceiling, shall be open or of opaque or translucent incombustible materials, or such partitions may be of incombustible materials.

### **1905 FLOORS**

**1905.1 MATERIALS:** (a) Floors shall be of incombustible materials except that for buildings not exceeding three stories in height, wood joists may be used for spans not exceeding 16 feet clear distance between supports.

(b) Wood joists shall not be used to support concrete and cement-base tile or terrazzo floor surfaces other than for bathrooms of less than 100 square feet in area.

(c) Spaces under a ground floor shall have the clearance and ventilation as set forth in Paragraph 2907.3(b). Access openings shall be provided to all space under the building.

**1905.2 FIREPROOFING:** Floors and all parts thereof shall be not less than one-hour fire-resistive construction, except that where the space under a ground floor has clearance of less than three feet, such fire protection for the ground floor may be omitted.

## 1906 ROOFS

**1906.1 MATERIALS:** Roofs shall be of incombustible materials except that for buildings not exceeding three stories in height, wood joists may be used for spans not exceeding 16 feet clear distance between supports.

**1906.2 FIREPROOFING:** Roofs and all parts thereof shall be of not less than one-hour fire-resistive construction, except as follows:

(a) Roofs, where every part of the structural framework is 20 feet or more above any part of any floor, balcony or gallery, need not be fire-proofed.

(b) Roofs of one-story open sheds not more than 75 percent enclosed by walls, not of Group E Occupancy, and in which the travel distance to the nearest exit does not exceed 40 feet, may be of unprotected incombustible materials.

**1906.3 ROOF COVERINGS:** Roof coverings shall be fire-retardant and as specified in Chapter 34.

**1906.4 ROOF DRAINAGE:** Roof drainage and the disposal of rain water shall be as specified in Part XII. Where parapets or curbs are constructed above the level of a roof, provision shall be made, such as by scuppers or similar positive overflow arrangements, to prevent rain water in excess of that considered in the design from accumulating on the roof in the event that rain water drains or leaders become clogged. Where scuppers are installed, they shall be not less in area than twice the area required for the contributory downspout leaders and the bottom of the scupper shall be not more than 4 inches above the low point of the roof.

**1906.5 ATTIC SPACES:** Attic spaces shall not be required, but where attic spaces are provided, such space shall have a minimum vertical dimension of 18 inches clear distance and where unprotected combustible material is exposed, shall be divided by fire-stops, into areas not exceeding 2500 square feet. Access scuttles, not less than 16 inches by 30 inches, shall be provided to all attic spaces. Such access scuttles shall be from common spaces such as corridors, and no part of an attic space shall be more than 100 feet from an access scuttle.

## 1907 ENCLOSURE OF VERTICAL OPENINGS

**1907.1** Enclosure of vertical openings shall be incombustible materials and where such openings exceed eight square feet in area shall be of not less than one-hour fire-resistive construction with fire-resistive door and/or windows.

**1907.2** Sheet metal used for vent shafts shall be of not less than 24-gauge with locked or riveted seams and joints. Such metal shafts shall be kept at least three inches clear of any combustible materials or shall be protected by not less than three-eighths-inch approved plasterboard or one-fourth-inch asbestos, and such shafts shall be fire-stopped around the outside at each floor and/or ceiling through which they pass with incombustible materials properly supported. All doors into shafts which are eight square feet or less in cross-sectional area shall be of metal or metal-clad, or may be wood protected on the shaft side with not less than one-fourth-inch asbestos and metal-bound, and all windows into such shafts shall be of wire glass.

## **1908 STAIRWAYS**

**1908.1** Stairways shall be as required in Part III and Chapter 31.

**1908.2** Stairs, stair platforms, treads and risers shall be constructed of incombustible materials. Unprotected steel or iron stairways may be used only when enclosed.

## **1909 DOORS AND WINDOWS**

**1909.1** Doors, windows, and similar openings in exterior walls, fire walls and enclosure walls shall be protected or entirely prohibited as set forth in this Chapter, Chapter 31, or in Occupancy, Part III.

**1909.2** Doors and windows shall not project over public property or restricted areas except as provided in Chapter 36.

## **1910 PROJECTIONS FROM THE BUILDING**

Cantilevering projections outside of the main exterior walls of the building shall be of incombustible construction and fire-resistive as specified in this Chapter.

One-story porches or canopies outside of the main exterior walls of the building, or marquees, shall be constructed of incombustible materials.

Architectural projections shall be limited as set forth in Chapter 36.

## **1911 ROOF STRUCTURES AND SKYLIGHTS**

**1911.1** Towers, pylons, masts, signs, and similar structures above a roof, when not enclosed, shall be of incombustible materials. Roof structures extending more than 25 feet above the roof or signs more than 100 square feet in area shall be supported to the ground by an incombustible frame.

**1911.2** Roof structures, including bulkheaded areas, shall be limited in total combined area to 30 percent of the area of the roof, shall extend not more than 20 feet above the allowable height, and any enclosure having a floor area of more than 15 square feet, shall be constructed as required for the main portion of the building.

**1911.3** Minor roof structures having an area of 15 square feet or less, housing ventilating shafts or similar openings shall be constructed of incombustible materials.

**1911.4** Water storage tanks and cooling towers may be of wood.

**1911.5** Storage tanks, having a capacity of over 500 gallons shall not be located over stairways or elevators.

**1911.6** Skylights shall be constructed of incombustible materials and transparent or translucent materials shall be fire-resistive.

**1911.7** (a) Parapets shall be required on exterior walls except where the roof is of incombustible, fire-resistive construction.

(b) Parapets shall be not less than 20 inches above the roof immediately adjacent thereto where located 20 feet or less from the building line of a contiguous lot or any building on the same lot, and shall be constructed as set forth in Chapter 27 or Section 1904.

(c) Where required to control rain water runoff, a curb not less than eight inches in height shall be provided where parapets are not required.

1911.8 Where the public has access to roof areas, a guard rail not less than 36 inches above the roof shall be provided around all open wells or shafts and at all exterior walls.

## **1912 COMBUSTIBLE MATERIALS REGULATED**

1912.1 Combustible materials shall be permitted except where specifically prohibited in this Chapter or in Occupancy, Part III.

1912.2 Combustible insulating materials, other than a vapor barrier not exceeding .064 inches in thickness, shall not be permitted in concealed spaces.

1912.3 Loading platforms for warehouses, freight depots and similar buildings may be of heavy timber construction, with wood floors not less than one and five-eighths inches thick. Such wood construction shall not be carried through the exterior walls.

1912.4 Interior finishes shall be as set forth in Section 3710.



## Chapter 20 — Type III Buildings (Ordinary Masonry)

- 2001 DEFINITION
- 2002 GENERAL
- 2003 STRUCTURAL FRAMEWORK
- 2004 WALLS AND PARTITIONS
- 2005 FLOORS
- 2006 ROOFS
- 2007 ENCLOSURE OF VERTICAL OPENINGS
- 2008 STAIRWAYS
- 2009 DOORS AND WINDOWS
- 2010 PROJECTIONS FROM THE BUILDING
- 2011 ROOF STRUCTURES
- 2012 COMBUSTIBLE MATERIALS REGULATED

### 2001 DEFINITION

2001.1 (a) Type III buildings or structures shall have an exterior structural frame of steel or reinforced concrete; or shall have exterior loadbearing walls of incombustible, fire-resistive construction.

(b) Type III buildings or structures shall have an interior structural frame of steel, reinforced concrete, wood, or interior loadbearing walls of incombustible materials or wood.

(c) Partitions, floors and roof framing may be of wood.

2001.2 (a) Type III (protected) buildings shall have all interior bearing walls, partitions, ceilings and floors of not less than one-hour fire-resistant construction, except that the fire protection of floors may be omitted as specified in Sub-section 2005.2.

(b) Type III (unprotected) buildings may have interior walls, ceilings and floors of unprotected steel and wood or concrete. Interior bearing walls shall be fire protected as specified in Sub-section 2004.3. Floors shall be fire protected as specified in Sub-section 2005.2.

### 2002 GENERAL

2002.1 Allowable height and area shall be as specified in Part III.

2002.2 Loads and material stresses shall be as specified in Part VI.

2002.3 Required fireproofing shall be as specified in Chapter 37.

### 2003 STRUCTURAL FRAMEWORK

2003.1 MATERIALS: (a) Unless specifically designed as a structural frame with panel walls, the exterior walls shall be considered as load-bearing and shall be constructed of masonry or reinforced concrete. When designed as a structural frame, the materials of construction of the exterior structural framework shall be of structural steel or reinforced concrete.

(b) The interior structural support shall be of steel, reinforced concrete, wood, or interior bearing walls of incombustible materials or wood studs.



**2003.2 FIREPROOFING** (a) Fireproofing shall be as required in Part III, Occupancy, or in this Chapter, or in Chapters 39 and 40, and, where required, or where otherwise referred to in this Code as being protected, the structural framework or supports shall be of not less than one-hour fire-resistive construction except that members in the exterior wall shall have the fire protection as set forth in Sub-section 2004.1.

(b) All steel members supporting masonry in buildings over one story in height shall be fire-protected with not less than one-hour fire-resistive construction.

(c) Heavy-timber structures, designed and constructed as set forth in Sub Section 2003.3 shall be considered the equivalent of one-hour fire-resistive protection.

**2003.3 HEAVY-TIMBER CONSTRUCTION:** (a) **GENERAL:** Heavy timber construction is that type in which fire resistance is attained by placing limitations on minimum sizes of wood structural members including the thicknesses and compositions of wood floors and roofs and by the use of approved fastenings and construction details.

(b) **HEAVY TIMBER FRAMING:** (1) **COLUMNS** Wood columns may be sawn or glued laminated and shall be not less than 8 inches, nominal, in depth when supporting roof loads only.

Columns shall be continuous or directly superimposed, one above the other with no girders or bolsters between columns, throughout all stories by means of reinforced concrete or metal caps with brackets, or shall be connected by properly designed steel or iron caps, with pintles and base plates, or by timber splice plates affixed to the column by means of metal connectors housed within the contact faces, or other approved methods.

(2) **Floor Framing:** Beams, girders and joists may be sawn or glued laminated and shall be not less than 6 inches, nominal, in width and 3 inches, nominal, in depth. Framed or glued laminated arches which spring from the floor line and support floor loads shall be not less than 8 inches, nominal, in any dimension. Framed timber trusses supporting floor loads shall have members of not less than 8 inches, nominal, in any direction.

(3) **ROOF FRAMING:** Beams, girders and joists may be sawn or glued laminated and shall be not less than 6 inches, nominal, in least dimension. Framed members or glued laminated arches which spring from the floor line and do not support floor loads shall have members of not less than 6 inches, nominal, in width and 6 inches, nominal, in depth for the lower half of the height and not less than 4 inches, nominal, in any dimension for the upper half of the height. Framed members or glued laminated arches which spring from the top of walls or wall abutments, framed timber trusses, and other roof framing which does not support floor loads, shall have members not less than 5 inches, nominal, in width and 6 inches, nominal, in depth. Spaced members may be composed of 2 or more pieces not less than 3 inches, nominal, in thickness when an automatic fire extinguisher system is installed in the building as set forth in Chapter 38 or when the space between parallel elements is solidly filled or is tightly closed for the full length on the underside thereof with a wood cover plate of 2-inch nominal thickness. Splice plates shall be of no less than 3 inches nominal in thickness.

(4) **CONSTRUCTION DETAILS** Wall plate boxes of self-releasing type or approved hangers shall be provided where beams and girders enter masonry. An air space of ½-inch shall be provided at top, end, and sides of members unless approved durable or treated wood is used. Girders and beams shall be cross tied to each other, or inter-tied by caps, to transfer horizontal loads across the joint. Wood bolsters may be placed on top of columns which support roof loads only. Intermediate beams used to support floors shall rest on top girders to be supported on approved metal hangers which transmit the vertical load to the top of the girder. Columns, beams, girders, arches and trusses of material other than wood shall have a fire-resistive rating of not less than one hour. Wood beams and girders supported by masonry between their ends and the outside face of the wall. Roof anchors shall be provided as set forth in Chapter 23. Where distance separation of 20 feet or more is provided, wood columns and arches may be used in exterior walls.

(5) **HEAVY TIMBER FLOORS:** Floors shall be without concealed spaces. Floors may be of sawn or glued laminated plank, splined or tongue and grooved, of not less than 3 inch nominal thickness, or square edged plank not less than 4 inch nominal thickness well spiked together. Planks shall be laid so that a continuous line of joints will not occur except at points of support. Planks shall be covered with one inch nominal tongue and grooved flooring laid crosswise or diagonally. Planks and floor shall not extend closer than one-half inch to wall to provide an expansion joint and such expansion joint shall be covered at top and bottom.

(6) **HEAVY TIMBER ROOF DECKS:** Roofs shall be without concealed spaces and decks shall be sawn or glued laminated, splined or tongue and grooved plank, not less than 2 inches nominal in thickness or of square edge plank not less than 3 inches nominal thickness well spiked together or of a double thickness of one inch nominal tongue and groove boards with staggered joints.

#### **2004 WALLS AND PARTITIONS**

**2004.1** Exterior walls shall be as set forth in Sub-section 1804.1.

**2004.2** Fire walls shall be of incombustible materials and shall be of fire-resistive ratings as required in Chapter 5.

**2004.3** Interior-bearing walls and partitions shall be of incombustible materials or of wood studs, and for Type III (protected) buildings, or for Type III (unprotected) buildings where supporting upper floors or where adjacent to common paths of egress, shall be of one-hour fire-resistive construction.

#### **2005 FLOORS**

**2005.1 MATERIALS:** (a) Floors shall be of incombustible materials or wood.

(b) Wood joists shall not be used to support concrete and cement base tile or terrazzo floor surfaces other than for bathroom of less than 100 square feet in area.

(c) Wood post and girder construction shall not be permitted for a ground floor and spaces under ground floors shall have the clearance and ventilation as set forth in Paragraph 2907.3 (b). Access openings shall be provided to all space under the building.

**2005.2 FIREPROOFING:** Floors and all parts thereof of Type III buildings shall be of not less than one-hour-resistive construction, except that where a ground floor has clearance of less than three feet, such fire protection may be omitted.

#### **2006 ROOFS**

**2006.1 MATERIALS:** Roofs shall be of incombustible materials or wood.

**2006.2 FIREPROOFING:** Roofs and all parts thereof of protected Type III buildings shall be of not less than one-hour fire-resistive construction except as follows:

(a) Roofs, where every part of the structural framework is 18 feet or more above any part of any floor, may be of unprotected incombustible materials or of heavy timber, as specified in Subsection 2003.3.

(b) Roofs of one-story open sheds not more than 75 percent enclosed by walls, not of Group E Occupancy, and in which the travel distance to the nearest exit does not exceed 40 feet, may be of unprotected combustible materials.

**2006.3 ROOF COVERINGS:** Roof coverings shall be fire-retardant and as specified in Chapter 34.

**2006.4 ROOF DRAINAGE:** Roof drainage and the disposal of rain water shall be as specified in Part XII. Where parapets or curbs are constructed above the level of a roof, provision shall be made, such as by scuppers or similar positive overflow arrangements, to prevent rain water in excess of that considered in the design from accumulating on the roof in the event that rain water drains or leaders become clogged. Where scuppers are installed they shall be not less in area than twice the area required for the contributory downspout leaders and the bottom of the scupper shall be not more than 4 inches above the low point of the roof.

**2006.5 ATTIC SPACES:** Attic spaces shall not be required, but where attic spaces are provided such spaces shall have a minimum vertical dimension of 18 inches clear distance and, where unprotected combustible material is exposed, shall be divided by fire stops into areas not exceeding 2,500 square feet. Access scuttles shall be from common spaces such as corridors, and no part of an attic space shall be more than 100 feet from an access scuttle. Minimum vertical dimension shall not be required for hip or gable roof construction.

#### **2007 ENCLOSURE OF VERTICAL OPENINGS**

Enclosures of vertical openings shall be incombustible materials and, except as otherwise provided, such openings exceeding eight square feet in area shall not be less than one-hour fire-resistive construction. Walls adjacent to open interior stairways and the soffits thereof shall be of not less than one-hour fire-resistive construction.

#### **2008 STAIRWAYS**

**2008.1** Stairways shall be as required in Part III and Chapter 31.

**2008.2** Stairways may be constructed of incombustible materials or wood except where combustible materials are specifically prohibited in Part III or Chapter 31.

## **2009 DOORS AND WINDOWS**

**2009.1** Doors, windows, and similar openings in exterior walls, fire walls and enclosure walls shall be protected or entirely prohibited, as set forth in this Chapter, Chapter 31 or in Occupancy, Part III, and such protection shall be as specified in Chapter 37.

**2009.2** Doors and windows shall not project over public property or restricted areas except as provided in Chapter 36.

## **2010 PROJECTIONS FROM THE BUILDING**

Cantilevering projections outside of the main exterior walls of the building shall be of incombustible construction and fire-resistive as specified in this Chapter except that the projection of wood roof rafters of Groups H and I occupancies over private property shall be permitted.

Architectural projections shall be limited as set forth in Chapter 36.

## **2011 ROOF STRUCTURES AND SKYLIGHTS**

**2011.1** Towers, pylons, masts, signs, and similar structures above a roof, when not enclosed, shall be of incombustible materials. Roof structures extending more than 25 feet above the roof or signs more than 100 square feet in area shall be supported to the ground by an incombustible frame.

**2011.2** Roof structures, including bulkheaded areas, shall be limited in total combined area to 30 percent of the area of the roof, shall not extend more than 20 feet above the allowable height, and any enclosure having a floor area of more than 15 square feet shall be constructed as required for the main portion of the building.

**2011.3** Minor roof structures having an area of 15 square feet or less, housing ventilating shafts or similar openings shall be constructed of incombustible materials.

**2011.4** Water storage tanks and cooling towers may be of wood.

**2011.5** Storage tanks, having a capacity of over 500 gallons, shall not be located over stairways or elevators.

**2011.6** Skylights shall be constructed of incombustible materials, and transparent or translucent materials shall be fire-resistive.

**2011.7** (a) Parapets shall be required on exterior walls except:

(1) Where the roof is of incombustible, fire-resistive construction.

(2) Where the walls of buildings for other than Group H and I occupancy are 20 feet from the building line of a contiguous lot or any building on the same lot.

(3) Where the building is of Group H or I occupancy.

(b) Parapets shall be not less than 20 inches above the roof immediately adjacent thereto and shall be constructed as set forth in Chapter 27 or Section 2004.

(c) Where required to control rain water runoff, a curb not less than eight inches in height shall be provided where parapets are not required.

## **2012 COMBUSTIBLE MATERIALS REGULATED**

**2012.1** Combustible materials shall be permitted except where specifically prohibited in this Chapter or in Occupancy, Part III.

**2012.2** Combustible insulating materials, other than a vapor barrier not exceeding .064 inches in thickness, shall not be permitted in concealed places.

**2012.3** Loading platforms for warehouses, freight depots and similar buildings may be of heavy timber construction, with wood floors not less than one and five-eighths inches thick. Such wood construction shall not be carried through the exterior walls.

**2012.4** Interior finishes shall be as set forth in Section 3710.

## Chapter 21 — Type IV Buildings (Incombustible)

- 2101 DEFINITION
- 2102 GENERAL
- 2103 STRUCTURAL FRAMEWORK
- 2104 WALLS AND PARTITIONS
- 2105 FLOORS
- 2106 ROOFS
- 2107 DOORS AND WINDOWS
- 2108 PROJECTIONS FROM THE BUILDINGS
- 2109 ROOF STRUCTURES AND SKYLIGHTS
- 2110 COMBUSTIBLE MATERIALS REGULATED

### 2101 DEFINITION

All structural and other elements of Type IV buildings shall be of incombustible materials.

### 2102 GENERAL

2102.1 Allowable height and area shall be as specified in Part III.

2102.2 Loads and material stresses shall be as specified in Part VI.

2102.3 Required fireproofing shall be as specified in Chapter 37.

### 2103 STRUCTURAL FRAMEWORK

The structural framework shall be of steel, aluminum, or reinforced concrete, and fireproofing of structural members shall be required only when such members are a part of an exterior wall as set forth in Sub-section 2104.1.

### 2104 WALLS AND PARTITIONS

Distance separations shall be measured at right angles from the wall or opening to the building line of a contiguous lot or any building on the same lot. Where a building line varies by the use of the land, the building line of a contiguous lot shall be taken as that for the use of which requires the least set back from the property line but in no case taken as more than five feet from and parallel to the common lot line.

2104.1 Main exterior walls shall be of incombustible materials and such walls shall be of fire-resistive construction with opening protection wheres located as followss

(a) Main exterior walls having a distance separation of less than five feet, or walls except on street fronts which are less than five feet from the building line of a contiguous lot, shall be of not less than two-hour fire-resistive construction and have no openings therein.

(b) Main exterior walls having a distance separation of from five to twenty feet shall be of not less than one-hour fire-resistive construction, and openings therein shall be protected by fire-resistive doors and windows and shall be limited in area to 30 percent of the wall area with no single openings more than ten percent of such wall area.

**2104.2** Fire walls shall be of incombustible materials and shall be of the fire-resistive ratings as required in Chapter 5.

**2104.3** Interior bearing walls and partitions shall be of incombustible materials.

### **2105 FLOORS**

Floors shall be of incombustible materials, and a wood-wearing surface shall be permitted.

### **2106 ROOFS**

Roofs shall be of any incombustible materials, and fireproofing shall not be required.

**2106.1** Roof coverings shall be as specified in Chapter 34.

**2106.2** Roof drainage and the disposal of rain water shall be as specified in Part XII. Where parapets or curbs are constructed above the level of a roof, provision shall be made, such as by scuppers of similar positive overflow arrangements, to prevent rain water in excess of that considered in the design from accumulating on the roof in the event that rain water drains or leaders become clogged. Where scuppers are installed they shall be not less in area than twice the area required for the contributory downspout leaders and the bottom of the scupper shall be not more than 4 inches above the low point of the roof.

### **2107 DOORS AND WINDOWS**

**2107.1** Doors, windows, and similar openings in exterior walls and fire walls shall be protected or entirely prohibited as set forth in this Chapter, Chapter 31, or in Occupancy, Part III.

**2107.2** Doors and windows shall not project over public property or restricted areas except as provided in Chapter 36.

### **2108 PROJECTIONS FROM THE BUILDING**

Projections from the building shall be of incombustible materials and as set forth in Chapter 36.

### **2109 ROOF STRUCTURES AND SKYLIGHTS**

**2109.1** Roof structures may extend above the allowable height not to exceed 20 feet and shall be of incombustible materials.

**2109.2** Skylights shall be constructed of incombustible materials, and transparent or translucent materials shall be fire-resistive.

**2109.3** Where the public has access to roof areas, a guard rail not less than 36 inches above the roof shall be provided around all open walls or shafts and at all exterior walls.

### **2110 COMBUSTIBLE MATERIALS REGULATED**

A loading platform may be constructed of heavy timber construction with wood floors not less than one and five-eighths inches thick. A Type IV building or structure erected over such platform shall be supported by incombustible materials to the foundation.

## Chapter 22 — Type V Buildings (Wood Frame)

- 2201 DEFINITION
- 2202 GENERAL
- 2203 WALLS AND PARTITIONS
- 2204 FLOORS
- 2205 ROOFS
- 2206 FIREPROOFING
- 2207 STAIRWAYS
- 2208 DOORS AND WINDOWS
- 2209 PROJECTIONS FROM THE BUILDING
- 2210 COMBUSTIBLE MATERIALS REGULATED

### 2201 DEFINITION

All structural and other elements of Type V buildings shall be of incombustible materials or wood.

### 2202 GENERAL

- 2202.1 Allowable height and area shall be as specified in Part III.
- 2202.2 Loads and material stresses shall be as specified in Part VI.
- 2202.3 Required fireproofing shall be as specified in Chapter 37.

### 2203 WALLS AND PARTITIONS

Distance separation shall be measured at right angles from the wall or opening to the building line of a contiguous lot or any building on the same lot. Where a building line varies by the use of the land, the building line of a contiguous lot shall be taken as that for the use which requires the least set back from the property line but in no case taken as more than five feet from and parallel to the common lotline.

2203.1 Main exterior walls shall be of incombustible materials or wood and such walls shall be of fire-resistive construction with opening protection where located as follows:

(a) Main exterior walls having a distance separation of less than five feet, or walls except on street fronts which are less than five feet from the building line of a contiguous lot, shall be of not less than two-hour fire-resistive construction and have no opening therein.

(b) Main exterior walls of buildings of other than Group I Occupancy having a distance separation of from five to twenty feet and main exterior walls of buildings of Group I Occupancy having a distance separation of from five to ten feet shall be of not less than one-hour fire-resistive construction and openings therein shall be protected by fire-resistive doors and windows and shall be limited in area to 30 percent of the wall area with no single openings more than ten percent of such wall area.

2203.2 Fire walls shall be of incombustible materials and shall be of fire-resistive construction as required in Chapter 5.

2203.3 Interior bearing walls and partitions shall be of incombustible materials or wood.



(g) The Building Official may accept a design based on other nationally recognized and accepted data, the validity of which is shown by wind tunnel and/or satisfactory test data.

**2306.2 VELOCITY PRESSURES:** Velocity pressures, in pounds per square foot, based on height above ground, in feet, shall be taken as not less than in the following table:

**TABLE 23-B**

Height Above Ground (In feet)	Minimum Velocity Pressure (In pounds per square foot)
0 to 10	27
10 to 20	33
20 to 30	37
30 to 50	43
50 to 80	49
80 to 100	52
100 to 200	64
200 to 300	71
300 to 500	82
500 to 800	94
800 to 1000	100
Over 1000	100

**2306.3 DESIGN WIND PRESSURE** Design unit wind pressures to be used for the design of structures shall be obtained by multiplying the velocity pressures of Sub-section 2306.2 by the Shape Factors listed in Sub-section 2306.4.

**2306.4 SHAPE FACTORS** (a) **GENERAL:** (1) The structure and individual element of construction shall be designed independently to withstand inward and outward wind forces.

(2) "Plus" or "Minus" signs denote the direction of the pressures with respect to the structures; "Plus" signifies pressures inwards or downwards and "Minus" signifies pressures outwards or upwards.

**(b) VERTICAL SURFACE FACTORS:**

	Pressure Inward	Pressure Outward
(1) Exterior walls of enclosed buildings	+1.3	-1.0
(2) Exterior walls of buildings with one side open	+1.4 (min.)	-1.4 (min.)
(3) Fastenings for wall coverings	+1.5	-1.5
(4) Flat vertical surfaces with no appreciable depth, such as fences, signs	+1.4 (min.)	
(5) Mobile Homes	+0.9 (min.)	-0.6 (min.)

**(c) INCLINED SURFACE SHAPE FACTORS**

(1) Roofs of fully enclosed buildings with angles from the horizontal	Normal to	Normal to
	Windward Surface	Leeward Surface
70° to 89°	+0.90	-0.45
60° to 69°	+0.70	-0.45
50° to 59°	+0.50	-0.45
40° to 49°	+0.20	-0.45
30° to 39°	-0.20	-0.45
20° to 29°	-0.40	-0.50
10° to 19°	-0.70	-0.50

(2) For buildings with one side open, add  $-1.0$  to the negative factors for inclined surfaces.

(3) The total of all factors for fastening of roof coverings shall be not less than  $-2.0$ .

(4) For gable roofs a factor of  $-0.6$  shall be used when the wind is assumed to blow parallel with the roof ridge.

(d) **FLAT ROOF SURFACE FACTORS:** (Includes surfaces with less than  $10^\circ$  inclination to the horizontal.)

(1) **Enclosed Buildings:**  $-1.0$  (for windward  $1/3$  of surface).  
 $-0.75$  (for leeward  $2/3$  of surface).

(2) For buildings with one side open: Add to the above (enclosed building) factors:  $-0.5$  for a windward opening.

(3) The total of all factors for fastenings of roof coverings shall not be less than  $-2.0$ .

(e) **OVERHANGS AND EAVES:**  $-1.5$  for all buildings.

(f) **CURVED ROOFS:** The wind pressures on a curved roof due to wind blowing at right angles to the axis of the roof shall be computed on the basis that the curved portion is divided into not less than five equal segments. The pressure on each segment, whether positive or negative, shall be determined by the use of shape factors in Paragraph (c) above, appropriate to the slope of the chords of the segments.

(g) **MULTI-SPAN OR SAW-TOOTH ROOFS:** In multi-span or saw-tooth roofs where the span heights and slopes are approximately the same and where there is a sheltering effect from the windward span, the external pressures and forces on the intermediate spans may be appropriately reduced.

(h) **SKELETON STRUCTURES:** (1) The wind pressure on closely latticed structures, such as open signs, towers, solar screens, sun screens, sun shades, and grill block, and similar structures shall be applied to two and one-half times the maximum projected area of all members but not to exceed 100 percent of the maximum projected area of the structure.

(2) The coefficient for fastenings shall be not less than  $2.0$ .

(i) **CYLINDERS:** The coefficients to be applied to the velocity pressures to compute the wind pressures on cylinders, such as chimneys and masts, shall be taken as not less than the following:

Circular .....	0.70
Octagonal .....	1.00
Square .....	1.30

**2306.5 OVERTURNING MOMENT:** Where the overturning moment of a building or other structure exceeds 50 percent of the moment of stability computed from deadload only, anchorage to resist the excess overturning moment shall be provided. The wind pressures used for computing the overturning moment of buildings shall be the velocity pressures set forth in Sub-section 2306.2 multiplied by a factor of  $1.20$ , and for other structures shall be the velocity pressures modified by the shape factor.

**2306.6 STRESSES:** For members carrying wind stresses only, and for combined stresses due to wind and other loads, the allowable unit stresses and the allowable loads on connections may be increased  $33\frac{1}{3}$  percent from the maximums specified in this Code for the material used except as provided for foundations in Chapter 24, and except that such increases shall not apply to towers, signs, cantilevered projections or metal sheathing where vibrating or fluttering action could be anticipated. In no case shall the section be less than required if the wind stress be neglected.

For the hydrostatic pressure on any floor below a ground water level, calculations shall be based on full liquid pressure, and such floors shall be designed for live load without hydrostatic uplift and hydrostatic uplift without live load except that private swimming pools may be designed with approved pressure releases for hydrostatic uplifts.

**2303.3 OTHER:** Balcony and stairway guard rails and grip rails shall be designed to resist a horizontal thrust, in any direction, of not less than 20 pounds per lineal foot applied to the grip rail or top of the guard rail.

Ornamental cantilevered projections on the exterior of buildings shall be designed for not less than 60 pounds per square foot load or 200 pounds per foot applied at the outer edge.

#### **2304 ROOF LIVE LOADS**

Roofs shall be designed for a live load of not less than 30 pounds per square foot except that roofs occupied as roof gardens or for concentrated loads shall be designed for the corresponding occupancies, and glass areas of greenhouse roofs shall be designed for a live load of not less than 15 pounds per square foot and except as may be otherwise set forth in Section 4403.1.

#### **2305 LIVE LOAD REDUCTION**

The following reductions in assumed live loads shall be permitted in designing columns, walls, beams, girders, and foundations:

**2305.1** No reduction of the assumed live load shall be allowed in the design of any slabs, joists or other secondary members.

**2305.2** A reduction of the total live load used in the design of girders based on a certain tributary floor or roof area shall be permitted as noted in the following schedule. This reduction shall not be in addition to the permitted column reduction nor shall such reduction be used in design of buildings to be used or occupied as warehouses or for storage purposes:

<b>Reduction Allowed</b>	<b>Tributary Floor or Roof Area</b>
5 percent	100 square feet
10 percent	200 square feet
15 percent	300 square feet or more

**2305.3** The total live loads carried by a column or footing may be reduced by an amount not exceeding the following percentages except that the reduction at any floor or roof shall not be required to be less than the average percent of reduction allowed for tributary members at that floor or roof. The percentages herein set forth shall be applicable to all the live load tributary to the member considered based on the location of the member in the building as follows:

#### **ALLOWABLE REDUCTIONS FOR WAREHOUSES AND STORAGE BUILDINGS**

	<b>Percent</b>
Roof . . . . .	0
Roof and one floor . . . . .	0
Roof and two floors . . . . .	5
Roof and three floors . . . . .	10
Roof and four floors . . . . .	15
Roof and five or more floors . . . . .	20

**LIVE LOAD REDUCTIONS FOR  
MANUFACTURING BUILDINGS, STORES AND GARAGES:  
PERCENT**

Roof .....	0
Roof and one floor .....	0
Roof and two floors .....	10
Roof and three floors .....	20
Roof and four or more floors .....	30

**ALLOWABLE LIVE LOAD REDUCTIONS FOR  
ALL OTHER BUILDINGS:  
PERCENT**

Roof .....	0
Roof and one floor .....	0
Roof and two floors .....	10
Roof and three floors .....	20
Roof and four floors .....	30
Roof and five floors .....	40
Roof and six or more floors .....	50

**2306 WIND REQUIREMENTS**

**2306.1 GENERAL:** (a) Buildings and structures and every portion thereof shall be designed and constructed to resist the forces due to wind pressure.

(b) Such forces shall be applied in any direction, with all possible combinations based on height and shape factors, but in no case shall any roof be designed for less than 30 pounds per square foot live load. The said live load shall not be considered to act simultaneously with the wind load.

(c) Systems shall be designed and constructed to transfer wind forces to the ground.

(d) No allowance shall be made for the shielding effect of buildings or other structures.

(e) The minimum unit wind pressure to be used in design shall be obtained by multiplying the velocity pressures set forth in Table 23-B of Sub-section 2306.2 by the Shape Factors as described in Sub-section 2306.4.

(f) For rectangular, fully enclosed buildings of not more than 50 feet in height, the unit wind pressures from Table 23-A may be applied in lieu of the Procedure set forth under (e) above. Design unit wind pressures, in pounds per square foot, shall be taken as acting normal to the surface.

**TABLE 23-A**

(1) Height above Ground	(2) Outside Walls	(3) Fastenings of wall Coverings	(4) Fastenings of roof Coverings	(5) Roofs 0° to 30° Upward	(6) Roofs 31° to 89° Downward	(7) Roofs 31° to 89° Upward
0'-10'	37	40	54	27	27	18
10'-20'	45	50	66	33	33	22
20'-30'	50	55	74	37	37	24
30'-50'	58	65	86	43	43	29

**NOTE:** For overhangs and eaves multiply the values of column (5) by 1.5 and apply the resulting wind pressure upwards.

Pressures in columns (2) and (3) shall be assumed to act inward or outward.

**2301.3 DEFLECTION:** The deflection of any structural member or component, when subjected to live, wind and other superimposed loads set forth herein, shall not exceed the following:

(a) Roof and ceiling or components supporting plaster	span	360
(b) Roof members or components not supporting plaster under	span	240
(c) Floor members or components	span	360
(d) Vertical and wall members or components with masonry or plaster backing	span	360
(e) Vertical and wall members or components without plaster backing	span	180

### 2302 UNIT LIVE LOADS

Unit Live Loads shall be not less than set forth in the following Tablee

USE	UNIT LIVE LOADS IN POUNDS PER SQUARE FOOT
Apartments	40
Auditoriums—Fixed Seats	75
Movable Seats	100
Balconies and Galleries	100
Cabanas and Bath Houses	50
Dance Halls	100
Dwellings	40
Garages	100
Garages—For passenger cars with seven and one-half feet fixed maximum head room to upper floors	50
Gymnasiums	100
Hospitals—Wards and Rooms	40
Hotels—Guest Rooms and Private Corridors	40
Libraries—Reading Rooms	60
Stack Rooms	150
Manufacturing—Light	75
Heavy	125
Marquees	60
Offices	50
Paths of Egress—serving occupancies 80 psf or less	80
Serving occupancies over 80 psf	100
(Nor less than the designed floor load)	
Platform, Assembly	100
Printing Plants—Press Rooms	150
Composing and Linotype Rooms	100
Rest Rooms	40
Restaurants	80
Reviewing Stands and Bleachers	100
Roof Loads	(See Section 2304)
Schools—Classrooms	40
Skating Rinks	100
Stages	125
Storage—Light	75
Medium	125
Heavy	250
(Load to be determined by proposed use or occupancy)	
Stores—Light Merchandise	75
Heavy Merchandise	100

### 2303 SPECIAL LOAD CONSIDERATIONS

**2303.1 FLOORS:** In the design of floors, consideration shall be given to the effect of known or probable concentration of load, partial load, impact and machine loads, and design shall be based on the load or combination of loads which produce the higher stresses.

**2303.2 BELOW GRADE STRUCTURES:** In the design of basements, tanks, swimming pools and similar below grade structures, provision shall be made for the forces due to hydrostatic pressure and lateral pressure of adjacent soil.

For the lateral loads of soil on below grade structures unless substantiated by more specific information, the angle of repose of fragmental rock and natural confined sand shall be 30 degrees, and the angle of repose of filled soil and muck shall be 15 degrees, with a horizontal line.

## **2204 FLOORS**

Floors shall be of steel, concrete or wood.

Wood posts shall not be permitted under a girder supporting a ground floor and spaces under ground floors shall have a clearance of ventilation as set forth in Paragraph 2907.3(b)n

Access openings shall be provided to all space under the building.

## **2205 ROOFS**

Roofs shall be incombustible materials or wood.

**2205.1** Roof coverings shall be as specified in Chapter 34.

**2205.2** Roof drainage and the disposal of rain water shall be as specified in Part XII. Where parapets or curbs are constructed above the level of a roof, provision shall be made, such as by scuppers or similar positive overflow arrangements to prevent rain water in excess of that considered in the design from accumulating on the roof in the event that rain water drains or leaders become clogged. Where scuppers are installed they shall be not less in area than twice the area required for the contributory downspout leaders and the bottom of the scupper shall be not more than four inches above the low point of the roof.

**2205.3** Attic spaces shall not be required, but where attic spaces are provided, such spaces shall have a minimum vertical dimension of 18 inches clear distance and, where unprotected combustible material is exposed, shall be divided by fire stops into areas not exceeding 2500 square feet. Access scuttles shall be from common spaces such as corridors, and no part of an attic space shall be more than 100 feet from an access scuttle. Minimum vertical dimension shall not be required for hip or gable roof construction.

## **2206 FIREPROOFING**

Bearing walls supporting floors shall be not less than one-hour fire-resistive protection except that where a ground floor has clearance of less than three feet, such fire protection may be omitted.

## **2207 STAIRWAYS**

**2207.1** Stairways shall be as required in Part III and Chapter 31.

**2207.2** Stairways may be of incombustible or combustible materials.

## **2208 DOORS AND WINDOWS**

**2208.1** Doors, windows and similar openings in exterior walls and fire walls shall be protected or entirely prohibited as set forth in this Chapter, Chapter 31, or in Occupancy, Part III.

**2208.2** Doors and windows shall not project over public property or restricted areas except as provided in Chapter 36.

## **2209 PROJECTIONS FROM THE BUILDING**

Projections from the building may be of wood.

## **2210 COMBUSTIBLE MATERIALS REGULATED**

No materials more combustible than wood shall be permitted in the construction of permanent portions of Type V buildings.

No combustible insulation other than a vapor barrier not exceeding .064 inches in thickness, shall be permitted in concealed spaces.

# PART VI – ENGINEERING & CONSTRUCTION REGULATIONS

## Chapter 23 – Live and Dead Loads

2301	GENERAL
2302	UNIT LIVE LOADS
2303	SPECIAL LOAD CONSIDERATIONS
2304	ROOF LIVE LOADS
2305	LIVE LOAD REDUCTIONS
2306	WIND REQUIREMENTS
2307	LIVE LOADS POSTED
2308	OCCUPANCY PERMITS
2309	UNIT DEAD LOADS
2310	FOUNDATION DESIGN
2311	LOAD TESTS

### 2301 GENERAL

**2301.1 DESIGN:** (a) Any system or method or design or construction shall admit of a rational analysis in accordance with well-established principles of mechanics and sound engineering practices.

(b) Buildings and other structures and all parts thereof shall be designed and constructed to be of sufficient strength to support the estimated or actual imposed, dead, live, wind, and any other loads, both during construction and after completion of the structure, without exceeding the stresses for the various materials as specified in this Code.

(c) The floor and roof systems shall be designed and constructed to transfer horizontal forces to such parts of the structural frame as are designed to carry these forces to the foundation.

**2301.2 LOADS:** (a) No building or part thereof shall be designed for live loads less than those specified in this Chapter.

(b) The live loads set forth herein shall be assumed to include ordinary impact but where loading involves unusual impact, provision shall be made by increasing the assumed live load.

(c) Provision shall be made in designing office floors for a load of 2000 pounds placed upon any space two and one-half-feet square wherever this load upon an otherwise unloaded floor would produce stresses greater than those caused by a uniformly distributed load of 50 pounds per square foot.

(d) In designing floors, not less than the actual live load to be imposed shall be used in the design. Special provision shall be made for machine or apparatus loads.

(e) Where partition locations are subject to change, floors shall be designed to support, in addition to all other loads, a uniformly distributed load equal to 20 pounds per square foot.

(f) Public garages and commercial or industrial buildings in which passenger cars or loaded trucks are placed, used or stored, shall have the floor systems designed to support the maximum concentrated wheel load placed in any possible position.





## **Chapter 24 — Excavations, Footings and Foundations**

- 2401 EXCAVATIONS**
- 2402 BEARING CAPACITY OF SOILS**
- 2403 SOIL BEARING FOUNDATIONS**
- 2404 PILE FOUNDATIONS**
- 2405 FOUNDATION WALLS AND GRADE BEAMS**
- 2406 GRADES UNDER BUILDINGS**
- 2407 RETAINING WALLS**
- 2408 SEAWALLS AND BULKHEADS**

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### **2401 EXCAVATIONS**

**2401 GENERAL:** Until provisions for permanent support have been made, all excavations shall be properly guarded and protected so as to prevent the same from becoming dangerous to life and property and shall be sheet piled, braced and/or shored, where necessary, to prevent the adjoining earth from caving in; such protection to be by the person causing the excavation to be made. No excavation, for any purpose, shall extend within one foot of the angle of the repose of the soil bearing footing or foundation unless such footing or foundation is first properly underpinned or protected against settlement.

**2401.2 PERMANENT EXCAVATIONS:** No permanent excavations shall be made nor shall any construction excavations be left on any lot or lots which will endanger adjoining property or buildings or be a menace to public health or safety. Any such excavations made or maintained shall be properly drained and such drainage provisions shall function properly as long as the excavations exist. Permanent excavations shall have retaining walls of steel, masonry, concrete or similar approved material of sufficient strength to retain the embankment together with any surcharged loads.

**2401.3 ENFORCEMENT:** Where, in the opinion of the Building Official, an unsafe condition may result or damage may occur as the result of an excavation, he may order the work stopped or may approve the work of excavation subject to such limitations as he may deem necessary.

### **2402 BEARING CAPACITY OF SOIL**

**2402.1 SOIL INVESTIGATION:** Plans for new buildings or addition shall bear a statement as to the nature and character of the soil under the structure. Where the bearing capacity of the soil is not known or is in question, or the load imposed on the soil is unusual, the Building Official may require examination of sub-soil conditions such as borings and other tests and evaluation of results of investigation by a Registered Professional Engineer, known to the Building Official to be qualified to evaluate safe bearing capacity. Plate load tests shall be used only to supplement other sub-soil investigations.

**2402.2 PRESUMPTIVE CAPACITIES:** The allowable bearing capacities on supporting soils shall not exceed those set forth in the following table unless the design bearing capacity is substantiated by recognized tests, analysis and procedure. These values are considered safe in respect to actual failure of the supporting ground but do not necessarily ensure the prevention of excessive foundation movements where unusual soil or moisture conditions are encountered.

Nature of Soil	Maximum Soil Pressures (Pounds per square foot)
Other than as stated below	0
Rock or sand fill over soil of higher bearing capacity	600
Undisturbed sand, or sand and rock	2500
Solid rock or with pot holes cleaned and filled with concrete (Minimum depth of strata 5 feet)	ca. 6000

**2403 SOIL BEARING FOUNDATIONS**

**2403.1 GENERAL:** Footings shall be constructed of reinforced concrete, as set forth in Chapter 25 and in this section, and shall insofar as practicable, be so designed that the soil pressure shall be reasonably uniform to minimize differential settlement.

**2403.2 CONTINUOUS FOOTINGS:** (a) Footings under walls shall be continuous or continuity otherwise provided and shall be not less than required to keep the soil pressure within that set forth in Section 2402 nor less than the following minimums:

Allowable Bearing Capacity (Pounds per square foot)	Number of Stories	Depth and Width
600	1	12'' x 30''
	2	12'' x 36''
2500 or more	1	10'' x 16''
	2	10'' x 20''

Based on soil investigation as set forth in Section 2402.1, the following sizes may be reduced considering allowable bearing values and loads, but the minimum width of a footing under the main walls of a building shall not be less than 16 inches nor less than 8 inches more than the width of the foundation wall.

(b) Masonry fences, flower bins, steps and similar decorative structures have reinforced concrete foundations designed for all live, dead and wind loads set forth in Chapter 23. The minimum sizes of these foundations shall be as followsa

	HEIGHT			
	9'' to 2'	2'1'' to 4'	4'1'' to 6'	6'1'' to 10''
Other rock <del>nc</del> 4'' x 8''	8'' x 8''	8'' x 16''	10'' x 16''	12'' x 20''
For Rock . . . . None	8'' x 12''	8'' x 16''	10'' x 20''	

(c) The minimum continuous footings specified in this section shall be reinforced as followsa

**RE INFORCING**

- 2 — #4 Bars
- 2 — #5 Bars
- 3 — #5 Bars
- 4 — #5 Bars

**WIDTH FOUNDATION**

- 12" wide
- 16" and 20" wide
- 24" and 30" wide
- 36" wide

Where footings are 30 inches or more in width, cross bars designed to resist bend at the face of the foundation shall be provided.

(1) Equivalent areas in No. 4 reinforcing bars may be substituted for sizes as specified.

(2) Splices in reinforcing bars shall not be less than 24 bar diameters and all corners shall be properly tied. When three or more bars are required, the bars shall be held in place and alignment by transverse bars spaced not more than four feet apart.

(3) Reinforcing shall be uniformly spaced and shall provide a minimum of three inches of concrete cover.

(4) Excavations for continuous footings shall be cut true to line and grade and the sides of footings shall be formed, except where soil conditions are such that the sides of the excavation stand firm and square. Excavations shall be made to firm, clean bearing.

(d) Continuous footings shall be placed level and any changes in the grade of such footings shall be made with a vertical tie of the same cross section and design as the footings, or the smaller of the footings, so joined.

(e) Continuous footings on which the center of gravity of the loads fall outside of the middle one-third shall be considered eccentric and provisions shall be made to limit the soil pressure at the edges to acceptable values by means of counter-balancing or by other approved methods.

(f) When foundation walls are to be poured separately from the footing, they shall be keyed and doweled to the footing with not less than No. 4 dowels, 20 diameters in length above and below the joint, and spaced not more than 4 feet apart. Where footing depth does not allow straight dowels standard hooks will be allowable.

(g) Concrete footings and pad shall not receive superimposed loads until 12 hours or more after the concrete is placed.

(h) Excavations for footings and foundations which are to serve as forms shall be thoroughly wet prior to placing concrete.

**2403.3 ISOLATED FOOTINGS** (a) Dimensions for an isolated footing shall not be less than 10 inches deep and 20 inches square. Isolated footings in soil having low lateral restraint and isolated piers shall be provided with adequate bracing to resist lateral movement.

(b) Isolated footings on which the center of gravity of the load falls outside the middle 1/3 of any line passing through the center of gravity of the footings shall be considered eccentric, and provisions shall be made to limit the soil pressure at the edges by means of footing straps or other approved methods.

(c) Where isolated footings support reinforced concrete columns, dowels equivalent in number and area to the column reinforcing and having a length not less than 20 diameters above and below the joint shall be provided in the footing. Where footing depth does not allow, straight dowels standard hooks will be allowable. Such dowels, or anchor bolts as required for steel columns, shall be held to proper grade and location during the pouring of the footing by means of templates or by other approved methods.

**2403.4 CONCRETE SLABS ON FILLO** (a) The provisions of this Sub-section apply to only Group H and I Occupancy, and do not necessarily apply to a concrete slab placed outside of the enclosing walls of the building.

(b) Where it is proposed to place concrete slabs directly on the supporting soil, a sub-grade shall have first been prepared by removing all top soil, organic matter and debris and the sub-grade and fill shall be thoroughly compacted by approved mechanical methods. All fill placed under slabs shall be clean sand, or rock, free of debris and other deleterious materials. The maximum size of rock in compacted fill shall be three-inch in diameter

(c) Concrete floor slabs placed directly on the supporting soil shall be a minimum of four inches in thickness, reinforced with not less than .029 square inches of reinforcing per linear foot of slab in each direction and placed in the upper half of the slab.

Such reinforced slab shall not be supported by foundation walls. Tests shall be made in accordance with "Tentative Methods of Test for Moisture Density relations of Soils, ASTM Designation: E96-63T" modified to use 25 blows on 5 layers with a 10-pound hammer dropping 18 inches.

(d) Where a concrete slab is supported by a foundation wall or continuous footing, the slab shall be reinforced for a distance of not less than two and one-half feet out from such support with a minimum of twice the area of reinforcing set forth in Paragraph 2403.4(c).

(e) The discontinuous edges of all slabs surrounding swimming pools and slabs for screen patios shall be at least 8 inches deep for a width of 8 inches and contain one No. 16 continuous bar.

#### **2404 PILE FOUNDATIONS**

**2404.1 GENERAL:** (a) Piles used for the support of any building or structure shall be driven to a resistance and penetration in accordance with the plans and/or specifications and as set forth herein.

(b) Piles may be jetted under the supervision of the Engineer. Immediately after completion of jetting, pile shall be driven below the depth jetted to the required resistance but not less than one foot. No jetting shall be permitted that may be detrimental to existing adjacent structures or piles that have been driven.

(c) When isolated columns, piers and other loads are supported on piles a minimum of three piles shall be used for such supports unless lateral bracing is provided at the pile cap to insure stability. Should a pile group be loaded eccentrically so as to produce an overload on any pile more than 10 percent of the allowable load, footing straps or other approved methods shall be required to counter-act the effect of eccentric loading.

(d) The minimum center to center spacing of piles shall be not less than twice the average diameter of round piles or 1-3/4 times the diagonal dimension of rectangular piles but in no case less than 30 inches, considering also provisions of Section 2404.1(1)n Piles supporting walls shall have dowels in piling to offer sufficient resistance for lateral restraint of grade beam.

(e) Non-fluid soil shall be considered as providing full lateral support against column action. The portion of a pile which extends through air, water, fluid, soil or other unstable material shall be designed as a structural column. Soils having a consistency stiffer than fluid soil may be considered as capable of pro-

viding lateral support. Where cast-in-place piles are used reinforcement shall extend ten feet below the plane where the soil provides lateral restraint. Sufficient reinforcing for all types of piles shall be provided at the junction of the pile and pile cap or grade beam to make a suitable connection. Shells conforming to Paragraph 2404.6(f) may be considered as reinforcement.

(f) Reinforced concrete caps shall be provided for all pile clusters and such caps shall extend laterally not less than 6 inches beyond the extreme pile surface and vertically not less than 4 inches below the pile butt. Pile caps may be omitted when piles are used to support grade beams, provided that the spacing of Paragraph (d) above is complied with and provided that the portions of the grade beams acting in place of the pile cap shall be computed by a recognized method of analysis to properly carry the loads.

(g) Piles shall be driven using an approved cushion block consisting of material so arranged as to provide transmission of hammer energy equivalent to one-piece hardwood with the grain parallel to the axis of the pile and enclosed in a metal housing to prevent its lateral deformation between the hammer ram and the top of the pile.

(h) Friction piles shall be driven a minimum penetration of 12 feet below cut-off or the existing ground, whichever is the lower.

(i) Diesel hammers may be used for driving piles if a piston stroke indicator rod is provided which is striped in increments above the top head and fastened to the body of the hammer. The energy of the blow shall be computed as the working stroke times the ram weight. The load bearing formula applicable for single-action pile hammers shall be used to compute the bearing capacity of the driven pile.

(j) Followers shall be used only upon permission of the Building Official and only where necessary to effect installation of piles. A follower shall be of such size, shape, length, material and weight as to permit driving the pile in the desired location and to the required depth and resistance, without loss of hammer energy in the follower.

(k) Splices shall be avoided as far as practicable. Splices shall be so constructed as to provide and maintain true alignment and position of the component parts of the pile during installation and subsequent thereto. Splices shall develop the required strength of the pile.

(l) The safe capacity of a group of friction piles in plastic material may be determined by load testing the group to 150 percent of the proposed group load or by the formula given in Sub-section 2404.2. When computed by formula, the allowable load for such a group shall be the allowable load for one pile times the number of piles in the group times the efficiency of the pile group as follows:

$$E = 1 - \phi \times \frac{((N - 1) M + (M - 1) N)}{(90 MN)}$$

E.....e..... is the efficiency

S.....e..... the average spacing of the piles, in inches

M.....m..... the number of rows

N.....e..... the number of piles in one row

D.....e..... the average diameter of the pile, in inches

$\phi$ .....e..... Arc tan D in degrees

S

(m) Types of piles which are not provided for in this Section shall conform to the requirements herein for the type which it most nearly approximates, subject to such additional requirements as may be made by the Building Official.

(n) Pile driving hammers shall develop a minimum of one-foot-pound of energy per pound of pile or mandrel, but not less than 7,000 foot-pounds of energy per blow.

(o) Piles may be driven with drop or gravity hammers provided the hammer shall weigh not less than 3,000 pounds and the fall of the hammer shall not exceed 6 feet.

(p) Piles shall be driven with a variation of not more than 1/4 inch per foot from the vertical, or from the batter line indicated, with a maximum variation of the head of the pile from the position shown on the plans of not more than three inches, subject to the provisions of Paragraph 2404.1(c)o

(q) The Contractor supervising the pile driving operations shall be required to keep an accurate record of the material and the principal dimensions of each pile; of the weight and fall of the hammer, if a single-acting hammer or drop hammer; the size and make, operating pressure, length of hose, number of blows per minute and energy per blow, if a double-acting hammer; together with the average penetration of each pile for at least the last five blows, and the grades at tip and cut-off. A copy of these records shall be filed with the Building Official and kept with the plans.

(r) Where piling must penetrate strata offering high resistance to driving or where jetting could cause damage, the Building Official may require that the piles be set in pre-drilled or punched holes. The equipment used for drilling or punching must be approved by the Building Official. The piles shall reach their final penetration by driving.

(s) The maximum load permitted on any pile shall not exceed 50 tons unless substantiated by load test performed at the site as set forth in sub-section 2404.9. The Building Official may require tests on any pile where its performance is questionable.

(t) Piles shall be designed and driven to develop not less than 10 tons safe bearing capacity.

(u) In soils in which the installation of piles causes previously installed piles to heave, accurate level marks shall be put on all piles immediately after installation and all heaved piles shall be reinstalled to the required resistance.

(v) Piles shall not be driven closer than two feet nor jetted closer than ten feet, to an existing building or structure unless approved by Building Official.

**2404.2 DRIVING FORMULA LOAD:** Subject to pile load limitations contained in Paragraphs 2404.3(h) and 2404.4(b) and in the absence of pile load test data satisfactory to the Building Official, the load on a pile shall not exceed that computed from the following driving formula:

Drop Hammer:

$$P = \frac{2 Wh}{S + 1}$$

Single Acting Hammer:

$$P = \frac{2 Wh}{S + 0.1}$$

Double Acting Hammers  
or Differential:

$$P = \frac{2 (W + AP)h}{S + 0.1}$$

- A ..... Area of piston in square inches
- P ..... equals allowable total load in pounds
- W ..... equals weight of striking part of hammer in pounds
- h ..... equals height of fall of striking part of hammer in feet or stroke in feet
- S ..... equals average penetration, in inches, per blow of not less than the five final blows
- E ..... equals actual energy delivered by hammer per blow in foot pounds
- p ..... Pressure in psi at the hammer.

**2404.3 WOOD PILES:** (a) Wood piles shall be in one piece of approved timber containing no evidence of decay, free from short kinks or reverse bends and having a uniform taper from butt to tip. A straight line drawn from the center of the butt to the center of the tip shall lie wholly within the body of the pile. The diameter of wood piles shall be not less than 6 inches at the tip and not less than 10 inches three feet from the butt for piles which are 25 feet or less in length; or 8 inches at the tip and 12 inches three feet from the butt for piles which exceed 25 feet in length. No piles which have a spiral grain exceeding one complete turn in 40 feet shall be used.

(b) Untreated wood piles in all cases shall be cut off not higher than mean low water and shall be capped with concrete.

(c) Pressure preservative treatment for piles as set forth herein shall be in conformance with the requirements of the American Wood Preservers Association "Manual of Standard Practice" C1 and C3 for the treatment of wood piles currently in effect. Preservative treatment required herein may be omitted for piles having rot and borer resistive characteristics, satisfactory evidence of which is approved by the Building Official.

(d) Wood piles supporting structures over the ground may be cut off at any elevation below the ground surface provided that such piles shall have been treated with the equivalent of Grade 1 creosote oil under pressure in such a manner as to retain not less than 12 pounds of creosote oil per cubic foot. In such cases, the pile butt shall be thoroughly coated with two applications of hot creosote oil.

(e) Wood piles which support a structure over water may project above the water to such height as may be necessary for structural purposes, provided that such piles used to support structures other than open wharfs, boat loading and other similar light structures shall have been treated with the equivalent of Grade 1 creosote oil or 70 - 30 creosote-coal tar solution under pressure in such a manner as to retain not less than 20 pounds of creosote oil or creosote-coal tar solution per cubic foot or refusal.

(f) Wood piles shall be driven with a protective driving cap or ring when necessary to prevent brooming or splitting of the butt. When brooming or splitting occurs, such piles shall be cut back to solid wood before the final resistance to penetrations is measured.

(g) If required, when driving through or to hard materials or to rock, wood piles shall be fitted with a metal protective drive shown satisfactory to the Building Official.

(h) In the absence of load tests, the total load on any wood pile shall not exceed the values set forth in Table 24-A.



**TABLE 24-A**

<b>TIP DIAMETER</b>	<b>BUTT DIAMETER</b>	<b>MAXIMUM LOAD IN TONS</b>
6"	10"	15
8"	12"	20
10"	14"	25

**2404.4 PRECAST CONCRETE PILES:** (a) Precast concrete piles shall be cast of concrete having a compressive strength of not less than 3,000# per square inch at time of driving, and shall be reinforced with a minimum of four longitudinal steel bars having an area of not less than one percent nor more than four percent of the gross concrete area. All longitudinal bars shall be of uniform size and shall be tied by not less than #2 hoops spaced eight inches in the body of the pile and not over three inches for the first 18 inches from both the butt and the tip. All reinforcement shall be protected by two inches or more of concrete, except that for piles subjected to the action of open water, waves or other severe exposure, a 3-inch protective covering shall be furnished in the zone of such exposure. For point bearing piles, the concrete area of the tip shall be not less than 75 percent of the area of the butt.

(b) All precast concrete piles shall have their date of manufacture and the lifting points clearly marked on the pile. Concrete piles shall not be driven until they have attained their full specification strength as verified by tests, nor shall the piles be removed from the forms until 50 percent of the specification strength has been attained. Piles shall not be transported nor driven until they have been cured not less than 7 days for Type I cement and three days for Type III cement.

(c) In the absence of load tests, the maximum allowable load per pile shall not exceed the values set forth in Table 24-B.

**TABLE 24-B**

<b>SIZE (Inches)</b>	<b>MAXIMUM LOAD (Tons)</b>
10 x 10	17
12 x 12	25
14 x 14	35

**2404.5 PRESTRESSED PRECAST CONCRETE PILES:** (a) Prestressed precast concrete piles shall conform to Section 2509 and to subsections 2404.1, 2404.2, 2404.4, and 2404.9 except as specifically detailed in this sub-section.

(b) Prestressed concrete piles shall be cast of concrete having a compressive strength of not less than 5,000 p.s.i. at time of driving and 3,000 p.s.i. before transfer of the prestressing force. The prestressing elements shall not be stressed initially in excess of 75 percent of its ultimate strength. The elements shall transfer a compressive stress to the concrete, after losses, of not less than 0.08 of the specified strength at driving. Under loads other than handling, no tension will be permitted in the concrete.

(c) Longitudinal reinforcing shall be protected by 2 inches of concrete and shall be tied by #2 hoops and #5 AS & W gauge spirals spaced at 8 inches in the body of piling 14 inches or smaller, and 9 inches in the body of piling 16 inches or larger, and not over 3 inches for the first 18 inches from both the butt and the tip.

**2404.6 CAST-IN-PLACE:** (a) Cast-in-place concrete piles shall consist of a steel shell driven in intimate contact with the surrounding soil and left in place and filled with concrete. Steel

shells may be uniformly tapered, step-tapered, cylindrical or a combination of such shapes and may be laterally corrugated, spirally corrugated, longitudinally fluted or plain.

(b) Pile shells and end closures shall be of sufficient strength and rigidity to permit their driving in keeping with the driving method used, and to prevent harmful distortion caused by soil pressures or by driving of adjacent piles until filled with concrete. A reduction of cross sectional area in excess of 15 percent shall be cause for rejection. The shells shall also be sufficiently watertight to exclude water during the placing of concrete.

(c) The minimum diameter shall be eight inches.

(d) Concrete for cast-in-place piles shall develop a compressive strength of not less than 3,000# per square inch at 28 days. The concrete shall be deposited in a continuous operation so as to insure a full sized pile without voids or separation. Concrete shall be placed in the dry. The pile may be sealed by depositing concrete by tremie or other approved method.

(e) Splices of shell sections shall be designed to insure the alignment of the shells and develop the full strength of the shell station.

(f) The load on the shell shall not exceed 25 percent of the minimum average tensile yield strength of the steel multiplied by the area of the shell. Shells having a wall thickness of 0.119 inch or more may be considered as carrying part of the load. Adequate allowance for corrosion shall be considered in the design but not less than the ~~th~~ 1/16 inch of the shell thickness shall be deducted before computing the area of the shell considered as carrying load. The metal for the shells shall conform to ASTM Designation A252-63aT, Grade 2, Welded and Seamless Steel Pipe Piles, or ASTM Designation A-245, Grade A, Flat-Rolled Carbon Steel Sheets of Structural Quality. The yield strength used in design shall be that of the material in the fabricated shell.

(g) For friction piles the allowable load shall be computed at the cross section located at a point two-thirds of the embedded length of the pile, in material providing suitable lateral support, measured upward from the tip. The load on the concrete shall not exceed 25 percent of the 28 day strength of the concrete multiplied by the concrete area.

(h) For end bearing piles, the concrete area of the critical section shall be such that the unit stress on the concrete does not exceed 0.25 f'c under the pile load. The area of the shell and the critical section of the concrete shall be taken at the elevation where the pile enters the stratum furnishing and bearing.

**2404.7 ROLLED STRUCTURAL STEEL SHAPES:** Rolled structural steel piles shall conform to the Specification for Structural Steel for Bridges and Building of the American Society for Testing Materials, ASTM Designation A7-61T, except that copper may be added to increase the corrosion resistant properties of the material. Sections of such piles of H form shall have flange projection not exceeding 14 times the thickness of web or flange and with total flange width not less than 85 percent of the depth of the section. No section shall have a nominal thickness of metal less than 3/8 inch. For end bearing piles, the allowable stress may be determined on the basis of an allowable stress of 25 percent of the yield value of the steel. In the absence of adequate corrosion protection, 1/16 inch shall be deducted from each face in determining the area of the pile section. The allowable load when used as friction piles, shall be determined by load tests at the site.

**2404.8 SPECIAL PILES OR SPECIAL CONDITIONSE** The use of types of piles or conditions not specifically covered herein may be permitted, subject to the approval of the Building Official, upon submission of acceptable test data, calculations or other information relating to the properties and load-carrying capacity of such piles.

**2404.9 LOAD TEST ON PILES:** (a) Single piles tested shall be loaded to at least twice the desired design load and should pile groups be tested, the test load shall be not less than one and one-half times the total desired load for the group.

(b) The apparatus for applying known vertical loads to the top of the pile shall maintain constant load under increasing settlement, and shall apply the loads in such a way that no lateral forces or impact will occur. Hydraulic jacks when used, shall be equipped with a calibrated pressure gauge. Uplift piles used to provide the jacking resistance shall be sufficient distance from the test pile so as not to influence its behavior under test.

(c) The test load shall be applied in increments of not more than 25 percent of the design load until the total test load has been applied.

(d) The method for determining vertical movement shall be subject to the approval of the Building Official. Readings shall be sufficient in number to define the time settlement and rebound curve.

(e) Each load increment shall be maintained for a minimum of one hour, and until the rate of settlement is less than 0.01 inch per hour. The total load shall be maintained until settlement does not exceed 0.01 inch in 24 hours. Settlement readings shall be taken at regular intervals during the test period.

(f) After the maximum load has remained on the pile for 24 hours and final settlement readings have been taken, the pile shall be unloaded in 50 percent decrements of design load. Rebound readings shall be taken at regular intervals during the unloading period, and final readings taken approximately 12 hours after the entire load has been removed.

(g) The maximum allowable pile load shall be one-half of that load which causes a net settlement of not more than 0.005 inch per ton of test load, a gross settlement of one inch (which ever is less) or a disproportionate increase in settlement.

## **2405 FOUNDATION WALLS AND GRADE BEAMS**

### **2405.1 EXTERIOR FOUNDATION WALLS: (a) GENERAL:**

(1) Exterior foundation walls of buildings, where the character of the soil is such that allowable soil loads of 1,500 pounds or less per square foot are used for design, shall be poured-in-place reinforced concrete from the footing to the bottom of the first or ground floor construction.

(2) Exterior foundation walls of building, where the character of the soil is such that allowable soil loads of more than 1,500 pounds per square foot are used for design, may be of unit masonry or concrete on continuous concrete footings.

(3) Under the exterior walls of buildings of Type V construction, in locations where extreme dampness exists, the Building Official may approve isolated piers, provided such piers are as otherwise set forth in Paragraph 2405.2(b).

(b) **DETAILED REQUIREMENTS:** (1) The thickness of the foundation wall shall be not less than eight inches.

(2) Where wood joist construction is used for the first or ground floor, the thickness of the exterior foundation walls shall be not less than eight inches, plus four inches for the bearing of joists.

(3) Foundations of unit masonry supporting joists shall be capped with four inches of concrete.

**2405.2 INTERIOR FOUNDATION WALLS** Interior foundation walls shall be of the material and design specified in Section 2405.1 except as follows:

(a) Interior foundation walls which support stud walls shall be exempted from the additional four inches of width required for the bearing of joists.

(b) For wood frame buildings not exceeding one story in height, isolated piers may be substituted for interior foundation walls where such piers do not exceed 24 inches in height, are a minimum of 12 inches by 12 inches in cross-sectional dimension, and are located at corners and points of concentration, but not more than six feet apart.

Exception: Where frame buildings are moved from one location to another, continuous footings shall be required with stem walls.

**2405.3 GRADE BEAMS:** (a) Grade beams, supporting loads between piles or piers, shall be reinforced concrete, or structural steel protected by two inches of concrete cover.

(b) Grade beams shall be the thickness of the wall they support but never less than eight inches nor less than set forth for foundation walls herein.

(c) Grade beams shall be suitably designed and reinforced around access openings and vents.

#### **2406 GRADES UNDER BUILDINGS**

The grades of the ground under buildings of joist or suspended slab construction, having no basements, shall be not lower than the lowest surrounding finished lot area grades in order to prevent the accumulation and standing of ground, storm or tide water under such building unless provided with other approved means of drainage. Plans for future raising of lots shall be taken into account in planning the grade of the ground under such buildings or the Building Official may establish grades under such buildings based on present or future street or sidewalk grades abutting the property.

#### **2407 RETAINING WALLS**

All walls exceeding 24 inches in height, built to retain or support earth, or subject to pressure from adjoining earth and any surcharges shall be designed to resist the pressures to which they are subjected, including any water pressure that may exist.

#### **2408 SEA WALLS AND BULKHEADS**

Seawalls, bulkheads, groins and other retaining walls along an ocean front, bay, creek, canal, lake or waterway, shall be designed by a Registered Professional Engineer in the State of Florida.

**2408.1** The structures shall retain the adjoining earth from the surface of the ground to a point sufficiently deep to retain the base against surcharge pressures, with due design consideration for wave action and currents. Where riprap is placed below a

structure and has side slopes not steeper than one and one-half to one, does not extend above elevations minus 1.0 and has a width at the top at least three feet greater than the width at the base of the structure above, it will be classified as retaining the adjoining earth.

**2408.2** Timber shall not be used, other than where located below mean low water, except that borer-resistant or appropriately treated wood may be specifically approved by the Building Official.

**2408.3** Structures shall be classed as gravity types when the resultant of the acting forces fall within the middle third of the base. Boulder type walls shall be considered as gravity type where the base width equals or exceeds the height of the wall. Structures which are not of gravity or cantilever type shall be secured to properly designed anchors.

**2408.4** Structures may be constructed of a combination of lime rock boulders and concrete. The minimum percentage of cross-section area of the concrete to the total cross-section area of the structure shall be 40 percent, not including concrete used for copings or decorative purposes.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud. The text notes that without reliable records, it would be difficult to track the flow of funds and identify any irregularities.

2. The second part of the document outlines the specific requirements for record-keeping. It states that all transactions must be recorded in a clear and concise manner, using a standardized format. This includes recording the date, amount, and purpose of each transaction. The document also mentions that records should be kept for a minimum of five years, unless otherwise specified by law.

3. The third part of the document discusses the role of internal controls in ensuring the accuracy of records. It explains that internal controls are designed to prevent errors and fraud by separating duties and requiring authorization for transactions. The text notes that strong internal controls are a key component of a robust financial system.

4. The fourth part of the document addresses the importance of regular audits. It states that audits are necessary to verify the accuracy of records and to identify any weaknesses in the internal control system. The document emphasizes that audits should be conducted by independent parties to ensure objectivity and fairness.

5. The fifth part of the document discusses the consequences of non-compliance with record-keeping requirements. It notes that failure to maintain accurate records can result in penalties, fines, and even criminal charges. The text also mentions that non-compliance can damage the reputation of an organization and lead to a loss of trust from stakeholders.

## Chapter 25 — Reinforced Concrete

- 2501 GENERAL
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### 2501 GENERAL

Reinforced concrete shall be of the materials, proportions, strength and consistency as set forth in this chapter and shall be designed by methods admitting of rational analysis according to established principles of mechanics.

### 2502 STANDARDS

The following standards are hereby adopted as a part of this Code and supplement, but do not supersede, the specific requirements as set forth herein:

2502.1 "Building Code Requirements for Reinforced Concrete," ACI 318-63, as adopted by the American Concrete Institute.

2502.2 "Minimum Standard Requirements for Precast Concrete Floor Units," ACI 711-56, as adopted by the American Concrete Institute.

2502.3 "Manual of Standard Practice for Detailing Reinforced Concrete Structures", ACI 315.

2502.4 "High Strength Billet Steel Bars for Concrete Reinforcing," ASTM A431 of the American Society for Testing Materials, in accordance with the recommendations of the standard in Sub-section 2502.1.

2502.5 "Deformed Billet Steel Bars for Concrete Reinforcing with 60,000 psi minimum Yield Point," ASTM A432 of the American Society for Testing Materials.

2502.6 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction", AWS D12.1 of the American Welding Society.

### 2503 DEFINITIONS

The following words and terms shall, for the purpose of this Code, have the meanings set forth in this Section:

(a) Commissioners of Buildings shall mean the Building Official.

(b) Board of Special Construction shall mean the Board of Appeals.

### 2504 MATERIALS AND TESTS

2504.1 **PORTLAND CEMENT:** Portland Cement shall conform to the "Standard Specifications for Portland Cement" (ASTM Designation C150).

2504.2 **CONCRETE AGGREGATES:** Aggregates used in concrete for buildings or structures shall conform to the "Standard Specifications for Concrete Aggregates" (ASTM Designation: C33 or to the "Standard Specifications for lightweight Aggregates for Structural Concrete" (ASTM Designation: C330 except as follows:

(a) The gradation of locally-produced sand and crushed rock aggregate shall be as follows:

#### COARSE AGGREGATE

Percent Passing	
1 1/2" Sieve	100-
1" Sieve	95-100
1/2" Sieve	25-60
#4 Sieve	0-10
#8 Sieve	0-5

#### FINE AGGREGATE

Percent Passing	
3/8" Sieve	100-
# 4 Sieve	90-100
# 8 Sieve	79-95
# 16 Sieve	50-85
# 30 Sieve	30-70
# 50 Sieve	10-45
#100 Sieve	0-10

(b) Aggregates failing to meet these specifications but which have been shown by approved laboratory test to produce concrete of the required quality may be used where authorized by the Building Official.

(c) Aggregates shall be quarried in fresh water and shall contain not more than one-twentieth of one percent salt by weight.

2504.3 **REINFORCING:** Reinforcing steel complying with ASTM Designation A15 shall be of only intermediate grade.

2504.4 **TESTS:** (a) The Building Official, or his authorized representative, shall have the right to order the test of any mater-



ial entering into concrete or reinforced concrete to determine its suitability for the purpose to order reasonable tests of the concrete from time to time to determine whether the materials and methods in use are such as to produce concrete of the necessary quality and to order the test under load of any portion of a completed structure, when conditions have been such as to leave doubt as to the adequacy of the structure to serve the purpose for which it is intended.

(b) Tests of materials and of concrete shall be made in accordance with the requirements of the American Society for Testing and Materials as noted elsewhere in this Chapter. Tests shall be made by an approved testing laboratory and the results of such tests submitted to the Building Official by the laboratory. The complete records of such tests shall be available for inspection during the progress of the work and for a reasonable period thereafter, and shall be preserved by the engineer or architect for that purpose.

### **2505 QUALITY OF CONCRETE**

**2505.1 CONCRETE QUALITY:** (a) For the design of reinforced concrete structures, the value of  $f'c$  used for determining the allowable stresses as stipulated in Section 2505.3 shall be based on the 28-day compressive strength of the concrete or the specified minimum compressive strength at the earlier age at which the concrete may be expected to receive its full load. All plans, submitted for approval or used on the job, shall clearly show the assumed strength of concrete at a specified age for which all parts of the structure were designed.

(b) The minimum quality of structural concrete recognized by this Code shall be concrete having a design strength of 2000 pounds per square inch in 28 days. The minimum strength of light weight aggregate concrete, structural or fill, shall not be less than 500 psi in 28 days.

(c) The Building Official may accept concrete mixed in the proportion of one cubic foot or one sack of Portland cement, two and one-half cubic feet of sand and four cubic feet of coarse aggregate when machine mixed with sufficient water to make a plastic mix with no free water, provided the use of concrete so proportioned and mixed is limited to minor building components.

(d) When the design is based on  $f'c$  in excess of 2500 psi, proportioning and mixing shall be approved by, and placing shall be under the supervision of, a Registered Professional Engineer as set forth in Sub-section 305.3.

**2505.2 TESTS ON CONCRETE** (a) The Building Official may require a reasonable number of tests to be made during the progress of the work, or may promulgate and set forth in writing such reasonable rules for requiring tests to be made by an approved laboratory as he may consider necessary to insure compliance with this Code. Not less than three specimens shall be made for each standard test, nor less than one test for each 50 cubic yards of concrete used at any job site. Specimens shall be made and cured in accordance with the Standard Method of Making and Curing Concrete Compressions and Flexure Test Specimens in the Field (ASTM Designation C31). Specimens shall be tested in accordance with the Standard Method of Test for Compressive Strength of Molded Concrete Cylinders (ASTM Designation C39) and the three specimens constituting a standard test shall be tested at 28 days.

(b) The age for strength tests shall be 28 days, or where specified at the earlier age at which the concrete is to receive its full working load, but seven-day tests may be used, provided that the relations between the seven and 28-day strengths of the concrete is established by tests for the materials and proportions used.

(c) To conform to the requirements of these specifications, the average strength of the laboratory-cured cylinders representing each class of concrete as well as the average of any five consecutive strength tests representing each class of concrete shall be equal to, or greater than the specified strength, and not more than one strength test in ten shall have an average value of less than 90 percent of the specified strength.

(d) In addition, where there is question as to the quality of the concrete in the structure, the Building Official may require core tests in accordance with the "standard" Methods of Securing, Preparing and Testing Specimens from Hardened Concrete for Compressive and Flexural Strengths," (ASTM Designation C42) or order load tests for that portion of the structure where the questionable concrete has been placed. When concrete in structures has failed to meet the minimum standards, the Building Official shall order analysis and report by a Registered Engineer to determine the adequacy of the structure.

(e) The maximum allowable slump of concrete shall be six inches. On jobs controlled and supervised by a Professional Engineer, this maximum may be exceeded, but no concrete shall exceed the slump as indicated on the approved plans for the proposed work.

No water shall be added at the job site to concrete delivered by truck as ready for use except by the control of a supervising Professional Engineer or other concrete control authority acceptable to the Building Official, and then only when slump tests are made and the concrete so delivered is known to be of less than the slump specified or job conditions require a greater slump.

**2505.3 ALLOWABLE UNIT STRESSES IN CONCRETE:** (a) The unit stresses in pounds per square inch on concrete using heavy aggregates to be used in the design shall not exceed the values of Table 25-A where  $f'c$  equals the minimum specified compressive strength at 28 days, or at the earlier age at which the concrete may be expected to receive its full load.

(b) The unit stresses in concrete using light weight aggregates shall not exceed the percentages of ultimate strength as established in Table 25-A based on ultimate strengths demonstrated by tests.

## **2506 MIXING AND PLACING**

**2506.1 FORMS AND EQUIPMENT:** (a) Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned, all debris removed from the spaces to be occupied by the concrete, forms shall be thoroughly wetted or oiled, masonry filler units that will be in contact with concrete shall be well drenched, and the reinforcement shall be thoroughly cleaned.

(b) Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Building Official.

**2506.2 MIXING OF CONCRETE:** (a) Unless otherwise authorized by the Building Official, the mixing of concrete shall be done in a batch mixer of approved type.

(b) All concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.

(c) For job mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for at least one and one-half minutes after all materials are in the drum. For batches larger than one cubic yard, mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof.

(d) Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in the "Standard Specifications for Ready-Mixed Concrete" (ASTM Designation C94).

(e) No concrete shall be retempered after it has taken an initial set nor shall any batch or portion thereof be deposited in forms more than one and one-half hours after the mixing of that particular batch has been commenced.



**2506.3 CONVEYING:** (a) Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent separation or loss of materials.

(b) Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery and without separation of the materials.

**2506.4 DEPOSITING:** (a) Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. The concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the spaces between the bars. No concrete that has been contaminated by foreign materials shall be deposited on the work.

(b) When concreting is once started, it shall be carried on as a continuous operation until the placing of the panel or section is completed. The top surface shall be generally level. When construction joints are necessary, they shall be made as set forth in Sub-section 2507.8.

(c) All concrete shall be thoroughly compacted by suitable means during the operation of placing, and shall be thoroughly worked around the reinforcement and embedded fixtures and into the corners of the forms. Where concrete is placed in columns or walls, the placing shall be so conducted that the concrete will not pass reinforcements for more than six feet. Separate lifts shall be thoroughly compacted. Vibrators may be used to aid in the placement of the concrete, provided they are used under experienced supervision, the forms are designed to withstand their action, and their action is not directed to bars, any part of which is in contact with concrete which started to take its initial set.

(d) Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete, shall first be deposited in the forms to a depth of at least one inch.

**2506.5 CURING:** In all concrete structures, concrete made with normal Portland cement shall be maintained in a moist condition for at least the first seven days after placing and high-early-strength concrete shall be so maintained for at least the first three days.

**2506.6 BONDING:** Before new concrete is deposited on or against concrete which has set, the forms shall be re-tightened, the surface of the set concrete shall be cleaned of all foreign matter and laitance, and wetted. The cleaned and wetted surfaces of the hardened concrete shall first be slushed with a coating of neat cement against which the new concrete shall be placed before the mortar has attained its initial set.

## **2507 FORMS AND DETAILS OF CONSTRUCTION**

**2507.1 DESIGN OF FORMS:** Forms shall conform to the shape, lines and dimensions of the members as called for on the plans, and shall be substantial and sufficiently tight to prevent leakage of mortar. Forms shall be properly braced or tied together so as to maintain position and shape. Temporary openings at the bottom of columns shall be provided to facilitate cleaning and inspection before depositing concrete. When the concrete has attained sufficient strength, the forms shall be removed from at least two faces of all reinforced members, other than where placed in contact with the soil or for slabs or joists, to facilitate inspection of placing operations, except that "U" type block may be used with the limitations as set forth in Sub-paragraph 2704.2 (c)(12).

**2507.2 REMOVAL OF FORMS:** The removal of forms shall be carried out in such a manner as to insure the complete safety of the structure. Vertical forms may be removed in 24 hours, provided that the concrete has hardened sufficiently that it is not injured. Bottom forms and shoring for slabs, beams and girders shall not be removed in less than 14 days; except that where tests indicate that the concrete has attained sufficient strength to safely support itself and any imposed loads in less time, adjustments in the above waiting periods may be made by the Building Official in conformance with the results obtained.

**2507.3 PIPES AND CONDUIT EMBEDDED IN CONCRETE:** Steel or iron pipes larger than one inch in diameter, or pipes which will contain liquid, gas or vapor at other than room temperature or which are under pressure shall not be directly embedded in concrete necessary for structural stability, or fire protection. Sleeves or other pipes passing through floors, walls or beams shall not impair the strength of the construction. Sleeves or pipes not over two inches nominal inside diameter may be considered as structurally replacing the concrete, provided they are not exposed to rusting or other deterioration, are of plain or galvanized iron or steel not thinner than standard wrought-iron pipe and are spaced not less than three diameters apart.

Electric conduits and other pipes whose embedment is allowed shall not, with their fittings, displace that concrete on which stress is calculated or which is required for fire protection, to greater extent than four percent of the area of the cross-section.

Embedded pipes and conduits other than those passing through, shall not be larger than one inch in outside diameter or larger than one-third the thickness of the slab, wall or beam in which they are embedded; shall not be spaced closer than three diameters apart nor located to impair the strength of the construction.

Circular uncoated or galvanized electrical conduit of iron or steel (EMT included) may be considered as replacing the displaced concrete. Non-metallic and non-ferrous metallic conduit which does not reduce the structural strength below that required by the design may be embedded in concrete where such use and embedment complies with the National Electrical Code as set forth in Paragraph 4505.1 (a) herein.

The Building Official may permit exceptions to the above restrictions where provisions acceptable to him are made in the design of the members to accommodate larger pipes.

**2507.4 CLEANING AND BENDING REINFORCEMENT:** Metal reinforcement, at the time concrete is placed, shall be free from rust, scale or other coatings that will destroy or reduce the bond.

**2507.5 PLACING REINFORCEMENT:** Metal reinforcement shall be accurately placed and adequately secured in position by concrete or metal chairs or spaces or other acceptable methods. The minimum clear distance between parallel bars, except in columns, shall be equal to the nominal diameter of the bars. In no case shall the clear distance between bars be less than one inch, nor less than one and one-third times the maximum size of the course aggregate. When reinforcement in beams or girders is placed in two or more layers, the clear distance between layers shall not be less than one inch nor less than the diameter of the bars, and the bars in the upper layers shall be placed directly above those in the bottom layer.

**2507.6 SPLICES IN REINFORCEMENT:** In slabs, beams and girders, splices in reinforcement at points of maximum stress shall be avoided wherever possible. Such splices where used, shall be welded, lapped or otherwise fully developed, but in any case, shall transfer the entire stress from bar to bar without exceeding the allowable bond and shear stresses listed in Table 25-A. The minimum overlap for a lapped splice shall be 24 bar diameters, but not less than 12 inches for bars. The clear distance between bars shall also apply to the clear distance from a contact splice and adjacent splices or bars. Welded splices shall comply with the standards set forth in sub-paragraph 2502.6.

**2507.7 CONCRETE PROTECTION FOR REINFORCEMENT:**

(a) The reinforcement of footings and other principal structural members in which the concrete is deposited against the ground, shall have not less than three inches of concrete between it and the ground contact surface. If concrete surfaces after removal of the forms are to be exposed to the weather or be in contact with the ground, the reinforcement shall be protected with not less than two inches of concrete.

(b) The concrete protective covering for reinforcement at surfaces not exposed directly to the ground or weather shall be not less than three-fourth inch for slabs and walls; and not less than one and one-half inches for beams, girders and columns. In concrete ribbed floors in which the clear distance between ribs is not more than thirty inches, the protection of reinforcement shall be at least three-fourths inch.

(c) Concrete cover for reinforcement shall in all cases be at least equal to the diameter of round bars, and one and one-half times the side dimension of square bars.

(d) Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

(e) The above protective coverings are minimums but protection shall not be less than elsewhere set forth for required fire-resistive ratings.

**2507.8 CONSTRUCTION JOINTS** (a) Joints not indicated on the plans shall be so made and located as to least impair the strength of the structure. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed. Vertical joints shall be thoroughly wetted, and slushed with a coat of neat cement grout immediately before placing of new concrete.

(b) At least two hours must elapse after depositing concrete in the columns or walls before depositing in beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith.

(c) Construction joints in floors shall be located near the middle of the spans of slabs, beams, or girders except where such slabs, beams or girders carry concentrated loads, in which case the location of construction joints shall be determined by engineering analysis.

## **2508 PRECAST CONCRETE FLOOR AND ROOF UNITS**

**2508.1 GENERAL:** (a) Precast concrete units shall comply with the minimum requirements set forth in this Chapter, and the Standards set forth in Sub-section 2502.2 shall be applicable to only floor and roof units.

(b) All precast structural items shall be designed by a Registered Professional Engineer.

(c) Only the material cast monolithically with the units at the time of manufacture shall be used in computing stresses unless adequate and approved mechanical shear transfer is provided.

(d) The Building Official may promulgate and set forth in writing such reasonable rules for requiring tests to be made by an approved laboratory as he may consider necessary to insure compliance with this Code or uniformity of the products produced. The quantity of tests shall be based on consideration of safety or volume of output.

(e) The Building Official or his representative shall have free access to the plant of any producer at all hours of normal operation, and failure to permit such access shall be cause for revocation of approval.

(f) Failure of any product to satisfy in every respect the quality prescribed, or failure to conform with plans and specifications, shall be cause for rejection of the product.

## **2508.2 CONCRETE PROTECTION FOR REINFORCEMENT**

(a) Precast floor and roof units made under certified and controlled manufacturing procedures, when used in locations protected from the weather or moisture, may be approved with three-fourths inch concrete covering for the reinforcing, provided that the concrete cover in all cases shall be at least equal to the diameter of round bars and one and one-half times the side dimension of square bars, and provided that to insure exact final location to the steel, positive and rigid devices for that purpose are employed in the manufacturing process. When the precast members are exposed to weather or moisture the concrete cover shall be not less than set forth in Sub-section 2507.1 and, where fire-resistive construction is required, the concrete cover shall be as set forth in Chapter 37.

(b) Aggregate for floor slabs shall be so graded from fine to coarse that not less than one-half nor more than two-thirds by weight of the total, based on dry materials, is retained on the No. 4 standard sieve, except that these proportions do not necessarily apply to lightweight aggregates. The maximum size shall not exceed one-third the thickness of the slab.



**2508.3 AGGREGATE** The maximum size of the aggregate for precast units shall be not larger than one-third of the narrowest dimension between sides of the forms of the member in which the unit is cast nor larger than three-fourths of the minimum clear spacing between reinforcing bars and sides of the forms, except that where concrete is placed by means of high frequency vibration, the maximum size of the aggregate shall not be larger than one-half the narrowest dimension between sides of the forms.

**2508.4 STRENGTH OF CONCRETE** (a) Concrete for precast structural units made of crushed stone or other heavy aggregate shall have a compressive strength of not less than 2500 psi at 28 days.

(b) Concrete for precast units made of lightweight aggregate concrete shall follow the general provisions of Sub-section 2503.3 with consideration of the nature and limitations of the aggregate and the strength of the product.

**2508.5 WORKMANSHIP:** (a) The mix, the gradation of the aggregate and the workability shall be such as to insure complete filling of the forms and continuous intimate bond between the concrete and all steel.

(b) Handling and conveying before curing shall be reduced to a minimum. Machinery for this purpose should be so designed that the unit will not be subject to bending or shock which will produce incipient cracks, broken edges or corners. Precast units shall not be freely transported or placed until the concrete is at least 14 days old, if made with regular cement, or at least seven days old, if made with Type III cement or until its strength, as established by definite tests, is at least 60 percent of the required 28-day strength.

(c) The use of precast structural units not complying with ACI requirements or having visible cracks, honeycomb, exposed reinforcing except at ends or, with a compressive section dimension more than one-eighth inch less than specified dimension shall not be permitted.

**2508.6 CURING:** (a) No precast structural unit shall be removed from the form until the concrete has attained a compressive strength of 30 percent of the 28-day design strength but not less than 1000 psi, as verified by representative tests.

(b) Curing by high-pressure steam, steam vapor, or other accepted processes may be employed to accelerate the hardening of the concrete and to reduce the time of curing.

(c) To insure the eventual placement of the units in the structure without damage, the handling shall be done in such a manner that bending shall be reduced to a minimum or prevented.

**2508.7 IDENTIFICATION AND MARKING:** All joists, beams, girders and other units shall show some mark plainly indicating the top of the unit. This mark or symbol shall indicate the manufacturer, the date of manufacture and the length, size and type of reinforcing.

**2508.8 CUTTING OF HOLES:** No openings or channels not provided for in the structural design shall be made on the job without the specific approval of the engineer and in accordance with his written, detailed instructions covering such work.

**2508.9 ANCHORAGE:** Anchorage of all precast concrete units shall be designed, based on rational analysis to transmit loads and other forces to the structural frame.

**2508.10 BRIDGING:** Joists shall be secured against lateral displacement by cast-in-place bridging, and such bridging shall be spaced not to exceed 32 times the width of the compression flange of the joist except that for roof systems, cast-in-place Portland concrete slabs embedding the top flanges not less than one-half inch, or steel inserts cast in the joist heads to which bulb-tees supporting gypsum decks are welded, shall be accepted in lieu of bridging.

### **2509 PRESTRESSED CONCRETE**

**2509.1 GENERAL:** (a) The term "prestressed concrete" refers to pretensioned concrete in which the reinforcing is tensioned before hardening of the concrete or to post-tensioned concrete in which the reinforcing is tensioned after hardening of the concrete or combination of both pre-tensioning and post-tensioning.

(b) All prestressed precast structural items shall be designed by a Registered Professional Engineer. Openings or channels not provided for in the structural design shall not be made on the job without the specific approval of the Design Engineer or Structural Engineer.

(c) The Building Official may promulgate and set forth in writing such reasonable rules for requiring tests to be made by an approved laboratory as he may consider necessary to insure compliance with these Standards or uniformity of the products produced.

(d) The Building Official or his representative shall have free access to the plant of any producer at all hours of normal operation, and failure to permit such access shall be cause for revocation of approval.

(e) Failure of any product to satisfy the quality described or failure to conform with plans and specifications shall be cause for rejection of the product.

**2509.2 DESIGN AND CONSTRUCTION:** (a) Design and construction of prestressed concrete of the ACI-ASCI Joint Committee 323 as published in the Journal of the American Concrete Institute, which are hereby adopted as a part of this Code, and supplement but do not supersede, the specific requirements as set forth herein.

(b) Deflection under live load shall not exceed  $L/240$  and where plaster ceilings are to be applied shall not exceed  $L/360$ .

(c) Calcium chloride shall not be used in concrete for prestressed members.

**2510 PNEUMATICALLY PLACED CONCRETE**

2510.1 (a) Pneumatically placed concrete is a proportioned combination of fine aggregate Portland cement and water which, after mixing, is pneumatically projected by air directly onto the surface to which it is to be applied.

(b) Pneumatically placed concrete shall be proportioned and applied as set forth herein.

2510.2 **MATERIALS** (a) Portland cement shall comply with the Standard Specifications for Portland cement (ASTM Designation: C150)t

(b) Fine aggregates shall consist of washed sand and shall be hard, dense, durable, clean, sharp and graded evenly from fine to coarse as followsr

<u>SIEVE SIZE</u>	<u>PERCENT PASSING</u>
3/8"	100
# 4	97-100
# 8	78-85
# 16	60-73
# 30	36-47
# 50	10-20
#100	0-4

The sand shall have a fineness modulus of between 2.70 and 3.3 and for proper placement, sand shall contain between three and six percent moisture by weight.

(c) Water shall be of potable quality.

(d) All reinforcement shall be clean and free of loose rust or other coatings harmful to bond. Only round bars or wire mesh shall be used.

2510.3 **PROPORTIONS** (a) Unless otherwise specified, all pneumatically placed concrete shall be mixed in the proportions of one part of cement to four and one-half parts of sand based on loose, dry volume.

(b) The Building Official may require that core testrshall be made to determine the strength of the material placed. Not less than two test cylinders shall be made of eachrday's operation. Test cylinders shall be furnished by the person or firms doing or causing therwork to be done, and shall be six inches in diameter and 12 inches in height. Forms for cylinders shall be of three-fourths inch hardware cloth, shall be shot with the same air pressure, nozzle tip and hydration as the mortar in the structure and the hardware cloth form shall be removed in 24 hours. Cylinders shall be cured and tested in accordance with the Standard Method of Test for Compressive Strength of Molded

Concrete Cylinders (ASTM Designation: C39). One cylinder shall be tested at seven days and shall develop a compressive strength of not less than 2400 psi and one cylinder shall be tested at 28 days and shall develop the specified strength but not less than 3000 psi based on 1:4½ mix.

**2510.4 REBOUND:** Rebound recovered clean and free of foreign matter may be reused as sand in quantity not to exceed 20 percent of the sand requirements.

**2510.5 CONSTRUCTION JOINTS:** Construction joints shall be sloped to a thin edge. No square joints will be allowed.

**2510.6 CURING:** A light spray of water shall be applied as soon as possible without damage to the surface and the surface shall be kept moist for a period of not less than five days.

**2510.7 WORKMANSHIP:** Only well trained or experienced foremen, gunmen, nozzle men, and rodmen shall be employed and the Building Official may require written evidence of experience as a requisite of approval of the work.

**2510.8 FORMS:** Forms shall be true to line and level, shall be substantially braced to avoid excessive vibration and shall be adequately supported to avoid deflection. Forms for columns shall, where practicable, be on two sides only. Forms for beams shall be a soffit and one side or may be a soffit only with vertical backing of fine wire mesh near the center. Forms shall be clean and thoroughly wetted before application of mortar.

**2510.9 PREPARATION OF SURFACES:** (a) Old concrete or masonry surfaces shall be thoroughly cleaned by sandblasting. Sandblasting shall be done by experienced workmen and using approved equipment and sand shall be clean, sharp, hard and uniform.

(b) All concrete and masonry surfaces shall be cleaned of dust and loose particles by compressed air and water and shall be thoroughly wetted and surface damp before application of mortar.

(c) Steel surfaces shall be cleaned free of substances that will prevent bond and shall be sandblasted where necessary.

(d) Earth surfaces shall be thoroughly compacted, neatly trimmed to line and grade, and shall be wetted and without free surface water before application of mortar.

**2510.10 PLACING OF MORTAR:** (a) A uniform water pressure, not less than 15 pounds per square inch above the air pressure, shall be maintained at the nozzle.

(b) For lengths of hose up to 100 feet, pneumatic pressure at the gun shall be 45 pounds per square inch or more. Where length exceeds 100 feet, pressure shall be increased five pounds per square inch for each additional 50 feet of hose required. Steady pressure shall be maintained.

(c) The nozzle shall be held at right angles to the surface and at a distance of two and one-half to three and one-half feet.

(d) When enclosing reinforcing steel, the nozzle shall be held to direct the material behind the bars. Each side of individual bars shall be shot separately.

(e) When enclosing reinforcing steel, an air blow-out jet shall precede the nozzlement to blow out all rebound or sand which may have lodged behind the bars.

(f) Mortar shall emerge from the nozzle in a steady uninterrupted flow and when the flow becomes intermittent, the nozzle shall be diverted from the work. Hydration shall be thorough and uniform.

(g) In shooting walls and columns, application shall begin at the bottom and the first coat shall completely embed the reinforcement to the form.

(h) In shooting beams, application shall begin at the bottom and a surface at right angles to the nozzle shall be maintained.

(i) In shooting slabs, the nozzle shall be held at a slight angle to the work so that rebound is blown on to the finished portion where it shall be removed. The limit of material in one layer shall be the appearance of excess moisture on the surface.

(j) Before placing succeeding layers, all loose material rebound, laitance, rebound pockets, sags or other imperfections harmful to bond or strength shall be removed or carefully cut out and the surface shall be damp. Sufficient time shall be allowed between layers for the material to set.

(k) Finishing of surfaces may be by any method not harmful to the strength of the material. A finish coat may be applied starting from the top and working down.

## Chapter 26 — Reinforced Gypsum Concrete

2601 DESIGN

2602 STANDARDS

2603 TESTS

2604 CONSTRUCTION DETAILS

### 2601 DESIGN

**2601.1 DESIGN:** Reinforced gypsum concrete shall be designed by methods admitting of rational analysis based on established principles of mechanics. The general assumptions and principles specified for reinforced concrete in Chapter 25 shall be the basis of design of reinforced gypsum so far as they are applicable.

**2601.2 LIMITATIONS OF USE:** (a) Reinforced gypsum concrete used for roofs of occupancies producing unusually high humidities shall be constructed with the use of non-absorbitive formboard.

(b) Reinforced gypsum concrete shall not be used:

- (1) For floors.
- (2) For direct support of concentrated loads, such as water tanks, fan bases, cooling towers, flag poles and signs. Details must provide for transmitting such loads directly to the walls or the primary framing.
- (3) For exterior locations other than roofs.
- (4) For ceilings of structures not completely enclosed, unless constructed with the use of non-absorbitive formboard.

### 2602 STANDARDS

The "Standard Specifications for Reinforced Gypsum Concrete" (ASA A59.1) of the American Standards Association is hereby adopted to supplement, but not supersede, the specific requirements set forth herein.

### 2603 TESTS

The Building Official may require reasonable tests of gypsum-concrete units or the materials of gypsum-concrete construction to determine their quality.

### 2604 CONSTRUCTION DETAILS

**2604.1 POURED-IN-PLACE GYPSUM:** (a) Roof slabs of poured-in-place gypsum shall be solid and, for spans not exceeding 33 inches, shall have a minimum thickness of 2 inches not including the formboard.

(b) Reinforcing fabric shall conform to ASTM Designation: A185, shall be galvanized with a zinc coating conforming to

ASTM Designation: B6, and contain a minimum weight of coating of 0.30 ounces per square foot of uncoated wire surface determined in accordance with ASTM Designation A90; shall have an effective cross-sectional area of not less than 0.026 square inches per foot of width or No. 12 gauge wire spaced four inches on centers as principal reinforcing nor less than 0.0075 square inches per foot of width or No. 14 gauge wire spaced eight inches on center as temperature reinforcing, and shall be lapped not less than 16 inches at the ends. Sides of fabric shall be butted or spaced not more than four inches.

(c) Sub-purlins shall be designed to provide a mechanical lock or key with the gypsum to resist uplift.

(d) Sub-purlins shall be rigidly secured to the primary roof framing by welding, riveting or bolting to the supporting members, including end supports, and where welded, such welding shall be on both sides of the sub-purlin. Sub-purlins terminating at or on masonry walls shall be securely anchored to the masonry by a continuous member. Supporting masonry running parallel to the sub-purlins shall not be used in the installations of sub-purlins on or adjacent to the masonry.

(e) Where sub-purlins are not used, resistance to uplift shall be otherwise provided of suitable design equivalent to the sub-purlins.

(f) Sub-purlins supporting reinforced gypsum shall not be considered as bridging to serve in lieu of bridging otherwise required for the framing members supporting such sub-purlins.

(g) Sub-purlins shall not be field-spliced between supports.

(h) Suspended ceilings shall not be hung from the gypsum. Such ceilings may be hung from the sub-purlins where the sub-purlins are so designed.

(i) Roof coverings shall be applied as specified in Chapter

### 34.

**2604.2 PRECAST GYPSUM UNITS:** (a) Precast gypsum-concrete units for roof construction shall be of uniform thickness, solid or hollow or may be recessed on the underside. The span of precast gypsum concrete shall not exceed six feet eight inches. For the purpose of this section, any span over three feet shall be called a long span.

(b) Except as otherwise provided in Section 2604.2(c), precast gypsum-concrete units shall have not less than the following thicknesses:

(1) Solid units shall be not less than two inches thick, nor, if a long span, less than three inches thick.

(2) Hollow units shall be not less than three inches, nor the shell in compression less than three-fourth inch thick; if long span, the units shall be not less than five inches thick nor the shell in compression less than one and three-eighths inch thick.

(3) Recessed units shall be not less than five inches thick nor the panel less than one and three-eighths inch thick.

(c) Precast solid reinforced gypsum-concrete units, not more than 15 inches wide and bound on the long edges with structural or pressed steel of approved design anchored to the units, shall be not less than two inches thick. If the length of units is not less than one and one-half times the span and the steel binding on the edges is designed to interlock with adjoining units in the manner of tongue-and-grooved wooden plank and is of sufficient strength to transmit the load on one unit to adjoining units, the end joints may be staggered at random not less than two feet, and the construction may be designed as continuous.

(d) Precast gypsum-concrete units for roof construction shall be reinforced, and unless the shape or marking of the unit is such as to insure its being placed right side up, the reinforcing shall be symmetrical so that the unit can support its load either side up.

(e) Precast gypsum-concrete units shall be bolted, or the edge binding securely welded, to the supporting members. Clips or other methods where lateral movement would reduce the resistance to vertical uplift will not be permitted.





## Chapter 27 — Masonry

- 2701 DESIGN
- 2702 QUALITY, TESTS AND APPROVALS
- 2703 ALLOWABLE UNIT STRESSES
- 2704 CONSTRUCTION DETAILS

### 2701 DESIGN

2701.1 Masonry shall be designed by a method admitting of rational analysis based on established principles of mechanics.

2701.2 Buildings not exceeding three stories, or 40 feet, in height shall be designed as either wall-bearing or skeleton frame or a combination thereof and all buildings more than three stories, or 40 feet, in height shall be designed as a skeleton frame.

### 2702 QUALITY, TESTS AND APPROVALS

2702.1 **GENERAL** (a) **QUALITY** The quality of materials assembled into masonry and the method and manner of their assembly shall conform to the requirements of this Chapter.

(b) **OTHER MATERIALS** A material of masonry, other than set forth herein, which is incombustible and otherwise sufficiently embodies the characteristics and satisfies the requirements of one of the materials herein may be approved by the Building Official, subject to such tests as he may prescribe.

(c) **TESTS:** The Building Official may require materials to be subjected to tests to determine their quality whenever there is reason to believe the materials used do not meet the requirements of this Code, and may require any tests to be repeated if there is any reason to believe that a material is no longer up to the standards on which the approval was based. The cost of such tests shall be borne by the person or persons proposing to use or continue the use of such material or product.

Test of materials shall be made in accordance with the Standard Specifications of the American Society for Testing and Materials as such standard specifications are noted in this Chapter (ASTM).

(d) **APPROVALS:** (1) Only such masonry units as bear the approval of the Building Official and are manufactured or fabricated by plants having a Certificate of Approval as set forth in Paragraph 305.1 (b) shall be considered acceptable for the construction of buildings or other structures.

(2) Approval of masonry units and manufacturing or fabricating plants shall be for periods not to exceed one year and may be obtained upon application and the submission of certificates of tests in accordance with the provisions of this Chapter.

(3) The provisions for tests for approval of masonry units shall not be construed as in lieu of any tests otherwise required under this Chapter.

(4) Failure of a manufacturer of masonry units to obtain approval or to submit tests as required in this Chapter, or such additional tests as the Building Official may require, shall be cause for rejection of such masonry units.

**2702.2 BRICK:** (a) **GENERAL:** Brick shall include masonry units usually about two and one-fourth inches thick, three and three-fourths inches wide, and eight inches long, and not less than 75 per cent solid.

(b) **TESTS:** Tests shall be made in accordance with Standard Methods of Testing Brick, ASTM Designation: C67.

(c) **QUALITY:** (1) Burned clay or shale brick shall conform to the Standard Specification for Building Brick, ASTM Designation: C62.

(2) Sand-lime brick shall conform to the Standard Specification for Building Brick, ASTM Designation: C73.

(3) Concrete brick shall conform to the Standard Specification for Building Brick, ASTM Designation: C55.

**2702.3 STONE:** Stone for masonry shall be hard and durable.

**2702.4 CAST STONE:** Cast stone shall be made of Portland cement, aggregates and water with or without admixtures. Cast stone for load-bearing masonry or where exposed to the weather shall have an average compressive strength, at 28 days, of at least 3000 pounds per square inch and shall have not more than seven percent water absorption by weight.

**2702.5 CONCRETE BLOCKS:** (a) **GENERAL:** (1) Concrete blocks shall be made of Portland cement, water and approved aggregates. The materials shall conform to the requirements for the materials of concrete specified in Chapter 25, and the finished units shall meet the requirements of this Section.

(2) Concrete blocks used for fire-resistive walls rated two-hours or more or used for load-bearing or exterior walls shall have a minimum face-shell thickness of one and one-fourth inches, a minimum web thickness of one inch, and shall have a net cross-sectional area not less than 50 per cent of the gross section.

(3) Concrete blocks for other purposes shall have wall and web thicknesses not less than three-fourths inch.

(4) Where masonry walls are required by this Code to be eight inches in thickness, hollow concrete block units may be 7 5/8" x 7 5/8" x 15 5/8" modular dimension with corresponding widths for tie columns and tie beams.

(b) **QUALITY:** Standard Units of hollow concrete block shall conform to the Standard Specification for Hollow Load-Bearing Concrete Masonry Units, ASTM Designation: C90, except that the maximum moisture content shall not exceed 50 percent of the total absorption.

**2702.6 STRUCTURAL CLAY TILE:** (a) **LIMITATIONS:** All hollow burned clay wall tile used for fire-resistive walls rated two-hours or more, load-bearing or exterior walls shall be load-bearing tile.

(b) **TESTS:** Tests shall be made in accordance with the

Standard Methods of Sampling and Testing Structural Clay Tile, ASTM Designation: C112.

(c) **QUALITY:** (1) Structural clay load-bearing wall tile shall conform to the Standard Specification for Structural Clay Load-Bearing Wall Tile, ASTM Designationr C34.

(2) Structural clay floor tile shall conform to the Standard Specification for Structural Clay Floor Tile, ASTM Designation: C57.

(3) Structural clay non-load-bearing tile shall conform to the Standard Specification for Structural Clay Non-Load-Bearing Tile, ASTM Designation: C56.

**2702.7 GYPSUM TILE:** (a) **LIMITATIONS:** Precast gypsum shall not be used in load-bearing masonry or in any masonry which will be exposed to the weather.

(b) **TESTS:** Tests of gypsum tile shall conform to the Standard Method of Testing Gypsum and Gypsum Products, ASTM Designationr C473.

(c) **QUALITY:** Gypsum partition tile or block shall conform to the Standard Specification for Gypsum Tile or Block, ASTM Designationr C52.

**2702.8 PLAIN CONCRETE:** Plain concrete is concrete cast in place and not reinforced, or reinforced only for shrinkage or change of temperature. Plain concrete shall be mixed, placed and cured as specified for concrete in Chapter 25. The minimum strength of structural concrete shall be not less than 2000 psi in 28 days. The minimum strength of light weight aggregate concrete used structurally or for fill, shall be not less than 500 psi in 28 days.

**2702.9 PLAIN GYPSUM CONCRETE:** (a) Plain gypsum concrete is gypsum concrete cast in place and either not reinforced or reinforced for shrinkage.

**2702.10 MORTAR:** (a) **GENERAL:** Except as otherwise set forth herein, all mortars and the materials therein shall conform to the "Tentative Specifications for Mortar of Masonry Units," ASTM Designiation: C270.

(b) **AGGREGATES:** (1) The gradation of aggregate for masonry mortar shall be such that the fineness modulus is between 1.20 and 2.35 when determined in accordance with the "Tentative Specification for Aggregate for Masonry Mortar," ASTM Designation: C144.

(2) Aggregates shall be quarried in fresh water and shall contain not more than one-twentieth of one per cent salt by weight.

(c) **MORTAR:** (1) All mortar used to bond unit masonry construction shall be type M,S,N,O and shall have the average compressive strength tested in two-inch cubes at 28 days as follows:

**MORTAR STRENGTH**

Type	Minimum Average Strength (psi)
M	2500
S	1800
N	750
O	350

(2) Mortar shall be proportioned to give strength as listed in the Table in Sub-paragraph 2702.10(c) on the minimum cement content specified in the Standard in Paragraph 2702.10(a).

(3) Mortar shall be of not less strength than the type set forth in the following table in consideration of the location of the unit masonry construction.

Use of Location	Type of Mortar
Below grade foundation and walls	M
Swimming pool walls and retaining walls	M
Fire resistive walls rated 2 hrs. or more	M or S
Exterior walls and load-bearing walls	M or S
Piers less than 32 inches wide	M or S
Partitions	M, S, or N
Solid Masonry Units	One classification less than the above
Mortar or grout under concentrated loads	M
Fences	M, S, N or O
Gypsum	Gypsum

(4) All solid unit masonry shall be laid up in full beds with full end joints. All hollow unit masonry shall be laid with full mortar coverage of the face shells in both horizontal and vertical joints.

**2703 ALLOWABLE UNIT STRESSES IN MASONRY**

**2703.1 COMPRESSION:** (a) Allowable working compressive stresses in masonry walls shall not exceed the limits in pounds per square inch of gross area in the following table:

Unit	Type N or O Mortar	Type M or S Mortar
Brick	200	300
Stone	450	600
Rubble Stone	200	300
Concrete Blocks	100	150
Clay Tile	80	100

(b) The maximum allowable working stress in plain concrete shall be the following percentages of the ultimate strength of the concrete in compression:

Compression	0.02 f'c
Shear and diagonal tension	0.02 f'c

where f'c represents the ultimate compressive strength.

**2703.2 SHEAR:** The shear in unit masonry shall not exceed one-tenth the allowable compressive strength.

**2703.3 TENSION:** Unreinforced unit masonry shall be assumed to have no value in resisting tension.

**2703.4 CONCENTRATIONS:** Walls of hollow masonry units shall not directly support concentrated loads.

#### **2704 CONSTRUCTION DETAILS**

**2704.1 GENERAL:** (a) Masonry walls of hollow or solid units or plain concrete shall be constructed as specified in this Section.

(b) Designed reinforced concrete walls, columns and beams shall be as specified in Chapter 25, except that such designed columns and beams shall be not less than the equivalent of the minimums herein set forth.

(c) Reinforced concrete required in this Section shall comply with Chapter 25, Reinforced Concrete.

(d) Reinforced unit masonry shall not be permitted except with the approval of the Building Official.

(1) Second-hand masonry units shall not be used unless they conform to the requirements of this Code, are sound, and have been thoroughly cleaned and are approved for use by the Building Official.

**2704.2 EXTERIOR WALLS:** (a) **GENERAL:** Exterior Walls of unit masonry shall have a minimum thickness of eight inches except as otherwise specified in Section 2704.2(h) and in Section 2702.5(a).

No roof or other members shall be placed to develop direct horizontal thrust on walls unless such walls are specifically designed.

A maximum masonry panel area of 256 square feet must be maintained in load-bearing masonry construction by reducing either the allowable masonry height or the allowable tie column spacing.

(b) **TIE COLUMNS:** (1) Concrete tie columns shall be required in exterior walls of unit masonry except in one-story buildings of Group H and I Occupancy. Concrete tie columns shall be required at all corners, at intervals not to exceed 20 feet center to center of columns, adjacent to any corner opening exceeding four feet in width, adjacent to any wall opening exceeding nine feet, in width and at the ends of free-standing walls exceeding two feet in length. Structurally designed columns may substitute for the tie columns herein required. Tie columns shall be required in all structures, including buildings of Group H and I Occupancy, where dead load resistance to uplift is not otherwise suitably provided. In one-story buildings of Group H or I Occupancy anchorage of the required tie beam to the foundation shall be provided at all changes of direction. Anchorage shall be not less than the equivalent of a vertical #5 bar bent into the footing and tie beam with standard hooks to develop full bond, and encased in concrete. Continuity shall be provided by lapping the bars a minimum of three feet or by hooks or threaded attachments. Temporary openings shall be provided for inspection before pouring concrete.

(2) Tie columns shall be not less than 12 inches in width. Tie columns having an unbraced height not exceeding 15 feet shall be not less in thickness than the wall or less than a nominal eight inches, and where exceeding 15 feet in unbraced height, shall be not less in thickness than 12 inches. The unbraced height shall be taken at the point of positive lateral support in the direction of consideration or the column may be designed to resist applicable lateral loads based on rational analysis.

(3) Tie columns shall be reinforced with not less than four #5 vertical rods, nor less than 0.0125 of the cross-sectional area, tied with #2 hoops spaced not more than 12 inches apart. Vertical reinforcing shall be doweled to the footing and splices shall be lapped 30 bar diameters.

(4) The concrete tie columns set forth herein are a minimum to limit masonry panel areas and provide an integrated framework for masonry. The spacing of concrete columns for skeleton frame construction, designed as specified in Chapter 25, may exceed the spacing herein set forth provided the masonry panels have an area of less than 256 square feet and the structural system is designed to transmit horizontal wind loads to the columns.

(5) Concrete tie columns designed to limit masonry panel areas may be offset at tie beams or other horizontal members to avoid openings, but the maximum spacing shall not be exceeded.

(6) Concrete columns in load-bearing walls shall be poured only after masonry units are in place. Where masonry walls of skeleton frame construction are laid up after the frame has been erected, lugs not less than one inch deep by three inches wide shall be provided in the concrete which forms the perimeter of such panels. Where structural steel members are fireproofed with masonry units, the panel walls shall be bonded into the fire proofing.

(7) Concrete tie columns shall be required in load-bearing, masonry walls adjacent to any openings where the computed end reactions of the concrete beam for all dead and live loads exceed 4,000 pounds.

(c) **TIE BEAMS:** (1) A tie beam of reinforced concrete shall be placed in all walls of unit masonry, at each floor or roof level, and at such intermediate levels as may be required to limit the vertical heights of the masonry units to 16 feet. Well compacted and confined soil below grade may be considered lateral restraint but only above a point one foot below the grade where such restraint begins.

(2) A tie beam shall be not less in dimension or reinforcing than required for the conditions of loading nor less than the following minimum. A tie beam shall have a width of not less than a nominal eight inches, shall have a height of not less than 12 inches, and shall be reinforced with not less than four #5 reinforcing bars placed two at the top and two at the bottom of the beam except that a tie beam using "U" type beam block may be used with the following limitations:

(aa) Limited to one-story Group I Occupancy.

(bb) Limited to unsupported spans of seven feet.

(cc) Beam block shall be reinforced with one #7 bar in the top and one #7 bar in the bottom of the pour.

(dd) Beam block shall provide not less than 14½ inches vertical dimension nor less than four and one-half inches horizontal dimensions of poured-in-place beam cross-section.

(ee) Where beam blocks are used, not less than 12 inches at each corner shall be formed out and fully poured.

(ff) Where beam blocks are used, consideration of resistance to uplifts due to wind forces shall be based on only that portion of the dead load above the topmost mortar joint in the wall.



(3) The tie beam shall be continuous. Continuity of the reinforcing in straight runs shall be provided by lapping splices not less than 18 inches. Continuity shall be provided at corners by bending two bars from each direction around the corner 18 inches or by adding two #5 bent bars which extend 18 inches each way from the corner. Continuity at columns shall be provided by continuing horizontal reinforcing through columns or by bending horizontal reinforcing in the columns a distance of 18 inches.

(4) A tie beam shall not be required where floor or roof systems provide a rigid diaphragm or reinforced concrete with a minimum thickness of four inches.

(5) Changes in level of tie beams shall be made at columns.

(6) A tie beam may follow the rake of a gable or shed end if the slope does not exceed 3 in 12.

(7) The concrete in tie beams shall be placed to bond to the masonry units immediately below and shall not be separated therefrom by wood, felt, or any other material which may prevent bond. Felt paper no wider than the width of the cells of the block may be used provided that it is depressed a minimum of 2 inches in one cell of each block.

(d) **GABLE END AND SHED END WALLS:** Gable and shed end walls of masonry with a maximum rise of more than three feet shall be provided with a concrete coping not less than 64 square inches in area reinforced with two #4 bars and tie columns.

(e) **PARAPET WALLS:** Masonry parapet walls shall be not less than eight inches thick, shall be reinforced with minimum tie columns and shall be coped with a concrete beam not less than 64 square inches in cross-section, reinforced with two #4 reinforcing bars.

A parapet wall exceeding five feet in height above a tie beam or other point of lateral support shall be specifically designed to resist horizontal wind loads.

(f) **PIERS:** (1) In any section of a masonry wall of an enclosed structure where openings are arranged to leave sections of walls less than 16 inches, such sections shall be steel or reinforced concrete.

(2) Isolated masonry piers of unenclosed structures shall be so constructed that the height of such piers shall not exceed ten times the least dimension, that the cells are filled with cement grout or concrete and reinforced with not less than two #5 bars anchoring the beam to the foundation.

(g) **CAVITY WALLS:** (1) Cavity walls consisting of two separate walls with an air space of not less than two nor more than six inches may be constructed of solid or hollow-unit masonry provided such walls meet the specific requirements for tie columns and beams set forth in this Section and are bonded together at intervals not more than 24 inches apart, vertically and horizontally, by masonry ties or by durable rigid metal ties 0.10 square inches in cross-section.

(2) The minimum thickness of the separate walls of cavity wall construction shall be not less than four inches, and units shall be laid in full beds of Portland cement mortar with full-end joints.

(h) **BRICK AND STONE WALLS:** Walls of brick and stone shall be laterally supported by tie columns and beams, or the equivalent thereof, as provided in this Section and shall meet these additional requirements:

(1) In all brick walls at least every sixth course on both sides of the wall shall be a header course or there shall be at least one full header in every 72 square inches of each wall surface. In walls more than 12 inches thick, the inner joints of header courses shall be covered with another header course which shall break joints with the course below.

American Standards Association Publication A41.1 shall be the standard for solid-unit masonry construction.

(2) Rubble stone walls shall be four inches thicker than is required for solid brick or concrete walls of the same respective heights, but in no part less than 16 inches.

(i) **SUBSTITUTIONS:** (1) Where, for architectural reasons or otherwise, it is desirable to reduce the area of any required tie column or tie beam below the specified requirements, the Building Official may grant such reduction, provided that the area of concrete omitted shall be replaced by reinforcing or structural steel in the ratio 1: (n-1).

(2) Where it is desired to substitute for the #5 reinforcing as required by this Section, three #4 bars may be substituted to replace two #5 bars.

(j) **WALL ADDITIONS:** Where new walls are connected to existing walls, such connection shall be by means of a starter column of minimum 8" x 8" dimension reinforced with not less than two #5 rods.

(k) **CHASES, RECESSES AND OPENINGS:** (1) No chase or recess in any unit masonry wall shall be deeper than one-third of the wall thickness. No horizontal chase or the horizontal projection of a diagonal chase shall exceed four feet. No required tie column or tie beams shall be reduced in required dimension by chasing or recessing. No recess in a required thickness of a unit-masonry wall shall exceed overall dimensions of two feet by three feet. Masonry units of four inch nominal thickness may be used for recessed exterior walls where the masonry panel does not exceed 5 feet in width in one direction and 7 feet in height and where any discontinuous edge is held by a tie column of reinforced concrete having not less than two #4 vertical bars doweled to the footing and extending 12 inches into the tie beam. Such 4-inch wall and tie column shall not be considered to support the construction above.

(2) Where the length of opening in load-bearing masonry walls exceeds 12 feet, suitable support shall be provided at the sides of the openings.

Openings for doors and windows shall have lintels of reinforced concrete. Where such lintel is precast or formed separately from a tie beam, it shall bear on the masonry at each end not less than 8 inches. Where such lintel is formed integral with the tie beam by deepening the tie beam above the opening and the tie beam itself is capable of safely supporting the superimposed

loads, the beam may be deepened not to exceed 12 inches without additional reinforcing and without the 8 inch bearing required for independent lintels. Where the tie beam is deepened in excess of 12 inches above openings and the tie beam itself is capable of safely supporting the superimposed loads, the dropped portion shall bear at least four inches on the masonry at each end and shall be designed and reinforced as a concrete wall but shall not contain less than two #4 bottom bars and two #3 ties at each end, unless structural design to the contrary is indicated.

(1) **GLASS BLOCK:** (1) Masonry of glass blocks may be used in non-load-bearing exterior or interior walls and in openings which might otherwise be filled with windows, either isolated or in continuous bands, provided the glass block panels have a thickness of not less than three and one-half inches at the mortar joint and the mortared surfaces of the blocks are satisfactorily treated for mortar bonding.

(2) Glass block panels for exterior walls shall not exceed 144 square feet of unsupported wall surface nor 25 feet in length nor 20 feet in height between supports. For interior walls, glass block panels shall not exceed 250 square feet of unsupported area nor 25 feet in one direction between supports.

(3) Exterior glass block panels shall be set in recesses at the jambs and, for panels exceeding ten feet in horizontal dimension between supports, along the panel edges; except that when approved by the Building Official for panels exceeding neither 100 square feet in area nor ten feet in either horizontal or vertical dimension, and situated four stories or less, and less than 52 feet above grade level, anchorage may be provided by means of non-corrodible perforated metal strips.

(4) Glass block panels shall have reinforcement in the mortar joints spaced not more than two feet apart vertically and below and above any openings within a panel. The reinforcement shall consist of two parallel longitudinal galvanized steel wires, No. 9 gauge or larger, spaced two inches apart, and having welded thereto No. 14 or heavier cross wires at intervals not exceeding eight inches, or the equivalent approved by the Building Official.

(5) Glass block shall be laid in Type M mortar. Both vertical and horizontal mortar joints shall be at least one-quarter and not more than three-eighths inch thick and shall be completely filled.

(6) Every exterior glass block panel shall be provided with expansion joints at the sides and top. Expansion joints shall be entirely free of mortar, and shall be filled with resilient material.

**2704.3 INTERIOR BEARING WALLS:** Interior-bearing walls shall be constructed as specified in Section 2704.2 for exterior walls, except that interior-bearing walls in one-story buildings of Group H or I Occupancy where not required to be more than one-hour fire-resistive may be constructed of four-inch concrete block not exceeding nine feet in height, capped with a reinforced concrete beam not less than four inches in width nor less than 12 inches in height, reinforced with two one-half inch rods, and such wall shall support only a roof or ceiling not in excess of 700 pounds per lineal foot with no chases or recesses.

**2704.4 FIRE-WALLS:** Fire-walls shall be constructed as set forth in Section 2704.2 for exterior walls and as set forth in Chapter 37.

**2704.5 PANEL WALLS:** (a) Panel walls of unit-masonry shall be not less than eight inches thick and shall be limited in panel dimension as set forth in Section 2704.2.

(b) Panel walls of reinforced concrete shall be not less than four inches thick nor less than required by design as specified in Chapter 25.

**2704.6 VENEERED WALLS:** (a) **MASONRY BACKING:**

(1) Veneering or facing on masonry backing shall not be considered as adding any strength to such walls and shall be limited in height above foundations or between proper and adequate supports to 30 feet. Veneering shall be securely anchored to masonry backing by means of substantial non-corroding metal wall ties, spaced not farther apart than 16 inches vertically or 24 inches horizontally.

(2) Tile veneering, not more than one inch thick with individual units not exceeding 20 inches in any dimension and having not more than 200 square inches of surface area with corrugations or scorings on the back side thereof, need not be anchored in accordance with the above requirements but shall be cemented solid to the backing with Portland cement mortar so as to provide a continuous integral support to the backing.

(b) **WOOD BACKING:** (1) In all cases, before applying masonry veneer, a substantial waterproofed paper or asphalt-saturated felt, weighing not less than 14 pounds per 100 square feet shall be applied horizontally, shingle fashion, over diagonal sheathing. Horizontal joints in the paper or felt shall be lapped not less than four inches and vertical end joints not less than six inches.

(2) Masonry veneer shall be not less than three and three-fourths inches thick and shall be bonded to the backing by means of substantial non-corroding metal wall ties spaced not farther apart than 16 inches vertically and 24 inches horizontally.

**2704.7 PARTITIONS:** (a) The requirements specified herein shall apply to non-bearing interior separations, other than fire-walls, of unit masonry construction.

(b) The lateral distance between vertical supports of non-bearing interior partitions of unit-masonry shall not exceed 72 times the actual thickness of the partition, including plaster.

(c) The height of unit masonry partitions shall not exceed 36 times the actual thickness, including plaster.

**2704.8 FENCES:** (a) Masonry fences so located on a property that such fence, at the proposed height or by a future addition to height, could be used as a wall of arbuilding, shall be constructed with foundations and tie columns as provided for an exterior wall. Such fences shall be capped with a coping beam not less than 64 square inches in cross-section reinforced with a minimum of two #4 rods, when not exceeding a height of five feet, or shall be capped by a tie beam as provided for exterior walls if exceeding a height of five feet.



(b) Masonry fences, so located on a property that by zoning regulation such fence could not be used as a wall of a building, shall be constructed as follows:

(1) Fences not exceeding five feet in height, shall be eight inches thick and shall not be required to have tie columns, but shall be required to have a coping as provided herein; or such fences may be four inches thick with tie columns and coping not less than eight inches thick.

(2) Fences exceeding five feet in height shall be not less than eight inches thick and shall have tie columns as required for exterior walls and a coping as provided herein.

**2704.9 GRILL BLOCK:** (a) Masonry of grill block, hollow concrete block laid with cells open through the wall or similar decorative masonry may be used in non-load bearing exterior or interior walls in openings which might otherwise be filled with windows, either isolated or in continuous bands, provided the blocks have a thickness in the wall of not less than four inches.

(b) Grill block panels of units having a thickness of 4 inches or more but not exceeding 7½ inches shall not exceed 50 square feet in area where used in exterior walls including garden walls and shall not exceed 100 square feet in area where used in interior walls. Grill block panels of units having a thickness of a nominal eight inches shall not exceed 150 square feet in area where used in exterior walls and shall not exceed 200 square feet in area where used in interior walls. Area shall be taken as measured between reinforced concrete footing, tie columns, tie beams or coping beams as otherwise set forth herein or between metal supports any of which supporting members shall be designed to resist the wind and other loads as set forth in Chapter 23.

(c) Grill block shall be laid in Type M or S Mortar.

**2704.10 OTHER MASONRY WALLS:** Walls of masonry materials or arrangements of masonry units other than those specifically set forth in this Chapter shall be in conformance with the general provisions of this Code, may be classified by the Building Official as one of the type or arrangements provided for herein and subject to all or any of the requirements therefor and any such additional requirements as the Building Official may prescribe.











## Chapter 28 — Steel and Iron

- 2801 GENERAL
- 2802 MATERIAL
- 2803 DESIGN
- 2804 MINIMUM THICKNESS OF MATERIAL
- 2805 CONNECTIONS
- 2806 PIPE COLUMNS
- 2807 PROTECTION OF METAL
- 2808 OPEN-WEB STEEL JOISTS
- 2809 LIGHT-GAGE STEEL CONSTRUCTION

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### 2801 GENERAL

**2801.1 DESIGN:** Steel and iron members shall be designed by methods admitting of rational analysis according to established principles of mechanics.

**2801.2 SCOPE:** The design, fabrication and erection of steel and iron for buildings and other structures shall be as set forth in this Chapter. The requirements set forth in Sections 2802 through 2808, inclusive herein, apply to structural steel for buildings and other structures. Section 2809 applies to coldformed members of sheet or strip steel and light-gage steel construction.

**2801.3 STANDARDS:** The following standards are hereby adopted as a part of this Code and supplements, but do not supersede, the specific requirements set forth herein:

(a) "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings, adopted April 17, 1963, including the sixth edition of the manual of steel construction of the American Institute of Steel Construction."

(b) "Code for Welding in Building Construction, AWS D1.0, of the American Welding Society."

(c) "Specifications for Structural joints Using ASTM A325 or A490 Bolts, as approved by the Research Council on Riveted and Bolted Structural Joists of the Engineering Foundation, March 1964."

(d) "Standard specifications for open web steel joists as adopted by the Steel Joist Institute."

(1) J-series, October 1, 1963. (2) H-series, October 1, 1963.  
(3) Longspan or LA-series, July 1, 1961. (4) High Strength Longspan or LH-series, June 21, 1962.

(e) "Specification for the Design of Light Gage Cold-formed Steel Structural Members, 1962 edition, of the American Iron and Steel Institute."

(f) "Tentative Specification for 1.25 ounce Class Coating (Pot Yield) Zinc Coated (Galvanized) Iron and Steel Roofing Sheets, ASTM A 361 of the American Society for Testing and Materials."

## **2802 MATERIAL**

**2802.1 STEEL:** Steel shall conform to the physical requirements set forth in the Standards, Paragraph 2801.3(a).

**2802.2 HIGH-STRENGTH STEEL BOLTS:** High-strength steel bolts shall conform to the requirements set forth in the standards of Sub-section 2801.3.

**2802.3 USED AND DAMAGED MATERIAL:** All steel shall be straight and true, and any section damaged to be out of shape shall not be used. Steel previously used or fabricated for use or fabricated in error shall not be used except with the approval of the Building Official. Filled holes or welds shall not be concealed. Straightened or retempered fire-burned steel shall not be used except with the approval of the Building Official.

**2802.4 TESTS:** The Building Official may require tests and/or mill records to determine the quality of materials.

**2802.5 RIBBED BOLTS:** Ribbed bolts shall be made from a carbon manganese steel with a minimum tensile strength of 70,000 psi.

### **2803 DESIGN LOADS**

Design shall be based on the dead, live, wind and other loads set forth in Chapter 23 and the additional stress considerations set forth in this section.

### **2804 MINIMUM THICKNESS OF MATERIAL**

The minimum thickness of steel and iron used in buildings or other structures or to resist wind forces shall be not less than as set forth in the Standards in Paragraph 2801.3(a); and where structural members are exposed to industrial fumes, salt water, salt-water spray and other corrosive agents, such members shall be increased in thickness of material or otherwise effectively protected. Structural members less than three sixteenth of an inch in thickness shall be asphalt coated or otherwise effectively protected from rust or deterioration where in contact with concrete or masonry.

### **2805 CONNECTIONS**

**2805.1** Connections shall conform to the requirements of the Standards as set forth in Sub-section 2801.3.

**2805.2** A special inspector whose ability has been tested and certified by an approved testing laboratory shall inspect the welding and high strength bolting on buildings exceeding 10,000 sq. ft. in area or 3 stories in height or as required by the Building Official because of special conditions.

**2805.3** It shall be permissible to use ribbed or splinted bolts in place of riveting or ordinary bolts. Diameter of the bolts shall be identical as for rivets.

### **2806 TUBULAR COLUMNS**

**2806.1** Tubular columns and other primary compression members, excluding secondary posts and struts not subject to bending and whose design load does not exceed 2,000 pounds, shall have a minimum least dimension of 2½ inches and a minimum wall thickness of 3/16 of an inch.

**2806.2** Tubular members when filled with concrete shall have 1/4 inch diameter pressure relief holes drilled thru the shell, within 6 inches of the top and bottom of the exposed length of the member and one hole at mid height.

**2806.3** Concrete fill in tubular members shall not be assumed to carry any of the load except compression members having a least dimension of 8 inches or greater and having a one-inch inspection hole in the plate at each end.

### **2807 PROTECTION OF METAL**

**2807.1** All field rivets, bolts, welds and abrasions to the shop coat shall be spot painted or treated with the material used for the shop coat, or an equivalent comparable to the shop coat, after removal of all objectionable deleterious materials.

**2807.2** Primary structural steel members, except where intended to be encased in concrete shall have one shop coat of paint and if exposed to the atmosphere or elements in the completed building or structure shall receive a second shop coat of paint or be field painted in addition to the initial shop coat with lead, graphite, asphalt paint or other approved coating compatible with the shop coat, except as herein provided. Surfaces of members in contact with, but not encased in, concrete or masonry shall be asphalt coated or otherwise effectively coated where the thickness of the metal is no less than 3/16 inch.

**2807.3** Members having a corrosion-resistive metallic or other equivalent approved coating are not required to have the shop and field painting.

**2807.4** Where structural members are exposed to industrial fumes, fresh and/or salt water, salt water spray, and other corrosive agents, such members shall be effectively protected with a corrosion-resistive metallic or other equivalent approved coating.

**2807.5** Corrosion-resistant steels with or without painting or coating may be approved where sufficient test or other factual data establishing the satisfactory performance under the particular exposure conditions or usage is submitted to and approved by the Building Official and Broward County Board of Rules and Appeals.

#### **2808 OPEN-WEB STEEL JOISTS**

**2808.1** Open-web steel joists shall comply with the Standards set forth in Paragraph 2801.3(d).

**2808.2 SCOPE:** Shortspan-series open-web steel joists, spaced farther apart than 24 inches on floors and 30 inches on roofs, center to center, shall not be considered as "steel-joist construction," and shall comply with the standards set forth in Paragraph 2801.3(a) and 2808.1.

**2808.3 DESIGN:** (a) Open-web steel joists shall be designed as trusses.

(b) Only adequately-welded steel or suitable-keyed, poured-in-place, Portland cement concrete decks shall be considered as providing lateral support to top-chord members; and where decks of other materials are used, suitable lateral support of top-chord members shall be provided.

**2808.4 CONNECTIONS:** The joints and connections of members of steel joists shall be made by welding or riveting.

**2808.5 BRIDGING:** (a) At the time steel joists are erected and before application of any loads, bridging shall be installed at the spacings set forth in the standards, Subsection 2808.1. Bridging shall be adequate to secure the topchords against lateral movement and to hold the steel joists vertically and in a straight line.

(b) Bridging shall be located at panel points, where practicable, and connected at the point of its crossing.

(c) Bridging shall be secured to the joists by welding or bolting.

(d) Bridging shall be cross-braced members, having at least 1/r of 200, as computed on the diagonal distance between connections, but not less than required to transmit a horizontal force of 500 pounds applied at the bottom of the joist.

(e) Where flexible forms or precast units are used for a deck, a continuous member, not less than one-half-inch round bar, shall be secured to the top-chords of each joist, parallel to and at each line of cross-bridging, and anchored at each end of the panel.

**2808.6 ANCHORAGE:** (a) Joists shall not bear directly on masonry units.

(b) The ends of every joist shall be anchored to provide not less resistance in any direction than 50 percent of the allowable end reaction of the joist, but in no case less than 1000 pounds.

**2808.7 FABRICATION:** The fabrication of joists shall specifically comply with paragraph 305.1(b) herein.

**2808.8 SHOP STANDARDS:** The Building Official may require that shop drawings, prepared by a professional engineer, showing stress diagram, sizes of members and sizes of welds, be submitted for approval before erection of open-web steel joists and that the designer make inspection of the joists in place and certify that the fabrication and placing conforms to the design. Certification by the designer shall be submitted before a Certificate of Occupancy is issued.

**2808.9 SHORTSPAN SERIES:** (a) Joists shall be made of hot or cold-formed sections, strip or sheet steel, riveted or welded together or by expanding, and shall have a minimum thickness of one-eighth inch for shapes, flats and formed sections and three-eighths inch for rounds.

(b) The ends of joists shall have a minimum of four inches of bearing on reinforced concrete and two and one-half inches on steel supports.

**2808.10 LONGSPAN SERIES:** (a) Joists shall be of the materials set forth in the standards, Paragraph 2808.1(b), and shall have a minimum thickness of one-eighth inch for shapes and flats and three-eighths inch for rounds.

(b) The ends of joists shall have a minimum of six inches of bearing on reinforced concrete and four inches on steel supports.

### **2809 LIGHT-GAGE STEEL CONSTRUCTION**

**2809.1 SCOPE:** (a) Light-gage steel construction shall include individual structural members, structural decks or wall panels, cold formed to shape from sheet or strip steel.

**2809.2 STANDARDS:** (a) Light-gage steel construction shall conform to the standard set forth in Paragraph 2801.3(e).

(b) Galvanizing as referred to herein is to be a zinc coating conforming to the standard set forth in Paragraph 2801.3(f).

(c) Gage as referred to herein is the thickness of the base material, without coating, according to U. S. Standard Gage.

**2809.3 STRUCTURAL MEMBERS OTHER THAN DECKS:** Design and fabrication shall be as set forth in Sub-section 2809.2, except as follows:

(a) All connections shall be by welding, riveting, bolting or

other suitable approved fastening devices or methods providing positive fastening and resistance to loosening. Welding of members shall be made on two sides or two edges of each bearing in such a manner as to resist effectively the stresses developed.

(b) Light-gage steel for the treads, risers, stringers and landings of stairways shall have a minimum thickness of 12 gage.

(c) (1) Light-gage steel studs for bearing walls shall have a minimum thickness of 18 gage and, except where specifically designed as columns, shall be spaced not more than 24 inches on centers. Provisions shall be made to resist horizontal wind forces by diagonal members, diaphragm panels or other comparable means.

(2) Light-gage steel studs for non-bearing partitions shall have a minimum thickness of 18 gage for exterior or exposed locations and 28 gage for interior locations.

(d) Light-gage steel joists, rafters, purlins, and girts shall have a minimum thickness of 16 gage, minimum bearing of 4 inches on concrete, minimum bearing of 2½ inches on steel and each end shall be positively anchored to resist the loads set forth in Chapter 23 herein.

(e) Light-gage steel used in sandwich construction for wall panels for exterior or enclosing walls of buildings shall have a minimum thickness of 28 gage for the sheathing.

**2809.4 STRUCTURAL SHEETS:** Structural sheet sections may be used for floor decks, roof decks and wall claddings to span between supports; provided the design is based on rational analysis, and design and fabrication comply with the standard set forth in Sub-section 2809.2 and as follows:

(a) Sheet sections shall have a minimum thickness of 18 gage for floors and 22 gage for roofs and walls except as follows:

(1) Where diaphragm action is not required, the minimum thickness may be reduced by multiplying by the factor, 33,000 divided by the yield stress, but may not be less than 24 gage for floor and 26 gage for roofs.

(2) Sections used for walls, and sections used for roofs having a lightweight concrete fill to provide stability to the section, may have the minimum thickness reduced by multiplying by the factor 33,000, divided by the yield stress, but may not be less than 28 gage.

(b) Except as herein provided, no structural value shall be allowed for any fill material used with deck systems. Lightweight concrete fill, when permitted to provide stability or diaphragm action, shall be a minimum thickness of 2 inches and have initial volume change and thermal expansion characteristics that prevent objectionable cracking and loss of bond to the deck. Lightweight concrete shall develop a minimum compressive strength at 28 days of 125 psi except when acting as a diaphragm it shall conform with the requirements set forth in Chapter 25.



(c) Decks and wall panels, where properly supported by and attached to the building frame, may be considered to act as a diaphragm in resisting lateral forces where designed as such by a registered professional engineer, subject to the limitation set forth in Paragraphs 2809.4(a)(1) and 2809.4(b).

(d) The shape of the sections as placed in buildings shall be such as to provide adequate lateral support to the compression areas.

(e) Where large openings occur, the perimeter of the opening shall be framed with adequate supports for the panels. Openings 12 inches and smaller shall be reinforced as required so that the allowable stresses in the adjoining materials are not exceeded.

(f) Positive anchorage shall be provided as set forth in Paragraph 2809.3(a). Maximum spacing of fastenings along each supporting member is to be based on gravity, uplift, stress reversal, and diaphragm requirements but not to exceed 8 inches nominal on centers at ends of sheets and 12 inches nominal on centers at intermediate bearings. At perimeters, parallel to direction of span, edges of sheets are to be so supported as to provide for a maximum spacing of fastenings of 12 inches on center. Welding of material less than 22 gage in thickness shall be through contoured weld washers not less than 14 gage in thickness and one inch in diameter or an equivalent device. An adequate side lock or other connection shall be made to provide for the distribution of imposed loads. Where continuous interlocking or lightweight concrete fill is not provided, side edges shall be fastened together at intervals not exceeding 12 inches where diaphragm action is required or 18 inches otherwise. Roof and floor panels having a concrete or lightweight concrete fill mechanically connected to the structure may utilize the properly designed fill in diaphragm action, where designed as such by a registered professional engineer.

(g) Bolts, rivets and other suitable fasteners at supports shall be not less than three-sixteenths inch in diameter, under the head.

(h) Structural sheet sections spanning between supports shall be designed to support the live and/or wind loads without exceeding the deflections set forth in Chapter 23.

**2809.5 ROOFING AND SIDING:** Sheet-metal sections not suitable by rational analysis for self-supporting structural sheets, as set forth in Sub-section 2809.4, shall be termed roofing and siding. Roofing and siding shall be used only over solid wood sheathing and shall be as follows:

(a) The minimum thickness of sheet-metal roofing and siding shall be 30 U. S. standard gage.

(b) Attachment shall be as set forth in Paragraph 2809.4(f) but not less than 12 inches on center each way; except that attachment may be by 8d nails, penetrating not less than three-fourths inch into wood sheathing or by No. 16 screws.

**2809.6 PROTECTION OF METAL:** All members shall be treated with protective paint coatings or equivalent protection except as follows:

(a) Where exposed to high humidity atmospheres, industrial fumes or other corrosive agents or where less than 22 gage is used, the sheets shall be protected by being galvanized in accordance with the standards of Paragraph 2801.3(f) or be of an approved alloy or be otherwise coated to provide equal durability and protection.

(b) Abrasions to protective coating shall be spot treated with a material and in a manner compatible to the shop protective coating.

**2809.7 WELDING:** Welding shall conform to the requirements of Sub-sections 2805.2 and 2805.3.

## Chapter 29 — Wood

- 2901 DESIGN
- 2902 STANDARDS
- 2903 QUALITY AND SIZE
- 2904 ALLOWABLE UNIT STRESSES
- 2905 CONSTRUCTION DETAILS
- 2906 WORKMANSHIP
- 2907 PROTECTION OF WOOD

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### 2901 DESIGN

Wood members used for structural purposes shall be designed by methods admitting of rational analysis according to established principles of mechanics.

### 2902 STANDARDS

The following standards are hereby adopted as being a part of this Code and supplement, but do not supersede, the specific requirements set forth herein:

**2902.1** National Design Specification for Stress-Grade Lumber and its Fastenings of the National Lumber Manufacturers Association.

**2902.2** Douglas Fir Plywood-Commercial Standard CS 45 of the U. S. Department of Commerce, National Bureau of Standards.

Western Softwood Plywood-Commercial Standard CS 122 of the U. S. Department of Commerce, National Bureau of Standards.

**2902.3** American Lumber Standards for Softwood Lumber—Simplified Practice Recommendations R-16 of the U. S. Department of Commerce, National Bureau of Standards.

**2902.4** The Timber Construction Standards Second Edition 1956 as recommended by the American Institute of Timber Construction.

**2902.5** Structural Glued Laminated Timber — Commercial Standard CS 253, U. S. Department of Commerce, National Bureau of Standards.

### 2903 QUALITY AND SIZES

**2903.1 GRADE:** (a) The Building Official shall require the species and grade of all wood used for load-bearing purposes, the design of which is based on stresses in excess of those for 1200 psi stress-grade lumber, to be shown on the plans submitted with application for building permit.

(b) All lumber used for load-bearing or structural purposes shall be grade-marked by the official crediting agency for that species and shall be of not less strength than the lowest stress-grade of the species. Sub-flooring and roof sheathing shall be considered structural and wall sheathing shall not be so considered.

**2903.2 SIZES:** (a) All wood structural members shall be of sufficient size to carry the dead and required live loads without exceeding the allowable deflections or working stresses specified. Adequate bracing and bridging to resist wind and other forces shall be provided.

(b) Sizes of wood members referred to by this Code are nominal sizes. The minimum acceptable net sizes shall be within 2 percent of the minimum net sizes contained in the standard specified in Sub-section 2902.3 at 19 per cent moisture content. Computations to determine the required sizes of members shall be based on the net sizes contained in the standard.

#### **2904 ALLOWABLE UNIT STRESSES**

**2904.1 GENERAL:** (a) Wood joists and rafters may be of the sizes set forth in Table 29-B without additional professional design. All wood members shall be designed based on the allowable unit stresses set forth in the standards in Section 2902 except that all wood as set forth in Sub-section 2903.1 shall be identified by the grade-mark of a lumber grading or inspection bureau or agency recognized by the American Lumber Standards Committee as being competent. Where the design is based on allowable working stresses higher than the lowest stress-grade for the species, the design shall be by a registered professional engineer and the Building Official may require that fabrication and/or construction be under the supervision of a special inspector as set forth in Sub-section 305.2.

(b) Wood members shall not exceed the deflections set forth in Sub-section 2301.3 herein.

TABLE 29-A

Cypress

Allowable Stress Span for Uniform Loading						
	12	16'-4	17'-7	17'-7	19'-5	28'-0
3 x 8	16	14'-8	15'-11	15'-11	17'-7	25'-3
	24	12'-1	13'-1	14'-0	15'-5	21'-3
	12	20'-9	22'-3	22'-3	24'-6	—
3 x 10	16	18'-9	20'-3	20'-3	22'-3	—
		15'-4	16'-8	17'-8	19'-6	26'-10
	12	13'-8	14'-8	14'-8	16'-2	23'-4
4 x 6	16	12'-4	13'-4	13'-4	14'-8	21'-2
	24	10'-8	11'-7	11'-8	12'-10	18'-7
	12	18'-3	19'-7	19'-7	21'-8	—
4 x 8	16	16'-7	17'-10	17'-10	19'-7	28'-2
	24	14'-3	15'-6	15'-7	17'-7	24'-7
	12	23'-5	24'-9	24'-9	27'-3	—
4 x 10	16	21'-3	22'-11	22'-11	24'-8	—
	24	17'-11	19'-6	20'-0	22'-0	—

67#—Floor joists with plaster under, 50#LL 17#DL

57#—Floor joists with plaster under, 40#LL 17#DL

Roof rafters having a slope of 2½ to 12 or more, 30#LL  
27#DL

47#—Floor joists without plaster under, 40#LL 7#DL

Roof joists with plaster under, 30#LL 17#DL

37#—Ceiling joists over living rooms and under usable attic space, 25#LL 12#DL

Roof joists without plaster under, 30#LL 7#DL

22#—Ceiling joists without usable attic space,  
10#LL 12#DL.

Where there is an accessible space having a clear vertical height of 30 inches or more, ceiling joists shall be designed as having usable attic space.

**2904.2 PLYWOOD STRESSES:** (a) Douglas Fir Plywood shall not exceed the working stresses set forth in the Technical Data on Plywood handbook, APA Jan. 1963, of the Douglas Fir Plywood Association.

(b) Working stresses of plywood other than those in the standards in Sub-section 2902.2 shall be determined according to the species.

(c) All plywood permanently exposed in outdoor locations shall be of exterior type, and where used for roof or exterior wall sheathing shall meet the performance standards for exterior type plywood in Sub-section 2902.2, unless otherwise approved by the Building Official.

(d) Walls or roofs sheathed with plywood may be considered as diaphragms to distribute horizontal forces subject to the approval of the Building Official, based on structural analysis and/or tests; and where so used plywood shall be bonded with an exterior adhesive meeting performance standards for exterior type except as set forth in Section 2904.2 (c) above.

(e) All plywood used structurally shall bear the identification of an approved agency as to type and grade, species of veneer used and conformance with the appropriate U.S. commercial standard.

**2904.3 GLUED-LAMINATED** (a) Glued-laminated members shall comply with the Standard set forth in Sub-section 2902.1.

(b) The Building Official may require tests to determine the strength, permanence, effect of moistures and insect resistance of adhesives; and only approved adhesives may be used.

(c) The Building Official may limit or otherwise regulate the use of glued-laminated members after consideration of the exigencies of manufacture, location and service.

**2904.4 TRUSSED RAFTERS** Trussed rafters shall be designed by methods admitting of rational analysis based on the standards set forth in Section 2902.

Where metal is used for connecting wood members such metal shall be not less than 20 gage and shall be galvanized with a zinc coating conforming to Tentative Specification of ASTM Designation A361.

## **2905 CONSTRUCTION DETAILS**

**2905.1 COLUMNS OR POSTS:** (a) All wood columns and posts shall be framed to true-end bearings and shall be securely anchored against lateral or vertical forces.

(b) All wood columns and posts shall have the bottom protected from deterioration.

(c) Splicing of columns shall be done only in regions where lateral support is adequately provided about both axes.

(d) No notching or cutting shall reduce the design dimensions of the column.

**2905.2 STUDS:** (a) **SIZE:** Studs shall be less than 2" x 4" and, where supporting more than one floor and a roof, shall be not less than 2" x 6" or 3" x 4".

(b) **HEIGHT:** Maximum allowable height of 2" x 4" and 3" x 4" stud framing shall be 14 feet, and of 2" x 6" stud framing shall be 20 feet, unless the wall is otherwise laterally supported. Solid wood bridging shall be placed at intervals of not over seven feet.

(c) **SPACING:** No studding shall be spaced more than 16 inches on centers, except that in lieu of this requirement the studs and plates shall be designed as a system of columns and beams.

(d) **PLACING:** Studs in exterior and bearing walls shall be placed with the longest dimension perpendicular to the wall. Stud-bearing walls shall, so far as practicable, be carried directly to the foundation or sills or beams at grade.

(e) **PLATES:** The top plate of stud-bearing walls shall be doubled and lapped at each intersection with walls and partitions. Joints in the upper and lower members of the top plate shall be lapped not less than four feet.

(f) **BASE PLATES:** Stud walls resting on masonry shall have base plates or sills of wood treated with an approved preservative.

Sills of interior bearing walls, resting on masonry foundation walls where wood floor joists are to be used, and sills of exterior stud walls shall be not less than the 4" x 6" dimension, bolted to the masonry at the corners and at intervals of not less than four feet with one-half-inch bolts embedded seven inches into the masonry or in lieu thereof, a 2" x 4" base plate, and each such stud anchored past the base plate to the masonry with a 1/8" x 1" steel strap or equivalent.

Base plates of interior stud bearing walls resting on concrete slab floors shall be effectively fastened thereto, and such plates shall not be embedded in the concrete.

(g) **CORNERS:** Corners of stud walls or partitions shall be framed solid by doubling the studs.

(h) **WIND BRACING:** Exterior stud walls shall be effectively wind-braced with diagonal sheathing or plywood as set forth in Section 2905.9(c).

(i) **SPLICING:** Bearing studs shall be spliced only at points where lateral support is provided.

(j) **BALLOON FRAMING:** Where practicable, exterior stud walls of two-story buildings shall be balloon-framed with studs continuous from foundation to second-floor ceiling and having second-floor joists set on a let-in 1" x 4" ribbon.

(k) **NOTCHING:** No notching or cutting whatsoever shall be permitted in studs which carry loads in excess of 75 percent of their capacity.

Studs which carry 75 percent or less of their capacity or studs of non-bearing partitions may be notched to a depth of 1/3 the depth of the stud without limit of the number of consecutive studs.

(l) **PIPES IN WALLS:** Stud partitions containing plumbing, heating or other pipes shall be so framed and the joists spaced to give proper clearance for the piping. Where a partition containing such piping runs parallel to the floor joists, the joists shall be doubled and spaced to permit the passage of such pipes and shall be bridged. Where plumbing, heating or other pipes are placed in or partly in a partition, necessitating the cutting of the plates, a metal tie not less than one-eighth-inch thick and one and one-half inches wide shall be fastened on each side of the plate across the opening with four 16d nails at each end of each strap.

(m) **HEADERS:** All openings 4 feet wide or less in bearing walls shall be provided with headers equivalent to double headers not less than 2 inches thick, placed on edge, securely fastened together, and all openings more than 4 feet wide shall be trussed or provided with headers or lintels. Such headers or trusses shall have not less than 2-inch solid bearing at each end to the floor or bottom plate, unless other approved framing methods or joint devices are used.

(n) **STUDS JOINING MASONRY:** Where stud walls or partitions join masonry walls, such studs shall be secured against lateral movements by nailing or bolting to the masonry.

(o) **INTERIOR PARTITIONS:** Interior partitions shall be constructed, framed and firestopped as specified for interior bearing walls, except that partitions may have a single-top plate. In any occupancy, interior partitions not more than four feet from a bearing wall and not exceeding 9 feet in height may be of studs spaced 24 inches on centers and placed flat in the wall. Wardrobe units serving as non-bearing interior partitions, prefabricated or partially prefabricated, may be constructed of 2" x 2" wood studs spaced not farther apart than 16 inches and with a plywood skin glued and nailed to the studs regardless of the proximity of this type partition to a bearing wall. Non-bearing interior partitions which separate adjacent closets may be constructed of 2" x 4" wood studs spaced not farther apart than 24 inches placed flat in the wall where gypsum lath and plaster is applied to both sides in accordance with Sections 3502 and 3503, regardless of the proximity of this type partition to a bearing wall.

Studs in walls subject to frequent wetting shall be protected with 15-pound asphalt-saturated felt.

**2905.3 FIRESTOPS:** Firestopping shall be provided to cut off all concealed draft spaces both vertical and horizontal. Firestops shall form effective fire barriers between stories and between a story and roof space. Firestops shall be provided in specific locations, as follows:

(a) In exterior and interior stud walls, at ceiling and floor levels.

(b) In all stud walls and partitions, so placed that the maximum dimension of any concealed space is not over eight feet.

(c) Between stair stringers at intervals not exceeding seven feet of vertical height and at top and bottom.

(d) Around sliding door pockets.

(e) Other locations not specifically mentioned where concealed spaces permit a spread of fire.

(f) Firestops, when of wood, shall be of two-inch nominal thickness in direction of protection.

(g) Horizontal firestops of attic and ceiling plenums shall be provided as specified in Sub-sections 2006.5 and 2205.3.

**2905.4 JOISTS AND RAFTERS:** (a) **SIZE:** The minimum size of joists and rafters shall be as specified in Section 2904 and shall be not less than 2" x 6" nominal size; except that for ceiling joists of spans not exceeding four feet, the Building Official may approve 2" x 4" nominal size.



(b) **SPACING:** Maximum spacing of joists and rafters, where a plaster ceiling is directly supported on the bottom of such members, shall be 16 inches on centers.

(c) **BEARING:** Joists and rafters shall bear on wood plates and shall not be directly in contact with masonry; except that joists and rafters, when more than six feet above grade and bearing on concrete beams cast in masonry walls which extend above the wood joists and rafters, may bear on such concrete beams provided the ends shall be fire-cut and anchored as specified in Paragraph (d) herein.

Joists and rafters shall have not less than four inches of bearing, except as follows:

(1) Joists may bear on a 1" x 4" ribbon and be nailed to the studs at the second-floor level of balloon framing.

(2) Ceiling joists may butt into the web of a steel beam and be neatly fitted to bear on not less than a three-inch wide bottom flange of such beam.

(3) Joists and rafters bearing on top of a concrete beam and where no parapet is to be erected shall bear on a wood plate, secured to the concrete with one-half inch diameter bolts, ten inches long. Where one-eighth by one-inch anchors embedded in the concrete beam secure directly to the rafters or roof joists, such plate shall be not less than 2" x 4", with bolts to the masonry not more than four feet apart, and where anchorage is provided only from the plate to the rafter or roof joist, such plate shall be not less than a 2" x 6", with bolts to the masonry not more than two feet apart.

(4) Floor joists may butt into a header beam if effectively toe-nailed and if an approved saddle providing not less than three inches of bearing transmits the vertical load to the top of the header.

(5) Ceiling joists may butt into a header beam, as set forth for floor joists or approved devices or other means of support may be used in lieu of bearing.

(d) **ANCHORAGE:** (1) Joists fire-cut into a masonry wall shall be anchored to the concrete beam on which they bear. Such anchors shall be spaced not more than four feet apart and shall be placed at opposite ends across the building on the same run of joists.

(2) All joists shall be nailed to the bearing plates, to each other where they lap, and to the studs where such studs are adjacent; and ceiling joists shall be nailed to roof rafters, if practicable.

(3) Every roof rafter and/or roof joist shall be anchored to the beam or studs on which they bear, and roof rafters opposing at a ridge shall be anchored across the ridge.

(4) Anchors securing wood to concrete shall be of not less than 1/8" x 1" strap iron embedded in the concrete and nailed to the stud or joist or rafter with not less than three 16d galvanized nails or shall be a commercial anchor approved by the Building Official, anchoring each member to a plate provided such plate is not less than 2" x 6" and anchored to the concrete by bolts spaced not more than 24 inches apart.

(5) Anchors securing wood to wood shall be of 1/8" x 1" strap, nailed to each member with three 16d galvanized nails, or shall be a commercial anchor approved by the Building Official, anchoring each member.

(6) Any anchoring systems shall be continuous from the foundation to the roof and shall satisfy the uplift requirements of Section 2306.

(e) **SPLICING:** No horizontal members shall be spliced between points of support except that the Building Official may, in special cases, approve properly designed and bolted splices.

(f) **NOTCHING AND BORING:** Unless the local unit stress is calculated on the basis of a reduced size and found to be not in excess of the allowable stresses, wood members in bending shall not be cut, notched or bored to clear pipes or conduits or for other purposes except as followst

(1) Notches may be cut in the top or bottom not deeper than one-fifth of the depth of the joist and not farther from the support than one-fifth of the span.

(2) Holes may be bored in the middle one-third of the depth and length, not larger than one-sixth of the depth, and there shall be not less than the depth of the joist between any two holes in the same joist.

(3) Where necessary to run service pipes in the space between the ceiling and floor larger than can be accommodated by the above provisions, such ceilings shall be furred down, or provisions shall be made by the use of headers or beams and/or changing the direction of the joists where the design permits.

(g) **OPENINGS:** Joists shall be doubled adjacent to openings where more than one joist is cut out or shall be so increased in size or number as may be needed to meet the unit stress requirements. Headers shall be the same size as the joists and where supporting more than one joist shall be not less than doubled members. Headers shall be supported by approved metal hangers or ledgers or other approved means.

(h) **ENTERING MASONRY OR CONCRETE:** Ends of wood members entering masonry or concrete walls shall be provided with one-half-inch air space on sides, top and end, unless the wood is treated with an approved preservative by a method approved by the Building Official. Ends of such wood members shall be fire-cut so that the top edge does not enter the masonry or concrete more than one inch.

(i) **FLOOR JOISTS:** Floor joists under all walls parallel to any joists shall be doubled. Such doubled joists may be separated not more than 6 inches by solid blocking spaced at 4-foot intervals. Floor joists supporting concrete for bathroom floors shall have a maximum spacing of 12 inches. At the ends and at each support, joists shall be stabilized from buckling or overturning by solid blocking of not less than two inches nominal thickness and the full depth of joists, or by nailing to the studs when supported on ribbons or sills. Solid bridging of two-inch thickness, wood cross-bridging of not less than 1" x 4" or approved metal cross-bridging of equal strength shall be placed between floor joists at intervals not exceeding eight feet and under all load concentrations. Where cross-bridging is used, the lower ends of the cross-bridging shall be driven up and nailed after the floor or sub-floor has been secured.

(j) **CEILING JOISTS:** (1) In buildings without parapet walls, the ceiling joists, where practicable, shall be nailed to the rafters to act as a collar tie.

(2) Ceiling joists, spanning more than 14 feet, shall be laterally supported by a 2" x 6" member set on edge on top of the joists at mid-span and secured to the joists with 2" x 4" blocks.

(3) Ceiling joists shall not be used to support rafter loads.

(k) **ROOF JOISTS:** (1) Blocking and bridging as required for floor joists in Paragraph (i) shall be provided for roof joists, except that bridging shall be cross-bridging or shall be solid bridging of one nominal size less than the joist.

(2) Roof joists may cantilever over exterior walls as limited by the allowable stress, but the length of such cantilever shall not exceed the length of that portion of such joist inside the building; and when the cantilever of tail joists exceeds three feet, the roof joist acting as a header shall be doubled.

(l) **ROOF RAFTERS** (1) Hip rafters, valley rafters and ridges shall be required and shall be not less in size than the largest rafter framing thereto nor less than required to support the loads.

(2) Collar ties shall be provided at each third pair of rafters, shall be placed horizontally at or below the upper-third point of the rafters, and shall be not less than 1" x 6" size. Effectively nailed ceiling joists may serve as collar ties for roof spans not exceeding 20 feet. Unless other adequate means of resisting the thrust of the rafters of a gable-type roof is provided, the ridge shall be designed as a supporting beam.

(3) All ridge, hip and valley rafters shall be effectively anchored.

(m) **TRUSSES:** Sizes of truss members will be determined by the stress diagram. The minimum allowable upper and lower chords shall be 2 x 4 inch, diagonal and vertical members shall be 2 x 3 inch.

**2905.5 SUSPENDED OR FURRED CEILINGS** (a) Joists or furring supporting a plaster ceiling shall be spaced not more than 16 inches on center.

(b) Joists of a suspended ceiling shall be not less than 2" x 4" members, and wood hangers shall provide proper nailing and be not less than the equivalent of 1" x 4" members.

(c) Furring of a ceiling in contact with supporting joists shall be not less than 1" x 3" for spans to 24 inches; 2" x 2" for spans to 36 inches, and for longer spans shall be designed as joists.

2905.6 Mill-constructed floors or roofs shall comply with Sub-section 2003.3.

2905.7 **VERTICALLY LAMINATED BEAMS:** Vertically laminated built-up beams shall be made up of members continuous from bearing to bearing.

2905.8 **STAIR STRINGERS:** Stair stringers shall, where practicable, be so framed that there is not less than four inches of bearing at the ends. Where it is not practicable to provide such bearing, the stringers may be hung in steel hangers of approved type.

No notching or cutting whatsoever shall be permitted in the effective area of stair stringers.

2905.9 **SHEATHING:** (a) **FLOOR SHEATHING:** (1) Floor sheathing, where a part of a required fire-resistive assembly, shall comply with Section 3704.

(2) The finish floor shall be tongue-and-grooved not less than nominal one-inch lumber laid perpendicular to the joists with end joists on the joists, or a sub-floor shall be provided as set forth in Sub-paragraphs (3), (4), and (5)t

(3) Square-edged or spaced sub-flooring may be used under only a finish floor having a strength equal to or greater than one-half-inch tongue-and-groove wood strip flooring; and under finish floors of less strength, a tongue-and-groove or plywood sub-floor shall be required.

(4) Lumber sub-flooring shall be laid diagonally, shall be not less than nominal one-inch wood, end joints shall be on joists, joints shall be staggered and parallel to the joists, and ends at walls and similar places shall be supported by a ribbon or by blocking.

(5) Plywood sub-flooring shall be as follows:

**Douglas Fir Plywood and Western Softwood Plywood  
Group I Sheathing Grades**

Thickness	Maximum Joist Spacing
1/2"	16"
5/8"	20"
3/4"	24"

**Western Softwood Plywood Group II or III**

Thickness	Maximum Joist Spacing
5/8"	16"
3/4"	24"

Panels of C-D and C-C grade, complying with Section 2904.2(e) as Group I species and manufactured to special provisions U.S. Commercial Standard CS 122.

Panels identified as Group II or Group III species under U.S. Commercial Standard CS 122 and panels identified as Group I species, but of grade other than C-D or C-C.

Blocking shall be required at edges unless tongue-and-groove wood strip flooring not less than twenty-five thirty-seconds inch in thickness is used.

Plywood panels shall be nailed to supports with 6d common nails for the 1/2" thickness and 8d common nails for the 5/8" and 3/4" thicknesses. Nail spacing in all applications shall be 6" on center at panel edges and 10" on center at intermediate supports. Plywood shall be continuous over two or more spans and face grain perpendicular to supports.

(6) Flooring shall be nailed with 8d common nails not less than two in each board at each support.

(7) Floors for mill-type buildings shall be sheathed as specified for mill floors, Sub-section 2905.6.

(8) Flooring shall not extend closer than one-half inch from masonry walls.

(b) **ROOF SHEATHING:** (1) Wood roof sheathing shall be tongue-and-grooved or shall be plywood except as may be otherwise approved by the Building Official.

Sheathing shall extend over the fascia board to cover a 1' x 2' nailing block around edge of roof on fascia.

(2) Tongue-and-grooved roof sheathing shall have thickness of not less than twenty-five thirty-seconds inch, and sheathing of such thickness shall span not more than twenty-eight inches between rafters or joists, shall have staggered joints and shall be nailed with 8d common nails not less than two in each six-inch board nor three in each eight-inch board at each support.

(3) Plywood roof sheathing shall be as followse

**Douglas Fir Plywood and Western Softwood Plywood  
Group I Sheathing Grades**

Thickness	Maximum Spacing of Joists or Rafters
3/8"	16"
1/2"	24"
5/8"	32"
3/4"	36"

**Western Softwood Plywood Groups II and III (Unsanded)**

Thickness	Maximum Spacing of Joists or Rafters 55 lbs./sq. ft.	
	Group II	Group III
3/8"	16"	16"
1/2"	24"	20"
5/8"	28"	24"
3/4"	32"	30"

Panels of C-D and C-C grade complying with Section 2904.2(e) as Group I species and manufactured to special provisions set forth in U.S. Commercial Standard CS 122.

Panels identified as Group II or Group III as species under U.S. Commercial Standard CS 122 and also panels identified as Group I species but of grade other than C-D or C-C. Sheets shall be nailed to supports with 6d common nails for 3/8" and 1/2" thicknesses and with 8d common nails for 5/8" and 3/4" thicknesses.

Nail spacing in all applications shall be 6" on center at panel edges, and 12" on center at intermediate supports. Plywood shall be continuous over 2 or more spans and face grain perpendicular to the supports.

(c) **STORM SHEATHING:** Exterior stud walls shall be wind-braced with storm sheathing. Such storm sheathing shall be tightly fitted, diagonally-placed, tongue-and-groove sheathing, not less than 25/32 inch thickness, nailed with three 8d common nails to each support; or shall be the maximum practicable size plywood panel, not less than 5/16 inch in thickness, nailed with 6d common nails for 5/16 inch, 3/8 inch and 1/2 inch thickness and 8d common nails for 5/8 inch thickness and all such nails shall be 6 inches on centers at edges of panel and 12 inches on centers to interior panel supports. An effective water barrier shall be provided under all wood exterior cladding between the cladding and the supporting studs, and all openings shall be flashed.

(d) **EXTERIOR CLADDING:** Where plywood is used for covering the exterior of outside walls, it shall be of the Exterior type and may be applied directly to studs or over sheathing. Panel thickness shall be not less than 3/8" nominal except that panels surface-textured by grooving or other means may average not less than 5/16" in thickness, if equivalent in cross-panel stiffness to that provided by a 3/8" thick panel. Panel joints shall be backed solidly by 2" framing members except over sheathing or where applied as lapped siding or otherwise made waterproof to the satisfaction of the Building Official. Nailing shall be with corrosion-resistant nails of the size and spacing required for plywood sheathing.

**2905.10 FURRING:** Where the interior of masonry walls are furred, such furring shall be treated and firestopped as herein required and shall be securely fastened to the masonry with not less than one cut nail in alternate courses of block.

**2905.11 CONNECTORS:** (a) The allowable loads on all types of connectors shall be as set forth in the standards referred to in Sub-section 2902.1 and in Table 29-C.

**TABLE 29-C**

Number of Nails for Connecting Wood Members		
Connection	Box	Common
Joist to Sill or Girder, Toe Nail	2	16d
Bridging to Joist, Toe Nail	2	8d
1" x 6" Sub-floor to Joist, Face Nail	2	8d
Two-inch Sub-floor Joist or Girder	2	16d
Plate to Joist or Blocking		16d 16"c/c
Stud to Plate, End Nail	2	16d
Stud to Plate, Toe Nail	3	16d or 4 8d
Top Plates: Spike Together		16d 24"c/c
Laps and Intersections	2	16d
Ceiling Joist to Plate, Toe Nail	2	16d
Laps over Partitions	3	16d
To Parallel Rafters	3	16d
Rafter to Plate	3	16d
Continuous One-Inch Brace to Stud	2	8d
1" x 6" Sheathing to Bearing	2	8d
1" x 8" Sheathing to Bearing	3	8d
Corner Studs and Angles		16d 30"c/c
Plywood		8d (6"c/c edges) (12"c/c interior)
Anchors to Rafters or Roof Joists	3	8d or 2 16d

(b) Nails, bolts and other metal connectors which are used in locations exposed to the weather shall be galvanized or otherwise corrosion resistant.

(c) In general, nails shall penetrate the second member a distance equal to the thickness of the member being nailed thereto. There shall be not less than two nails in any connection.

(d) Except for plywood and other laminated members manufactured under technical control and rigid inspection, gluing shall not be considered an acceptable connector in lieu of the connectors herein specified.

(e) Safe loads and design practice for types of connectors not mentioned or fully covered herein shall be determined by the Building Official before approval.

**2905.12 WOOD SUPPORTING MASONRY:** No wood shall support masonry or concrete except as follows:

(a) Wood foundation piles may be used to support concrete or masonry.

(b) Wood joists shall not be used to support concrete and cement-base tile or terrazzo floor surfaces other than for bathrooms of less than 100 square feet in area, having slabs not more than two and one-half inches in thickness. A moisture barrier shall be provided between wood members and Portland Cement slabs or ceramic tile.

(c) Wood rafters may support concrete roof tile.

#### **2906 WORKMANSHIP**

Workmanship, in the fabrication, preparation, installation and the joining of wood members and the connectors and mechanical devices for the fastening thereof, shall conform throughout to the best practices.

#### **2907 PROTECTION OF WOOD**

**2907.1 WOOD PILES:** Wood piles shall be treated with preservatives as specified in Section 2404.3(b)t

**2907.2 PROTECTION AGAINST ROT: (a) PRESERVATIVE TREATED OR DURABLE SPECIES WOOD:** (1) All wood in areas where deterioration would affect structural safety shall be treated in an approved method with an approved preservative or shall be of an approved durable species as set forth in the standards of Sub-section 2902.

(2) All wood in contact with, or less than 18 inches from, the ground shall be treated in an approved method with an approved preservative or shall be of an approved durable species as set forth in the standards in Sub-section 2902.

(3) All wood in contact with concrete or masonry including sills, sleepers, plates, posts, columns, beams, girders and furring shall be treated in an approved method with an approved preservative or shall be of an approved durable species as set forth in the standards in Sub-section 2902, except that the ends of joists not less than 8 feet above the grade when in contact with concrete or masonry, may be treated by dipping the ends in an approved preservative for a period of not less than 5 minutes.

(4) Approval of the method and materials of treatment with a preservative shall be in accordance with the standards as set forth in Sub-section 2902.

**(b) VENTILATION:** Attic space between ceiling joists and roof rafters shall be effectively ventilated. Openings shall be located to provide effective cross ventilation, and such openings shall be covered with a corrosion-resistant mesh with openings not greater than one-sixteenth inch.

**(c) TERMITE TREATMENT FOR BUILDINGS:** It is the objective of this sub-section to provide protection from subterranean termites. The following control practices are required in construction:

1. Adequate drainage of area around building.
2. Proper removal of debris from site prior to construction.
3. Minimum clearance between wood and ground.
4. Floors on grade.
5. Proper soil treatment for termites.

(1) See Section 2406 for grading from building to street. Slope all surface of soil away from building and lead all gutters and down-spouts to flow the water away from foundation walls.

(2) All stumps, roots, wood and wood product debris shall be removed from under building and adjacent to all footings or slabs. No form boards, grade stakes, etc. shall be permitted under or adjacent to building.

(3) Minimum clearance between wood members and grade is 8 inches on the exterior and 18 inches under crawl spaces.

(4) Construction details of floors on grade in addition to pretreating of soil shall require a continuous barrier from slab through to exterior.

a. When footing and slab are monolithic or when slab is reinforced with 6" x 6" and 10/10 and extends over foundation wall a minimum of 4 inches, this is considered adequate.

b. When a floating slab is used, i.e. the slab stops at the exterior wall, this vertical joint must be sealed against future termite penetration either by a metal termite shield extending a minimum of 2 inches into the concrete and 2 inches into the foundation wall, or the entire joint must be caulked as required below.

All holes or joints penetrating the slab on grade must be caulked with coal tar pitch, rubberoid bituminous sealers, chemicalbearing sealers designed specifically for termite protection, or other materials accepted by the U. S. Forest Service, U.S. Department of Agriculture for this purpose.

(5) The soil under all slabs on grade, crawl spaces, foundation walls will be chemically treated for the protection against termite attack. This treatment is a supplement to good construction, not a substitute. The following chemicals and their concentration are approved:



Aldrin — .5%, BHC — .8%, Chlordane — 1%, Heptachlor — .5%, Dieldrin — .5%, or other chemicals as approved by the U. S. Forest Service, U. S. Department of Agriculture.

If wells are the source of drinking water, refer to U. S. Department Bulletin No. 64 for precautions.

Rates and methods of application will be in accord with U. S. Department of Agriculture Leaflet #324 Rev. 61 or Bulletin #64, latest date.

Application under Building as followst

Foundation:	1 gal. per 2½ lin. ft. both sides of foundations and piers
Crawl spacet	1 gal. per 10 sq. ft.
Voids in masonryt	1 gal per 5 lin ft.
Under slabs:	1 gal. per 10 sq. ft.
Holes Penetrating Concrete Slab:	Double treat area 3' around all pipes, etc., after rough piping is complete.

#### **TREATMENT OF WOOD:**

(1) In masonry or frame construction with crawl space, pressure treat all wood below first floor line but include all plates, joists, heads, etc. in contact with masonry, regardless of height.

(2) In masonry or frame construction where slab is on the ground, treat all framing members in contact with masonry. All rough lumber treatment shall be done by a pressure method in accordance with interim F. S. TT-W-571d "Wood Preservative Treatment Practice." All finished millwork may be dipped or hand painted with preservative when specifically approved by the Board of Rules and Appeals.

#### **ENFORCEMENT:**

Before a Certificate of Occupancy will be issued, the owner of new construction shall furnish the Building Department a certificate from a pest control operator certified in termite control, that the soil has been treated for termites as provided herein, or if the owner of the property himself shall treat the soil, he must furnish the Building Department evidence that the above requirements have been met.

**2907.3 LIGHT AND VENTILATION** (a) The space between the bottom of wood-floor joists and the ground of any building, except such space as is occupied by a basement or cellar, shall have ventilating openings through foundation walls, and such openings shall be covered with a corrosion-resistant wire mesh with openings not greater than one-sixteenth inch. Where practicable, ventilating openings shall be arranged on three sides. The minimum total area of ventilating openings shall be two square feet for each 15 linear feet of exterior wall. Such openings need not be placed in the front of the building.

(b) Where wood-floor joists are used, there shall be not less than 18 inches distance between the bottom of such floor joists and the grade beneath, as set forth in Section 2406.

**2907.4 DEBRIS:** (a) Before any new building is erected, all stumps and roots shall be removed from the soil to a depth of at least 12 inches below the surface of the ground in the area to be occupied by the building.

(b) In buildings or portions thereof having wood first-floor systems, all wood forms which have been used in placing concrete, if within the ground or less than 18 inches above the ground, shall be removed before the building is occupied or used for any purpose.

(c) Loose or casual wood shall not be stored in direct contact with the ground under any building, and this space must be thoroughly cleaned of all wood and debris.

**2907.5 EXISTING BUILDINGS:** Whenever the Building Official has knowledge of the existence of termites in any building or structure, he shall notify the owner in writing and direct that necessary measures be taken for the extermination of the termites within a reasonable length of time, not to exceed 60 days.

## Chapter 30 – Aluminum

- 3001 GENERAL
- 3002 ALLOWABLE UNIT STRESSES
- 3003 DESIGN
- 3004 CONSTRUCTION DETAILS

### 3001 GENERAL

**3001.1 DESIGN:** Aluminum members shall be designed by methods admitting of rational analysis according to established principles of mechanics.

**3001.2 STANDARDS:** The aluminum Construction Manual May 1963 of the Aluminum Association is hereby adopted to supplement, but not supersede, the specific requirements set forth herein.

### 3002 ALLOWABLE UNIT STRESSES

**3002.1** The design, fabrication and assembly of aluminum members for buildings and other structures shall conform to the standard set forth in Sub-section 3001.2 and as otherwise set forth herein.

**3002.2** The use of aluminum alloys, other than those listed in the standard shall provide performance not less than those required by the standard and as set forth herein.

**3002.3** Aluminum members shall be limited by the deflections set forth in Sub-section 2301.3 herein.

### 3003 DESIGN

The Building Official may require that any structure using aluminum primary or secondary members be designed by a registered professional engineer.

Increases in allowable unit stresses as set forth for wind loads in Sub-section 2306.6 herein shall be applicable to aluminum structural members except that allowable unit stresses thus increased shall not exceed 75 percent of the minimum yield strength.

In addition to flexural and shearing stresses, the critical factors of buckling, fatigue, stress raisers such as notches or holes or sharp reentrant corners, deflection and connections, shall be considered and provided for by proper design.

## 3004 CONSTRUCTION DETAILS

**3004.1 CONNECTIONS:** Aluminum members shall be designed as set forth in the Standards in Paragraph 3001.2(a).

**3004.2 DECKING AND SIDING:** Aluminum sheet used for roof decking or siding shall be not less than .024 inch in thickness. Aluminum sections spanning between supports shall be limited in span to satisfactorily support positive and negative loads set forth in Chapter 23 and shall not exceed that set forth in Sub-section 2301.3 herein. Aluminum sheets shall be secured to the supports to adequately resist positive and negative loads at intervals not exceeding eight and one-half inches and shall be secured to each other at side laps at intervals not exceeding 12 inches. Fasteners shall have a head, and/or be provided with washer, not less than one-half inch in diameter. Fasteners located at end laps shall be placed not more than two inches nor less than one inch from the end of the overlapping sheets.

**3004.3 WALL PANELS:** Aluminum sheets used in wall panels shall have a thickness of not less than .032 inch.

Finished facing shall have a maximum deviation of one-fourth inch at the center when measured from a plane determined by the edges of the panel, with a maximum deviation of one-sixteenth inch in any 12-inch run.

**3004.4 DISSIMILAR MATERIALS:** (a) Where aluminum surfaces come in contact with metals other than stainless steel, zinc, white bronze of small area or other metals compatible with aluminum, aluminum surfaces shall be kept from direct contact with such parts by:

(1) Painting the dissimilar metal with a prime coat of zinc-chromate primer or other suitable primer, followed by one or two coats of aluminum metal-and-masonry paint or other suitable protective coating, excluding those containing lead pigmentation;

(2) Painting the dissimilar metal with a coating of a heavy-bodied bituminous paint;

(3) A good quality caulking material placed between the aluminum and the dissimilar metal;

(4) A non-absorptive tape or gasket;

(5) Steel members hot-dip galvanized or zinc plated after fabrication.

(b) Dissimilar metals shall be painted if used in locations where drainage from them passes over aluminum.

(c) Aluminum surfaces in contact with lime mortar, concrete or other masonry materials shall be protected with alkali-resistant coatings, such as heavy-bodied bituminous paint or water-white methacrylate lacquer.

(d) Aluminum in contact with wood or other absorptive materials which may become repeatedly wet shall be painted with two coats of aluminum metal-and-masonry paint or a coat of heavy-bodied bituminous paint, or the wood or other absorptive material shall be painted with two coats of aluminum house paint and seal joints with a good quality caulking compound.

(e) Where aluminum is in contact with treated wood, wood shall be treated with pentachlorophenol, 5 percent minimum concentration or creosote or zinc naphthanate, following the protective measures outlined in Paragraph (d).

**3004.5 EXPANSION, CONTRACTION:** Aluminum work shall be designed and anchored so that the work will not be distorted nor the fasteners over-stressed from the expansion and contraction of the metal.



## PART VII – DETAILED REGULATIONS

### Chapter 31 – Exit Facilities

- 3101 GENERAL
- 3102 STAIRWAYS
- 3103 RAMPS
- 3104 SMOKEPROOF TOWERS
- 3105 HORIZONTAL EXITS
- 3106 EXIT COURTS
- 3107 PASSAGEWAYS
- 3108 RAILINGS
- 3109 ELEVATORS & ESCALATORS
- 3110 AISLES & CORRIDORS
- 3111 DOORS
- 3112 EXIT SIGNS & LIGHTS

#### 3101 GENERAL

**3101.1 STANDARDS:** In every building hereafter erected, the minimum standards of egress for occupants shall be as specified in this Chapter or as set forth in Part III herein, "Requirements Based on Occupancy."

**3101.2 GENERAL:** (a) Paths of egress shall be permitted across roofs only where the roof construction is of protected incombustible material.

(b) Ramps as herein specified, may be substituted for required stairways.

(c) Escalators, when constructed and arranged as specified in Section 3109, may be used in the calculation of exit stairways only where open interior stairways are permitted.

(d) The requirements of this Chapter shall not apply to Group I Occupancy except as specifically stated.

(e) Minimum head room in all paths of egress shall be not less than seven feet and two inches, except as followst

(1) Head room at doors shall be not less than six feet eight inches.

(2) Head room at all points of stairs and landings shall be not less than seven feet and six inches, measured vertically above treads and landings, but shall not be less than six feet six inches as measured perpendicularly to a line running through the nosing of the flight.

(f) Except where otherwise specifically stated, exits from the first or ground floor shall be proportioned on the basis of the exits required therefrom plus the required units of exit width from other floors that exit therethrough.

(g) All exits shall provide continuous paths of egress to a public space, so that buildings may be emptied with minimum danger to life.

(h) Paths of egress shall continue with no decrease in required widths to a public street.

(i) Nothing that could confuse the direction of exit travel shall be placed in any path of egress.

(j) The exit facilities, as separately described in this Chapter, shall, when serving as a part of a required path of egress, be as set forth herein and may be used singly or in combination.

(k) Travel distances shall be as set forth in Part III based on Groups of Occupancy except that the travel distances set forth herein may be increased 5 feet for each unit of exit width in excess of those otherwise required herein.

(l) Where stairways serve two or more upper floors the same stairway required to serve one upper floor may serve other upper floors.

**3101.3 OCCUPANT CONTENT:** (a) The occupant content for which exit capacity shall be provided shall be determined as set forth in Chapter 6 through 15 for the Group of Occupancy Classification of the space and shall be the maximum number of persons that may be anticipated to occupy a building or portion thereof at any time under any reasonably foreseeable condition. Where a building or fire division thereof is of multiple occupancy use, rooms and spaces incidental to the principal Group of Occupancy may be separately considered in accordance with the occupant content of the Group of Occupancy most reasonably applicable. Where occupant content is thus computed for multiple occupancy, exit facilities shall be provided as set forth in Section 510.

(b) Buildings shall not be occupied beyond the occupant content for which exits are provided except that the Building Official may permit proportional adjustment of exit facilities where the occupant content is clearly established as being more or less than set forth herein.

(c) The maximum capacity of any assembly room in which seats are not fixed shall be conspicuously posted by the owner of the building by means of durable, metal signs placed in each assembly room. It shall be unlawful to remove or deface such notice or to permit more than this legal number of persons within such space.

### **3102 STAIRWAYS**

**3102.1 GENERAL REQUIREMENTS:** (a) Stairways shall be designed and constructed and shall be required and limited as set forth in Part III, "Groups of Occupancy," and Part V, "Types of Construction."

(b) Stairways and intermediate landings shall continue with no decrease in width along the direction of exit travel.

(c) No flight of a stairway shall have less than three risers.

(d) No flight of a stairway shall have a height of more than ten feet, and no flight of a stairway serving Groups A or B Occupancies of more than 300 persons shall have a height of more than eight feet. Intermediate landings shall be provided as set forth in Section 3102.4.

(e) The width of stairways shall be measured between walls or guard rails. A grip rail projecting not more than three and one-half inches shall not be considered to decrease a stair width.

(f) The underside of all interior stairways which are of combustible materials, including Group I Occupancies, shall be protected by one-hour fire-resistive construction.

(g) Spaces under required stairways of combustible construction, even though protected, shall be left entirely open or shall be completely closed without door or other opening provided that nothing in this paragraph shall be construed to prohibit an enclosed flight of stairs beneath another flight.







**3102.2 ARRANGEMENT AND ACCESS:** (a) In buildings three or four stories in height with roofs having a slope of less than one foot in four, a scuttle or scuttles to permit access to all parts of the roof from a common space on the top floor, preferably a stairway, shall be provided.

In buildings more than 4 stories in height or of any height above one story where there is equipment on the roof requiring frequent adjustment or maintenance, permanent stairways or ladders shall be provided.

(b) Not less than one stairway which serves a roof, nor less than one-half of the required number of stairways shall discharge directly to a street or shall connect thereto by means of a passageway or exit court.

(c) All stairways which may be used for exit purposes shall be readily visible and shall make clear the direction of egress to the street. Provisions shall be made, where stairways continue beyond the main exit to the exterior, to prevent persons exiting from other floors from passing the main exit.

(d) Stairways shall abut on not more than one side of an elevator enclosure.

(e) Every doorway serving an exit stairway shall have a width of not less than one 20-inch unit of width for each unit of width required for the stairway at that point.

**3102.3 TREADS AND RISERS:** (a) There shall be no variations in the width of treads and height of risers in any flight. Where variations in heights of risers in different flights are necessary due to varying story heights, such variation shall not exceed three-sixteenths of an inch. All treads less than ten inches wide shall have a nosing of not less than one inch, or a rake of not more than two inches, over the level immediately below.

(b) The surface of stair treads and landings shall be such as not to involve danger of slipping. Continuous strip carpeting providing a rounded and padded nosing shall be considered unsafe. Carpeted treads with metal nosings may be accepted.

(c) So far as practicable, treads and risers shall be different shades or colors.

(d) All required stairways shall have solid treads and risers.

(e) Curved stairways shall be permitted in buildings of only Group I Occupancy or for duplex dwellings or within a residential apartment under Group H Occupancy or for monumental stairways which are not required paths of egress. The inside radius of winders shall be not less than 20 inches nor shall the width of tread on the inside curve be less than eight inches.

(f) Treads shall not vary more than three-sixteenths inch from level.

(g) Treads and risers shall be so proportioned that the sum of two risers and one tread, exclusive of nosing, shall be not less than 24 inches nor more than 25 inches. For main stairways of Groups A, B, or C Occupancy, no riser shall be more than seven and one-half inches, and no tread less than ten inches, exclusive of nosing; and for other stairways, no riser shall be more than eight inches and no tread less than nine inches exclusive of nosing.

**3102.4 LANDINGS:** (a) The length of intermediate landings shall be not less than the width of the stairways in which they occur but shall not be required to exceed 44 inches in straight-run stairs.

(b) Doors swinging into landings which serve as a path of egress from floors above shall not reduce the width of such landings to less than 22 inches nor, when open, interfere with the full use of the landing except that in Group A, B, C, and D Occupancies, swinging doors during their swing shall not reduce the required width of stairs or landings.

(c) The outer corners of landings of stairways in Groups A, B, C, and D Occupancies shall be curved on a radius of at least two feet or shall have a 45-degree splay not less than 20 inches wide.

(d) No door shall open directly onto a flight of stairs, but landings, as specified in this section, shall be provided between a door and a flight of stairs.

(e) The requirements for landings shall apply to all occupancies, including Group I.

**3102.5 STAIRWAY ENCLOSURES:** (a) All stairways shall be enclosed where required under Types of Buildings, Part V, or Groups of Occupancy, and Part III; and enclosures shall include the path of egress, so that once inside enclosures, persons may go from any part of the enclosure to the outside exit without leaving the enclosure; except that monumental stairways serving a mezzanine or basement and which are not a part of required paths of egress need not be enclosed.

(b) Stairway enclosures shall not be used for storage or equipment.

(c) At the top of every stairway enclosure, skylights shall be provided on the roof or windows in the walls. Glazing shall be plain glass and skylights shall be protected by a substantial wire mesh beneath.

(d) Doors in connection with stairway enclosures shall be as specified in Section 3111.

**3102.6 OUTSIDE STAIRWAYS:** (a) Outside stairways shall not be used for buildings which exceed three stories.

(b) Outside stairways shall not be used for more than 50 percent of the required upper-floor exits; except that for buildings of Groups H and I Occupancies, not exceeding three stories in height and where the floor level of the third floor does not exceed 20 feet above grade, the upper floors of such buildings may be served by incombustible exterior galleries and outside stairways, provided that from each upper floor door there shall be remote stairways.

(c) Outside stairways shall be constructed of incombustible materials with solid risers, treads and landings.

(d) No part of any open outside stairway shall be closer than ten feet to a contiguous building line.

**3102.7 FIRE ESCAPES:** (a) Fire escapes shall not be permitted as required means of egress for new construction.

(b) Fire escapes may be permitted as a means of increasing the exit facilities of existing buildings less than four stories in height when additional exits are required, but only where conditions do not permit the use of more adequate exit facilities.

(c) Exterior fire escapes, where permitted, shall conform so far as possible with the requirements of Section 3102, except that widths shall be based on 18 inches per unit of exit width with a minimum width of 24 inches; maximum height of risers shall be eight inches; minimum width of tread shall be nine inches, exclusive of nosing; landings shall be located to limit flights to not less than three nor more than 13 risers between landings.

(d) Fire escapes shall be arranged and located as set forth in Section 3101.

(e) Balcony and stair guard rails shall be designed for a lateral load of 20 pounds per lineal foot with deflection under load limited to 1/240 of the span.

(f) Wall openings located along or within ten feet below fire escapes shall be protected by self-closing, fire-resistive doors or windows.

(g) The Building Official may require permanent ladders to be provided for mechanics' access to machine rooms, tank towers and spaces and for fire-fighting access to flat roofs where no stairways serve the roof, and such permanent ladders shall meet these minimum requirements:

(1) Distance between rails shall be not less than 16 inches.

(2) Distance between rungs shall be 12 inches in every case; top rungs to be within six inches of the roof or parapet line.

(3) Rungs shall have a diameter not less than seven-eighths inch and shall be riveted or welded in place.

(4) Rails shall be supported at intervals of not more than ten feet.

(5) Rails shall extend not less than 45 inches above the roof or parapet line, except where such ladders are inside and pass through scuttles.

(6) When the travel is between the ladder and the wall, the minimum clearance shall be 27 inches; and when on the outside, there shall not be less than six and one-half inches clearance between the center of the rungs and the wall.

(7) Ladders shall be vertical, or may be positively inclined. No negative incline shall be permitted.

### 3103 RAMPS

Wherever stairways are required by this Code, ramps may be substituted. The construction, width, enclosure, rails, and landings of such ramps shall be as set forth in Section 3102 except as follows:

(a) Changes of direction shall be at a landing or by a curve with radius of not less than 10 feet.

(b) Ramps shall have non-slip surfaces and shall have a slope not greater than 1 in 8.

(c) Ramps with slope not greater than 1 in 10 shall not be required to have landings.

(d) There shall be no variation in slope in the flight of a ramp between landings.

(e) Ramps with slopes greater than 1 in 10 shall have grip rails as set forth in Sub-section 3108.2.

### 3104 SMOKEPROOF TOWERS

Smokeproof towers shall be as required under Groups of Occupancy, Part III. A smokeproof tower shall consist of a continuous stairway enclosure together with entrance vestibules or balconies and shall provide a path of egress from the roof and all stories.

**3104.1 VESTIBULES:** Access to the stairway of a smokeproof tower enclosure shall be provided from each story through vestibules open to the outside on an exterior wall or from balconies

overhanging an exterior wall, but such vestibule or balcony to its nearest point shall be not closer than 20 feet to the building line of a contiguous lot or any building on the same lot. Every such vestibule, balcony or landing shall have an unobstructed length and width not less than the required width of the stairway, and every such vestibule shall be directly open to a public street or alley or open yard or court not less than 30 feet in width. Balconies or vestibules shall have guard rails of incombustible material not less than three feet six inches high, as set forth in Section 3108.

Balcony or vestibule floors shall be approximately level with the interior floors, and there shall be no step from a vestibule or balcony into the stairway enclosure.

**3104.2 DOORS:** Access to vestibules or balconies and from the vestibules or balconies to the stairway enclosure shall be through doorways not less than 40 inches wide. Such doorways shall be provided with self-closing, fire-resistive doorstwinging in the direction of exit travel. Door hardware shall be as set forth in Section 3111.

An observation panel shall be required in each door from the stairway enclosure. Such panel shall not exceed 100 square inches in area or 12 inches in maximum dimension and shall be glazed with clear wire-glass.

**3104.3 PATHS OF EGRESS:** All other provisions of this chapter relating to paths of egress shall also apply to smokeproof towers.

Egress at ground level shall be to a public street or through a passageway leading to a public street.

**3104.4 ENCLOSURES:** Smokeproof-tower enclosures shall be of Type I construction. There shall be no openings in walls separating the enclosure from the interior of the building. Fixed or automatic fire windows are permitted in an exterior wall not subject to severe fire exposure from the same or nearby buildings.

### **3105 HORIZONTAL EXITS**

A horizontal exit is an exit from a building or a fire division of a building to another building or another fire division of the same building. Such horizontal exit shall consist of a passageway or opening from one fire division to another, through or around a fire wall or by means of an enclosed pasageway or bridge connecting two separate buildings or portions of the same building.

**3105.1 AREA OF REFUGE:** The area of refuge for which credit is allowed in connection with a horizontal exit shall have not less than one stairway of incombustible material, arranged to prevent obstruction by the same fire or smoke, as the area from which refuge is taken.

The floor area on either side of a horizontal exit shall be sufficient to hold the occupants of both floor areas.

Horizontal exits shall not exceed 50 percent of the required number of floor exits from any exit area.

**3105.2 BALCONIES:** Balconies may be provided to lead around fire walls and shall be constructed as balconies for smokeproof towers.

**3105.3 BRIDGES:** Bridges to another building or another fire division of the same building, shall, when serving as part of a required path of egress, be of Type I construction, entirely enclosed or with openings protected by fire-resistive windows, and shall approximately meet the level of the floor served.

**3105.4 DOOR:** Each opening serving as a horizontal exit shall be protected by a self-closing swinging fire door. There shall be adjacent openings with swinging doors at each side, opening in opposite directions, with signs on each side of the wall indicating as the exit the door which swings with the travel from that side, or other approved arrangements, providing doors always swing with any possible exit travel. Doors shall be as specified in Section 3111.

### **3106 EXIT COURTS**

**3106.1 EGRESS:** The path of egress from an exit court shall be directly to a public street or by a passageway to a public street. Not more than one required exit shall open into an exit court unless such court is open at both ends to a public street.

**3106.2 WIDTH:** Every exit court shall be not less in width than the required total width of the tributary paths of egress and shall be a minimum of 44 inches wide.

**3106.3 CONSTRUCTION:** The walls of buildings within five feet of a required exit court shall have all openings therein to a height of ten feet, protected by fire-resistive doors or windows; except that this requirement may be waived by the Building Official where, in his opinion, no severe fire hazard exists.

### **3107 PASSAGeways**

**3107.1 WIDTH:** Every exit passageway shall be not less in width than the required total width of the tributary paths of egress and shall be a minimum of 44 inches wide.

**3107.2 CONSTRUCTION:** A passageway shall be without openings other than entrance and exit doors and shall have walls, floor and ceiling of the same period of fire-resistance as that of the building, but not less than two-hour construction. Doors shall be as specified in Section 3111.

### **3108 RAILINGS**

**3108.1 GENERAL:** The requirements of this section for guard rails and grip rails shall be applicable to all Groups of Occupancy.

**3108.2 GUARD RAILS:** Open sides of stairways, balconies and landings and any abrupt differences in level exceeding twelve inches shall have well-secured guard rails. Where the difference in level is less than 24 inches, such guard rails shall be not less than 30 inches high, and for differences in level of 24 inches or more shall be 36 inches high above the floor of a balcony or landing, or 32 inches high above the nosing of treads of a stairway. Guard rails above the first floor of a building of Group H or I Occupancy shall provide protection for children by being designed and constructed so the openings in the guard rail shall have either a least dimension of 6 inches or a maximum area of 64 square inches.

**3108.3 GRIP RAILS:** Flights of three or more steps shall have grip rails. Grip rails shall be on one side of such flights of steps, 44 inches or less in width, and on both sides of such flights of steps which exceed 44 inches in width. Any such flight of steps, 88 inches or more in width, shall be provided with one or more intermediate grip rails, the number to be such that the spacing shall not exceed 66 inches.

Grip rails shall be placed not less than 30 inches nor more than 32 inches above the nosing of the treads, and all ends shall be returned. Grip rails shall be so designed and erected that they will withstand a pressure of 20 pounds per lineal foot applied in any direction. Not less than one and one-half inches of clearance shall be provided at all points between any grip rail and a wall

When guard rails of stairs meet the requirements for grip rails, additional grip rails shall not be required.

### **3109 ELEVATORS AND ESCALATORS**

**3109.1 ELEVATORS:** Elevators shall not be considered as required paths of egress.

**3109.2 ESCALATORS:** (a) Escalators normally operating in the direction of exit travel and complying with this Section may be substituted for stairways.

(b) Escalators shall be constructed as set forth in Chapter 32.

(c) Only full units of exit width of an escalator may be substituted for a required exit width of a stairway.

(d) Escalators serving as required exits shall be enclosed as required for stairways. Escalators continuous for more than two floors shall be enclosed or be protected by a water curtain or other method meeting the requirements of the National Board of Fire Underwriters.

### **3110 AISLES AND CORRIDORS**

Unless otherwise specified in "Requirements Based on Occupancy" in Part III, aisles and corridors shall be as set forth in this Section.

**3110.1 AISLES:** Aisles shall be provided in every building or part thereof, and such aisle shall be not less than three feet in clear width and shall lead directly to an exit and be arranged to be readily accessible. Every exit shall have an evident and unobstructed aisle thereto.

**3110.2 CORRIDORS:** All corridors shall be constructed of not less than one-hour fire-resistive construction.

There shall be a path of egress in either direction from any point in a corridor; provided that a dead end beyond the floor exit or other corridor having two remote exits and not exceeding the width of the corridor shall be permitted; except as longer dead ends are permitted in Chapters 12 and 13.

Every corridor, unless otherwise specified, used as a patch of egress shall be not less than 44 inches in unobstructed width.



## 3111 DOORS

**3111.1 GENERAL:** All doors serving as required exits shall be substantially constructed, installed and maintained.

Doors serving as required exits shall swing in the direction of exit travel when serving an occupant load of ten or more, except as may be otherwise specified in Part III. No door shall swing over a public right-of-way.

Revolving, folding, sliding and overhead doors shall not be used in any path of egress unless exit doors or required width are installed adjacent thereto.

No required doorway shall be less than 30 inches in width, and no leaf of an exit door shall exceed four feet in width.

Exit doors, equipped with self-closing devices, shall be operative at any point in their swing by not more than 15 pounds of horizontal pressure applied at the outer edge thereof, and such closing device shall operate the door's closing at a rate not to exceed 90 degrees of arc in five seconds.

**3111.2 WIDTHS:** Door jams shall not project into the required width of opening by more than two inches, and a 20-inch doorway width is equal to a 22-inch unit of required exit width as herein set forth.

Doorways shall be as specified in the following table:

Doorway Width		No. Exits	Stair Width
Nominal	Clear	Exit Width	Served by Door
	28''**	1	
36''	34''	1½	36''
44''	40''	2	44''
66''	60''	3	66''
	2-28''s	2	44''
88''	2-40''s	4	88''

\*\*Twenty-eight inches is the minimum allowed for an individual door.

**3111.3 FIRE-RESISTIVE DOORS:** Doors required to be fire resistive and located in required paths of egress shall be self-closing and shall be kept free from obstruction.

**3111.4 HARDWARE:** (a) **PANIC HARDWARE:** Panic hardware shall consist of bars or panels not less than two-thirds across the width of the door and not less than 30 inches, nor more than 44 inches, above the floor.

Exit doors shall be provided with panic hardware when required in Occupancy, Part III, or for smokeproof towers in Section 3104.2, and such hardware shall be operative in the direction of egress with 15 pounds of horizontal pressure.

(b) **OTHER HARDWARE:** Any required exit door shall be unlocked during periods the building is occupied or shall be equipped with panic hardware or locking hardware, operative in the direction of egress, without the use of keys or any special knowledge or skill.

## 3112 EXIT SIGNS AND LIGHTS

Exit signs and lights shall be as set forth in Part III and Subsection 4505.4 herein.

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## Chapter 32 — Elevators and Escalators

### 3201 STANDARDS

### 3202 DEFINITIONS

### 3203 GENERAL

### 3204 ELEVATORS

### 3205 ESCALATORS

### 3206 TRANSPORTING ASSEMBLIES

#### 3201 STANDARDS

**3201.1 SCOPE:** (a) Elevators, dumbwaiters, escalators and transporting assemblies shall be designed and constructed of the material, proportions and strength admitting to rational analysis based on established principles of mechanics and shall be maintained and operated in a manner to insure public safety.

(b) Elevators, dumbwaiters, escalators and transporting assemblies shall comply with the requirements of the standard specified in sub-section 3201.2 except as they may be modified herein.

(c) Elevators and escalators shall also comply with the applicable requirements of the Florida Industrial Commission, wherein such standards are more restrictive than as set forth herein.

**3201.2 STANDARDS:** (a) The "American Standard Safety Code for Elevators, Dumbwaiters and Escalators," "ASA Designation A17.1, together with the supplement thereto designated ASA A17.1a, of the American Standards Association is hereby adopted to supplement, but not supersede, the specific requirements set forth herein and is hereinafter referred to as "The Elevator Safety Code."

(b) The "American Standard Safety Code for Manlifts," ASA A90-1, of the American Standards Association is hereby adopted to supplement, but not supersede, the specific requirements set forth herein.

(c) The Building Official may promulgate and specifically set forth in writing such rules applicable to transporting assemblies as are not inconsistent with the standards of Paragraph (a) and which, in his opinion, are necessary to provide for safety and to protect public welfare.

#### 3202 DEFINITIONS

Definitions of terms shall be as set forth in Chapter 4 or in "The Elevator Safety Code" or as follows:

**ALTERATION:** Shall mean any change to an existing installation other than repair or replacement of worn or broken parts necessary for normal operation.

**TRANSPORTING ASSEMBLIES:** Shall mean any permanent or semi-permanent device, manually or power-operated, other than elevators, dumbwaiters or escalators used for transporting material or persons in any horizontal, inclined or vertical direction, and such assemblies shall include but shall not be confined to the following:

(a) Amusement devices used to convey persons as a form of amusement.

(b) Inclined devices, with or without seats, but not considered as escalators.

(c) Man hoists, stage and orchestra lifts, tiering and piling machines, skip hoists and wharf ramps.

(d) Belt, bucket, scoop, roller or similarly inclined or vertical freight conveyors.

(e) Hoists which are used for handling material during construction of buildings and structures.

### 3203 GENERAL

**3203.1 PERMITS:** (a) For the installation, relocation or alteration of an elevator, escalator or transporting assembly, an application for the proposed work shall be filed with the Building Official, and a permit therefor shall be issued upon approval as specified in Chapter 3 herein, subject to the following:

(1) Servicing and repairs and replacements necessary for normal maintenance, which are made with parts of equivalent materials, strength and design to those replaced shall not require a permit.

(2) Installation or alteration of several amusement devices shall be considered for the purposes of a permit as one installation.

(3) Material hoists for construction operations shall be exempted from the paying of a fee, but such exemption shall not relieve the owners thereof from the provisions herein nor from the responsibility of requesting inspection and securing approval of such device by the Building Official before its use or service.

Nothing in this section shall exempt the above from complying with safety requirements.

(b) Application for permit for elevators, dumbwaiters and escalators shall be accepted only from elevator contractors, currently licensed as such. Application for permits for transporting assemblies shall be accepted only from persons or firms who manufacture, or who are qualified to install, such devices; except that for relatively minor installations not to be permanently incorporated into building structures and not involving the transporting of persons, application may be accepted by the Building Official from currently licensed general contractors. Application for permit shall be accompanied by plans and drawings showing the proposed construction, equipment and mode of operation.

**3203.2 RESPONSIBILITY:** Responsibility for the care, operation and maintenance of elevators, dumbwaiters, escalators, transporting assemblies and amusement devices, shall be as follows:

(1) **EQUIPMENT MANUFACTURER:** The manufacturer of the elevator, dumbwaiter, escalator, transporting assembly or amusement device shall be responsible for the failure of the equipment or any part thereof, until the installation has been approved, but shall not be responsible for the safe operation or proper maintenance of elevators, dumbwaiters and escalators during the time when any limited certificate, as defined in subparagraph 3203.4 (e), (3) shall be in effect. The manufacturer also shall be responsible for all tests of new and altered equipment until the installation has been approved.

(2) **THE OWNER:** The owner or his duly appointed agent shall be responsible for the safe operation and proper maintenance of the elevators, dumbwaiters, escalators, transporting assemblies and amusement devices after the installation has been approved, and also during the period of effectiveness of any limited certificate as defined in subparagraph 3203.4 (e), (3). The owner shall also make and be responsible for all routine tests, which may be required in accordance with sub-section 3203.5.

**3203.3 ACCIDENTS:** The owner or his duly authorized agent shall promptly notify the Building Official of each and every accident involving the equipment wherein any person is injured to the extent of requiring the services of a physician or disability exceeding one day, or damage exceeding one hundred dollars or more has been done to the equipment, and shall afford the Building Official access for inspection of damage or cause of damage and shall prevent the use of such equipment or assembly until its use is approved by the Building Official. The Building Official

will inspect the site of an accident and record in detail all material facts and information available and the cause or causes, insofar as they can be determined, and said site shall be open to public inspection at all reasonable hours. Any damaged construction or operating mechanism shall not be removed from the premises until inspection by the Building Official.

**3203.4 (a) INSPECTION:** The Building Official may accept the inspection of a regular employee of any other legally constituted governmental authority, but such acceptance shall not abridge the duty of the Building Official from requiring that such inspection be made or Certificate posted.

**(b) TESTS AND CERTIFICATES REQUIRED:** Any new, altered or moved elevator, dumbwaiter, escalator, transporting assembly or amusement device shall not be placed in operation until such equipment has been tested, inspected and approved as required by this section and a certificate so stating has been issued as set forth in paragraph 3203.4 (e)

**(c) ELEVATORS, DUMBWAITERS AND ESCALATORS:** The permit holder installing, moving or altering elevators, dumbwaiters or escalators shall notify the Building Official in writing at least three days before completion of the work, and shall, in the presence of the official or his representative, subject the new, moved or altered portions of the equipment to tests required to show that such equipment meets the requirements of this code.

**(d) TRANSPORTING ASSEMBLIES AND AMUSEMENT DEVICES:** The permit holder installing, moving or altering transporting assemblies or amusement devices shall, in the presence of the Building Official or his representative, make such tests as the official may prescribe in order to determine the safety of such equipment.

**(e) CERTIFICATES OF INSPECTION: (1) ISSUING OF CERTIFICATES:** The Building Official or his representative shall file a full report of each and every inspection made, showing the exact condition of the equipment, with a statement of any repairs or replacements required. If this report indicates that the equipment meets the requirements of this Code and is in a safe operating condition, the Building Official will issue a certificate of operation for a load capacity not to exceed that named in the report of inspection. This certificate shall be valid for three months after the date of issue for passenger elevators, six months after the date of inspection for freight elevators, escalators, building hoists and manlifts, and twelve months after date of inspection as to dumbwaiters of either electric or hand powered type, freight elevators of the hand power type or other lifting apparatus, unless subsequent inspections indicate an unsafe condition.

No passenger elevator, freight elevator, dumbwaiter, escalator, building hoist or other lifting apparatus may be operated without this certificate first having been conspicuously posted.

A new certificate shall be issued or an endorsement made on the existing certificate by the Building Official following each inspection period.

**(2) POSTING OF CERTIFICATES:** The required certificate shall be posted in a conspicuous location in the elevator car, and on, near or plainly visible from the dumbwaiter, escalator, amusement device or transporting assembly. The certificate shall be suitably framed with a glass cover.

**(3) LIMITED CERTIFICATES:** The temporary use of any elevator, dumbwaiter or escalator for passenger or freight service may be approved during the installation or alteration, under the authority of a limited certificate, issued for each class of service. Such limited elevator certificates shall not be issued until the elevator shall have been tested under contract load, and the car-

safety and terminal-stopping equipment have been tested to determine the safety of the equipment for construction purposes, and until permanent or temporary guards or enclosures are placed on the car and around the hoistway and at the landing entrances on each floor. Landing-entrance guards shall be provided with locks that can be released from the hoistway side only. Automatic and continuous-pressure elevators shall not be placed in temporary operation from the landing push buttons unless door locking devices and/or interlocks required by the Elevator Safety Code are installed and operative.

(aa) **PERIOD OF USE:** Limited certificates shall be issued for a period not to exceed thirty days.

(bb) **POSTING OF LIMITED CERTIFICATES:** When a limited certificate is issued, a notice bearing the information that the equipment has not been finally approved shall be conspicuously posted on, near, or visible from each entrance to such elevator, dumbwaiter or escalator.

**3203.5 ROUTINE INSPECTIONS, TESTS AND MAINTENANCE:** (a) **ELEVATORS, DUMBWAITERS AND ESCALATORS:** Elevators, dumbwaiters and escalators shall be inspected by the Building Official as provided in paragraph 3203.4 (a) and tested by the owner or his agent in the presence of the Building Official in accordance with the requirements set forth in the Elevator Safety Code.

(b) **AMUSEMENT DEVICES AND SPECIAL EQUIPMENT:** Amusement devices and special equipment shall be tested and inspected on a semi-annual schedule in accordance with such rules and procedures as the Building Official may reasonably request.

**3203.6 EXISTING INSTALLATIONS:** (a) Existing installations of elevators, dumbwaiters, escalators and man hoists, legally installed before the adoption of this code, may be used without being reconstructed to comply with requirements of the Elevator Safety Code as herein adopted except as follows:

(1) Within a period of two years all power attachments on hand power elevators shall be removed.

(2) Within a period of three years all elevators and dumbwaiter hoistway entrance doors or gates shall be made to meet the requirements of the Elevator Safety Code.

(b) Existing installations may be altered to obtain the advantage of any provisions of the Elevator Safety Code, provided the safety requirements covering such provisions are met and permit secured.

**3203.7 REPAIRS AND REPLACEMENTS:** Ordinary repairs and replacements of damaged, broken or worn parts, necessary for normal maintenance, may be made with parts of equivalent material, strength and design, except that replacement of wood overhead beams, guide rails and wood carframes shall be made with metal, meeting the requirements of the Elevator Safety Code. Broken or damaged parts subject to tension, torsion or bending or parts on which the support of the elevator car depends, shall not be repaired by welding.

**3203.8 UNSAFE EQUIPMENT:** Whenever an elevator, dumbwaiter, escalator or transporting assembly is, in the opinion of the Building Official, in an unsafe condition, he shall have the authority to order the discontinuance of use of such assembly until repaired, replaced or tested, or he may order demolition.

### **3204 ELEVATORS**

**3204.1** The enclosure of elevator hoistways shall be as specified in Part III, "Requirements Based on Occupancy," and Part V, "Requirements by Types of Construction."

**3204.2** Guide rails for cars and counterweights shall be of steel.

**3204.3** Not more than two elevators shall be allowed in one shaft, and not less than a two-hour fire-resistive rating shall be required between contiguous shafts.

**3204.4** Elevators shall not be included in the calculation of required stairways.

**3204.5** Every passenger and freight elevator, except elevators having automatic or continuous-pressure operation, shall be operated only by qualified operators. Qualified operators shall conform to the following requirements:

(a) Be at least 18 years of age and physically and mentally capable.

(b) Make written application to the Building Official on forms provided by him for an Operator's Permit for the type of elevator he desires to operate.

(c) Pass an examination to test the applicant's experience and ability to operate an elevator of the type specified.

(d) Pay a fee of one (\$1) dollar for such examination.

Following such examination, the Building Official, at his discretion, shall issue to the applicant an Operator's Permit which shall specify the type or types of elevator the holder thereof is entitled to operate.

No person shall operate an elevator requiring an Operator's Permit if the elevator to be operated is of a type different from that specified on the permit. Permits shall be valid for one year and may be renewed, at the discretion of the Building Official, for a fee of one (\$1) dollar.

### **3205 ESCALATORS**

**3205.1** Escalators shall be enclosed as set forth in Section 3109.

**3205.2** Elevators, dumbwaiters and moving stairways, moved from one shaft or location to another, shall conform to the requirements of the Elevator Safety Code.

### **3206 TRANSPORTING ASSEMBLIES**

**3206.1 TEMPORARY MATERIAL LIFTS:** (a) Temporary material lifts for construction work on multiple-story buildings having a hoistway and platform may be constructed without a permit therefor, but shall not be assembled or constructed without the written approval of the Building Official.

(b) All temporary material lifts for the work of construction shall be as set forth in this chapter and in Chapter 33, "Precautions During Building Operations."

(c) Service and inspection shall be each three months, as for elevators.

**3206.2 AMUSEMENT DEVICES:** Amusement devices shall not be placed in operation until the design, materials of construction and operation are approved by the Building Official in accordance with such regulations or requirements as he may deem necessary in the interest of public safety.

Amusement devices shall be equipped with safety clutches. The cars or receptacles which persons are permitted to occupy shall have handrails of sufficient number and height, or other



approved appliances or safeguards, to prevent persons from being thrown therefrom or from coming in contact with structural members.

**3206.3 OTHER DEVICES:** Other devices shall be serviced and inspected not less frequently than annually, or at such periods as may be required by the Building Official.



## **Chapter 33 — Precautions During Building Operations**

- 3301 GENERAL**
- 3302 DEMOLITION**
- 3303 EXCAVATION**
- 3304 SIDEWALK SHEDS AND FENCES**
- 3305 STORAGE OF MATERIAL**
- 3306 HOISTING MACHINERY**
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- 3308 CABLES, ROPES, CHAINS AND BLOCKS**
- 3309 PLATFORM HOISTS**
- 3310 HOIST TOWERS**
- 3311 TEMPORARY FLOORING**
- 3312 FLOOR COVERINGS**
- 3313 RUNWAYS AND RAMPS**
- 3314 TEMPORARY STAIRS**
- 3315 LADDERS**
- 3316 SCAFFOLDS**
- 3317 GUARD RAILS AND TOE BOARDS**
- 3318 TEMPORARY LIGHT AND POWER**
- 3319 FIRST AID**
- 3320 SANITATION**
- 3321 WELDING AND CUTTING**
- 3322 OPEN FIRES**
- 3323 FIRE PROTECTION**
- 3324 SPECIAL HURRICANE PRECAUTIONS**

### **3301 GENERAL**

The provisions of this Chapter shall apply to all work in connection with the erection, alteration, repair, removal or demolition of buildings and structures.

The construction, erection, alteration and removal of scaffolds and the application, installation and setting up of safeguards and equipment devices shall be done by skilled workmen under the supervision of a person qualified by experience or training for such work.

A safeguard, device or piece of equipment which is unsafe shall be reported to the superintendent or foreman, who shall take immediate steps to remedy such condition or remove such safeguard, device or equipment.

Scaffolds, ladders, stairs, fuel gas tanks and other devices or equipment regulated by this chapter shall be maintained in a good, safe and usable condition as long as in use.

No ladders, scaffold, railing or other devices or equipment required or regulated by this chapter, or any part thereof, shall be removed, altered or weakened when required by the work, unless so ordered by the superintendent or foreman in charge.

Scaffolds, temporary floors, ramps, stairway landings, stair

treads, and all other walkway surfaces shall be kept free from protruding nails and splinters. They shall be kept free from unnecessary obstructions so that the workers may move about safely.

Protruding nails and tie wire ends shall be removed, hammered in or bent over in a safe condition.

Electric lines, moving ropes and cable gears, or similar hazards with which a worker might come in contact, shall be encased or guarded.

Prior to making an excavation, drilling or otherwise disturbing the ground, the person doing the work, or causing such work to be done, shall contact all public-utility organizations to determine the possible location of underground facilities, to avoid the hazard to public safety, health and welfare caused by the inadvertent disruption of such facilities.

No person, firm or corporation, either personally or through an employee or agent of another, shall operate or move any machinery, equipment, material, scaffolds or assembly-to-be closer than six feet to any energized high-voltage overhead electrical facilities except with the approval of the electrical inspector.

### **3302 DEMOLITION**

Before commencing the work of demolition of a building or structure, all gas, electric, water and other meters shall be removed and the supply lines disconnected, except such as are especially provided or required for use in connection with the work of demolition.

Glazed sashes and glazed doors shall be removed before the start of demolition operations.

No wall, chimney or other construction shall be allowed to fall in mass, except under competent supervision. Scaffolds or stagings shall be erected for workers if falls or other elements of the structure are too thin or too weak to work on. Heavy structural members, such as beams or columns, shall be carefully lowered and not allowed to fall freely.

Chutes for the removal of materials and debris shall be provided in all parts of demolition operations which are more than 20 feet above the point from which material is to be removed.

Chutes shall be completely enclosed and shall be equipped, at intervals of 25 feet or less, with substantial stops to prevent descending material from attaining dangerous speeds.

The bottom of each chute shall be equipped with an adjustable gate or stop for regulating the flow of materials; a danger sign shall be placed at the discharge end of every chute; and except for the discharge of materials, the gate or stop shall be kept closed.

Proper tools shall be provided and kept available to loosen material or debris jammed in the chute.

Chutes, floors, stairways and other places shall be effectively wet down, at frequent intervals, when the dust from such operations would cause a menace or hardship to adjoining buildings or premises.

Stairs and stair railings shall be kept in place and in useable condition as long as is practicable, and steps and landings shall be kept free from debris.

Floor openings, unless covered or otherwise protected, shall be provided with guard rails and toe boards, as specified in Section 3317.

All areas of danger in demolition operations shall be properly enclosed and danger signs posted. Sufficient watchmen shall be provided to warn workers of impending dangers, and all unauthorized persons shall be excluded from places where demolition is in progress.

### 3303 EXCAVATION

The sides of every excavation in connection with building operations, including trenches for pipes or any other purposes, shall be sheet-piled, braced or shored when necessary to prevent the soil from caving in on persons engaged in work within such excavation.

Where workers are employed adjacent to an excavation on work other than that directly connected with the excavation, substantial railings or fences shall be provided to prevent such workers from falling into the excavation.

Every trench, five feet or more in depth, shall have suitable means of exit or escape at least every 25 feet of its length.

### 3304 SIDEWALK SHEDS AND FENCES

**3304.1 SIDEWALK SHEDS:** Where buildings, which exceed 45 feet in height, are to be erected or demolished closer than ten feet, or buildings which exceed 25 feet in height are to be erected or demolished closer than five feet, to a street line, there shall be erected and maintained, during such work adjacent to the street line, a shed of sufficient strength and stability to sustain safely the weight of materials that may be placed thereon, and to withstand the shocks incident to the handling of such materials or their preparation for use, and accidental jars from trucks passing or delivering materials.

When the roof of such shed is used for the storage of materials or for the performance of work of any kind, substantial railings not less than three feet high and solid toe boards not less than six inches high shall be placed along the open sides and ends of such roof.

Such sheds shall be constructed to afford unobstructed walkways, not less than eight feet high and five feet wide. The street side shall be kept open for a height of not less than seven feet above the curb, and the sheds shall be properly lighted at night with not less than one 100-watt bulb every 20 feet of its length and at each change of grade or elevation of the sidewalk surface.

Such shed shall remain in place until the building is enclosed, or if being demolished, until the building is reduced to 20 feet in height.

**3304.2 CONSTRUCTION FENCES:** Buildings which are erected or demolished closer than five feet to a street line and which are not required to have a sidewalk shed shall be provided with protection on the street sides in the form of a substantial fence not less than eight feet high. Such fence shall not restrict the sidewalk to less than five feet in width and shall be built solid for its full length, except for such openings as may be necessary for a proper execution of the work.

**EXCEPTIONS:** The Building Official may waive, or may vary, any or all of the provisions of Section 3304 where the safety of the public may otherwise be protected.

### 3305 STORAGE OF MATERIAL

Materials to be stored at or near locations where workers are employed or on any public property shall be piled or stacked in an orderly manner to avoid toppling over or being otherwise displaced.

No materials shall be piled or stacked to a greater height than six feet, except in yards or sheds intended especially for storage. When piles exceed four feet in height, the material shall be so placed that the sides and ends of the piles taper back.

The placing of construction materials in a building or structure during building operations shall be done with due consideration of the effect of such loads on the structural members, and such loads shall, in general, be placed as near to the points of support of the structural members as possible. Such loading shall not cause stresses in any structural member beyond the design stresses.

Waste material rubbish resulting from building operations shall be removed as rapidly as possible and shall not be allowed to accumulate on the premises or adjacent thereto.

### **3306 HOISTING MACHINERY**

Every hoisting engine shall be provided with adequate brakes, capable of holding the maximum load at any point of travel.

Guards shall be provided for exposed gears and other moving parts and around hoisting cables at all points to prevent workers from tripping or getting clothing caught.

Ample room shall be provided around hoisting engines, motors or other machinery or apparatus for the free and safe movement of those who operate or otherwise attend such engines, motors or other machinery apparatus.

Hoisting machinery shall be enclosed to exclude unauthorized persons, and if placed outside the building, further protection against falling objects shall be provided.

When hoisting machinery is set on an elevated platform, such platform shall be of substantial construction, and guard rails and toe boards shall be provided along all open sides of such platform.

Electrical machinery and equipment to be used in connection with building construction shall be installed as specified in Part XI.

Steam boilers used in connection with building construction shall be installed, equipped and maintained as specified in Section 4007 herein, and operators in charge of such boilers shall be acceptable to the Building Official.

### **3307 DERRICKS AND CRANES**

Derricks shall be so designed and assembled that no part shall be stressed beyond the safe-working stress for the material, as specified in this Code, under its maximum-rated load in any possible position. Such maximum-rated load shall be conspicuously posted on each derrick.

The foot-block of every derrick shall be firmly secured against motion in any direction.

Guy derricks shall have the top of the mast held by not less than six steel guy cables secured by firm anchorages and so placed that the angle of the guy with the mast shall be as large as possible.

The moving parts of derricks and cranes shall be kept well lubricated, and all parts shall be inspected at least every other day.

### **3308 CABLES, ROPES, CHAINS AND BLOCKS**

Cables, ropes, chains and blocks shall be of such size that the maximum load supported by them will not exceed one sixth of their breaking strength.

Blocks designed for use with manila ropes shall not be used for steel cables. Blocks used at or near floors or in other exposed places to change the direction of cables shall be enclosed or otherwise effectively guarded.

All ropes and cables used in connection with scaffolds, derricks, and hoisting apparatus shall be tested before being put to use and at least once every 30 days while in use, to insure their safety and suitability for the purpose to which they are to be put. Any rope or cable found to be unsafe or unfit shall not be used.

Chains shall not be used for slings, bridles or other similar purposes, but shall be restricted to only such purposes as require a straight pull.

Hooks shall not be used for hoisting buckets, cages or skips.



### 3309 PLATFORM HOISTS

No person shall be permitted to ride on any platform hoist unless it has been designed and constructed for passenger service, as specified in Chapter 32. Elevators used for the transportation of workers during construction shall comply with the requirements of Chapter 32.

Platform hoists for the handling of materials within buildings under construction shall have the car substantially constructed and provided with covers, either solid or wire mesh. Sections of the cover may be arranged to swing upward for the handling of bulky materials, or the covers may be omitted if suitable overhead protection is provided.

Hoists shall be equipped with a broken-rope safety device.

Where wheelbarrows or buggies are used for handling material on platform hoists, cleats shall be nailed to the platform to fix the proper position so that handles shall not project beyond platform edges.

Supports for the overhead sheave shall be designed to carry, within the allowable stresses, as specified in this Code, two times the weight of the hoist and its maximum load.

### 3310 HOIST TOWERS

Hoist towers, erected in connection with building construction shall be substantially constructed, and all members shall be so proportioned that the stresses shall not exceed those specified for that material, when carrying the dead load of the tower plus two times the weight of the platform or bucket or its maximum load.

Every hoist tower shall rest on a sufficiently solid foundation to prevent injurious settlement or distortion of its framework.

Every hoist tower shall be secured in not less than four directions against swaying or tipping, at intervals of not more than 32 feet in its height, by steel cable guys adequately anchored or by other satisfactory means. Such towers which are constructed adjacent to buildings shall be secured to the building frame at each floor as the building progresses.

Landing platforms in hoist towers or platforms connecting a hoist tower to a building or other structure shall be provided with guard rails and toe boards.

The bottom of every hoist tower shall be screened or otherwise protected on all sides to a height of not less than six feet.

Hoist towers erected within the building, but not occupying the entire opening through which they pass, shall be completely enclosed on all sides and shall be provided with doors at the unloading points unless the platform hoist is solidly enclosed on all sides to the height to which material is to be loaded or unloaded.

### 3311 TEMPORARY FLOORING

In buildings of skeleton construction, the permanent floor, except for necessary hoistway openings, shall, when possible, be constructed as the building progresses. There shall be not more than three unfilled floors above the highest permanent floor.

In buildings of skeleton construction, the entire working floor shall be planked over, except spaces required for construction work, for raising or lowering materials, and for stairways or ladders. Planks shall be placed so that they cannot tip under the weight of a worker at any point and secured so that they cannot slip out of place.

In buildings of wood joist construction, the underfloor shall be laid for each floor as the building progresses.

### **3312 FLOOR OPENINGS**

All floor openings, used as hoistways or elevator shaftways, shall be guarded on all sides, except the side being used for loading or unloading. Guards shall be barricades not less than four feet high along or near the edges of such openings, or guard rails not less than three feet high, placed not less than two feet distant at all points from the edges of such openings. If guard rails are used, toe boards shall be provided along the edges of the openings. Sides left open for loading or unloading shall be guarded by similar solid doors or gates.

All floor openings used as stairways, or for the accommodations of ladderstor runways, shall be guarded by railings and toe boards.

All other floor openings shall be guarded on all sides by solid barriers not less than three feet high, or by railings and toe boards or shall be planked over or otherwise covered over by temporary construction capable of sustaining safely such loads as are likely to come thereon.

Barriers for the guarding of openings used as hoistways or for elevators shall be constructed so that workers cannot thrust head, arms or legs through them, and loose material cannot fall or be pushed into the shaftway.

Barriers and guard rails around floor openings shall remain in place until permanent enclosures or protection are otherwise provided.

### **3313 RUNWAYS AND RAMPS**

Runways and ramps in connection with scaffolds or extending from story to story or otherwise located and maintained for an extended period of time or for the transfer of bulky material shall be constructed of at least three 10-inch planks laid closely side by side and substantially supported and braced to prevent unequal deflection and springing action.

Runways and ramps shall have a slope not steeper than one in three, and the total rise of a runway or ramp between landings shall not exceed 12 feet.

When the rise is steeper than one in six, or when the rise is more than six feet and steeper than one in eight, runways or ramps shall be provided with cleats spaced not more than eight inches apart.

Runways and ramps, having a total rise of more than six feet, or passing over or near floor openings, high-tension wires or other dangerous places, shall be provided with guard rails and toe boards.

### **3314 TEMPORARY STAIRWAYS**

In all buildings, the permanent stairways shall be installed as soon as conditions will permit. When the work on a building has progressed to a height in excess of 60 feet and it has not been practicable to install the permanent stairways, at least one temporary stairway shall be provided for the full height and continued upward as rapidly as the work progresses.

Stairs and stairways shall be of sufficient strength to support a load of at least 100 pounds per square foot, and all stairways shall be guarded on all open sides with hand rails and toe boards.

Temporary stairs shall be constructed so that treads and risers are uniform in width and height in any one flight. The sum of the height of the two risers and the width of one tread shall be not less than 24 nor more than 26 inches. Temporary stairways shall be not less than 36 inches wide. Landings shall be not less than 30 inches long.

No flight of stairs of a temporary stairway shall have a vertical rise in excess of 12 feet, and, when necessary, immediate landings shall be provided.

Temporary and permanent stairways shall be adequately lighted as set forth in Section 3318.

No door shall open directly onto a flight of stairs, but a landing equal to at least the width of the door shall be provided between the door and the stairs. Temporary doors higher than four feet and six inches shall be fitted with wire glass panels.

Permanent stairs that are to be used during construction and on which treads are to be filled in later shall have wooden treads firmly fitted in place for the full area of the tread. The top surfaces of the temporary treads shall be maintained above the tops of the risers or nosings.

The storage of materials on stairs or in stairways or adjacent to stair openings shall not be permitted.

### 3315 LADDERS

Except where either permanent or temporary stairways or runways are required, ladders shall be provided to give access to all floors, stagings or platforms where work is being done more than five stories above ground or above a permanent or temporary floor.

Ladders required by this Code shall be left in place until the permanent stairways are ready for use or until temporary stairways are installed, and stairways shall be erected as soon as the building exceeds 60 feet in height.

All fixed ladders shall be substantial in construction and shall conform to the Florida Industrial Commission regulations for "Portable and Fixed Ladders" (LAD-1959 amended 1960) adopted July 14, 1959 and amended November 1, 1960.

All ladders, when in use, shall be set up in a manner to be secure and to prevent slipping; and ladders, except stepladders or other self-supporting ladders, shall be securely fastened to a permanent support at the top, and if necessary, at the bottom, and braced to prevent swaying, bending or shaking.

Ladders, leading to floors, stagings or platforms, shall extend at least three feet above the level of such floors, stagings or platforms.

No single ladder shall exceed 20 feet in length. When greater heights are to be reached, intermediate platforms shall be erected. Ladder landings shall be at least four feet square and equipped with handrails and toe boards.

Ladder rungs shall be spaced uniformly and as near to 12 inches as is practicable.

When used temporarily, in place of stairways or runways, ladders serving traffic in both directions simultaneously shall be at least 40 inches wide. If separate ladders are provided for going up and coming down, they shall be marked "UP" and "DOWN" respectively at each floor and platform level.

Ladders, other than sectional or extension ladders, shall not be extended by joining two or more together.

Ladders shall not be placed or used in shafts of operative elevators or hoists except by workers engaged in the erection, construction, alteration or repair of any such shafts, hoistways or equipment.

Ladders shall not be painted, but may be oiled or otherwise treated with preservative so as to permit the detection of faults. Every ladder shall be inspected by the superintendent or foreman in charge before being put to use on a building operation and thereafter at least once every 30 days while continued in use.

Broken or weak ladders, or ladders with weak or missing rungs, shall not be used or permitted to remain on the site of building operations, but shall be repaired and made safe or destroyed.

### 3316 SCAFFOLDS

Properly constructed scaffolds shall be provided for all work which cannot be done safely by workmen standing on permanent or solid construction, except when such work can be done safely from ladders. All such scaffolds shall be substantially constructed, to support at least four times the maximum load, and shall be secured to prevent swaying.

Planks used in the construction of stationary scaffolds shall be not less than two inches nominal thickness. Where such planks overlap at the ends, the overlap shall be not less than six inches. Planks shall be so placed that they cannot tip under the weight of the worker at any point. Nails used in the construction of scaffolds shall be of ample size and length to carry the loads they are intended to support, and all nails shall be driven full length. No nails shall be subject to direct pull.

Ropes, cables and blocks used in the support of swinging scaffolds shall be of sufficient size and strength to sustain at least six times the maximum loads to which they will be subjected. Where acids are likely to come into contact with them, ropes shall not be used in the support of scaffolds, but steel cables properly protected by grease or oil or other effective method shall be used instead.

Every scaffold, the platform level of which is more than six feet above the ground or above a permanent or temporary floor, other than iron workers' scaffolds and carpenters' bracket scaffolds, shall be provided with guard rails and toe boards extending the full length of the scaffold and along the ends except where ramps or runways connect with them, unless otherwise enclosed or guarded. On suspended, swinging and pole scaffolds, the space between guard rails and toe boards shall be fitted with wire mesh screens securely attached.

Where objects are likely to fall on a scaffold from above, a substantial overhead protection shall be provided; not more than ten feet above the scaffold platform, and at doorways, passageways or other points where workers must pass under scaffolds, a substantial overhead protection shall be provided. No materials or equipment, other than required by the workers, shall be placed on scaffold platforms.

Roof brackets, roof scantling, crawling boards and similar forms of support shall be substantial in construction and securely fastened in place when in use.

Barrels, boxes or other similar unstable objects shall not be used as supports for planking intended as scaffolds or places of work.

When used over public sidewalks or other places of public use, scaffolds used for minor building repairs, alterations, or painting, shall be equipped with drop cloths to effectively prevent the falling of paint or debris.

Scaffolds used for sandblasting and guniting operations shall be entirely and effectively enclosed, and the determination of effective enclosure shall be the complete absence of particles of material of operation in the air at a horizontal distance of 50 feet from the point of operation.

### **3317 GUARD RAILS AND TOE BOARDS**

**3317.1 GUARD RAILS:** Guard rails, when required in this chapter, shall have the top rail not less than 36 inches high above the platform level, and an intermediate rail shall be provided between the top rail and the platform. All guard rails shall have adequate supports not more than eight feet apart. Every guard rail shall be constructed to withstand a horizontal force of 20 pounds per foot.

**3317.2 TOE BOARDS:** Toe boards, when required, shall be solid to full height, shall extend not less than six inches above the platform level and shall be placed to fit close to the edges of the platform. They shall be adequately supported, secured and braced along the entire length to resist the impact of workers' feet and the shifting of materials. Toe boards of wood shall be not less than one-inch nominal thickness with supports not more than four feet apart, and toe boards of metal shall be not less than one-eighth inch thick, with supports not more than four feet apart.

### **3318 TEMPORARY LIGHT AND POWER**

All parts of buildings under construction, or other operations covered by the general provision of this chapter, and all sheds, scaffolds, covered walks, other work or storage areas, and equipment in connection with such operations shall have sufficient light to insure safety and protection of life and property. In passageways, stairways and corridors, the average light intensity measured at the floor level shall be not less than two foot candles.

At locations where tools and/or machinery are used, the averaged light intensity measured at the floor level shall be not less than five foot candles. Natural or artificial illumination shall be provided in such a manner that glare and shadows will not adversely affect the safety and protection of workers and property.

Temporary wiring for light, heat and/or power shall be adequately protected against mechanical or overcurrent failures. All conductive materials enclosing fixed or portable electric equipment, or forming a part of such equipment, shall be grounded by one or more of the methods permitted by this Code.

Temporary electric service poles shall be self-supporting or adequately braced or guyed at all times.

### **3319 FIRST AID**

On every building operation, arrangements shall be made for prompt medical attention in case of accident, and an ample supply of iodine or mercurochrome and aseptic-gauze bandages shall be provided and maintained in a clean, sanitary cabinet, at all times available under the direction of the superintendent or a person designated by him. Unless competent medical attention is otherwise quickly available, where more than 200 workers are employed, a properly equipped first-aid room or field hospital shall be provided, and a physician or competent nurse shall be in constant attendance.

### **3320 SANITATION**

Adequate toilet facilities, maintained in a clean, sanitary condition, shall be provided as set forth in Sub-section 4603.20 herein.

An adequate supply of pure, cool drinking water shall be provided for workers during hours of employment, and adequate, sanitary washing facilities shall be provided for workers within reasonable access.

### **3321 WELDING AND CUTTING**

Gas welding and cutting and arc welding in building construction and demolition operations shall be restricted to experienced workers acceptable to the Building Official. Suitable goggles or helmets and gloves shall be provided for and worn by workers engaged in gas welding or cutting or arc welding.

Incombustible shields shall be provided to protect the worker when exposed to falling hot metal or oxide.

Unless unavoidable, gas welding or cutting or arc welding shall not be done above other workers. When unavoidable, an incombustible shield shall be provided between the work and the workers below or a watchman shall be stationed to give warning at places where workers, in the course of their employment are likely to pass under a gas welding or cutting or an arc welding operation.

Unless unavoidable, gas welding or cutting shall not be carried on in any place where ample ventilation is not provided, or from which quick escape is difficult. When unavoidable, workers engaged in such work in confined spaces shall be allowed frequent access to fresh air and a relief worker shall be stationed close at hand to assist the worker in case of accident and to shut off the gases.

Tanks of fuel gas shall not be moved or allowed to stand for any extended period when not in use unless the caps of such tanks are in place. Suitable cradles shall be used for lifting or lowering oxygen or fuel tanks, to reduce to a minimum the possibility of dropping tanks. Ordinary rope slings shall not be used.

Tanks supplying gases for welding or cutting shall be located at no greater distance from the work than is necessary for safety. Such tanks shall be securely fastened in place and in an upright position. They shall be stored, or set in place for use, so that they are not exposed to the direct rays of the sun or to high temperature.

Before steel beams or other structural shapes or elements of construction are cut by means of a gas flame, they shall be secured by cables or chains to prevent dropping or swinging.

### **3322 OPEN FIRES**

Open fires, for the purpose of disposing of waste materials, the heating of roofing or other materials, or for any other purpose whatsoever, shall not be allowed except with the permission of the Chief of the Fire Department.

Wherever any enclosed flame heaters or open flames are used, there shall be a workman in constant attendance, whose duty it shall be to have such heater or fire under proper control at all times.

### **3323 FIRE PROTECTION**

Storage of combustible material shall not be permitted under or near welding operations. No part of the building shall be used for the storage of combustible materials until such fireproofing of that part has been installed.

In every building of reinforced concrete construction, forms of combustible materials shall be stripped from the concrete and removed from the building as soon as practicable. No part of the building shall be used for the storage of combustible materials until such forms have been removed in that part of the building.

In all buildings in which stand pipes are required, such stand pipes shall be installed as the construction progresses, and installations shall be in such a manner that they are always ready for Fire Department use, to the topmost constructed floor. Such stand pipes shall be provided with a Fire Department connection on the outside of the building at the street level and with one outlet at each floor.



In every building operation wherever a tool house, storeroom or other shanty is placed, or a room or space is used for storage, dressing room or workshop, at least one approved handpump, tank or portable chemical extinguisher shall be provided and maintained in an accessible location.

During building operations, free access from the street to fire hydrants and to outside connections for stand pipes, sprinklers or other fire-extinguishing equipment, whether permanent or temporary, shall be provided and maintained at all times.

No material or construction equipment shall be placed within ten feet of such hydrant or connection, nor between it and the central line of the street.

### **3324 SPECIAL HURRICANE PRECAUTIONS**

During such periods of time as are designated by the United States Weather Bureau as being a hurricane warning or alert, all construction materials or equipment shall be secured against displacement by wind forces; provided that where a full complement of personnel is employed or otherwise in attendance, or engaged for such protection purposes, normal construction procedures or uses of materials or equipment may continue allowing such reasonable time as may be necessary to secure such materials or equipment before winds of hurricane force are anticipated. Construction materials and equipment shall be secured by guying and shoring, by tying down loose materials, equipment and construction sheds.

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## **Chapter 34 – Roof Coverings**

- 3401 GENERAL**
- 3402 BUILT-UP FELTS AND GRAVEL**
- 3403 MEMBRANE BASE FLASHINGS**
- 3404 ROOF TILE**
- 3405 ASBESTOS-CEMENT SHINGLES**
- 3406 SLATE AND ASPHALT SHINGLES**
- 3407 METAL SHINGLES**
- 3408 WOOD SHINGLES**
- 3409 ROOF INSULATION**
- 3410 METAL ACCESSORIES**

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### **3401 GENERAL**

**3401.1 PERMITS:** (a) A permit shall be required for the erection, construction, fabrication, application, or repair of any roof covering as set forth in Chapter 3 herein.

(b) Application for permit will be accepted from only roofing contractors or general contractors, currently licensed in their respective classifications, except that application for permit will be accepted from a qualified owner for work on his own residence.

**3401.2 INSPECTIONS:** (a) The Building Official, upon notification from the permit holder, shall make a roofing inspection and shall either approve that portion of the work completed or order correction for compliance.

(b) On new roof construction, where the sheathing is exposed from below and for architectural appearance, the roofing nails are not driven through the sheathing; the permit holder shall notify the Building Official eight hours before the time that tin capping will be nearly completed, so that inspection may be made before the roof is mopped or covered.

(c) On replacement of roof coverings on existing buildings, the permit holder shall notify the Building Official eight hours before the time that tin capping will be nearly complete, so that inspection may be made before the roof is mopped or covered.

(d) On tile roofs, in addition to other inspections, the permit holder shall notify the Building Official eight hours before the time that tile laying will be nearly completed, so that inspection may be made during the process of laying the tile.

#### **3401.3 FIRE-RETARDANT ROOF COVERINGS REQUIRED:**

(a) Roof coverings for all buildings of Type I or Type II construction and all buildings of other than Group I Occupancy shall be fire-retardant. A fire-retardant roof covering shall be any roof or any roof covering which meets the requirements of anyone of the following or shall be any roof assembly bearing the label of the Underwriters' Laboratories, Inc. for Class A or B roofing.

(1) Any built-up composition roofing consisting of materials whose fire-retardant values as set forth in Table 34-A equal not less than 15 points including a top covering selected from parts (b), (c) and (d) of said Table.

(2) Hydraulic compressed rigid shingles not less than one-eighth inch thick, composed of Portland cement and asbestos fibres, laid over a layer of saturated felt weighing not less than 30 pounds to 100 square feet, or hydraulic compressed rigid sheets not less than seven thirty-seconds inch thick and as set forth in Sub-section 3507.7.

(3) Asphalt-saturated mineral-surfaced prepared composition shingles laid so there are not less than two thicknesses at any point. The combined weight of such shingles shall be not less than 200 pounds to 100 square feet.

(4) Concrete slab constructed as specified in Chapter 25 without additional roof covering.

(5) Steel roof covering as set forth in Section 2809.

(6) Aluminum roof covering as set forth in Chapter 30.

(7) Concrete or clay roof tile.

(8) Glass fibred felts may be substituted for the inorganic felts set forth in Table 34-A subject to interpretation by the Building Official of the results of tests on such glass fibre felts.

(b) Fire-retardant roofs shall comply with all other requirements of this Chapter.

**3401.4 MATERIALS:** Roofing materials applied to solid decks shall be as set forth in this Chapter and roof decks or sheets designed to be self-supporting between structural members and to provide protection from rain or sun shall be designed and constructed as followst

(a) **STEEL:** Steel decking and roofing shall comply with Section 2809 herein.

(b) **ALUMINUM:** Aluminum roof sheeting shall comply with Chapter 30 herein.

(c) **PLASTICS:** Plastics used for roofs shall comply with Section 3505 herein.

(d) **ASBESTOS CEMENT:** Corrugated asbestos-cement sheets used for roof coverings shall comply with Section 3506 herein.

**3401.5 EXISTING ROOFS:** (a) Not more than 25 percent of the roof covering of any building or structure shall be replaced in any 12-month period unless the entire roof covering is made to conform to the requirements of this Code.

**TABLE 34-A—FIRE-RETARDANT VALUES OF ROOFING MATERIALS**

	SHIPPING WEIGHT (Pounds)	TYPES OF MATERIALS	Min. Wt. Per 100 Sq. Ft. of Roof Area (Pounds)	Fire Retardant Value
(a) Base Sheets	15	Asphalt-Saturated Felt .....	14	3
	30	Asphalt-Saturated Felt .....	28	6
	20	Asphalt-Saturated and Coated Dampcourse .....	18	4
	40	Asphalt-Smooth Surfaced Roofing .....	37	6
	15	Asphalt-Saturated Asbestos Felt .....	14	5
	20	Asphalt-Saturated Asbestos Felt .....	18	5
(b) Base or Cap Sheets	45	Asphalt-Saturated Asbestos Felt (Black Top) .....	41	9
	55	Asphalt-Saturated Asbestos Felt (Black Top) .....	50	10
	15	Asphalt-Saturated Asbestos Felt (minimum 2 layers) .....	28	10
(c) Cap Sheets Only	55	Mineral-Surfaced Split Sheets (minimum 2 layers) .....	106	12
	90	Mineral-Surfaced Asphalt Cap Sheet .....	83	10
	75	Smooth-Surfaced Cap Sheet .....	68	9
	65	Smooth-Surfaced Cap Sheet .....	60	7
	55	Smooth-Surfaced Cap Sheet .....	50	6
	39	Asphalt-Saturated Asbestos Roofing (White top) .....	37	9
	55	Asphalt-Saturated Asbestos Roofing (White top) .....	52	10
(d) Gravel and Tile		Gravel, 1/4" to 1/2" in size .....	400	6
		Concrete or clay tile .....	300	4

(b) Roofing felts, roll-slate roofing, asbestos-cement shingles and slate or composition shingles shall not be applied over existing roofs where the roof sheathing will not permit suitable grip for nailing; where old roofing is water-soaked or deteriorated so that suitable bond for additional plies is not possible or where the existing roof surface is of corrugated or standing-seam metal. Such additional materials may be applied over existing roofs only when the following conditions are satisfied:

(1) Where water blisters or air blisters exist in old roofing, blisters shall be removed and remopped before applying additional roofing.

(2) Where the existing roofing surface is gravel, existing gravel shall be completely removed before applying additional roofing.

(3) Where the existing roofing is on spaced sheathing, shingles shall be removed and the roof shall be solid sheathed, with tongue-and-groove sheathing, and filler strips between spaced sheathing shall not be permitted.

(4) Under no circumstances shall roofing felts, roll-slate roofing or shingles be applied over existing shingles or any other surfaces more uneven than solid wood sheathing. Asphalt shingles or 90# roll roofing may be applied over existing asphalt shingles having not more than one-eighth inch difference in level.

(c) Additional layers of roofing felt and other materials may be applied over existing roofs as follows:

(1) Unless it can be shown, to the satisfaction of the Building Official, that the existing roofing is sufficiently anchored, the entire roof shall be tin capped at 12-inch centers before additional layers of roofing are applied.

(2) If two or more layers of 15-pound felt or 30-pound felt are applied over an existing roof on a concrete, gypsum or steel deck, all layers of additional felt shall be solidly mopped to the existing roof.

(3) Tile shall not be applied over an existing roof where the added weight may increase stresses in the supporting structure to be greater than the allowable stresses set forth in this Code.

### **3402 BUILT-UP FELTS AND GRAVEL**

#### **3402.1 GENERAL: (a) PREPARATION OF SURFACE:**

Before starting the application of all roofing membranes, all roof decks shall be broom-cleaned; parapet walls, vertical walls, penthouses and similar structures above the roof level shall have been completed; and all flat roof decks shall have been provided with a cant-strip where the roof deck joins a vertical surface. Cant-strips shall be of nailable material and shall extend at least four inches up the vertical surfaces. Wood roof decks shall be solidly sheathed. Concrete roof decks shall be smooth and free from laitance. Portland cement roof decks shall be thoroughly dry and gypsum decks shall be surface dry, before starting application of roofing. All eave facias shall be completed before starting application of roofing.

On all non-wood decks a 2 x 4 or a 2 x 6 of treated wood sub-fascia shall be required to attach metal gravel stop and/or gutter. Minimum anchorage of sub-fascia to be 1/2 diameter steel galvanized bolt 4' on center.

(b) **MATERIALS:** Mineral-surfaced cap sheets, asphalt shingles, and smooth-surface cap sheets shall bear the label of the Underwriters' Laboratories, Inc., for Class A, B, or C roofing. All materials shall be delivered in original packages bearing the manufacturer's label.

(c) **ANCHORING:** Roofing felts, sheets, plies and shingles shall be attached to the roof deck by mopping or mechanical fastening as set forth herein. Attachment to the deck shall provide resistance of not less than 80 pounds per square foot.

(d) **NAILING:** (1) Nails securing roofing to nominal one-inch lumber or to plywood  $\frac{3}{4}$ -inch or more in thickness shall be untumbled hot-dipped galvanized wire nails or ring-shanked nails having not less than 20 rings per inch, not smaller than 12 gage, not less than one inch in length and with heads not less than  $\frac{3}{8}$ -inch diameter.

(2) Nails securing roofing to plywood less than  $\frac{3}{4}$ -inch in thickness shall be 12 gage wire ring-shanked nails having not less than 20 rings per inch and of not less length than will penetrate the plywood plus  $\frac{3}{16}$ -inch and with heads not less than  $\frac{3}{8}$ -inch diameter.

(3) Nails in gypsum concrete or other nailable concrete shall be hot-dipped galvanized nails not less than one and three-fourths inches in length.

(4) Nails securing shingles over felts may substitute in quantity for the number of nails required for the attachment of the felts.

(5) Nails securing felts shall be applied through tin caps not less than 1 and  $\frac{5}{8}$ -inch nor more than 2-inch diameter not less in thickness than 32 gage sheet metal.

(6) The spacing of nails along the lap of sheets and both ways in the field between laps shall not exceed the following, based on height above grades

<b>HEIGHT ABOVE GRADE</b>	<b>CENTER-TO-CENTER SPACING</b>
0' to 20'	12''
20' to 30'	11''
30' to 50'	10''
50' to 80'	9''
Over 80'	6''

(7) **EXCEPTION:** Other mechanical methods or devices for attaching the anchor sheet or sheets to the decking may be approved provided such fastenings are spaced not to exceed 12 inches on centers and provided it can be demonstrated that the attachment is capable of resisting not less than 80 pounds per square foot pull-out at the roof deck nor less than 88 pounds per square foot pull-through of the anchor sheet, with proportionate increase for heights exceeding 20 feet above grade.

(8) **EXCEPTIONS** Where the underside of sheathing is to be exposed, mechanical attachment shall be:

(aa) 1-1/4 inch long, untumbled, hot-dipped galvanized-wire nails or 1-1/4 inch ring-shanked nails 12 inches on center driven through tin caps along the rafters and with ring-shanked nails that do not penetrate the sheathing spaced as set forth in Sub-paragraph 3401.3(d) (6) in the field between rafters, or

(bb) The rafters nailing may be omitted and ring-shanked nails that do not penetrate the sheathing spaced to provide twice the number of nails set forth in Sub-paragraph 3401.3(d) (6).

(9) Where nailing or other mechanical fasteners are used, the anchor sheet shall be not less than one 30-pound felt each sheet lapped 2 inches over the preceding sheet; or the attachment shall provide resistance to pull-through of the anchor sheet as set forth in Sub-paragraph 3402.1(d) (7).

(e) **MOPPING:** (1) Each additional sheet above the anchor sheet shall be thoroughly solid-mopped between layers with a bituminous compound, or other approved adhesive providing the attachment set forth in Paragraph 3402.1(c); so that in no place shall felt touch felt. Sheets shall be embedded without wrinkles or buckles. On new work, each felt sheet above the anchor sheet may be perforated felt.

(2) Bituminous compounds shall be air-refined asphalt or coal tar pitch.

(3) Hot asphalt shall be applied in a quantity of not less than 20 pounds per square per ply and 40 pounds per square for the flood coat and at a temperature of not less than 350 nor more than 400 degrees Fahrenheit (425° to 475° in kettle).

(4) Coal tar pitch shall be applied in a quantity of not less than 25 pounds per square per ply and 50 pounds per square for the flood coat and at a temperature of not less than 275 nor more than 350 degrees Fahrenheit (350° to 400° in kettle).

(f) **WEIGHT:** Roofing felts, plys, adhesives and surface minerals shall be designated by the weight per 100 square feet, herein termed a square.

#### 3402.2 WOOD, GYPSUM, AND OTHER NAILABLE DECKS:

(a) The first layer or anchor sheet shall not be less than one thirty-pound felt, each sheet lapped two inches over the preceding sheet, turned up vertical surfaces four inches and nailed through tin discs at six inch centers on laps and 12-inch centers in the field between laps, or not less than two layers of 15 pound felt lapped 19 inches and nailed through both sheets at six-inch centers along laps and 12-inch centers in the field between laps.

(b) Over decks of gypsum or similar material attachment of the anchor sheet shall be by nailing as set forth in Paragraph 3402.1(d) or by strip-mopping in Paragraph 3402.1(e) and further provided that only dead level asphalt or coal tar pitch shall be used as the bonding agent for strip-mopping on gypsum.

(c) Each sheet shall be lapped 2 inches over the preceding sheet and turned up 4" on vertical surfaces.



(d) Sheathing paper shall be used on wood decks under tarred felts.

(e) Where the incline of the roof exceeds 2 inches per foot, the only bituminous compound used shall be steep asphalt or steep coal tar pitch.

**3402.3 PORTLAND CEMENT CONCRETE DECKS:** (a) (1) Where felts are to be anchored to Portland cement concrete decks with bituminous compounds, the deck shall be strip-mopped with continuous moppings of hot bituminous compound 2 feet wide with one-foot spacing between strips. Felts over concrete shall be applied lapping each sheet immediately behind the mop to insure a uniform coating of bituminous compound.

(2) Where approved felts or other approved membranes are to be anchored to Portland cement concrete decks with approved adhesives other than bituminous compounds, the material and method shall comply with the condition of approval and shall provide anchorage not less than set forth in the standard in Paragraph 3402.1(e)s

(b) Where four layers of 15-pound felt are used, each sheet shall be lapped 27-1/2 inches over the preceding sheet.

(c) Where the incline of the roof deck exceeds 2 inches per foot, the only bituminous compound used shall be steep asphalt or steep coal tar pitch.

(d) Where the incline of the roof deck exceeds three inches per foot, wood nailer strips, treated with an approved preservative, shall be cast in the concrete.

**3402.4 GRAVEL OR SLAG SURFACING:** Gravel or slag surfacing shall not be used on inclines of more than four inches per foot and where used shall be applied over base sheets as set forth in Sub-sections 3402.2 and 3402.3. A flood coat of hot asphalt or pitch shall be uniformly applied into which, while hot, shall be embedded not less than 400 pounds of gravel or 300 pounds of slag per 100 square feet and gravel or slag shall be approximately one-fourth to five-eighths inches in size, dry and free from dirt. Adhesive compounds other than bituminous may be approved and shall be applied subject to the conditions of approval.

**3402.5 MINERAL SURFACED ROOFING:** (a) Mineral surfaced roofing shall be applied over only the base felts set forth in Sub-section 3402.2, except that where the incline is one-half inch or less per foot, mineral surfaced roofing shall not be permitted. The edges of sheathing at eaves and gable ends shall be covered and protected with non-corrosive metal as set forth in Section 3409 or with rolled edges of the mineral surfaced roofing. Where used under tile roofs or where incline exceeds 5 inches per foot, slate shall be back-nailed 18 inches on centers. Mineral surfaced felts of glass or asbestos composition are not limited to slope requirements.

(b) Mineral surfaced roof may be two layers of 55-pound split sheet roofing, each layer lapped 19 inches and fastened to the deck with two rows of tin caps, spaced not more than eight inches staggered on center and nailed through the unsurfaced portion of the sheet.

### 3403 MEMBRANE BASE FLASHINGS

**3403.1** Felt used in the construction of the built-up roof shall be carried over the cant strips or turned up the wall. When the layers of felt are carried over the cant strips they shall be nailed every 12 inches along a line one and one-half inches down from the top edge of the cant strip.

**3403.2** Each layer of felt base flashing shall be uniformly mopped with hot bitumin or plastic cement and asphalt shall be steep asphalt, applied at the rate of not less than 20 pounds per 100 square feet for each mopping.

**3403.3** There shall be not less than one 30-pound felt starting at a point one inch out from the cant strip and carried up the wall three inches plus one mineral surfaced felt, starting at a point two inches out from the cant strip and carried up the wall five inches.

**3403.4** Roofing felts wrapping parapet walls shall be as follows: The built-up roofing felts plus one 30-pound felt shall start at a point two inches out from the cant strip and shall be carried up the face and over the top of the parapet to the center line, and nailed on 12-inch centers, two inches from the top of the wall. The 90-pound slate shall step out two inches beyond the 30-pound and be carried up and over the wall to a point three inches from the outside edge of the wall and be nailed on six-inch centers two inches from the top of the wall. The top edge is then stripped with a three-inch wide strip of membrane set in plastic cement and painted with aluminum paint.

**3403.5 EXCEPTION:** Membrane base flashing other than felt or adhesive other than bituminous compounds may be used, provided the membrane and adhesive is approved and provided the attachment and application comply with the conditions of approval.

### 3404 ROOF TILE

Roof tile shall not be applied to the surface of roofs having an incline of less than two-and-one-half in 12.

**3404.1 MATERIAL:** Tile shall be of Portland cement concrete or of clay of various sizes and shapes, and shall be laid in accordance with manufacturer's directions where not conflicting with minimum building code requirements.

**3404.2 QUALITY:** (a) Portland cement concrete used for roof tile shall be of not less strength than 2,000 pounds per square inch in 28 days, as set forth in Chapter 25. Except for an overlapping lip, tile shall have a minimum thickness of not less than one-half inch for barrel tile and three-eighths inch for shingle tile.

(b) Roof tile shall comply with the physical test requirements as follows:

(1) Barrel tile shall be test loaded by being supported on sand two inches deep in a sand box four inches wider than the width of the tile. Shingle tile shall be test loaded by being supported on sand-filled cloth tubes parallel to the edge of the tile. Sands tubes shall be two-inch diameter loosely filled with dry 40-60 silica sand and shall be placed under the edges of the tile with center-to-center distance equal to the width of the tile.

(2) A test load shall be applied on a three-inch-square steel plate bearing on a sand bag at the center of the tile.

(3) The breaking load of any individual shingle tile shall be not less than 200 pounds and the average breaking load of five shingle tile shall be not less than 250 pounds. The breaking load of any individual barrel tile shall be not less than 250 pounds and the average breaking load of five barrel tile shall be not less than 300 pounds.

**3404.3 Deleted.**

**3404.4 MORTAR BED:** (a) All tile shall be set in a bed of mortar and mortar shall be sandwiched in between all laps at the butt of shingle, pan and barrel tile and along the sides of barrel tile.

(b) Mortar shall contain not less than one part cement and three parts sand, and not more than 25 percent of lime by volume.

**3404.5 LAYING:** (a) Tile shall be laid on only mineral surfaced roofing as set forth in Sub-section 3402.5 applied over one layer of 30-pound felt as set forth in Sub-section 3402.2. Mica surfaced roofing shall not be considered acceptable to bond tile mortar.

(b) Tile shall be applied wet, having been thoroughly wet with a hose and the excess water allowed to drain off.

(c) Tile shall have a headlap of not less than two and one-half inches, and, for barrel tile, not less than one and one-half inches lap at the sides.

(d) Tile shall extend not more than 1" beyond the roof sheathing at the eave.

Stack the tile on roof with bottom tile top up, and the balance stack with the bottom up.

**3404.6 NAILING:** Where the incline of roof is more than 3" in 12" but less than 4-1/8" in 12", the 90-pound felt shall be back nailed 6" on centers with 1-1/4" roofing nails.

When the incline is more than 4-1/8" in 12" mineral surfaced roof of two layers of 55-pound split sheet roofing, each layer shall have a minimum lap of 19". It shall be cut in lengths of not more than 12 feet laid in hot steep asphalt with two rows of tin caps and with 1-1/4" nails spaced not more than 12" staggered on centers and nailed through the unsurfaced portion of the sheet. Tile shall be laid in a mortar bed as specified in Sub-section 3404.4.

**3404.7 RESISTANCE TO UPLIFT:** Roof tiles shall be secured to the roof surface to resist an uplift force of 30 pounds applied at the eaveward edge of each tile. Where more than one tile in every ten so tested fail to resist the 30-pound force, the Building Official shall require necessary correction.

**3404.8 WEEP HOLES:** The eave ends of roof tile shall be cemented, with weep holes provided for adequate drainage.

### **3405 ASBESTOS-CEMENT SHINGLES**

**3405.1** Asbestos-cement shingles conforming to the "Standard Specifications," ASTM Designation: C222 of the American Society for Testing Materials, may be applied over roofs having an incline of four in 12 or more.

**3405.2** Asbestos-cement shingles may be applied over existing roofs, except as prohibited in Sub-section 3401.5, provided such existing roof is in good condition, or may be applied over a 30-pound felt nailed with tin caps 18 inches apart, both ways.

**3405.3** Asbestos-cement shingles shall be nailed with not less than two nails in each shingle and nails shall be non-corrosive and penetrating not less than three-fourths inch into solid wood deck. Corners shall be tabbed as set forth in Sub-paragraph 3406.2(c)(1).

**3405.4** Asbestos-cement shingles shall project not more than one-half inch at the eave or gable ends.

**3405.5** All intersections shall be flashed with non-corrosive metal not less than 28 U. S. Standard gage.

### **3406 SLATE AND ASPHALT SHINGLES**

**3406.1 SLATE SHINGLES:** (a) Slate shingles shall not be applied over roofs having an incline of less than three and one-half in 12.

(b) Slate shingles may be applied over existing roofs, except as prohibited in Sub-section 3401.5, provided such existing roof is in good condition, or may be applied over two 30-pound felts shingled in and mopped and fully nailed, as set forth in Section 3402.t

(c) Slate shingles shall be nailed with not less than two nails in each shingle, and nails shall be non-corrosive and shall penetrate not less than three-fourths inch into solid wood sheathing.

(d) Base sheets shall be mopped over with hot steep asphalt and shingles laid in hot mop except that where the incline is five inches per foot or more, the mopping may be omitted.

(e) The edges of sheathing at eaves and gable ends shall be covered and protected and all intersections shall be flashed with non-corrosive metal not less than 26 U. S. Standard gage.

**3406.2 ASPHALT SHINGLES:** (a) Each bundle of shingles and roll of asphalt saturated felt shall bear the Underwriters' Laboratories, Inc. label, and shall meet the requirements of the applicable ASTM or Federal Specification standard.

(b) The roof covering after application shall provide at least double coverage, at all points. Cutouts and spacing between shingles not in excess of 3/4 inch may be disregarded in determining double coverage.

(c) Minimum headlap will be as followse Square tab strip shingles, double coverage, 2 inches; triple coverage, 4 inches. Individual shingles (American Method) 6 inches.

(d) Minimum roof slope for shingle application shall be 2 inches per foot. Double coverage underlay is required on roof slopes between two inches and four inches per foot. Single coverage is required on all slopes four inches per foot and up. The minimum average weight of the applied shingles shall be 210 pounds per 100 square feet.

(e) Starter course of shingles and rake shingles shall project over eaves or rake edge approximately 1/2 inch.

(f) Corrosion resistant roofing nails shall be used of 11 or 12 gage wire. Nails shall have deformed, barbed or threaded shanks with heads not less than 3/8 inch diameter. Length of nail shall be that which will penetrate sheathing or at least one inch into wood plank decks. Number, spacing and pattern shall be as recommended by the roofing manufacturer, per direction sheets in bundles.

(g) On roof slopes under four inches per foot double coverage underlayment is required, consisting of No. 15 asphalt saturated felt lapped 19 inches, with end laps a minimum of 6 inches. Underlay shall be nailed to the deck with nails spaced 6 inches apart along edges of sheet and 12 inches through center of sheet. On roof slopes of 4 inches per foot and up, single coverage underlayment is required, consisting of No. 15 asphalt saturated felt lapped 2 inches, with end laps of 6 inches. Nail as stated above.

Roof slopes of less than 4 in 12 shall require a 6 inch strip of flashing (metal drip edge) at eaves and rakes, applied over felt underlay at rakes, and under felts at eave. Flashing to be nailed to deck with galvanized nails spaced 8 to 10 inches o. c., with the strip bent down over edge to form a drip.

(h) Shingle tabs shall be securely sealed to undercourse with either manually applied or factory applied adhesive cement.

#### 3407 METAL SHINGLES

3407.1 Galvanized sheet metal shingles, not less than 27 gage, and aluminum shingles, not less than .040 inch in thickness, may be applied over roofs having an incline of not less than five in 12.

3407.2 Metal shingles may be applied over any existing roof, provided it is in good condition and provided the deck below is solid sheathed.

3407.3 All roof decking shall be covered with a rosin sheet free from tar or acid. The felt shall be well lapped and nailed securely to the decking. Gutters shall be applied before the laying of any shingles. Shingles shall be laid in courses, the first course to a chalk line running horizontally from gable to gable. Shingles shall extend not more than one inch at the eave. Each shingle shall be nailed with not less than three non-corrosive nails.

#### 3408 WOOD SHINGLES

3408.1 Wood shingles shall not be permitted on new construction except for buildings of Group I or Group J Division 1 Occupancy where having a distance separation of 30 feet or more. Repair to existing wood shingle roofs shall be as set forth in this Section and in Sub-section 104.6.

3408.2 Wood shingles shall be of clear vertical grain, all heartwood, not less in thickness than five shingles to two inches at the butt, laid with the following exposure

<b>TOTAL LENGTH OF SHINGLE</b>	<b>PERMISSIBLE EXPOSED LENGTH</b>
16"	5 "
18"	5½"
24"	7½"
32"	9½"
36"	11 "

**3408.3** All wood shingles shall be nailed firmly with copper, zinc, zinc-coated, aluminum, or commercially-pure iron nails of at least 14 B. and S. gage and not less than one and one-half inches long. Each shingle shall be nailed with two nails driven substantially into the supporting roof construction.

### **3409 ROOF INSULATION**

Where insulation is applied over roof decks, such insulation and the roofing shall be as herein set forth.

**3409.1 VAPOR BARRIER:** To prevent moisture absorption from a roof deck to the insulation applied above a roof deck, a vapor barrier may be installed and such vapor barrier shall be as followsn

(a) A vapor barrier applied over wood and gypsum decks shall be not less than two 15-pound felts lapped 19 inches or one 30-pound felt lapped four inches and shall be solidly mopped, at laps between plys, with hot bitumin and nailed each twelve inches along thenlapped edge through tin caps and both plys of felt. Where tarred felts are used on wood decks, the felts shall be applied over one layer of sheathing paper lapped two inches.

(b) A vapor barrier applied over concrete roof decks shall be not less than two 15-pound felts, lapped 19 inches and shingled in and solidly mopped with hot bitumin.

**3409.2 INSULATION:** (a) Where insulation is attached with solid mopping it shall be mopped with not less than 30 pounds of hot bituminous for each 100 square feet of roof area. Where insulation is attached with solid mopping it shall be pressed into position while the bituminous is hot and shall be laid with staggered joints.

(b) When more than one layer of insulation is used, each successive layer shall be mopped in with hot bitumin and joints shall be staggered.

(c) Insulation applied to roofs with incline of three in 12 or more, shall be nailed or screwed or bolted with tin caps so that fastenings are spaced not more than 12 inches apart, both ways, and only steep roofing asphalt and steep coal tar pitch shall be used.

(d) Insulation shall be kept dry and be protected and sealed at the end of each day's work.

**3409.3 WATER CUT-OFFS:** Water cut-offs shall be installed in accordance with manufacturer's instructions.

**3409.4 ATTACHMENT:** Roof insulation may be applied under or over the anchor sheet but the attachment of the insulation and all membranes shall satisfy, or shall be attached in such a manner as to satisfy the standards set forth in Section 3402 herein.

### 3410 METAL ACCESSORIES

**3410.1 GENERAL:** Metal accessories for roofs shall be of non-corrosive metal not less in thickness than 26 U. S. Standard gage galvanized iron (means before galvanizing; .0217 inches) 16-ounce copper or 0.025 inch aluminum.

**3410.2 GRAVEL STOP AND DRIP:** Gravel stop and drip for gravel roofs shall be applied with not less than three-inch flange on the roof and nailed six inches on center with one-inch ring shank roofing nail into sheathing. Such drip shall be installed after the roof has been applied and stripped with a minimum of two plies of 15-pound felt. The face shall be not less than three inches. All joints shall be butted and coved in any one of the following ways:

**3410.2 (1)** Each end of gravel stop to be face nailed with one-inch ring shank roofing nail and covered with clip-on type cover plate same gage as the gravel stop and six inches in length set in plastic cement with two one-inch ring shank roofing nails in each end on roof.

**3410.2 (2)** Each end of gravel stop shall be face nailed with one-inch ring shank roofing nails and covered with cover type cover plate made of 20 gage galvanized iron six inches in length set in plastic cement with three one-inch ring shank roofing nails in each end on roof.

(a) Gravel stop with locking strip shall be nailed same as regular gravel stop with a two-inch wide clip of 26 gage galvanized iron with two one-inch shank roofing nails, nailed every 32 inches into fascia board, joint to be butted and covered with cover plate of type explained in 3410.2(1) or a concealed joint connection six inches in length of 26 gage galvanized iron face nailed with two one-inch ring shank roofing nails through each end of gravel stop.

(b) Copper gravel stop and drip shall be with locking strip with three inch flange on roof nailed six inches on center with copper ring shank roofing nails. A clip of three inches in width of 24 ounce copper every 32 inches nailed with two one-inch copper ring shank roofing nails into fascia board. Joint to be butted and covered with 16 ounce copper cover plate of type explained in Section 3410.2(1) of the concealed joint connection made of 24 ounce copper as explained in 3410.2(a).

(c) Aluminum gravel stop and drip for gravel roofs shall be applied with not less than three-inch flange on roof and nailed six inches on center with one inch aluminum ring shank roofing nailed into sheathing. Such drip shall be installed after the roof has been applied. Drip shall be set in plastic cement and stripped with a minimum of two plies of 15-pound felt. The face shall be not less than three inches. All joints shall be butted and covered with 0.025 inch aluminum cover plate as described in 3410.2(1) or as described in 3410.2(2) using 0.040 inch aluminum.

(d) Zinc gravel stop and drip shall be with locking strip with three-inch flange on roof nailed six inches on center with galvanized ring shank roofing nails. A clip of three inches in width of 26 gage galvanized iron every 24 inches shall be nailed with two one-inch galvanized ring shank roofing nails into fascia board. Joints shall be butted and covered with 26 gage zinc cover plate as explained in 3410.2(1) or a concealed joint connection as described in 3410.2(a).

**3410.2 (3)** The face shall extend down not less than ½-inch below the sheathing or other member immediately contiguous thereto.

**3410.2 (4)** The metal shall be attached to the sheathing each 6 inches on center with 12 gage ring-shanked nails one inch in length.

**3410.2 (5)** Gravel stop shall be installed after all of the roof felts have been applied.

**3410.2 (6)** The deck flange shall be covered with a 6-inch wide strip of membrane or 15-pound asbestos felt applied in a bed of plastic roofing compound covering all nail heads and extending over onto mopped felts or stripped with one 6-inch and one 9-inch felt and mopped with bituminous or approved adhesive.

**3410.2 (7)** Joints shall be one of the following:

(aa) Joints shall be lapped a minimum of 6 inches and the entire interior of the joint where metal fits to metal shall be coated with mastic from the lower drip edge to the edge of the roof flange. There shall be a minimum of 3 nails through the deck flange at the joint.

(bb) Joints shall be butted (not lapped) with a 1/16 inch gap. The gap shall be covered with a 6-inch long cover plate centered over the gap. The cover plate shall be 20 gage sheet metal or 24 oz. copper or .064 inch aluminum. The material of the cover plate shall be the same as that of the gravel stop and drip. The cover plate shall have holes punched in the deck flange section for nailing. The cover plate shall have a deck flange not less than 2½ inches in width and shall be precisely prefiled to fit over the gravel-stop with mastic from the lower drip edge to the edge of the roof flange then 6 ring-shanked nails symmetrically spaced about the butt joint of the gravel stop described, except that where the roof incline is one or more in 12, the gable drip shall be lapped not less than 2 inches and a cover plate shall not be used.

**3410.3 EAVE AND GABLE DRIP:** (a) Eave and gable drip for tile roofs, asbestos shingle roofs, composition roofs and mineral surface roofs shall be applied with not less than a 1½-inch flange on the roof.

(b) The drip shall be nailed 6 inches on center into the sheathing with three-quarter-inch, ring-shanked nails.

(c) The joints shall be lapped not less than 3 inches.

(d) The drip shall be installed between layers of felt.

(e) The face shall be a minimum of 1½ inches but not less than 1/2-inch below the sheathing.

**3410.4 VALLEYS:** (a) Metal valleys shall be of corrosion resistant metal not less than 12 inches in width.

(b) Metal valleys shall be installed on top of the sub-roof, set in hot asphalt or plastic cement, stripping edges of valley with not less than one layer of 15-pound felt with 4-inch minimum width and sealing edges with plastic cement before laying of the finished roof of tile, quarry slate, asbestos shingles, composition shingles or similar materials.



(c) Valley metal shall have a minimum 4-inch end lap.

**3410.5 RAKE AND CAP FLASHINGS:** Rake and cap flashings shall be installed in the same manner as metal counter flashings in Sub-section 3410.8.

**3410.6 CRICKETS AND SADDLES:** Crickets and saddles shall be installed on top of the sub-roof and stripped into the sub-roof with not less than one layer of 30-pound felt sealed with plastic cement. Crickets and saddles joining vertical surfaces shall be flashed in the same manner as metal counter flashings in Sub-section 3410.8.

**3410.7 METAL BASE FLASHINGS:** Metal base flashings shall be installed after the 15-pound roofing felts have been laid and turned up the vertical surfaces. Felts shall be imbedded in and mopped over with hot bitumin. The metal base flashing shall then be set to extend not less than eight inches up the vertical surface and six inches on the roof, being nailed to the roof deck on three-inch centers. Where the roof deck is not nailable, a wood nailing strip shall be installed. The roof flange shall be stripped with one 15-pound felt not less than four inches wide centered over the nailing course and one 15-pound felt not less than six inches wide completely covering the first. The end lap of flashings shall be locked and/or soldered.

**3410.8 METAL COUNTER FLASHINGS:** Metal counter flashing shall be turned down over base flashing not less than four inches and shall be set into a reglet one-half inch wide and one-half inch deep. The reglet shall be from nine to twelve inches above the roof deck or above in-the-wall metal counter flashing, or above stucco shoulder metal counter flashing. Reglet block or metal form flashings shall be built into the wall and the base felt flashing shall be thoroughly caulked into flashing joints.

**3410.9 VENT PIPE FLASHINGS:** All vent pipes shall be properly flashed with approved lead, sleeve-type flashing, pitch pans or other approved methods. Where vent pipes extend more than 12 inches above the roof, a collar or draw band may be installed around the top of the lead flashings and thoroughly caulked into place.

**3410.10 OVERFLOW SCUPPERS AND OUTLETS:** Overflow scuppers and roof outlets shall be lined with metal and installed not more than 2 inches above the low point of the roof and shall comply with Section 4611 herein.

**3410.11 GUTTERS AND DOWNSPOUTS:** Gutters and downspouts shall be constructed of metal with lapped or soldered or caulked joints and shall be securely fastened to the building with a standard type of fastening device.

## Chapter 35 — Wall Claddings and Glazing

3501	GENERAL
3502	LATHING
3503	PLASTER
3504	STUCCO
3505	PLASTICS
3506	ASBESTOS CEMENT
3507	TILE
3508	GLASS AND GLAZING
3509	GLASS VENEER
3510	OTHER MATERIALS
3511	STORM SHUTTERS

### 3501 GENERAL

**3501.1 SCOPE:** Wall coverings and glazing shall be as set forth in this chapter and be fire-resistive where required by this Code, except that the requirements of this chapter shall be applicable to lath and plaster as follows:

(a) Where fire-resistive protection is required by this Code, lath, plaster and stucco shall be as set forth herein and shall also comply with the requirements of Chapter 37.

(b) Where fire-resistive protection is not required by this Code, lathing shall be as set forth herein; and plaster and stucco may be omitted or otherwise varied, subject to the approval of the Building Official. The specifications of this chapter shall be considered standards of good practice.

**3501.2 INTERIOR FINISHES:** Interior finishes shall be as set forth in Section 3710.

**3501.3 EXISTING BUILDINGS:** The Building Official shall inspect existing buildings having wood-stud exterior walls for which application for a permit for exterior wall coverings is made, shall have the authority to order the uncovering of structural elements for inspection and require necessary repairs as a part of such approval for a permit, or may order demolition as set forth in Part I herein.

### 3502 LATHING

**3502.1 GENERAL:** Lath shall be gypsum, metal or wire lath, as set forth herein, and shall conform to the "Standard Specifications for Interior Lathing and Furring," A42.4, of the American Standards Association.

**3502.2 GYPSUM LATH:** (a) Gypsum lath shall conform to the requirements of the "Standard Specifications for Gypsum Lath," ASTM Designation: C37, of the American Society for Testing Materials.

(b) Gypsum lath shall be nailed to wood supports, at intervals not to exceed five inches, with 13-gage galvanized or blued nails having 19/64-inch diameter flat heads. Nails shall be not less than one and one-eighth inches long for three-eighths-inch lath nor less than one and one-fourth inches long for one-half-inch lath. Each 16-inch width of lath shall be secured to each support with not less than five nails; except that where fire-resistive-rated construction is not required, there shall be not less than four nails. Lath shall be secured to horizontal or vertical metal supports by means of approved special clips.

(c) The center-to-center distance between supports for three-eighths-inch thick gypsum lath shall not exceed 16 inches, and the center-to-center distance between supports for one-half-inch gypsum lath shall not exceed 24 inches.

(d) Lath shall be applied with face side out and with the long dimension at right angles to the framing members. Joints shall be broken in each course, except that end joints may fall on one support when such joints are covered with three-inch-wide strips of metal lath. Lath shall be butted together.

(e) Internal angles, external angles, coves, arches and junctures between gypsum lath shall be reinforced with metal or wire lath carried around or across intersections. Such reinforcement shall not be secured to the framing members.

(f) No interior lath shall be applied until the roof is on and the building is dried in.

**3502.3 METAL AND WIRE LATH:** (a) Metal and wire lath and metal accessories embedded in the plaster shall be galvanized or otherwise rust-resistant by approved means. Weight tags shall be left on all metal or wire lath until approved by the Building Official.

(b) The weight of metal and wire lath and the spacings of supports shall conform to the requirements set forth in Table 35-A.

**TABLE No. 35-A  
WEIGHTS OF METAL AND WIRE LATH**

TYPE OF LATH	MINIMUM WGT. (Lbs. per Sq. Yd.)	MAXIMUM SPACING OF SUPPORTS	
		For Walls	For Ceilings
Flat Expanded Metal Lath . . .	2.5	16"	0
Flat Expanded Metal Lath . . . .	3.4	16"	16"
Flat Rib Metal Lath . . . . .	2.75	16"	12"
Flat Rib Metal Lath . . . . .	3.4	19"	19"
3/8" Rib Metal Lath* . . . . .	3.4	24"	24"
Sheet-Metal Lath . . . . .	4.5	24"	24"
Wire Lath . . . . .	2.48	16"	12"
Wire Fabric . . . . .	**	16"	16"

\*Rod-stiffened or V-stiffened flat expanded metal lath of equal rigidity and weight is permissible on the same spacings as 3/8" rib metal lath.  
\*\*Paper-backed wire fabric, No. 16-gage wire, 2" x 2" mesh, with stiffener.

(c) Metal and wire lath shall be lapped not less than one inch at sides and ends.

(d) All attachments for securing metal lath, wire lath and wire fabric to supports shall be spaced not more than six inches apart, and side laps shall be secured to supports and be tied between supports not to exceed nine inch intervals.

(e) Metal and wire lath shall be attached to vertical wood supports with the equivalent of 4d-galvanized or blue common nails driven to a penetration of at least three-quarters inch and bent over to engage not less than three strands of lath. Metal and wire lath shall be attached to ceiling joists or other horizontal wood supports with the equivalent of No. 11 gage, barbed, galvanized or blued nails one and one-half inches long, having a head not less than seven-sixteenths inch in diameter, and where walls are subject to frequent wetting, shall comply with Section 2905.2(c).

(f) Metal and wire lath shall be attached to horizontal and vertical metal supports with the equivalent of No. 18 W. and M. gage, galvanized annealed wire.

#### **3502.4 NONBEARING LATH AND PLASTER PARTITIONS:**

(a) Where reinforced plaster or pneumatically-placed plaster partitions are used, they shall have vertical steel or iron channels with a depth of not less than one-third the thickness of the partition and spaced not more than 24 inches on centers. The thickness of metal in the channels shall be not less than 16 U. S. standard gage or light gage steel studs as set forth in Paragraph 2809.3(c).

(b) Hollow nonbearing partitions of reinforced plaster or pneumatically-placed plaster shall have a shell thickness of not less than three-fourths inch.

(c) Metal reinforcing shall be as set forth in Table No. 35-A, and gypsum lath shall be not less than three-eighth inch in thickness. The minimum thickness of metal lath and plaster partitions shall be not less than two inches nor one-eighty-fourth of the distance between supports.

**3502.5 SUSPENDED AND FURRED CEILINGS:** (a) **GENERAL:** Suspended or furred ceilings shall be designed to meet the requirements of this Section.

(b) **MAIN RUNNERS:** Main runners or carriers shall be rolled steel channels not less than the sizes and weights set forth in Table No. 35-B.

**TABLE NO. 35-B**  
**SPANS AND SPACINGS OF MAIN RUNNERS**

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**TABLE No. 35-C**  
**SIZES OF CROSS FURRING IN SUSPENDED AND**  
**FURRED CEILINGS**

Size and Type	Maximum Span Between Supports	Maximum Spacing
1/4" pencil rods	Up to 2 feet	12"
3/4" channels	Up to 3 feet	24"e
3/4" channels	Up to 4 feet	16"

Cross furring shall be securely saddle-tied to the main runners by not less than two strands of No. 16 W. and M. gage galvanized wire or equivalent approved attachments. Cross furring shall be attached to joists or beams with double No. 14 W. and M. gage galvanized wire or equivalent approved attachments. Splices in cross furring shall be lapped eight inches and tied, each end, with double loops of No. 16-gage wire.

(d) **HANGERS:** Hangers supporting suspended ceilings shall be not less than the following minimumse

Ceiling Area Supported Square Feet	Minimum Size of Hanger
12.5	8-gage wire
16	6-gage wire
18	3/16" rod
22.5	1/4" rod
25	1" x 3/16" flat bar

Hangers shall be saddle-tied or wrapped around main runners to develop the full strength of the hangers. Hangers shall be fastened to, or embedded in, the structural framing, masonry or concrete. Lower ends of flat-strap hangers shall be bolted with three-eighth-inch bolts to runner channels or bent tightly around corners and bolted to the main part of the hanger.

### 3503 PLASTER

**3503.1 GENERAL:** (a) The "Standard Specifications for Gypsum Plastering," A42.1, of the American Standards Association is hereby adopted to supplement, but not supersede, the requirement for gypsum plastering set forth herein.

(b) Plastering with gypsum, hardwall, lime or cement plaster shall be three-coat work when applied over metal and wire lath and shall be not less than two-coat work when applied over gypsum lath or gypsum block.

(c) Portland cement plaster shall not be applied directly to gypsum lath.

(d) In no case shall a brush coat be accepted as a required coat where three-coat work is required by this section.

(e) Grounds shall be installed to provide for the thicknesses of plaster, as set forth in Table No. 35-D.

**TABLE No. 35-D**  
**REQUIRED THICKNESS OF INTERIOR PLASTER**

Type of Lath	Thickness of Plaster
Metal or wire lath .....	5/8" minimum
Gypsum lath .....	1/2" minimum

(f) If monolithic concrete ceiling surfaces require more than three-eighths inch of plaster to produce desired lines or surfaces, metal lath or wire lath shall be attached thereto except that special bonding agents approved by the Building Official may be used.

(g) The Building Official may require test holes to be made for the purpose of determining the thickness of plaster.

**3503.2 MATERIALS:** (a) **AGGREGATES:** (1) Organic aggregates used for plaster and stucco shall conform to "Standard Specifications," ASTM Designation C35 of the American Society for Testing and Materials, except that the graduation of locally-produced sand shall be such that the fineness modulus is between 1.20 and 2.35.

(2) Aggregates shall be quarried in fresh water and shall contain not more than one-twentieth of one percent salt, by weight.

(b) **GYPSUM:** Gypsum plaster shall conform to "Standard Specifications," ASTM Designation C28 of the American Society for Testing and Materials.

(c) **LIME:** Lime shall conform to the requirements of "Standard Specifications," ASTM Designation C5 or C206 of the American Society for Testing and Materials. Lime putty shall be made from quicklime or dehydrated lime and shall be prepared in an approved manner, stored and protected for an approved period of time.

(d) **KEENE'S CEMENT:** Keene's cement shall conform to "Standard Specifications," ASTM Designation C61 of the American Society for Testing and Materials.

(e) **PORTLAND CEMENT:** Portland cement shall conform to the "Standard Specifications," ASTM Designation C150 of the American Society for Testing and Materials. Approved types of plasticity agents may be added to portland cement in the manufacturing process or when mixing the plaster, but in no case shall the amount of plasticity agent exceed ten percent of the volume of cement in the plaster mixture.

(f) **MASONRY CEMENT:** Masonry cement shall conform to the "Tentative Specifications," ASTM Designation C91 of the American Society for Testing and Materials.

**3503.3 PROPORTIONING AND MIXING:** (a) **BASE COATS:** The proportions of sand, vermiculite or perlite to 100 pounds of gypsum neat plaster shall not exceed the following:

(1) **GYPSUM or HARDWELL PLASTER:**

	Pounds, Damp Loose Sand	Cu. Ft. Vermiculite or Perlite
<b>Two-Coat Work (Double-Up Method)</b>		
(1) Over gypsum lath .....	250	2½
(2) Over masonry* .....	300	3
<b>Three-Coat Work</b>		
(1) First (scratch) coat over lath ..	200a	2a
(2) First (scratch) coat over masonry	300	3
(3) All second (brown) coats .....	300a	3a

\*Except over monolithic concrete.

a-In lieu of the proportioning specified, the proportions may be 100 pounds of gypsum neat plaster to not more than 250 pounds of damp, loose sand or 2½ cubic feet of vermiculite or perlite, provided this proportioning is used for both scratch and brown coats.



(2) **WOOD-FIBRE GYPSUM PLASTER:** Wood-fibre gypsum plaster for use on all types of lath, shall be mixed with water only and shall be mixed in the proportion of one part of plaster to one part of sand, by weight, for use on masonry.

(3) **READY-MIXED PLASTER:** Gypsum ready-mixed plaster shall be in the proportion of 100 pounds of gypsum neat plaster to not more than 250 pounds of sande or when vermiculite or perlite is used as an aggregate, the proportions shall be 100 pounds of gypsum neat plaster to not more than two and one-half cubic feet of vermiculite or perlite.

(4) **PORTLAND CEMENT PLASTER:** For three-coat work, the first two coats shall be as required for the first two coats of exterior stucco, Section 3504.

(b) **FINISH COATS FOR GYPSUM OR LIME PLASTER:** The finish coats shall be mixed and proportioned in accordance with the following procedure

(1) Smooth white finish, mixed in the proportion of not less than one part gypsum gaging plaster to three parts lime putty, by volume, or an approved prepared gypsum trowel finish.

(2) Sand-float finish, mixed in the proportion of one-half part of Keene's cement to two parts of lime putty and not more than four and one-half parts of sand, by volume, or an approved gypsum sand-float finish.

(3) Keene's cement finish, mixed in the proportion of three parts Keene's cement to one part lime putty, by volume.

(4) Lime sand float finish mixed in the proportion of three parts lime putty to three parts sand, by volume.

(5) Finish coat for perlite or vermiculite aggregate plasters, mixed in the proportion of one cubic foot of aggregate to 100 pounds of unfibred gypsum plaster, or mixed according to manufacturer's specifications.

(c) **FINISH COAT FOR PORTLAND CEMENT PLASTER:** Finish coats for interior Portland cement plaster shall be one of the following:

(1) As required for the third coat of exterior stucco, Section 3504.

(2) A gaged cement plaster, mixed in proportion of one part Portland cement to not more than 15 percent lime putty and not more than four parts of sand, by volume.

**3503.4 APPLICATION:** (a) **BASE COATS:** (1) **GYPSUM PLASTER:** The scratch coat shall be applied with sufficient material and pressure to form a full key or bond.

For two-coat work it shall be doubled back to bring the plaster out to grounds and straightened to a true surface and left rough to receive the finish coat.

For three-coat work, the scratch (first) coat shall be scratched to a rough surface. The brown (second) coat shall be applied after the scratch coat has set firm and hard, brought out to grounds, straightened to a true surface with rod and darby and left rough, ready to receive the finish (third) coat.

The finish coat shall be applied to a practically dry base coat or to a thoroughly dry base coat which has been evenly wetted by brushing or spraying. The use of excessive water shall be avoided in the application of all types of finish coat plastering.

(2) **PORTLAND CEMENT PLASTER:** The first two coats shall be as required for the first two coats of exterior stucco, except that the interval between the first and second coats shall be not less than 24 hours.

(b) **FINISH COATS:** (1) Smooth white finish shall be applied over the base coat which has set for a period of not less than 24 hours and is surface-dry. Thickness shall be from one-sixteenth inch to one-eighth inch.

(2) Sand-float finish shall be applied over the set base coat which is not quite dry.

(3) Keene's cement finish shall be applied over the set base coat which is not quite dry. Thickness shall be from one-sixteenth inch to one-eighth inch, unless finish coat is marked off or is jointed; in which case, the thickness may be increased as required by depth of marking or jointing.

(4) The finish coat for interior Portland cement plastering shall be applied in the same manner as required for the third coat of exterior stucco, except that other types of finish coat may be applied as specified in Paragraph 3504.

(5) The finish coat for lightweight aggregate plastering shall be applied over a base coat which is not quite dry. The thickness shall be from one-sixteenth inch to one-eighth inch.

(c) **PLASTER OR CONCRETE:** (1) Monolithic concrete surfaces shall be clean, free from efflorescence, damp, and sufficiently rough to insure adequate bond.

(2) Gypsum plaster applied to monolithic concrete ceilings shall be specially prepared bond plaster for use on concrete, to which only water shall be added. Gypsum plaster on monolithic walls and columns shall be applied over a scratch coat of bond plaster, or other bonding material, before it has set. The brown coat shall be brought out to grounds, straightened to a true surface, and left rough, ready to receive the finish coat.

(3) Portland cement plaster applied to interior concrete walls or ceilings shall conform to requirements for application to exterior concrete walls as specified in Section 3504.

### 3504 STUCCO

**3504.1 STUCCO ON CONCRETE OR MASONRY:** (a) **GENERAL:** Stucco base coat shall be mixed in the proportion of one part Portland cement and three and one-half parts of sand by volume, or shall be any approved prepared product containing not less than one-third, by weight, of Portland cement.

Finish-coat stucco shall be mixed in the proportion of one part Portland cement to two parts sand, by volume, with not more than 15 percent lime, by volume.

(b) **MATERIALS:** The materials of stucco shall conform to the standards set forth in Section 3503 except that Type I masonry cement shall not be used or shall be one part Type II masonry cement to two parts sand, by volume.

(c) **ADMIXTURES:** Plasticity agents shall be of approved types and amounts; and if added to Portland cement in the manufacturing process, no later additions shall be made. Color may be added to the finish coat in approved amounts.

(d) **APPLICATION:** (1) Stucco applied to concrete or masonry shall consist of not less than two coats, and the total thickness shall be not less than five-eighths inch, nor shall any one coat be less than one-fourth inch thick.

(2) The masonry surface on which stucco is applied shall be clean free from efflorescence, damp, and sufficiently rough to insure proper bond.

(3) The first coat shall be well forced into the pores of the masonry, shall be brought out to grounds, straightened to a true surface and left rough to receive the finish coat. The first coat of two-coat work shall be rodded and water-floated with no variations greater than one-quarter inch under a five-foot straight edge in any direction.

(4) The base coat shall be allowed to dry or set for a period of not less than 24 hours.

(5) The finish coat shall be applied over a damp, but surface-dry base.

(6) Stucco shall be kept damp for a period of not less than 36 hours after application.

**3504.2 STUCCO ON WALLS OTHER THAN CONCRETE OR MASONRY:** (a) **GENERAL:** Stucco shall be as provided in Sub-section 3504.1.

(b) **BACKING:** Studs shall be wood sheathed. Wood sheathing shall be covered with building paper and metal reinforcement.

(c) **METAL REINFORCEMENT:** (1) Stucco shall be reinforced with expanded metal weighing not less than 1.8 pounds per square yard or welded or woven wire fabric, weighing not less than one pound per square yard.

(2) Metal reinforcement shall be furred out from the backing at least one-quarter inch by an approved furring method, which shall be spaced not more than six inches vertically and 16 inches horizontally. Nailing shall be by galvanized nails, driven to at least three-quarters inch penetration.

(3) Metal reinforcement shall be lapped at least one full mesh at all joints.

(d) **APPLICATION:** (1) Stucco applied on metal lath shall be three-coat work.

(2) The first coat shall be forced through all openings in the reinforcement to fill all spaces and scored horizontally.

(3) The second coat shall be rodded and water-floated, with no variation greater than one-quarter inch in any direction under a five-foot straight edge.

(4) The third coat shall be troweled to a thickness of not less than one-eighth inch.

**3504.3 PNEUMATICALLY-PLACED STUCCO:** Pneumatically-placed stucco shall consist of a mixture of one part Portland cement to not more than five parts sand, conveyed through a pipe or flexible tube and deposited by pressure in its final position. Rebound material may be screened and reused as sand in an amount not greater than 25 percent of the total sand in any batch. Plasticity agents may be used as specified in Paragraph 3504.1 (b).

### **3505 PLASTICS**

**3505.1 GENERAL:** (a) Plastic materials used in locations where required to resist loads shall be designed by methods admitting of rational analysis according to established principles of mechanics.

(b) Plastic materials may be used where ordinary window glass is permitted or where complying with Section 3710 for interior finishes or for structural sheets or members, any use of which shall be as set forth herein and/or as approved by the Building Official after review of the physical properties, chemical composition, weather resistance, electrical properties, fire resistance, flame spread characteristics, products of combustion and coefficient of expansion. On review of the data furnished, the Building Official may approve the material subject to such limitations as he may deem advisable.

(c) Application and plans submitted for proposed construction shall identify the plastic material intended.

(d) Plastic materials shall be wholly or principally those described in the "Technical Data on Plastics," as published by the Manufacturing Chemists Association, Inc.

(e) The products of combustion of a plastic material shall be no more toxic in point of concentration than those of wood or paper burned under similar conditions.

(f) A plastic material shall burn no faster than two and one-half inches per minute in sheets. Sixty-thousandths of an inch in thickness when tested in accordance with the "Standard Method for Flammability of Plastics over Fifty-thousandths of an Inch in Thickness," (ASTM Designation: D635)e

(g) Reinforced plastic shall be reinforced with glass fiber or other non-combustible material amounting to not less than one and one-half ounces per square foot and not less than 20 percent by weight.

(h) Reinforced plastics used in exterior locations shall be not less than one-sixteenth inch in thickness nor less than eight ounces per square foot in weight.

(i) Unreinforced plastics used in exterior locations shall be not less than one-fourth inch in thickness.

(j) Plastic structural members, other than sheets, shall be designed by a registered professional engineer.

**3505.2 INSTALLATION:** Plastic shall be secured to supports at intervals not exceeding six inches, and edges and sidelaps of sheets shall be secured at intervals not exceeding 12 inches. Fastenings shall be through one-half-inch diameter cushion washers and shall develop not less than 40 pounds pullout.

**3505.3 EXTERIOR VENEER:** Plastic veneer shall not be attached to an exterior wall to a height greater than 35 feet above grade.

**3505.4 AREA LIMITATIONS:** Where buildings or parts of buildings are enclosed with solid walls, other than screen, plastic panels in roofs shall be limited to one-fourth of the roof area and plastic panels in walls shall be limited to one-half of the wall area.

### **3506 ASBESTOS CEMENT**

Asbestos cement products used on exterior locations where required to resist wind load shall be as follows:

**3506.1** Flat sheets shall conform to the "Standard Specifications," ASTM Designation C220 or C222 or C223, of the American Society for Testing Materials. Flat sheets having a thickness of one-fourth inch, or less than one-fourth inch, shall span not more than 12 inches. Sheets shall be secured at intervals not exceeding 12 inches, each way, nor less than two fastenings in each piece.

**3506.2** Corrugated sheets shall conform to the "Standard Specifications," ASTM Designation C221 of the American Society for Testing Materials. Sheets shall be secured to supports at intervals not exceeding eight inches, and edges and side laps shall be secured at intervals not exceeding 12 inches.

### **3507 TILE**

**3507.1** Floor and wall tile shall be securely bonded to the backing.

**3507.2** Floor tile shall be set on a concrete slab. Cement base tile on wood joists shall be limited as set forth in Section 2005.1. The concrete slab shall be thoroughly wet and slushed with pure cement before the mortar bed is applied. Mortar bed on floors shall be not less than one part Portland cement to three parts aggregate.

**3507.3** Wall tile shall be backed with masonry or with stucco on wire lath, and be protected with an approved vapor barrier.

The first coat applied to wire lath shall be not less than one part of Portland cement to three parts aggregate. Bedding mortar on walls shall be four parts aggregate and one part Portland cement to which not more than 25 percent of lime has been added. The scratch coat shall be thoroughly slushed with cement before bedding mortar is applied.

**3507.4** Portland cement or other porous tile shall be soaked in water not less than one hour before placing.

#### **3508 GLASS AND GLAZING**

Glass and glazing shall be as set forth in this section and where required to be fire resistive for the protection of openings shall also comply with Chapter 37.

**3508.1 LIMITS OF AREA IN EXTERIOR WALLS:** The areas and dimensions of a single piece of glass used in the exterior walls of buildings shall be limited by material and location as follows:

(a) One-fourth-inch polished plate glass in first floor locations shall not exceed a least dimension of eight feet, and a maximum height of 12 feet and in upper floor locations shall not exceed a least dimension of six feet nor a maximum height of nine feet.

(b) Three-eighths-inch polished plate glass in first floor locations shall not exceed a least dimension of ten feet nor a maximum height of 12 feet and in upper floor locations shall not exceed a least dimension of eight feet nor a maximum height of nine feet.

(c) One-half-inch polished plate glass in first floor locations shall not exceed a least dimension of nine feet nor a maximum height of 12 feet, and in upper floor locations shall not exceed a least dimension of nine feet nor a maximum height of nine feet.

(d) Seven-thirty-seconds-inch drawn unpolished glass known as heavy sheet or crystal shall not be used in buildings other than for Group I Occupancy, and the least dimension shall not exceed four feet.

(e) Double-strength window glass used in any exterior wall shall be 26-ounce, shall meet Federal Specification, DD-G-451a shall not exceed seven and one-half square feet and shall not be used in any location less than ten feet from a public street or other public space.

(f) Single-strength window glass shall not be used in an exterior wall, except in buildings of Group I Occupancy.

(g) Any glass used in shower doors, tub enclosures, partition walls, sliding or swinging doors shall be at least seven-thirty-seconds of an inch thick.

(h) Corrugated glass shall be limited to spans determined by analysis and tests to resist the loads set forth in Chapter 23.

(i) Glass block shall be limited as set forth in Section 2704.

**3508.2 CONSTRUCTION DETAILS:** (a) **LIMITS OF SIZE OF GLASS:** Glass used in exterior walls shall not exceed the maximum least dimensions set forth in Table 35-E except as follows.

(1) Where storm shutters complying with Section 3511 are provided glass may exceed the sizes of Table 35-E but shall not exceed the sizes set forth in Table 35-F.

(2) Where design is based on 120 MPH wind velocities, as set forth in Table 35-E, storm shutters will not be required except in areas considered by the Building Official to be hazardous such as nearby or surrounding areas of refuge.

(3) The tables set forth herein are based on the glass being supported on 4 sides by material of sufficient strength to resist the pressures of 120 MPH winds without deflecting in excess of 1/175 of the span. Where the length of glass exceeds twice the width and where glass is supported on only 3 or 2 sides, the tables herein shall not be used and design based on rational analysis using a maximum fiber stress of 4333 psi shall be submitted to the Building Official for approval.

**TABLE 35-E**  
**MAXIMUM LEAST DIMENSION OF GLASS IN FEET**  
 Wind velocity taken at 120 MPH 30 feet above grade

Glass Thickness (inches)	Height above grade						
	0-15	15-30	30-50	50-80	80-100	100-200	Over 200
.087 (SS)	1.61	1.35	1.29	1.19	1.14	1.08	.96
.118 (DS)	2.26	1.84	1.74	1.61	1.55	1.47	1.32
1/8	2.48	1.94	1.84	1.70	1.63	1.55	1.20
3/16	3.6	2.8	2.7	2.5	2.4	2.3	2.1
7/32	4.2	3.4	3.2	3.0	2.8	2.7	2.4
1/4	4.8	3.9	3.7	3.4	3.3	3.1	2.7
5/16	6.0	4.9	4.7	4.2	4.1	3.9	3.5
3/8	7.1	5.8	5.5	5.1	4.9	4.7	4.2
1/2	9.5	7.8	7.3	6.8	6.6	6.2	5.6
5/8	12.0	9.7	9.2	8.5	8.2	7.7	6.9

**TABLE 35-F**  
 (Required Storm Shutters)  
**MAXIMUM LEAST DIMENSION OF GLASS IN FEET**  
 Wind velocity taken at 74 MPH 30 feet above grade

Glass Thickness (inches)	Height above Grade						
	0-15	15-30	30-50	50-80	80-100	100-200	Over 200
.087 (SS)	2.74	2.18	2.06	1.91	1.79	1.74	1.56
.118 (DS)	3.60	2.95	2.80	2.60	2.42	2.34	2.12
1/8	3.80	3.11	2.94	2.74	2.56	2.50	2.24
3/16	5.7	4.7	4.4	4.1	3.8	3.7	3.5
7/32	6.6	5.4	5.1e	4.8	4.5	4.3	3.9
1/4	7.6	6.2	5.9	5.4	5.1	5.0	4.5
5/16	9.6	7.9	7.4	6.9	6.5	6.3	5.7
3/8	11.5	9.4	8.8	8.2	7.7	7.5	6.7
1/2	15.2	12.5	11.8	11.0	10.3	10.0	9.0
5/8	10.0	15.6	14.7	13.7	12.8	12.5	11.2

(b) **BULKHEADS:** A bulkhead not less than six inches in height shall be provided under all plate glass adjacent to public sidewalks or other public space or in buildings of public use.

(c) **MIRRORS:** Mirrors more than nine square feet in area shall be directly secured to a solid backing and shall not be hung.

**3508.3 DOORS:** (a) The glazing in exterior and interior swinging and sliding doors and fixed lites adjacent thereto, having glass exceeding 3 square feet in any panel, shall be laminated safety glass, wire glass, fully tempered glass or approved plastic. Tempered glass shall not be less in thickness than 3/16" and wire glass shall not be less in thickness than 1/4". **EXCEPTION:** Jalousies shall be specifically excepted from the requirements of this sub-section.

(b) Swinging and sliding doors of glass without a continuous frame shall be of not less than 1/2 inch in thickness.

(c) Safety glass where required shall meet the following specifications:

(1) **FULLY TEMPERED GLASS:** (aa) **PARTICLE TEST:** The fully tempered safety glass panel shall be fractured by impact with spring loaded center punch or by hitting a regular center punch with a hammer. The point of impact shall be  $\frac{1}{2}$  inch from any glass edge. When fractured, there shall be no individual fragment larger than 0.15 ounces.

(bb) Impact test shall comply with Test No. 8 of the American Standards Association ASA 226.1.

(2) **LAMINATED GLASS:** (aa) Boil test shall comply with Test No. 4 of American Standards Association ASA 226.1.

(bb) Impact test shall comply with Tests No. 9 and 12 of American Standards Association ASA 226.1

(3) **WIRE GLASS:** Impact test shall comply with Test No. 11 of American Standards Association ASA 226.1.

(d) All glass and plastics shall be permanently labelled in the lower corner with a label visible when installed to show the manufacturers or processors identification, type of glass and thickness.

(e) Requirements herein shall also apply to shower doors and tub enclosures.



### 3509 GLASS VENEER

Glass veneer shall be as set forth in this section.

**3509.1 DIMENSION:** Glass-veneer units shall be not less than  $11/32$  inch in thickness. No unit shall be larger in area than ten square feet where 15 feet or less above the grade directly below nor larger than six square feet where more than 15 feet above the grade directly below.

**3509.2 ATTACHMENT:** Every glass-veneer unit shall be attached to the backing with approved mastic cement and corrosion-resistant ties and shall be supported upon shelf angles.

(a) Where more than six feet above grade, veneer shall be supported by shelf angles and ties shall be used in both horizontal and vertical joints.

(b) Below a point six feet above grade, glass veneer shall rest on shelf angles. Veneering shall not be supported on construction which is not an integral part of the wall, and over sidewalks shall be supported on a shelf angle not less than one-fourth inch above grade.

(c) All edges of glass veneer shall be ground.

**3509.3 MASTIC:** (a) The mastic shall cover not less than one-half of the area of the unit after the unit has been set in place and shall be neither less than one-fourth inch nor more than one-half inch in thickness.

(b) The mastic shall be insoluble in water and shall not lose its adhesive qualities when dry.

(c) Absorbent surfaces shall be sealed by a bonding coat before mastic is applied. The bonding coat shall be cohesive with the mastic.

(d) Glass-veneer surfaces to which mastic is applied shall be clean and uncoated.

(e) Space between edges of glass veneer shall be filled uniformly with an approved type pointing compound.

**3509.4 SHELF ANGLES AND TIES:** (a) Shelf angles shall be of corrosion-resistant material capable of supporting four times the weight of the supported veneer. The shelf angles shall be spaced vertically in alternate horizontal joints, but not more than three feet apart. Shelf angles shall be secured to the wall at intervals not exceeding two feet with corrosion-resistive bolts not less than one-fourth inch diameter. Bolts shall be set in masonry and secured by lead shields.

(b) Ties shall be of corrosion-resistant metal as manufactured especially for holding glass-veneer sheets to masonry surfaces. There shall not be less than one such approved tie for each two square feet of veneer surface.

**3509.5 BACKING:** Exterior glass veneer shall be applied only upon masonry, concrete or stucco.

**3509.6 EXPANSION JOISTS:** Glass-veneer shall be separated from each other and from adjoining materials by an expansion joint at least one-sixteenth inch in thickness. There shall be at least one sixty-fourth-inch clearance between bolts and the adjacent glass.

### **3510 OTHER MATERIALS**

**3510.1 WOOD:** Wood and wood products used for wall claddings shall comply with Chapter 29.

**3510.2 ASPHALT SHINGLES:** Asphalt shingles shall be applied only to solid wood sheathing and shall be tin-capped and spot-stuck, as set forth in Section 3406.2.

**3510.3 ROLL SLATE OR FELT:** Roll slate or felt shall be applied only to solid wood sheathing and shall be secured by nailing, as set forth in Sub-section 3402.5.

**3510.4 METAL SHINGLES:** Metal shingles shall be applied only to solid wood sheathing and shall be secured with 6d nails spaced not more than 12 inches apart, each way, nor less than one nail in each piece of metal.

**3510.5 STEEL SIDING:** Steel siding shall be designed and applied as set forth in Section 2809.5.

**3510.6 ALUMINUM SIDING:** Aluminum siding shall be designed and applied as set forth in Chapter 30.

**3510.7 VENEERS:** Masonry veneers shall be applied as set forth in Chapter 27.

**3510.8 GYPSUM WALLBOARD:** Gypsum wallboard shall comply with the American Society of Testing Material Specifications for "Gypsum Wallboard" Designation C36 and shall be applied in accordance with the requirements of the American Standards Association "Standard Specifications for Gypsum Wallboard Interior Finishes" in Section 3710.

**3510.9 COMBUSTIBLE MATERIALS:** Combustible materials and fire-resistive characteristics of all materials shall be regulated as otherwise required by this Code for the "Group of Occupancy" or "Type of Construction", or as "Interior Finishes" in Section 3710.

**3510.10 OTHER MATERIALS:** Other materials and assemblies shall be classified by the Building Official as one described in this Code and shall comply with the requirements of loading or fire resistance herein required.

### **3511 STORM SHUTTERS**

Where storm shutters are required by this Code or are a criteria of the size of glass as set forth in Paragraph 3508.2(a) such shutters shall effectively close the opening in the wall without coming in contact with or being supported by the glass or its supporting division bars or frame and shall be designed to resist the wind pressures set forth in Section 2306 by methods admitting of rational analysis based on established principles of design. Deflection shall not exceed  $L/80$  under design load. On other than Group I Occupancy such shutters shall be at the site and installed in a typical way for the purpose of final inspection before a Certificate of Occupancy is used for the construction covered by the permit.

## Chapter 36—Occupancy of Public and Restricted Property

- 3601 GENERAL
- 3602 TEMPORARY OCCUPANCY
- 3603 PERMANENT OCCUPANCY
- 3604 RESTRICTED AREAS

### 3601 GENERAL

The occupancy of public and restricted property shall be permitted only in conformity with the provisions of this Chapter, and the right to occupy public property shall be subject to revocation on 30-days' notice to the owner of any building or accessory which in any way occupies such property. The owner shall be responsible for the maintenance of or damage caused by projections over public property.

### 3602 TEMPORARY OCCUPANCY

**3602.1 GENERAL:** No building materials, equipment, machinery, storage sheds, job offices, debris or any other temporary requirement or result of building operations or demolition shall be placed upon any streets, alleys, or sidewalks, except as provided in this Section and in Chapter 33.

**3602.2 STREETS:** (a) Building materials, equipment, debris, and job offices, in connection with new construction or demolition, may be placed upon the street in front of a building in the course of construction, alteration or demolition. The maximum width of such occupied space shall not exceed one-third of the width of the street, measured between curbs, except as temporary closing of streets may be otherwise permitted.

(b) Materials, placed on streets, shall not obstruct any fire-hydrant, fire-alarm box, manhole or catch basin and shall be so placed, or such arrangements shall be made, that the flow of water in gutters shall not be restricted.

**3602.3 SIDEWALKS:** Sidewalks may be occupied for purposes in connection with construction, alterations, or demolition, provided that there shall be a temporary sidewalk, properly guarded and not less than five feet wide, constructed in the outer portion of the street area permitted for such occupancy in Paragraph 3602.2(a), and provided further that sidewalks shall be protected by sheds or fences as specified in Chapter 33.

**3602.4 ALLEYS:** Alleys, or any portion thereof, shall not be occupied for purposes in connection with construction, alterations or demolition; except that the use of all or a portion of any alley may be permitted for limited periods of times.

**3602.5 MISCELLANEOUS REQUIREMENTS:** Public property such as sidewalks and pavements shall be protected from damage incident to construction work or shall be repaired or replaced as required in Section 306.

### **3603 PERMANENT OCCUPANCY**

**3603.1 SIGNS:** Signs shall not be permitted to extend over public property except as specified in Chapter 41.

**3603.2 AWNINGS:** Awnings shall not be permitted to extend over public property except as specified in Chapter 46 and 47.

**3603.3 MARQUEES:** Marquees shall not be permitted to extend over public property except as follows:

(a) Marquees shall be constructed entirely of incombustible materials.

(b) Marquees shall be supported entirely from the building and shall not be used for human occupancy.

(c) No part of a marquee or appendage thereto shall project more than nine feet over public property, nor be less than nine feet above the sidewalk, nor extend closer than 18 inches to the curb line, nor shall the vertical overall depth exceed five feet.

(d) The roof of a marquee shall be sloped to downspouts which shall conduct the water under the sidewalk to the gutter.

(e) Marquees shall be designed for unit loads as specified in Chapter 23.

**3603.4 DOORS AND WINDOWS:** Ground floor doors and windows, including screen doors, either fully opened or when opening, shall not project over public property. Doors required to swing in the direction of egress from a building shall be recessed to comply with this limitation.

**3603.5 PIPES AND SERVICE EQUIPMENT:** (a) Pipes shall not project over public property except as follows:

(1) The downspout from a marquee shall project not more than four inches.

(2) A service conduit and weatherhead more than ten feet above a sidewalk may project a reasonable distance.

(b) Siamese connections to standpipes shall be recessed and shall not project over public property.

(c) Meters and piping shall not extend over public property.

**3603.6 AGRICULTURAL ORNAMENTATIONS AND OTHER PROJECTIONS:** Architectural ornamentations and other projections not otherwise specifically regulated herein may occupy public property when complying with all of the following requirements:

(a) Such projections shall comply with all applicable zoning regulations.

(b) Such projections shall be not less than 9 feet above the grade below.

(c) Such projections shall not extend closer than 18 inches to the curb line.

(d) Such projections shall be constructed of incombustible materials.

(e) Drainage of a projection of two feet or more shall be carried in downspouts under the sidewalk to the curb gutter except that where the roof of such projection is not more than 12 feet above the sidewalk nor more than four feet projection, the drainage may be back to the building and off the end projection adjacent to the building but shall not be drained off the street edge thereof.

**3603.7 FOUNDATIONS:** Foundations of buildings may project on public property, provided such projection shall not exceed three and one-half feet into a public street nor one foot into an alley, and provided that the top of the foundation is not less than 12 inches below the established grade of a sidewalk nor less than 42 inches below the grade of an alley or utility easement.

**3603.8 EXCEPTION:** Where, in this Code, reference is made to a required or minimum vertical distance above public property, such distance is measured from the sidewalk immediately below the projection. Where no such sidewalk is intended and vehicular traffic is permitted adjacent to the building, the minimum clearance shall be not less than 14 feet at any point.

#### **3604 RESTRICTED AREAS**

**3604.1 GENERAL:** Where there is conflict between the set back areas required by zoning regulations and court areas required by this Code for light, ventilation, fire protection, or paths of egress, the more restrictive provisions shall apply.

**3604.2 COURT AREAS:** (a) **EXIT COURTS:** Court areas, for the purpose of providing paths of egress, shall be unobstructed for their required width to a height of eight feet.

(b) **LIGHT AND VENTILATION:** Court areas, for the purposes of light and ventilation, shall be unobstructed for their required width from the lowest required point to the sky; except that sills, belt courses, cornices, eaves and similar horizontal projection may extend into such required widths not to exceed 12 inches for buildings which are three stories or more in height nor more than 18 inches for buildings less than three stories in height.

## **PART VIII — FIRE RESISTIVE STANDARDS & PROTECTION**

### **Chapter 37 — Fire Resistive Standards**

- 3701 GENERAL**
- 3702 FIRE-RESISTIVE MATERIALS AND ASSEMBLIES**
- 3703 PROTECTION FOR STRUCTURAL MEMBERS**
- 3704 FIRE-RESISTIVE RATINGS OF FLOORS AND CEILINGS**
- 3705 FIRE-RESISTIVE RATINGS OF WALLS AND PARTITIONS**
- 3706 FIRE-RESISTIVE DOORS**
- 3707 FIRE-RESISTIVE WINDOWS**
- 3708 PANEL ENCLOSURES**
- 3709 FIRE-RETARDANT ROOF COVERINGS**
- 3710 INTERIOR FINISHES**

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#### **3701 GENERAL**

**3701.1 STANDARDS:** Materials of construction and assemblies or combinations thereof shall be classified for fire-resistive purposes in terms of performances in authoritative tests made by a recognized laboratory in accordance with the "Standard Methods of Fire Tests of Building Construction and Material," ASTM Designation: #119 of the American Society for Testing & Materials, hereinafter called the "Standard Fire Tests."

**3701.2 RATINGS:** For the purpose of determining the degree of fire resistance afforded, the materials and assemblies listed in this Chapter shall be assumed to have the fire resistive ratings herein set forth and other materials and assemblies shall be given fire-resistive ratings by the Building Official, based on reasonable interpolation of ratings herein set forth and/or performance in "Standard Fire Tests."

#### **3702 FIRE-RESISTIVE MATERIALS AND ASSEMBLIES**

**3702.1 GENERAL:** Materials used for fire-resistive purposes shall be limited to those specified in this Chapter or acceptable under the provisions set forth in Section 3701.

**3702.2 CONCRETE:** Concrete shall be as set forth in Chapter 25 and have a 28-day strength of not less than 2500 psi, and not less than 60 percent of the coarse aggregate shall be pumice, limestone, calcareous gravel or traprock.

**3702.3 MASONRY:** Masonry shall be as set forth in Chapter 27 and shall be laid in lime-cement or Portland-cement mortar; except gypsum tile shall, and clay may, be laid in gypsum mortar when not exposed to the weather. Masonry shall be bonded by breaking joints in successive courses.

**3702.4 LATH:** (a) Gypsum lath shall be as set forth herein and in Chapter 35.

(b) Metal lath shall be as set forth herein and in Chapter 35.

**3702.5 PLASTER:** (a) Plaster shall be as set forth herein and in Chapter 35. Thickness of plaster is measured from the face of the plaster base except that with metal lath, it is measured from the back of the lath unless otherwise stated. The usual one-sixteenth-inch white or finish coat may be included in the required plaster thickness.

(b) Pneumatically-placed stucco shall be rated as Portland-cement plaster.

**TABLE No. 37-A**  
**MINIMUM PROTECTION OF STRUCTURAL PARTS BASED ON TIME PERIODS FOR VARIOUS**  
**INCOMBUSTIBLE INSULATING MATERIALS**

Structural Parts To Be Protected	Insulating Material Used	Minimum Thickness of Material In Inches for the Following Fire-Resistive Periods			
		4 Hr.	3 Hr.	2 Hr.	1 Hr.
Steel or Cast-Iron Columnse Steel Beams or Girders; All Members of Primary Trusses	Concrete	2	2	1½	1
	Brick of clay or concrete	3¾	3¾	2¼	1¼
	Clay tile, clay tile and concrete or concrete block <sup>1</sup>	4 or 2 pl. <sup>2</sup>	4 or 2 pl.	2	2
	Solid gypsum blocks <sup>1</sup>	2 pl.	2 pl.	2	2
	Hollow gypsum blocks <sup>1</sup>	3 pl.	3	2	2
	Poured gypsum	2	1½	1	1
	Metal lath and portland-cement pl.	....	....	2¾ <sup>4</sup>	1
	Metal lath and gypsum pl.	....	....	2¼ <sup>4</sup>	¾
	Gypsum-vermiculite or perlite pl. over metal lath	1½ <sup>8</sup>	1 <sup>8</sup>	..	..
	Perforated gypsum lath, ¾"; gypsum sanded pl.	....	2	1	½
	Two ½" layers, plain long-length gypsum lath, <sup>7</sup> wrapped with wire netting; thickness gypsum- vermiculite or perlite pl.	1½ <sup>8</sup>	1 <sup>8</sup>	....	....



	One 3/8" perforated gypsum lath, <sup>7</sup> no netting; thickness gypsum-vermiculite or perlite pl.	1 1/8	1	3/4
	Metal lath and gypsum-vermiculite or perlite pl.	1 1/2 <sup>9</sup> 1 <sup>8</sup>	1 <sup>9</sup> 3/4	3/4 1/2
Reinforcing Steel in Reinforced-Concrete Columns, Beams and Girders	Concrete	1 1/2	1 1/2	1 1/2
Reinforcing Steel in Reinforced-Concrete Joists	Concrete	1 1/4	1 1/4	1
Ceiling Protection for Steel Roof Members, Including Steel Roof Trusses and Secondary Trusses	Metal or wire lath and gypsum or cement pl., concrete, burned-clay products or gypsum	2	1 1/2	
	Metal lath and gypsum-vermiculite or perlite pl.	1 <sup>5</sup>	1/2 or 3/4	1 3/4
Reinforcing in Floor and Roof Slabs	Concrete or gypsum <sup>a</sup>	1	1	3/4

## NOTES FOR TABLE 37-A

1—See Note 3 in "Notes for Table 37-A."

2—The letters "pl." in Table 37-A shall mean gypsum or cement plaster.

3—Reentrant parts of protected members shall be filled solid for 4- and 3-hour protection.

4—Two layers with 3/4-inch air space between.

5—3/8 in h of gypsum-vermiculite or perlite plaster plus 1/2 inch of light-weight-aggregate, acoustical plaster may be used.

6—Thickness includes gypsum or cement plaster.

7—Lath applied tight against column flanges.

8—Perlite plaster, lath furred 7/16 inch from member, and vermiculite plaster, lath furred 1 1/4 inch from member, and space behind lath on flange faces filled with plaster.

9—Thickness required for column protection. Lath spaced 1 1/4 inch from column. Space behind lath on flange faces filled with plaster.

**TABLE No. 37-B—MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEMS**

Material	Construction	Minimum Thickness of Ceiling in Inches				Minimum Thickness of Floor or Roof Slab in Inches			
		4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.
Poured-in-place concrete	Slab or open rib	..	4	3	2½	..	..	..	..
	Open rib with metal lath and pl. ceiling	..	3	2½	2	..	7/8	¾	¾
	Tile rib	..	2½ <sup>1</sup>	2 <sup>1</sup>	2 <sup>1</sup>	..	7/8	¾	¾
Precast concrete joists concrete or gypsum slab	Ceiling on metal or wire lath gypsum or portland cement pl. <sup>2</sup>	..	..	2½	2	..	..	¾	¾
	Ceiling of gypsum lath and pl.	..	..	2½	2	..	..	..	¾
	No ceiling	..	..	..	2½	..	..	..	..
Steel joist or light-steel construction, with attached or suspended ceiling, concrete or gypsum slab	Concrete or gypsum slab	2½	2½	2	2	..	..	..	..
	Ceiling, metal lath, sanded-gypsum, pl.	..	..	..	..	..	1 <sup>3</sup>	¾	¾
	Ceiling, metal lath, gypsum vermiculite or perlite pl.	..	..	..	..	1 <sup>5</sup>	¾	¾	¾
	Ceiling, gypsum lath, gypsum vermiculite or perlite pl.	..	..	..	..	..	..	..	7/8
	Ceiling, gypsum lath, gypsum sand pl.	..	..	..	..	..	..	5/8 <sup>7</sup>	..
	Ceiling, metal lath, portland-cement, pl.	..	..	..	..	..	..	..	¾
Steel joists or light-steel construction with attached or suspended ceiling	T. & G. wood flooring on wood nailing strips. Ceiling, gypsum or metal lath, gypsum pl.	..	..	..	1 nom.	..	..	..	¾

Steel roof deck on steel framing with suspended ceiling of metal or wire lath	Incombustible fill with cement binder on top of deck; ceiling gypsum vermiculite or perlite	2	1½	1	1	7/8	¾
	Gypsum pl. sanded 1:2		1½	1		7/8	¾
Wood joists with sub-flooring of 1" nom.; or 5/8" plywood with a layer of building paper and T. & G. flooring	Ceiling of gypsum lath <sup>a</sup> and gypsum sanded pl. 1:2 or gypsum vermiculite or perlite pl.			1/8			7/8
	Ceiling of metal lath and gypsum or portland-cement pl. or gypsum-vermiculite or perlite pl.			1/8			¾
	Ceiling of two layers of 1/2" gypsum wallboard with staggered joints, a separately attached 20-gauge, 1" wire mesh between the two layers			1/8			

## NOTES FOR TABLE 37-B

- 1—Requires top covering of solid masonry equal to one-half thickness of slab or arch.
- 2—Portland-cement plaster with 15 pounds of hydrated lime and three pounds of asbestos fiber per bag of portland cement.
- 3—Neat, wood-fiber gypsum plaster.
- 4—Staggered joints.
- 5—5/8 inch of gypsum-vermiculite or perlite plaster plus 1/2 inch of light-weight-aggregate accoustical plaster may be used.
- 6—All joints reinforced with three-inch strips of metal lath.
- 7—14-gauge-wire reinforcing, 12-inch furring spacing.

**TABLE No. 37-C. RATED FIRE-RESISTIVE PERIODS VARIOUS WALLS AND PARTITIONS**

Material	Construction	Minimum Finished Thickness, Face to Face (Including Plaster Where Mentioned), in Inches (Nominal)			
		4 Hr.	3 Hr.	2 Hr.	1 Hr.
Brick of clay or concrete and plain concrete	Solid	8	...	5 <sup>1</sup>	4 <sup>1</sup>
	One cell in wall thickness. Plastered	...	...	...	3 <sup>1</sup>
Hollow clay tile	Two cells in 8" or less thickness. Unplastered	16	12	...	or 8
	Two cells in 8" or less thickness. Plastered	13	9	7 <sup>1</sup>	...
	Three cells in 8" or less thickness. Unplastered	12	...	...	...
	Three cells in 8" or less thickness. Plastered one side	...	8½	...	...
	Three cells in 8" or less thickness. Plastered	9	...	...	...
Combination of brick and hollow concrete block or clay tile	4" brick and 4" tile. Plastered one side (Hollow unit side)	9	...	...	...
	1¼" face shells. Unplastered	...	...	8	4 <sup>1</sup>
Hollow concrete block	1¼" face shells. Plastered one side	...	8½ <sup>2</sup>	...	...
	1¼" face shells. Plastered both sides	9 <sup>2</sup>	...	...	...
Solid concrete	Reinforcement not less than 0.2% in each direction	6	5	4 <sup>1</sup>	2 <sup>1</sup>
	Unplastered	6 <sup>1</sup>	5 <sup>1</sup>	4 <sup>1</sup>	3 <sup>1</sup>
Hollow gypsum block	Plastered each side	5 <sup>1</sup>	4 <sup>1</sup>	4 <sup>1</sup>	3 <sup>1</sup>
	Incombustible studding with metal or wire lath and portland-cement plaster	...	...	...	2 <sup>1</sup>

Solid gypsum or portland-cement plaster	Incombustible studding with metal or wire lath, neat wood-fibre gypsum plaster	...	...	2 <sup>1</sup>	...
	Studless partition; incombustible runners; 3/8" plain-gypsum lath; gypsum plaster, each side <sup>1</sup>	..	...	...	2 <sup>1</sup>
	Incombustible studding with metal or wire lath, gypsum-vermiculite or perlite pl. or sand 1:2	...	...	2 1/2 <sup>1</sup>	2 <sup>1</sup>
	Studless partition, incombustible runners, 1/2" plain-gypsum lath, gypsum-vermiculite or perlite pl. each side	...	...	2 1/2 <sup>1</sup>	2 <sup>1</sup>
	Incombustible studding with metal or wire lath, 3/4" pl. on each side	...	...	...	3
	Incombustible studding with metal or wire lath, 1" pl. on each side	...	...	4 1/2	...
Hollow stud partition with gypsum or portland-cement plaster on each side or gypsum wallboard	Incombustible studding with 3/8" perforated gypsum lath, 5/8" neat wood-fibre plaster	...	...	...	6
	Wood studs with metal or wire lath, 3/4" pl. each side	...	...	...	5
	Wood studs with 3/8" perforated gypsum lath, 1/2" gypsum plaster each side	...	...	...	5
	Wood studs with space between filled with mineral-wool bats <sup>3</sup> nailed to studs, 1/2" gypsum wall board each side	...	...	...	4 1/2
	Wood studs with two layers of 3/8" gypsum wallboard each side, joints staggered	...	...	...	5

## NOTES FOR TABLE 37-C

1—Shall be used for non-bearing purposes only.

2—One-part gypsum to one-part sand, by weight, for scratch coat; and one-part gypsum to two-parts sand, by weight, for brown coat.

3—Mineral or slag-wool bats shall weigh not less than 1.0 lb. and glass-wool bats not less than 0.6 lb. per sq. ft. of wall surface.

4—One-part gypsum to one-part sand for scratch coat and two-parts sand for brown coat.

Thicknesses given for masonry or wood units are nominal.

### **3704 FIRE-RESISTIVE RATINGS OF FLOORS AND CEILINGS**

**3704.1 GENERAL:** Fire-resistive floors or ceilings shall have the ratings set forth in Table 37-B.

**3704.2 CEILINGS:** Where a ceiling of lath and plaster as approved for one-hour fire-resistive construction, as specified in this Chapter, is used below slabs or structural members not otherwise required to be protected by such a ceiling, the required thickness of slab and fire protection of structural members may be reduced one-half inch; but in no case shall the slab thickness be less than two inches.

#### **3704.3 FIRE-RESISTIVE AND INSULATING TILE CEILINGS:**

(a) Wall and ceiling tile shall comply with Section 3710 or be incombustible or fire-resistive as otherwise set forth herein.

(b) Suspended ceiling tile providing required fire total protection shall be as follows:

(1) Each tile shall be attached to the supporting runners to resist uplift. Clips where required to resist uplift shall be spaced 12 inches apart along the runner.

(2) Where the area of a ceiling exceeds 100 square feet suitable methods to resist uplift forces shall be provided for each 64 square feet of ceiling.

### **3705 FIRE-RESISTIVE RATINGS OF WALLS AND PARTITIONS**

**3705.1 GENERAL:** Fire-resistive walls and partitions shall have the ratings set forth in Table 37-C.

**3705.2 COMBUSTIBLE MEMBERS:** Combustible members framed into a wall shall be protected at their ends by not less than one-half the required fire-resistive thickness of such wall.

### **3706 FIRE-RESISTIVE DOORS**

Doors which are required to be fire-resistive shall be as set forth in this section.

**3706.1 FIRE-RESISTIVE RATINGS:** (a) Fire-test ratings of fire doors, as enumerated in the "List of Inspected Fire-Protection Equipment and Materials," issued by the Underwriters Laboratories, Inc., and installed in accordance with the "Standards" of the National Board of Fire Underwriters, "For the Protection of Openings in Walls and Partitions Against Fire," shall be approved doors. Such doors shall be related to the degree of fire resistance specified for the wall or partition to which it is installed, as follows:

	<b>DOOR RATING</b>
In 4-hr. fire-resistive walls or partitions	3 hours
In 3-hr. fire-resistive walls or partitions	2 hours
In 2-hr. fire-resistive walls or partitions	1 hour
In 1-hr. fire-resistive walls or partitions	See below

In walls or partitions required to be of one-hour fire-resistive construction, fire doors of three-quarters-hour fire-test rating shall be installed; or in interior partitions or where approved by the Building Official, any of the following doors set forth in Paragraph 3706.1(d) may be installed; provided their frames, accessories, installation and operation conform with the requirements of this section:

(1) Sheet-metal doors constructed of two sheets of metal of not less than 26 U.S. gage, fastened to a structural-steel frame in such manner as to leave a one-inch space in the panels, which space shall be filled with asbestos.

(2) Metal-clad doors which shall be wood panel doors with frame not less than one and three-fourths inches in thickness and with wood panels not less than three-fourths of an inch in thickness, the whole door covered with not less than No. 26 gage metal. The panels of such doors shall fit into the frame not less than three-fourths of an inch and all joints of metal shall be lapped and nailed tightly to the wood frame.

(3) Doors as in (2) but with one-fourth inch rigid asbestos board securely nailed to the face thereof and the edge protected by 26 gage sheet metal.

(4) In the construction of fire doors, solder shall not be used, except for filling joints. Sheet metal shall be fastened to wood by nailing and to metal frame by bolting, riveting or welding.

(b) Fire-resistive doors when required to be more than one-hour fire-resistive, shall bear the approval and rating label of the Underwriters' Laboratories, Inc.

(c) The following labels of the Underwriters Laboratories, Inc., shall be approved labels within the meaning of this Section:

(1) Label marked "Fire Door for Opening in Fire Walls" or marked Class "A" shall be approved for three-hour rating.

(2) Label marked "Fire Door for Opening in Vertical Shaft" or marked Class "B" shall be approved for two-hour rating.

(3) Label marked "Fire Door for Opening in Corridor or Room Partition" or marked "Fire Door for Opening in Exterior Wall" or marked Class "C," "D," "E," or "F" shall be approved for one-hour rating.

(d) Glazed openings shall not be permitted in a fire assembly required to have three-hour or two-hour fire-resistive rating. Glazed openings shall be limited to one observation panel not exceeding 12 inches in width or height and 100 square inches in area for fire assemblies required to have one-hour fire-resistive rating except that where a rated, labeled, three-fourths-hour fire-resistive assembly shall be limited by the conditions of the test set forth in the approval.

**3706.2 DETAILED REQUIREMENTS:** (a) Fire-resistive doors, when closed, shall completely cover the doorway in the walls and partitions or the openings in the floors or roofs to which they are fitted. A swinging door shall either overlap both jambs and the head of the opening not less than four inches, or be fitted to a fire-resistive frame with a rabbet the full thickness of the door and with not less than one-half inch overlap on the door. A sliding fire door, except in enclosures of passenger elevators, shall overlap both jambs, and the head of the opening not less than four inches. A sliding fire door in an enclosure of a passenger elevator shall overlap jambs, head and adjoining panels not less than one-half inch. Fire doors shall fit closely at the floor with clearance of not over one-fourth inch.

(b) In buildings with combustible floors, doorways required to have fire doors shall have incombustible thresholds, extending at least four inches from each face of the door and extending laterally at least six inches beyond each jamb of the doorway. Thresholds may be flush with the floor.

(c) Fire doors, when closed, shall fit tightly against the wall or frame to provide an effective stop for fire and smoke, and self-closing devices shall be such as to hold them closed against opening by heat pressure. No combustible materials shall intervene between the door and the fire-resistive material of the wall, floor or roof to which it is fitted.

(d) Hardware for fire doors required to be rated two hours or more shall be of malleable iron or rolled structural steel not less than three-sixteenths-inch thick except that tubular steel track for sliding doors may be not less than one-eighth-inch thick. Fire doors shall not depend upon cords, cables or chains to support them in closed position, except in elevator shafts.

(e) Tracks for sliding fire doors shall be so supported that a track hanger comes at each door hanger when the door is closed. Track hangers shall be secured to masonry walls by through-bolts and to concrete walls by through-bolts or approved built-in inserts. Expansion shields shall not be used to support fire doors.

(f) Hinges for swinging fire doors shall be riveted or through-bolted to the structural steel frame of the opening or through-bolted to walls of masonry or concrete or secured by approved inserts in the concrete or built into masonry in an approved manner.

(g) Strap hinges and sliding door hangers shall be secured to fire doors by through-bolting, riveting or welding. Swinging fire doors in rabbeted frames, except in tin-clad wood core doors, may be hung on butts. Other swinging fire doors shall have long strap hinges.





(h) Sliding fire doors shall have adequate stops for the closed position and shall have surface latches or unit locks. The latch bolts of unit or mortise locks on fire doors shall have a throw of three-fourths inch. When mounted in pairs, fire doors shall be rabbeted by means of an astragal or otherwise where they come together. Each section of swinging fire doors shall have push bolts at top and bottom with a throw of three-fourths inch actuated by panic hardware.

(i) Except in detention buildings, fire doors hung in required exits shall be so fitted with hardware that they can be opened in any possible direction of egress without use of a key when the building is occupied.

### **3707 FIRE-RESISTIVE WINDOWS**

**3707.1 GENERAL:** Windows which are required to be fire-resistive shall be as set forth in this Section or as enumerated in the "List of Inspected Fire-Protection Equipment and Materials" issued by the Underwriters Laboratories, Inc.

**3707.2 DETAILED REQUIREMENTS:** (a) Fire windows shall have a fire resistance rating of not less than three-fourths of an hour, and shall have frames and sash of solid steel sections or of hollow steel or iron shapes fabricated by pressing, riveting, interlocking, welding or crimping together, but not by the use of solder or other fusible alloy.

(b) Wire glass not less than one-fourth inch thick shall be used in all fire-resistive windows. Size of individual glass lights shall not exceed 720 square inches of exposed area. Continuous glazing angles shall be provided on the inside of all fire windows, except such casement section sash, outside glazed, having wire clips, as have been approved by the Underwriters Laboratories, Inc.

(c) Maximum sizes of fire windows shall be as follows: Hollow metal window frames shall be limited to a height not exceeding ten feet and a maximum width of six feet for double hung and for counter-weighted type and for counter-balanced type, a maximum width of six feet for fixed sash windows, and of five feet for all other types.

(d) Solid section window frames shall be limited to a maximum size of 84 square feet with maximum dimension not exceeding 12 feet except that solid section windows when used with the unprotected steel mullions shall be limited to seven feet in width. Solid section mullions when used in lengths exceeding 12 feet shall be fire protected.

### **3708 PANEL ENCLOSURES**

**3708.1 GENERAL:** Exterior walls fronting on streets not less than 30 feet wide, and which have the necessary structural frame, may have panel enclosures as specified in this Section, to a height not exceeding 15 feet.

**3708.2 CONSTRUCTION DETAILS:** (a) The structural frame shall be fireproofed as set forth under Types of Construction.

(b) Plate glass shall be as set forth in Section 3508.

(c) Grille-work used for store fronts and other similar purposes shall be of substantial metal, and the frames shall be metal or metal clad securely anchored to the building frame as may be necessary to provide lateral support.

(d) (1) Doors and frames thereof used for the enclosure of store fronts and similar purposes, other than normal width entrance and exit doors shall be metal or metal clad in all buildings fronting on streets less than 50 feet in width.

(2) Doors used for panel enclosures on street fronts may be overhead, vertical, or horizontal rolling, sliding, swinging, accordion or any other suitable arrangement where proper provisions may be made to secure the doors at all sides when closed. Such doors and their frames or supports shall be substantially constructed and shall be capable of withstanding wind pressures, as specified in Chapter 23, acting either inward or outward. Wood doors shall have a minimum thickness of one and three-fourths inches and metal used for covering such doors, where required, shall be non-corrosive and not less than 26-gage.

### **3709 FIRE RETARDANT ROOF COVERINGS**

Roof coverings shall be required to be fire retardant where and as set forth in Chapter 34.

### **3710 INTERIOR FINISHES**

**3710.1 GENERAL:** Interior finish shall include the exposed interior surfaces of buildings where the surface is an integral part of the buildings or affixed thereto. Ordinary paint or wall paper, floor coverings, curtains, draperies and other furnishings shall be included in interior finish.

**3710.2 CLASSIFICATION:** Interior finish materials shall be classified in accordance with their average flame spread rating on the basis of tests conducted in accordance with ASTM Standard No. E84.

**3710.3 USES OF INTERIOR FINISH:** (a) Interior finish materials used in buildings except Group I occupancies shall not have flame spread ratings greater than as follows

(1) 75 in exit stairways and exit hallways that are part of exit ways required by this Code except that doors, unless otherwise required to be fire resistive, may have a rating not exceeding 200.

(2) 75 in all portions of buildings more than eight stories or 100 feet in height except that in rooms or spaces 1,500 square feet or less in area, the interior finish materials may have a flame spread rating of not greater than 200.

(3) 75 in all portions of buildings used for institutional occupancies.

(4) 200 in all portions of buildings not required to have lower flame spread ratings by Sub-paragraphs (1) or (2) or (3) of this Section, except that in rooms or spaces 1,500 square feet or less in area used for Groups E, F and G occupancies, the interior finish materials may have a flame-spread rating of not greater than 500.

(b) The flame-spread-rating limitations in this section shall apply to both the exposed and back faces of interior finish materials when such materials are used in:

(1) Rooms, spaces, and exit stairways and exit hallways that are part of required paths of egress; or

(2) Rooms or spaces used in connection with Groups A and B occupancies.

(3) **EXCEPTION:** The flame-spread-rating limitations shall not apply to the back faces of interior finish material applied directly to an incombustible backing.

(4) **EXCEPTION:** The classification of ceiling materials applied under a plaster ceiling may be reduced one classification where the entire building is equipped with an automatic sprinkler system.

**3710.4 FIRESTOPPING IN BACK OF WAINSCOTING AND PANELING:** Except in Group I occupancies, all spaces between combustible wainscoting or paneling and the wall or partition to which it is attached shall be firestopped to form areas not exceeding seven feet in any dimension.





## Chapter 38 – Fire-Extinguishing Apparatus

- 3801 AUTOMATIC SPRINKLER SYSTEM**
- 3802 CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS**
- 3803 STANDPIPES**
- 3804 WATER SUPPLY**
- 3805 FIRE DEPARTMENT CONNECTIONS**
- 3806 YARD HYDRANTS**
- 3807 PORTABLE FIRE EXTINGUISHERS**
- 3808 INSPECTION AND TESTS**

### **3801 AUTOMATIC SPRINKLER SYSTEMS**

**3801.1** In new buildings or buildings altered to increase the area or height and in existing buildings as set forth in Sub-sections 104.9 and 503.1 approved automatic sprinkler systems shall be installed and maintained in accordance with the following paragraphs, except that the Building Official shall require or may permit a carbon dioxide fire-extinguishing system, as set forth in Section 3802, to be used in lieu of such sprinkler system. The areas referred to shall be the areas set forth in Part III, "Groups of Occupancy," as allowable floor areas for the various Types of Construction. Combustible goods and merchandise shall include those made of wood, cloth or rubber; those containing flammable liquids; those packed with excelsior, paper or moss; and other goods or merchandise of equivalent, or greater, combustibility. Combustible shall be as defined in Chapter 4 herein. Approved automatic sprinkler systems shall be required as follows:

(a) In the following locations in buildings of Group A, or in buildings of Group B or C Occupancy, having a stage:

(1) In motion-picture booths.

(2) In all accessible locations on the stage side of a proscenium opening, including under the stage floor, gridiron, and tie and fly galleries.

(3) In dressing rooms, workshops and storerooms.

A line of sprinklers shall be installed on the stage side and immediately back of, the proscenium curtain and not more than five feet above the proscenium arc.

(b) In motion-picture booths of buildings of Group A or B Occupancy, not having a stage and having a seating capacity of 500 or more persons.

(c) In buildings of Group E Occupancy having an area of more than 1500 square feet and in buildings or portions of buildings of any other occupancy having an area of more than 1500 square feet and having hazardous uses such as, but not limited to planing mills, wood working shops, mattress factories, film exchanges, dry cleaning plants using flammable liquids, paint spray rooms, paint manufacturing or storage rooms, rooms where combustible fibres or dust is manufactured, processed or generated and rooms for processing and storage of waste paper and rags.

(d) In buildings or within fire divisions of buildings one and two stories in height used for the manufacture, sale or storage of combustible goods or merchandise and exceeding 20,000 square feet in area. In buildings or within fire divisions of buildings three or more stories in height used for the manufacture, sale or storage of combustible goods or merchandise and exceeding 10,000 square feet in area.

Any goods or merchandise packaged or packed in paper, cardboard or wood containers and similar packing or packaging shall be considered combustible.

(e) In repair garages over one story in height, repair garages exceeding 8,000 square feet in area and located in a building of mixed occupancy, and one-story repair garages exceeding 15,000 square feet in area.

(f) In all portions of film-storage rooms, as set forth in Section 4104, other high-hazard spaces, and in basements used for storage or maintenance workrooms in all buildings more than two stories in height.

(g) In dry goods and apparel manufacturing shops in buildings of Type II or Type III construction, constructed of combustible materials or of Type IV or Type V construction, where any such building exceeds 2,500 square feet in area.

**3801.2 DETAILED REQUIREMENTS:** (a) The "Standards for the Installation of Sprinkler Systems." NFPA No. 13 1965 of National Board of Fire Underwriters is hereby adopted as a part of this Code and supplements, but does not supersede, the requirements set forth herein.

(b) The alarm valve required for a standard sprinkler system shall be required only of Group A Occupancy and basements exceeding 3000 square feet of other occupancies.

**3801.3 WATER SUPPLY:** The water supply for sprinkler systems shall be as set forth in Section 3804.

### **3802 CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS**

**3802.1 GENERAL:** Carbon dioxide fire-extinguishing systems may be substituted for required sprinkler systems in places not commonly used by the public as follows:

(a) The Building Official may require such substitution.

(b) The Building Official may approve such substitution.

**3802.2 DESIGN AND CONSTRUCTION:** Carbon dioxide fire-extinguishing systems shall comply in all respects with the "Standards for Carbon Dioxide Fire-Extinguishing Systems." N F P A No. 12 of the National Board of Fire Underwriters.

**3802.3 WHERE PERMITTED:** Carbon dioxide fire-extinguishing systems may be used in rooms or enclosures containing flammable liquids in enclosed or open containers, ovens, dryers, electrical and other special machinery and apparatus and processes involving the use of flammable liquids, vapor or dusts, fur storage, lumber kilns, coal bins, loose textile stocks, grain-handling machinery, and in other enclosures containing stocks through which gas may permeate and where protection by water or other means may be ineffective or undesirable; also in vaults, library stockrooms, organs and other such places where fires may be extinguished by carbon-dioxide gas with less loss than if water is used.

### **3803 STANDPIPES**

Wet Standpipes having a primary water supply constantly or automatically available at each hose outlet shall be provided in buildings hereafter erected, or existing buildings altered to increase the area or height, as set forth in this section. A permit for a standpipe system shall be required as set forth in Sub-section 4601.5 and inspections shall be as set forth in Sub-section 4601.6.

**3803.1 WHEN REQUIRED:** (a) One or more interior standpipes shall be required in every building of Group A occupancy of any height, and every building of Group Beand C occupancy two or more stories in height, and every building of Group E and F occupancy over 10,000 square feet in area, regardless of the number of stories.

(b) In every building of Group B, Division 2 Occupancy, three or more stories in height.

**3803.2 DETAILED REQUIREMENTS:** (a) **LOCATION:** In buildings of Groups A and B occupancies, standpipes and hose stations shall be located on each side of the stage, on each side of the rear of the auditorium, and on each side of and near an exit at the rear of the balconies.

(b) **NUMBER REQUIRED:** The number of standpipes and hose stations shall be such that all parts of every floor can be reached within 30 feet by a nozzle connected to 75 feet of hose connected to a hose-station valve outlet.

(c) **WATER SUPPLY:** The water supply for standpipes shall be as set forth in Sub-section 4617.2.

(d) **OTHER:** Other detailed requirements shall be as set forth in Sub-section 4617.1.

#### **3804 WATER SUPPLY**

The water supply for all required fire extinguishing apparatus shall be as set forth in Sub-section 4617.2.

Every standpipe and/or sprinkler shall have fire department connections as set forth in Sub-section 4617.3.

#### **3805 FIRE-DEPARTMENT CONNECTIONS**

**3805.1** (a) One Siamese (duplex) Fire Department connection shall be provided for each of the first three required standpipe risers except that a single standpipe not exceeding 2½ inches in diameter need not have a Fire Department connection when, in the opinion of the Fire Inspector, sufficient pressure or volume is provided. Where a building is required to have two or more Siamese connections such connections shall be located remote from each other and where a building faces on two or more streets, a connection shall be located on each street exposure. All standpipes shall be cross-connected at their bases. Siamese (duplex) connections shall be of the same pipe diameter as the largest diameter of any standpipe connected thereto.

(b) One Siamese (duplex) Fire Department connection shall be provided for each sprinkler system. Where a building faces on two or more streets, there shall be not less than two Siamese connections located remote from each other separate street exposures. Siamese connections shall be not less than four inch diameter.

**3805.2** Fire Department connections shall be 2½ inch N.S.T. hose connection located on the street-front wall not less than one foot nor more than three feet above grade. Piping shall not project over public property and recesses shall be provided in property line walls.

**3805.3** A permanent, legible sign with letters at least one inch high shall be attached to the exterior of the building adjacent to the connection, and such sign shall read "STANDPIPE" and/or "SPRINKLER" where applicable.



### **3806 YARD HYDRANTS**

**3806.1 WHERE REQUIRED:** Boatyards, oil-storage tanks, lumber yards or exhibition parks or other similar enclosures, when deemed necessary by the Building Official, shall have not less than one yard hydrant and hose for each 20,000 square feet of area.

**3806.2 DETAILED REQUIREMENTS:** Yard hydrant shall be constructed as set forth in Sub-section 4617.4.

### **3807 PORTABLE FIRE EXTINGUISHERS**

**3807.1 WHERE REQUIRED:** Portable fire extinguishers shall be installed and maintained as specified in this section as follows:

In buildings for Group A Occupancy: In every projection room and one for each 2500 square feet of floor area or within a travel distance of 75 feet.

In buildings for Groups B, C, D, and E occupancies: One to each 2500 square feet of floor area, but not less than one to each story or within a travel distance of 75 feet.

In buildings for Groups F, G and H Occupancies: One to each 2500 square feet of floor area, but not less than one to each path of egress or within a travel distance of 75 feet.

In buildings for Group J Occupancy: As required by the Building Official, complying generally with the above requirements.

**3807.2 DETAILED REQUIREMENTS:** A portable fire extinguisher shall consist of a container or containers having a capacity of not less than one unit of fire protection, as defined by the National Fire Prevention Association, so arranged and equipped that pressure may be generated and the contents discharged through a hose and nozzle, or a portable extinguisher of other type, approved as equal by the Building Official. "The Standard for the Installation, Maintenance and Use of Portable Fire Extinguishers of the National Fire Protection Association No. 10, 1963 is hereby adopted as a part of this code to supplement, but not supersede, the specific requirements set forth herein.

Portable fire extinguishers, where required, shall be mounted in corridors or other approved locations generally accessible to the occupants of the building. Where they are placed in cabinets, they shall be visible, and doors shall be unlocked or of glass which can be broken to give access to the extinguisher in case of fire.

### **3808 INSPECTIONS AND TESTS**

**3808.1 GENERAL:** All required fire-extinguishing apparatus shall be inspected at least once a year, and such other tests shall be made as the Building Official shall require. Hose and other parts, considered by the Building Official to be defective, shall be replaced immediately on demand.

**3808.2 PORTABLE FIRE EXTINGUISHERS:** Portable fire extinguishers shall be recharged as often as shall be generally required by the Building Official for extinguishers of each type, but not less frequently than once each year, and shall be recharged immediately after each time used.







## Chapter 39 — Chimneys, Flues, Vents and Fireplaces

### 3901 GENERAL

#### 3902 TYPE A FLUES OR VENTS

#### 3903 TYPE B FLUES OR VENTS

#### 3904 TYPE C FLUES OR VENTS

#### 3905 SMOKEPIPES AND FLUE CONNECTORS

#### 3906 FIREPLACES

### 3901 GENERAL

**3901.1 GENERAL:** Chimneys, flues, vents and fireplaces, and their connections, carrying products of combustion, shall conform to the requirements of this Chapter and in Chapter 41.

**3901.2 EQUIPMENT AND APPLIANCES:** Equipment and appliances connected to chimneys, flues, vents and fireplaces shall be of approved types and shall be installed and maintained as set forth herein and in Chapters 40 and 47.

**3901.3 DEFINITIONS AND CLASSIFICATION: APPLIANCES, HIGH HEAT,** are any installations or equipment in which the temperature of the flue gases as they enter the flue is above 1500° F.

**APPLIANCES, MEDIUM HEAT,** are any installations or equipment in which the temperature of the flue gases as they enter the flue is between 550° F to 1500° F.

**APPLIANCES, LOW HEAT,** are any installations or equipment in which the temperature of the flue gases is up to 550° F.

**CHIMNEYS, FLUES OR VENTS** are conduits or passageways for conveying products of combustion to the outer air and shall be classified as Type A, Type B or Type C.

**CONDENSATE** is the liquid which separates from a gas due to a reduction in temperature.

**FIREBRICK** is any refractory fire-clay brick which meets the approval of the Building Official.

**FIRE-CLAY FLUE LINING** is flue lining made of fire clay.

**FLUE COLLAR** is that portion of any appliance designed for the attachment of a draft hood.

**SMOKEPIPE** is the pipe connecting a heat-producing appliance burning solid or liquid fuels to a flue or vent.

**VENT CONNECTOR** is a pipe connecting a heat producing appliance burning gas fuel to a flue or vent.

### 3902 TYPE A FLUES OR VENTS

**3902.1 GENERAL:** Type A flues or vents shall consist of chimneys, metal smokestacks and special flues approved by the Underwriters Laboratories and the Building Official. Type A flues or vents shall be required for: (1) solid and liquid fuel-burning heating equipment, and (2) gas burning equipment which produces flue gas temperatures in excess of 500° Fahrenheit at the outlet of the appliance or the draft hood when burning gas at the input rating specified by the manufacturer of such equipment.

**3902 CHIMNEYS** (a) **DESIGN:** (1) Chimneys shall be designed, anchored and supported as set forth herein and as specified in Chapters 23, 25 and 27, except that fireplaces complying with Section 3906 may be used for solid fuels or liquid fuel-burning equipment where the temperature of the flue gases, as they enter the flue, does not exceed 1000° Fahrenheit.

(2) No chimney shall support any structural load other than its own weight.

(3) Chimneys shall be anchored laterally at each floor and roof line by incombustible struts, walls or beams, except that for chimneys built integrally with masonry walls not less than eight inches in thickness and bonded thereto, such wall shall be considered proper lateral support.

(4) Chimneys shall be supported on reinforced concrete footings or grade beams or on steel beams having not less than two-hour fire-resistive protection.

(b) **WALLS AND FLUE LINING** (1) Masonry chimneys serving low and medium-heat appliances shall have walls of not less than eight inches of solid masonry or six inches of reinforced concrete or four inches of solid masonry and eight inches of block. Mortar used in laying up units of chimney construction shall be Portland cement mortar.

Masonry chimneys serving low and medium-heat appliances shall be lined with approved fire-clay flue lining not less than five-eighths-inch thick or with other approved liners of material that will resist a temperature of 1800° Fahrenheit without softening or cracking. The lining shall extend from eight inches below the lowest inlet to a point at least four inches above enclosing masonry walls. Flue linings shall be installed ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in fire-clay mortar, with close-fitting joints left smooth on the inside. Firebrick may be used in place of fire-clay flue lining and shall be not less than two inches thick. Cracked or broken flue lining shall not be used. Firebrick shall be laid in fire-clay.

(2) Masonry chimneys serving high heat appliances shall be built with double walls, each not less than eight inches in thickness with an air space of not less than two inches between them. The inside of the interior walls shall be of firebrick not less than four inches in thickness, laid in fire-clay mortar or refractory cement.

(c) **FLUE AREA:** No flue shall be smaller in area than the flue connection on the appliance attached thereto, provided that where more than one appliance is connected to such flue the area shall be increased as set forth in Sub-paragraph 3903.2(e) (1).

(d) **HEIGHT:** Every chimney shall extend at least two feet above that part of the roof through which it passes and at least two feet above the highest elevation of any part of the building within ten feet of the chimney. The Building Official may approve a chimney of lesser height installed with an approved vent cowl having a spark arrester whose opening shall be not less than six feet from any part of a building measured horizontally on the same or adjacent property or parcel.

(e) **CORBELING:** No chimney shall be corbeled from a wall.

(f) **SEPARATION OF CHIMNEY LINERS:** When more than one flue or vent is contained in the same chimney, masonry separation at least four-inches thick shall be provided to separate flues.

(g) **INLETS:** Every inlet to any chimney shall enter the side thereof and shall be of not less than one-eighth-inch thick metal or five-eighths-inch thick refractory material.

(h) **CLEARANCE:** Combustible material shall not be placed within two inches of chimneys nor less than required to comply with the Standard set forth in Paragraph 4001.2(c).

**3902.3 METAL SMOKESTACKS:** (a) **SCOPE:** The requirements of this Sub-section shall not be applicable to buildings of Group H or I occupancy, and no such smokestack shall be permitted in buildings of Group H or I occupancy or in other occupancies normally used for sleeping purposes.

(b) **DESIGN:** Smokestacks shall support no vertical loads other than their own weight and shall be capable of resisting wind forces and of supporting its own weight without exceeding the stresses set forth in Chapter 28.

(c) **CONSTRUCTION AND SUPPORT:** Metal of smokestacks shall be not less than the following thicknesses:

Diameter of Stack	Metal Thickness
Not more than 8 inches	No. 16 gage
More than 8 inches, not over 12 inches	No. 12 gage
More than 12 inches, not over 16 inches	No. 10 gage
More than 16 inches, not over 24 inches	No. 8 gage
More than 24 inches, not over 30 inches	3/16 inch
More than 30 inches, not over 43 inches	1/4 inch

Smokestacks shall be properly riveted or welded and, unless structurally self-supporting, shall be guyed to incombustible construction.

Metal smokestacks used for high-heat appliances shall be lined with four-inch firebrick laid in fire-clay mortar extending from not less than two feet below to not less than 25 feet above the smokepipe entrance.

(d) **HEIGHT:** Metal smokestacks shall extend to a height of not less than ten feet above the elevation of any part of any building within 25 feet.

(e) **CLEANOUTS:** Cleanout openings shall be provided at the base of every metal smokestack.

(f) **EXTERIOR STACKS:** Metal smokestacks, or parts thereof, erected on the exterior of a building shall have a clearance of 24 inches from combustible walls and four inches from incombustible walls, but not less than required to comply with the Standard set forth in Paragraph 4001.2(c). No stack shall be nearer than 24 inches in any direction from a door, window or other wall opening or from a required exit.

(g) **INTERIOR STACKS:** Metal smokestacks, or parts thereof, in a building other than a one-story building, shall be enclosed above the story in which the appliance served thereby is located, in walls of incombustible construction having a fire-resistance rating of not less than two hours, with a space on all sides between the stack and the enclosing walls sufficient to render the entire stack accessible for examination and repair. The enclosing walls shall be without openings, except doorways equipped with approved self-closing fire doors of Class B or better at various floor levels for inspection purposes. Where such a stack passes through a roof constructed of combustible materials, it shall be guarded by a galvanized-iron ventilating thimble extending not less than nine inches below and nine inches above such roof construction. Such thimbles shall be of a size to provide a

clearance on all sides of the stack for high-heat appliances of not less than 18 inches, for medium-heat appliances not less than eight inches and for low-heat appliances not less than six inches, but not less than required to comply with the standard set forth in Paragraph 4001.2(c)a Smokestacks shall not be carried up inside of ventilating ducts unless such ducts are constructed as required by this Section for Type A flues and provided such stacks or flues are used solely for venting the room or space in which the appliance served by the smokestack is located.



### 3903 TYPE B FLUES OR VENTS

**3903.1 GENERAL:** (a) Type B flues or vents shall consist of approved vent piping of incombustible, corrosion-resistant material of sufficient thickness, cross-sectional area, and heat-insulating quality to avoid excess temperature on any adjacent combustible material as determined by tests made by a recognized testing agency. Only those flue or vent materials or assemblies which have been inspected, approved and listed as Type B by the National Board of Fire Underwriters and are approved by the Building Official shall be used.

(b) Type B flues or vents may be used only to vent gas-fired appliances approved for maximum flue gas temperature of 550° Fahrenheit at the outlet of the appliance or the draft hood.

(c) Except as otherwise set forth herein, Type BW flues or vents shall comply with the general requirements of Type B flues, subject to the conditions of inspection, approval and listing as Type BW; and such vents shall be used only with approved, recessed, gas-burning space heaters.

**3903.2 INSTALLATION:** Installation of Type B flues or vents shall be as followsa (a) **JOINTS:** Flues or vents shall be made up with tight joints. Flue pipe cement, if used, shall be acid resisting.

(b) **CLEARANCES:** Flues or vents shall be installed with a clearance to combustible material of not less than one inch for Type B and three-eighths inch for Type BW, but not less than required to comply with Paragraph 4001.2(c). All flues shall be installed in accordance with manufacturer's and Building Official's instructions and with the conditions of approval and listing by the testing agency.

(c) **PROTECTION AGAINST INJURY:** Suitable provision shall be made to prevent mechanical injury to flues and vents where they extend through walls, floors or roof.

(d) **SUPPORT:** Flue or vent piping shall be secured at each joint and properly supported.

(e) **SIZE:** (1) The gravity flue or vent to which the smokepipe is connected shall be of a size not less than the flue collar on the appliance attached thereto. In no case shall the area be less than set forth in the following tablea

Gas-Input Rating B. T. U. per Hour	Area Square Inches
Not more than 35,000..... aa.....	12
60,000..... a . a.....	16
100,000..... c . c.....	28
200,000.....	50
300,000.....	78

When more than one appliance vents into a flue or vent, the flue or vent area shall be not less than the area of the largest vent connection plus 50 percent of the areas of all additional inlets. An oval flue or vent may be used provided its flue gas-venting capacity is equal to the capacity of round pipe for which it is substituted and that no flue shall be less than two inches in any internal dimension. Inlets shall be offset or staggered so that a horizontal plane will not pass through any part of more than one inlet. No damper shall be installed in any gas vent or flue.

(f) **HEIGHT:** Each gas vent shall extend above the roof surface and through its flashing and shall terminate in an approved cap or cowl, designed to prevent downdraft or the entrance of rain or other debris, with a venting capacity not less than that of the vent, except that the heaters with air-cooled, integral flues certified by recognized agencies may be installed with the approval of the Building Official. The outlet opening of any such vent shall be not less than 12 inches from any portion of the building, nor less than four feet from any of that portion of the building or structure which extends at an angle of more than 45° upward from the horizontal. Vent outlets shall be separated by distance, construction, or arrangement to prevent flue gases from being taken in by any mechanical or natural fresh air intake.

(g) **OFFSET:** Every flue or vent shall extend as nearly vertical as practicable. A single portion of any flue or vent may extend at an angle of not more than 60 degrees from the vertical.

h) **VENT CONNECTORS:** Vent connectors or manifolds connected to Type B flues or vents shall be as set forth in Section 3905 and shall be joined to the flue or vent by a Y-fitting, entering at an upward angle.

### 3904 TYPE C FLUES OR VENTS

3904.1 Type C flues or vents shall be of sheet copper of not less than 24 gage, or of galvanized iron of not less than No. 20 gage, or of other approved corrosion-resistant material.

3904.2 Type C flues or vents may be installed in buildings of Group I occupancy and in one-story buildings of F, G and J occupancy.

3904.3 Type C flues or vents shall be used only with low-heat appliances and run directly from the space in which the appliance is located through a roof to the outer air without passing through any attic, concealed space or floor. No such vent shall extend less than two feet above the roof or any construction within a horizontal distance of ten feet.

3904.4 Clearances between Type C flues or vents and combustible material shall be not less than six inches, nor less than required, to comply with the standard set forth in Paragraph 4001.2(c)a Combustible materials in roofs through which Type C flues or vents pass shall be protected at the point of passage by metal thimbles not less than four inches larger in diameter than the vent with the annular space filled with mineral wool or other approved non-combustible insulating material.

3904.5 Type C flues or vents shall be vertical:

### 3905 SMOKEPIPES AND VENT CONNECTORS

3905.1 **MATERIALS:** Smokepipes and vent connectors serving fixed appliances shall be of substantial metal construction, but never less than as set forth in the following table:

<b>Thickness of Metal for Smokepipes</b>	
Diameter (Inches)	Minimum Thickness (U. S. Gage)
6-10	26
11-29	24
30-39	22
40-49	20
50-up	18

**3905.2 DETAILS OF CONNECTIONS:** (a) No vent connection connected to any gas appliance having pilot provision for automatic or remote control shall be connected to any kitchen ventilation or any chimney flue which is used as a smoke flue for any stove, boiler, heater or other apparatus designed to burn wood, coal, oil or any fuel other than gas, unless such pilot provision is so designed that the supply of gas to the main burners in connection therewith will be automatically shut off when combustion of gas is not taking place at the pilot.

(b) Two or more smokepipes shall not be joined to a single flue or vent unless the common smokepipe and flue or vent is of sufficient size to serve all the appliances thus connected. The smokepipe of a heating appliance shall not be connected into the flue or vent of an incinerator which has the rubbish chute identical with the smoke flue.

(c) No flue or vent shall have smokepipe connections in more than one story of a building unless provision is made for effectively closing smokepipe openings with devices made of incombustible materials, whenever their use is discontinued temporarily, and completely closing such opening with masonry when discontinued permanently. Smokepipes shall be exposed to view throughout their entire length.

(d) Smokepipes serving appliances other than water heaters shall have a rise of not less than one-fourth inch to the foot.

(e) Provision for removal of condensate shall be provided. Any two inlets shall be separated vertically by not less than the diameter of the larger inlet.

(f) All gas appliances connected to a common vent shall be located in the same story of the building and in the same tenancy thereof except as otherwise permitted by NBFU Pamphlet No. 52.

(g) The horizontal projected length of the vent connector shall not exceed 75 percent of the vertical projected length of the vent unless the appliance is equipped for forced draft.

(h) Where smokepipes or vent connectors join into a single pipe, connector or flue, they shall be joined by a Y-fitting, discharging the flow in the direction of common passage.

**3905.3 CLEARANCES:** Clearances between smokepipes and combustible materials above shall be 18 inches when used on medium-heat appliances and 36 inches when used on high-heat appliances; except that such clearances may be reduced with insulating materials, as set forth in the National Board of Fire Underwriters Pamphlet NFBA No. 90B.

### **3906 FIREPLACES**

**3906.1 USE:** Fireplaces conforming to the minimum requirements herein may be used for solid fuels or liquid-fuel-burning equipment where the temperature of the flue gases, as they enter the flue, does not exceed 1000° Fahrenheit.

**3906.2 FIREBOX WALLS:** (a) Fireplace chimneys built as an integral part of a masonry wall shall have firebox walls, sides and back, lined with not less than four inches of refractory firebrick, set with fire-clay mortar. Side walls and back walls shall be, in addition to the thickness of such firebrick, of four inches of solid brick, or six inches of reinforced concrete, or eight inches of hollow concrete or clay tile, or ten inches of rubble masonry.

(b) Free-standing fireplaces, not otherwise built integrally with a masonry wall, shall have firebox walls of not less than eight inches of solid masonry or 12 inches of rubble masonry; and, in addition, the firebox shall be lined, back and sides, with four inches of refractory firebrick set in fire-clay mortar.

**3906.3 METAL HEAT CIRCULATORS:** Approved metal heat circulators may be installed in fireplaces, and when such device is designed with an air-circulating chamber not less than two inches in width, having metal of 12-gage U. S. Standard on both sides of such chamber, such air chamber may substitute for two inches of firebrick and only two inches of firebrick will be required, as set forth in Sub-section 3906. An insulated space of not less than two inches shall be provided between masonry units and the sides, top and back of metal heat circulators, except the flanges of circulator connections.

**3906.4 SMOKE CHAMBER:** The front, or inward sloping face, of the smoke chamber shall be lined with four inches of firebrick, as for the firebox; and the firebrick shall be carried up to the bottom of the flue liner. Walls shall be of the thickness set forth in Sub-section 3906.2

**3906.5 FIREPLACE CHIMNEY WALLS:** (a) Fireplace chimney walls shall be lined with five-eighths-inch refractory fireclay flue lining or with other approved liner, of material that will resist temperatures of 1800° Fahrenheit without softening or cracking, from the throat to a point four inches above the enclosing masonry walls.

(b) Masonry walls shall be eight inches of solid masonry, or four inches of solid masonry and eight inches of hollow concrete or clay block, or four inches of solid masonry and ten inches of rubble masonry, or six inches of reinforced concrete.

(c) Flue linings shall be built in as the masonry is laid. All joints and spaces shall be filled with mortar, and broken or cracked flue linings shall not be used.

(d) Chimneys shall be extended to a height not less than 24 inches above the highest point of the roof within a radius of ten feet.

(e) Where the chimney is built integrally with a masonry wall, the required tie beam shall be continuous and shall wrap around the chimney.

**3906.6 CLEARANCE:** Concealed combustible material shall not be within two inches of fireplaces, smoke chambers or chimneys. Exposed combustible materials shall not be placed within six inches of the fireplace opening. No such combustible material within 12 inches of the fireplace opening shall project more than one-eighth inch for each one-inch clearance from such opening.

**3906.7 AREAS OF FLUES:** The net cross-sectional area of the flue and of the throat between the firebox and the smoke chamber of a fireplace shall be not less than one-tenth of the area of the opening nor less than 64 square inches. Where dampers are used, damper openings shall be not less in area, when fully opened, than the required flue area.

**3906.8 LINTEL:** Masonry over the fireplace opening shall be supported by a lintel of steel not less than one-fourth inch in thickness.

**3906.9 HEARTH:** Every fireplace shall be provided with a brick, concrete, stone or other approved incombustible hearth slab at least 12 inches wider on each side than the fireplace opening and projecting at least 20 inches therefrom. This slab shall be not less than four inches thick and shall be supported by incombustible materials or reinforced to carry its own weight and all imposed loads. Combustible forms shall be removed.

**3906.10 FALSE FIREPLACES:** False fireplaces not complying with the requirements herein and recesses for space heaters shall be constructed and limited in use as set forth in Section 4005.

**3906.11 WEEPTUBE:** Fireplaces shall have a weeptube from the smoke chamber to a readily accessible discharge and cleanout point.

## Chapter 40c— Heat-Producing Apparatus

- 4001 GENERAL
- 4002 GAS-BURNING APPLIANCES
- 4003 OIL-BURNING APPLIANCES
- 4004 FRESH-AIR SUPPLY
- 4005 SPACE HEATERS
- 4006 RANGES
- 4007 WATER HEATERS
- 4008 BOILERS
- 4009 INCINERATORS
- 4010 SOLAR HEATERS
- 4011 COMBUSTION ENGINES

**4001.1 SCOPE<sup>a</sup>** Heat-producing appliances and apparatus, other than electrical appliances, shall conform to the requirements of this Chapter. Electrical appliances are regulated in Part XI, Electrical. Flues or vents and smokepipes or vent connectors to which such appliances are connected shall be as set forth in Chapter 39.

**4001.2 STANDARDS:** The following standards are hereby adopted to supplement, but not supersede, the requirements set forth herein:

(a) The National Board of Fire Underwriters:

(1) "Building Code Standards for the Installation of Heat-producing Appliances, Heating, Ventilating, Air-conditioning, Blower and Exhaust Systems".

(2) "Standards for the Installation of Gas Piping and Gas Appliances in Buildings," Pamphlet No. 54.

(3) "Standards for the Storage and Handling of Liquefied Petroleum Gases," Pamphlet No. 58.

(4) "Standards for the Storage and Handling of Liquefied Petroleum Gases at Utility Plants," Pamphlet No. 59.

(b) The American Standards Association, "Code for Pressure Piping," ASA B31.1.

(c) A standard of installation shall be to provide clearance or insulation in such manner that continued operation of the appliance will not raise the temperature of surrounding combustible construction above 170° Fahrenheit when measured with a mercury thermometer or conventional bead-type thermocouples.

(d) The storage of flammable liquids shall be as set forth herein and in Section 4102.

**4001.3 APPROVALS:** All heat-producing appliances and accessories, other than domestic gas appliances, installed or offered for sale within the jurisdiction of this code shall be inspected, tested and listed as approved by an applicable nationally-recognized testing and listing agency and for gas appliances and accessories shall bear the stamp and seal of approval of the American Gas Association Laboratories or the Underwriters'

Laboratories, Inc. Where no such standards exist, the inspection authority in conjunction with a panel of industry recognized by the Board of Rules and Appeals and created by the powers set forth in Paragraph 203.5(b) herein, may approve heat-producing appliances or apparatus not otherwise listed by a nationally-recognized agency, subject to such standards of safety as the inspection authority and the panel of industry deem necessary and using as a guide the recommended practices of the National Board of Fire Underwriters, American Gas Association<sup>2</sup> and American Heating and Ventilating Engineers.

**4001.4 PERMITS: (a) REQUIRED:** A permit shall be required to install or alter any heat-producing appliance or piping or flue or accessory thereto and no person, firm or corporation shall commence or proceed with such work without having first made application and secured a permit therefore as set forth herein; except that a permit shall not be required for any fully portable appliance which has no physical connection to piping or flue. Application for permit shall be made to the Plumbing Inspector for manufactured or natural gas installations, to the Fire Department (in unincorporated area, to the County Safety Inspectors until such a time as a County Fire Department is established) for liquefied petroleum gas and oil burning installations or the storage of bulk combustibles and the installation of all gas heat-producing appliances or apparatus, and to the Building Official for all other heat-producing appliances and these persons shall have respective jurisdiction over the apparatus as set forth.

**(b) APPLICATION FOR PERMIT:** Application for permit for the installation or alteration of any heat-producing appliance or piping or flue or accessory thereto shall be accepted only from persons currently licensed and holding a Certificate of Competency in their respective fields and against whom no revocation or suspension is pending; except that for installations involving the use of liquid petroleum gas, application shall be accepted only from liquid petroleum gas installers and for installations involving manufactured or natural gases, application shall be accepted only from master gas fitters, and except that application for permit will be accepted from any owner personally installing such appliance or accessory thereto in his own private residence, provided that such owner shall conform to all other requirements of this code, that all labor in connection therewith shall be personally done by him and that the doing of such work on more than one residence within any twelve months' period shall be construed to be acting as a contractor.

**(c) PLANS:** When required by the inspection authority, application for permit shall be accompanied by plans and specifications completely and accurately describing the proposed work. Description of the proposed work shall include a description of the appliances, flues and accessories and their rated capacities and locations.

**(d) APPROVAL OF APPLICATION:** Application for permit and plans shall be reviewed and if the proposed work is in compliance with this code, the plans shall be marked "APPROVED".

**(e) PERMIT FEES:** Any person desiring a permit to be issued shall, in addition to filing an application therefor and before such permit is issued, pay a permit fee as required.

**4001.5 SLEEPING ROOMS:** There shall be no exposed or open-flame heating apparatus in bedrooms and rooms normally used for sleeping except as set forth in Paragraph 4002.14(e)

**4001.6 GARAGES:** Appliances may be installed on the floor of a residential garage provided a door or the garage opens to an adjacent ground or driveway level that is at or below the level of the garage floor. Where this condition does not exist, appliances shall be installed not less than 18 inches above the floor.

**4001.7 TYPE OF FUEL:** No appliance shall be converted from the fuel specified on the rating plate for use with a different fuel without consulting the manufacturer's instruction and/or securing approval of the fuel supplier.

**4001.8 INSTALLATION:** The installation of heat producing appliances, whether or not specifically mentioned in this Chapter, shall conform to the conditions of approval as specified in the manufacturer's instructions attached to the appliance.

**4001.9 CLASSIFICATION:** The inspection authority shall classify all sources of heat and regulate the use and location of heat-producing apparatus by the standard set forth in Sub-section 4001.3. Such apparatus shall not be subject to undue corrosion, deterioration, accidental overturning or disarrangement.

**4001.10 LABELING:** Every heating device delivered and installed as a manufactured article shall bear a permanent and legible nameplate on which shall appear the following descriptive data where applicable. Such plate or plates shall be appropriately located on the appliance, and lettered and positioned to be legible to the operator.

- (a) The manufacturer's name.
- (b) The manufacturer's rating of the appliance.
- (c) A model and serial number.
- (d) Instructions for the lighting, operation and shutdown of the appliance.
- (e) The type of fuel approved for use in the appliance.
- (f) A seal of approval of the appliance by an approved test-laboratory if acceptance is based on such approval.
- (g) Data on electric-power demand and output.

**4001.11 ACCESSIBILITY:** Every heat-producing appliance shall be accessible for inspection, service, repair and replacement without removing permanent construction. Sufficient room shall be available to enable the operator to observe the burner, control and pilot while starting the appliance. The operating instructions must be in a position where they can be easily read.

**4001.12 SPECIAL REQUIREMENTS:** Where heat-producing apparatus is installed in locations where the occupants of the space for reasons of age or physical limitations may, in the opinion of the inspection authority, be required to be protected by additional safeguards, controls and devices shall be designed and installed to be inaccessible or inoperative to unauthorized persons and protective guards or screens installed to prevent physical contact with heated parts.



## 4002 GAS-BURNING APPLIANCES

**4002.1 GENERAL:** (a) Gas-burning appliances shall comply with the requirements of this Chapter and the specific requirements of this Section.

(b) All domestic gas appliances, devices or accessories, offered for sale or installed, shall bear the stamp or seal of approval of the American Gas Association Laboratories or the Underwriters' Laboratories, Inc., and shall have been approved by the inspection authority. Domestic gas appliances, devices or accessories without the said stamp or seal of approval shall not be offered for sale or installed.

(c) Appliances shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas and proper venting under normal conditions of use.

(d) Gas appliances shall not be installed in any location where flammable vapors are likely to be present, unless the design, operation and installation are such as to eliminate the possible ignition of the flammable vapors. Garages of Group I Occupancy shall be considered as set forth in Sub-section 4001.6.

(e) Every appliance shall be located so that it will be readily accessible for operation and servicing.

(f) No device or attachment shall be installed on any appliance which may in any way impair the combustion of gas.

(g) Any combination of appliances, attachments or devices used, together in any manner shall comply with the standards which apply to the individual appliance.

(h) No flame or fire in any form shall be used in attempting to locate a gas leak or where there is an odor of gas present.

(i) Space heaters burning gas, located in sleeping rooms, or in institutions, homes for the aged, sanitoriums, schools, orphanages and similar occupancies, shall be equipped with an automatic 100 percent safety pilot, and shall be vented.

**EXCEPTION:** A gas burning appliance located in a sleeping room of a Group I Occupancy and having a capacity of 10 BTU or less per cubic foot of room space, shall not be required to be vented.

(j) Provision shall be made for proper circulation of air.

(k) Where air and oxygen under pressure is used in connection with gas supply an effective means shall be provided to prevent air or oxygen from flowing back into the gas piping.

(l) Room temperature thermostats shall be located where they will be in the natural circulating path of room air. Thermostats shall not be located in a bedroom, bathroom or kitchen.

**4002.2 INSPECTIONS AND TESTS:** All gas piping, appliances and vents shall be inspected and tested as followsa

(a) The labor and materials necessary for inspection shall be supplied by the person or persons making the installations.

(b) All concealed pipes of the gas system shall be tested with air pressure of 25 pounds and maintained for a period of ten minutes. After installation, the piping and tubing to all appliances of all systems shall be tested at not less than normal operating pressure and proved free of leaks, using a manometer or other equivalent device that will indicate a drop in pressure. Tests shall not be made with a flame.

(c) On unmetered gas lines, installed against gas pressure, air tests may be omitted, provided such lines are not concealed within a building.

(d) In cases where connections are made to an existing gas pipe and the developed length of the new work does not exceed ten feet, the air test may be omitted, but a soap test shall be made.

(e) Under no conditions will water be permitted in testing gas lines.

(f) Whenever gas piping or gas appliances have been inspected and approved, the inspection authority shall issue a Certificate of Inspection.

(g) No gas shall be turned on in any building where permits and inspection are required until a Certificate of Approval has been issued.

(h) Before turning on gas under pressure into any piping, the person in charge shall assure himself that there are no openings from which gas can escape. The gas shall then be turned on and the hand on the test dial of the meter observed to ascertain that no gas is passing through the meter.

(i) If any concealed house piping or part thereof is covered before being regularly inspected, tested and approved, it shall be uncovered upon the order of the inspection authority.

(j) After the satisfactory completion and final test of the gas-piping system and upon request, a Certificate of Approval will be issued by the inspection authority.

**4002.3 FLUES AND VENTS:** (a) Any of the following gas appliances, except domestic gas ranges and domestic clothes dryers, shall be connected to an effective flue or vent:

(1) Any appliance installed for domestic purposes, having an input rating in excess of 50,000 BTU per hour.

(2) Automatically-controlled appliances which use more than 5,000 BTU per hour. For the purpose of this requirement, manually-operated appliances, equipped with automatic means for reducing the gas supply to the main burner or burners to no less than 30 percent of the maximum demand, are not considered as automatically controlled.

(3) Automatically-controlled appliances which use 5,000 BTU per hour, or less, unless equipped with a 100-percent automatic pilot or a flame-responsive fuel shut-off device.

(4) Any appliance installed in a room which, if not vented, would make the total combined input rating of all unvented appliances in the room 30 BTU, or more, per hour per cubic foot of room content.

(5) Any appliance located in a space having duct furnaces or floor furnaces.

(6) Any appliance which has a draft hood supplied by the manufacturer, except automatic water heaters having input ratings not in excess of 5,000 BTU per hour and space heaters listed as unvented.

(7) Unlisted appliances having flue collars.

(b) Where required to be connected to a flue or vent, gas appliances shall not be installed or fitted with supply unless the flue or vent is provided at the time of installation and the responsibility of securing a permit and complying with this requirement shall be that of the person installing the appliance.

(c) Flues or vents shall be Type B, Type BW or Type A, as set forth in Chapter 39.

(d) Approved appliances having sealed combustion chambers, so constructed and installed that air for combustion is derived from outside the space being heated, shall be installed with the vents and in accordance with the manufacturer's instructions.

**4002.4 FRESH-AIR SUPPLY:** Fresh air supply shall be provided as set forth in Section 4004.

**4002.5 SHUT-OFF VALVES:** (a) A readily-accessible shut-off cock shall be installed in the fuel piping outside of each gas appliance, and ahead of the union connection thereto, in addition to the valve provided on the appliance.

**EXCEPTION:** Shut-off valves may be accessibly located inside or under appliances when such appliance can be removed without removal of the shut-off valve.

(b) A separate shut-off valve shall be installed in all manufactured or natural gas lines within three feet of the appliance. The valve shall be of the same size as the pipe in which it is installed.

(c) A shut-off cock shall be provided for each occupancy for a multiple occupancy L.P. installation.

**4002.6 PIPING:** (a) All gas-burning, heat-producing appliances shall be rigidly connected to the fuel supply with piping or tubing as hereafter provided.

(b) The capacity of piping and tubing shall be that required by the appliance, but not less than recommended by the American Gas Association or the standard set forth in Paragraph 4001.2(a). Before the use of existing lines, sizes of existing pipe shall be verified. If such piping is found inadequate, the piping shall be replaced or separate fuel lines shall be installed.

(c) Gas appliances may be connected with semi-rigid, seamless copper tubing meeting the following requirements:

(1) The method of attaching semi-rigid tubing to the gas piping and appliance shall not depend upon separate ferrules, washers, gaskets, or other detachable parts for gas tightness, nor shall such separate parts be used to establish and maintain the method of seal provided within the connector and fittings.

(2) Where semi-rigid, seamless tubing is concealed within or run through any wall, floor or partition other than a direct passing through, the tubing shall be located to be the least subject to mechanical damage, but not closer than one inch clear from any nailing surface.

(3) All copper tubing shall be Type L or Type K complying with American Society for Testing and Materials Designations B251 and ASA B16.22.

(d) All house gas piping shall be constructed and installed so as to be durable, substantial and gas tight.

(e) All pipe shall conform to American Society for Testing and Materials standards for galvanized wrought iron or steel pipe. Used pipe must be free from scale, rust burrs and other obstructions.

(f) Reducing fittings shall be used where a change of size of piping is necessary. Unions shall not be located in concealed spaces and shall be of ground-joint type. Bushings may be used only at meter connections.

(g) Where condensation may occur, the piping shall be pitched back to the container, or suitable means shall be provided for collection of the condensate.

(h) Gas piping or tubing inside of any building shall not run in or through any air duct, clothes chute, chimney or flue, ventilating duct, dumb waiter or elevator shaft, except in proper ducts for that purpose.

(i) Each outlet, including a valve or cock outlet, shall be securely closed gas tight with a positive plug or cap if the appliance is not to be connected at that time. When an appliance is removed from an outlet and the outlet is not to be reconnected at that time, it shall be securely closed gas tight. In no case shall the outlet be closed with tin caps, wooden plugs, corks or similar devices.

(j) When air or oxygen under pressure is used in connection with gas supply, an effective means shall be provided to prevent air or oxygen from flowing back into the gas piping.

(k) Gas appliances shall be so connected to the piping as not to exert undue strain on the connections.

(l) Galvanized pipe shall not be bent, and galvanized fittings shall be used in all changes of direction.

(m) Meters shall not be placed in a kitchen, bathroom, bedroom or living room. All meters shall be placed on the outside of buildings.

(n) Pressure regulators or governors shall be installed on the services of all gas meters in localities designated as high-pressure areas by the service company.

(o) Only appliances which are fully portable in nature shall be connected with gas hose. Gas hose shall not be confused or substituted for required tubing and appliance connectors of flexible metal tubing and fittings. Appliances equipped with a control valve or valves which permit complete shut-off of the gas supply shall not be connected with gas hose. This requirement does not apply to hand torches, gas irons and similar equipment. Where a gas hose connection is made, a gas shut-off valve shall always be provided within convenient reaching distance of the operator, on the rigid supply piping where the hose is attached; and any valve on the inlet of the appliance shall be removed. Gas hose shall be of adequate capacity, gas tight, and so designed as to permit the secure attachment to the appliances by a threaded connection or a metal clamp, and no rubber slip connections shall be permitted. Under no circumstances shall gas hose be concealed from view or used in a concealed location. Where gas hose is used, it shall be of the minimum practical length, and shall not extend from one room to another nor pass through any walls, partitions, ceiling or floors.

(p) Piping and tubing shall comply with the following tables:



**TABLE 40-A**  
**FLOW OF MANUFACTURED GAS IN CUBIC FEET PER HOUR**  
**PRESSURE DROP OF 0.3 INCHES OF WATER**

(To determine cubic feet per hour, divide BTU rating of  
 Gas into sum total of BTU of connected load.)

Specific Gravity .75—Florida Power & Light Gas—550 BTU Rating  
 Specific Gravity .89—Peoples Gas Company Gas—709 BTU Rating

**Length of Straight Pipe — Feet**

Nominal Pipe Size	10	20	30	40	50	60	70	80	90	100	150	200
1/4"	80	60	62	41								
3/8"	208	145	120	102	93	84	78	73	69	65	54	46
1"	420	300	240	210	185	170	160	147	140	130	108	93
1 1/4"	710	500	415	360	320	290	270	250	240	225	185	160
1 1/2"	1,150	800	660	570	510	465	430	400	380	360	295	255
2"	2,350	1,650	1,350	1,150	1,050	950	890	825	790	740	610	530
2 1/2"	4,100	2,900	2,350	2,050	1,825	1,675	1,525	1,425	1,350	1,275	1,050	900
3"	6,400	4,500	3,700	3,200	2,850	2,625	2,400	2,250	2,125	2,000	1,650	1,400
4"	11,500	8,250	7,600	6,300	5,900	5,400	5,000	4,650	4,400	4,200	3,400	2,950

**Note:** Capacity of Intermediate lengths of piping will be determined by interpolating between the lengths shown in table above.

**Example:** A 2" pipe 85 feet long will be figured as follows:  
 825 — 790 = 35 cu. ft. 1/10 of 35 = 3.5 × 5 = 17.5 cu. ft. 790 + 17.5 = 807.5 cu. ft.

Where house piping serves more than one residential unit from same piping, diversity factor will be used in connection with connected load. For 2 - 3 unit use a factor of 80%, for 4 - 7 units use a factor of 70%, and for 8 units or more use a factor of 60%.

Where appliance gas connection is 1/4" or 3/8", such as coffee urn, dental jet, etc., the same size piping as the appliance connection may be used up to 2 feet in length.

**COPPER TUBING SIZE AND MAXIMUM CUBIC FEET  
 PER HOUR CAPACITY**

(Tubing to be used only in exposed locations and for connecting appliances to rigid house piping. Type K or Type L.)

Length of Tubing	3/8"	1/2"	5/8"
5 feet .....	15	45	90
10 feet .....	10	30	60
15 feet .....	—	20	45

**TABLE 40-B**  
**L. P. GAS TUBE AND PIPE SIZE CHART**  
**Tubing Sizes Shown Are Nominal Outside Diameter**  
**Pipe Sizes Shown Are Nominal Inside Diameters**  
**L. P. Gas in Btu Per Hour**

Length of Pipe in Feet	12,500		27,000		37,500		62,500		75,000		100,000		150,000		200,000	
	Tube	Pipe	Tube	Pipe	Tube	Pipe	Tube	Pipe	Tube	Pipe	Tube	Pipe	Tube	Pipe	Tube	Pipe
10 .....	3/8"	1/4"	3/8"	1/4"	3/8"	1/4"	3/8"	1/4"	1/2"	3/8"	1/2"	3/8"	5/8"	3/8"	5/8"	1/2"
15 .....	3/8"	1/4"	3/8"	1/4"	3/8"	1/4"	1/2"	3/8"	1/2"	3/8"	1/2"	3/8"	3/8"	3/8"		1/2"
20 .....	3/8"	1/4"	3/8"	1/4"	3/8"	1/4"	1/2"	3/8"	1/2"	3/8"	5/8"	1/2"	5/8"	1/2"		1/2"
25 .....	3/8"	1/4"	3/8"	1/4"	3/8"	1/4"	1/2"	3/8"	3/8"	1/2"	3/8"	1/2"	5/8"	1/2"		1/2"
30 .....	3/8"	1/4"	5/8"	1/4"	3/8"	1/4"	1/2"	3/8"	5/8"	1/2"	5/8"	1/2"	1/2"			1/2"
40 .....	3/8"	1/4"	3/8"	1/4"	1/2"	3/8"	5/8"	1/2"	5/8"	1/2"	5/8"	1/2"	1/2"			3/4"
50 .....	3/8"	1/4"	3/8"	1/4"	1/2"	3/8"	3/8"	1/2"	3/8"	1/2"	1/2"		3/4"			3/4"
75 .....	3/8"	1/4"	1/2"	3/8"	1/2"	3/8"	5/8"	1/2"	5/8"	1/2"	1/2"		3/4"			3/4"
100 .....	3/8"	1/4"	1/2"	3/8"	1/2"	5/8"	5/8"	1/2"	1/2"		1/2"		3/4"			3/4"
150 .....	3/8"	1/4"	1/2"	3/8"	1/2"	1/2"	3/8"	1/2"	1/2"		3/4"		3/4"			3/4"

**TABLE 40-C**  
**TABLE SHOWING MAXIMUM DEMAND REQUIRED FOR**  
**SOME COMMON DOMESTIC GAS APPLIANCES**

APPLIANCE	BTU/HOUR
<b>DOMESTIC RANGES</b>	
3 Burner Cooker . . . . . a . . . . .	48,000
4 Burner Cooker . . . . .	62,500
4 Burner Range . . . . .	62,500
6 Burner Range (2 Oven) . . . . .	107,500
8 Burner Range (2 Oven) . . . . .	138,000
<b>HOT PLATES AND LAUNDRY STOVES, DOMESTIC,</b>	
PER BURNER . . . . . a . . . . .	9,000
<b>REFRIGERATORS</b>	
WATER HEATERS	3,000
<b>Automatic Storage</b>	
Low Input/All Types . . . . .	5,000
Automatic Storage—Regular 7½ Gallon . . . . .	10,000
15 " . . . . .	20,000
20 " . . . . . a . . . . .	22,000
30 " . . . . .	25,000
40 " . . . . .	35,000
45 " . . . . .	40,000
50 " . . . . .	45,000
60 " . . . . .	50,000
75 " . . . . .	55,000
100 " . . . . .	100,000
Side Arm & Underfire Tank 15 " . . . . .	27,000
20 " . . . . .	28,000
25 " . . . . .	30,000
35 " . . . . .	35,000
Room Heater, domestic, radiant type, per single radiant . . . . .	2,000
Room Heater, domestic, radiant type, per double radianta . . . . .	4,000

**TABLE 40-D**  
**TABLE SHOWING MAXIMUM DEMAND REQUIRED FOR**  
**SOME COMMON COMMERCIAL GAS APPLIANCES**

APPLIANCE	BTU/HOUR
<b>RANGES (One Oven)</b>	
Hot Top . . . . .	130,000
Open Top . . . . .	130,000
Fry Top . . . . .	96,000
(Add 45,000 BTU for Additional Oven)	
<b>ROASTING OVEN</b> . . . . .	80,000
<b>BAKE OVENS</b>	
Multiple Deck . . . . .	18,000/burner
Individual Deck . . . . .	18,000/burner



**APPLIANCE**

**BTU/HOUR**

**BROTHER (Heavy Duty)** .....

**80,000**

(3) When in remodeling old buildings or making additions thereof, it is impractical to comply strictly with these requirements, these provisions may be modified to satisfy the spirit and substance thereof.

**4002.7 ELECTRICAL CONNECTIONS:** (a) All electrical connections and wiring shall be made in accordance with Part XI herein. Gas piping shall not be used for an electrical ground.

(b) No devices employing or depending upon an electrical current shall be used to control or ignite a gas supply if a failure of the electrical current could result in the escape of unburned gas or in failure to reduce the supply of gas under conditions which would normally result in its reduction, unless other means are provided to prevent the development of dangerous temperatures or pressures or the escape of gas.

The electrical circuit employed for operating the automatic, main-gas-control valve, automatic pilot, room-temperature thermostat, limit control or other electrical devices used with the gas appliance shall be in accordance with the wiring diagrams supplied with the appliance and Part XI herein.

(d) All gas appliances using electrical controls shall have the controls connected into a permanently-live electric circuit.

(e) Any separately-mounted transformer necessary for the operation of the gas appliance shall be mounted on a junction box and switch with "On" and "Off" markings installed in the hot wire side of the transformer primary.

## 4003 OIL-BURNING APPLIANCES

**4003.1 GENERAL:** (a) Fuel-oil burners used in connection with any boilers, hot-water heaters, ranges, or for any purpose whatsoever shall comply with the requirements of this Chapter.

(b) The requirements of this section shall apply to the oil-burning appliances, separately set forth as sections of this Chapter.

**4003.2 STANDARDS:** The "Regulations for the Installation of Oil-Burning Equipment," NBFU Pamphlet No. 31, 1963, of the National Board of Fire Underwriters is hereby adopted to supplement, but not supersede, the specific requirements set forth herein.

**4003.3 INSPECTION AND TESTS:** All installations requiring the obtaining of permits shall require inspection before work is concealed or the appliance used. Notice shall be given by the permit holder when the work is ready for inspection. After installation, the piping and tubing shall be tested at not less than normal operating pressure. After satisfactory completion and final test, and upon request, a Certificate of Approval will be issued by the Building Official.

**4003.4 FLUES AND VENTS:** A flue or vent, as set forth in Chapter 39, shall be required as follows

(a) Any appliance installed in a room where the appliance, or the total of all fuel-burning appliances, with an input rating of 30 BTU, or more, per hour per cubic foot of room content.

(b) Any appliance having a draft hood supplied by the manufacturer and an input rating in excess of 5,000 BTU per hour.

When required to be connected to a flue or vent, appliances shall not be installed unless the flue or vent is provided at the time of installation.

**4003.5 FRESH-AIR SUPPLY:** Fresh-air supply shall be provided as set forth in Section 4004.

**4003.6 SHUT-OFF VALVE:** A readily-accessible shut-off cock shall be installed in the fuel piping; and when more than one appliance is used, a readily-accessible valve shall be installed for each appliance. Shut-off valves shall be located outside or under appliances so that the appliance may not be removed and leave an open line.

**4003.7 PIPING:** (a) All liquid-fuel-burning, heat-producing appliances shall be rigidly connected to the fuel supply with solid iron pipe or semi-rigid, seamless tubing as hereafter provided.

(b) The capacity of the piping and tubing shall be that required by the appliance. Before use of existing supply lines, pipe sizes shall be verified; and if found inadequate, separate fuel lines shall be installed.

(c) Where semi-rigid, seamless tubing is concealed within or run through any wall, floor or partition other than a direct passing through, the tubing shall be located to be the least subject to mechanical damage but not closer than one inch clear from any nailing surface.

(d) Exposed semi-rigid, seamless tubing shall be protected from mechanical injury.

(e) All pipe shall conform to American Society for Testing Materials Standards for galvanized rough iron or steel and be free from rust, scale, burrs and other obstructions.

(f) Galvanized pipe shall not be bent, and fittings shall be used in all changes of direction.

(g) All electrical connections and wiring shall be made in accordance with Part XI herein.

## 4004 FRESH-AIR SUPPLY

**4004.1 FRESH-AIR SUPPLY:** All fuel-burning appliances shall be assured a sufficient supply of fresh air for proper fuel combustion.

**4004.2 SPACE:** Provision shall be made to supply fresh air where the volume, in cubic feet, of the space in which fuel-burning appliances are located is less than:

(a) One-twentieth of the maximum-rated input in BTU's of all gas-burning appliances in such space, and/or

(b) One-tenth of the maximum-rated input in BTU's of all solid and liquid fuel-burning appliances in such spaces.

**4004.3 METHODS OF SUPPLYING FRESH AIR:** Where provisions for fresh air are required in this section, the Building Official shall specify which of the following methods shall be used:

(a) Permanent openings or ducts leading from the appliance location to the outside of the building. For gas-burning appliances, such openings or ducts shall have a total unobstructed area of not less than one square inch per 1000 BTU maximum-input rating of all such appliances in the space; and for space heaters the area of openings shall be a minimum of 100 square inches. For solid and liquid fuel-burning appliances, such openings or ducts shall have a total unobstructed area of not less than one and one-half times the area required for gas-burning appliances.

(b) Permanent openings or ducts leading from the appliance location to other interior areas which meet the minimum-required volume specified in Sub-section 4004.2, except other interior areas where combustible liquids are stored or noxious gases may be produced. Such openings or ducts shall be not less in size than those specified in Paragraph 4004.3 (a).

Where openings or ducts are used, they shall consist of two or more of approximately equal area, one or more within six inches of the ceiling of the appliance enclosure, and one or more within six inches of the floor of the appliance enclosure.

## 4005 SPACE HEATERS

**4005.1 GENERAL:** (a) Gas or oil-burning space heaters shall be vented as set forth in Sections 4002 and 4003, and space heaters burning solid fuels shall be vented to an approved Type A flue or a fireplace, as set forth in Chapter 39.

(b) Space heaters shall not be located behind doors or in other locations which will cause the exposure of combustible materials or furnishings to dangerous heat therefrom. Open radiator clay-back space heaters shall not be installed in halls or corridors.

**4005.2 WALL RECESSES:** Wall recesses for gas space heaters having a demand of more than 35,000 BTU per hour or electric space heaters having a rating of more than ten kilowatts per hour and/or wall recesses designed and constructed to resemble fireplaces shall not be more than six inches in depth, shall be labeled by a metal plate bearing the words, "FOR GAS AND ELECTRIC APPLIANCES ONLY," shall be lined with materials providing not less than one-hour fire-resistive protection of combustible materials and shall be vented with a Type B flue, or such space heaters may be installed in fireplaces complying with Section 3906 herein.

**4005.3 OTHER LOCATIONS:** Gas space heaters, except those installed in fireplaces or wall recesses, shall be located to comply with the standards of Paragraph 4001-2(c).

## 4006 RANGES

**4006.1 COMMERCIAL:** Stoves and ranges such as used in kitchens of restaurants, hotels, clubs and similar establishments shall be supported on floors of not less than two-hour fire-resistive construction.

**4006.2 DOMESTIC:** Wood ceiling, shelving or cabinets over domestic appliances, used for a single family, shall comply with the standard set forth in Paragraph 4001.2(c) and shall not be less than 30 inches above an appliance burning solid, liquid or gas fuel, nor less than 24 inches above an electric range or hot plate.

**4006.3 VENTILATION:** (a) All ranges, except those for single-family use shall be provided with hoods as set forth in Section 4103.

(b) When range hoods and/or ducts are used for single-family residences they should be constructed of incombustible materials tightly fitted, and when vented they will be vented to the outside of the building.

**4006.4 SMOKE CONNECTIONS:** All ranges which use solid or liquid fuels shall be connected directly or by means of smoke-pipes to a Type A flue or vent, as set forth in Chapter 39. No such connection shall be to any flue or vent to which a gas-burning appliance is connected.

## 4007 WATER HEATERS

**4007.1 LOCATION:** (a) The location of water heaters shall comply with the standard set forth in Paragraph 4001.2(c) and 4001.8.

(b) Automatic hot water heaters shall comply with Sections 4001 and 4002 herein. Water heaters which burn solid, liquid or gas fuel shall not be installed in bathrooms, bedrooms, or any occupied rooms normally kept closed. Listed water heaters shall be installed in accordance with their listing and the manufacturer's instructions. In no case shall the clearances be such as to interfere with the requirements for combustion air, draft hood clearance and relief, and accessibility for servicing. See following table for minimum clearances for listed water heaters:

### MINIMUM CLEARANCES FOR LISTED WATER HEATERS

Type of Heaters	Distance from Combustible Material	
	Nearest Part of Jacket	Flat Side
Type A	6 Inches	.....
TypeeB	2 Inches	.....
Type C	.....	Flush
Counter Type Unit	In accordance with manufacturer's instructions.	

Type A—Miscellaneous (including circulating tank, instantaneous uninsulated, underfired)a

Type B—Underfired, insulated, automatic storage heaters.

Type C—Type B units with one or more flat sides and tested for installations flush to wall.

Counter Type—Type B units specifically designed for installations in or beneath a counter.

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**4007.2 VENTILATION:** (a) All enclosures for water heaters using solid, liquid or gas fuel shall be provided with an adequate system of ventilation as set forth in Section 4004, located at or near the floor and ceiling levels; and the area of such openings shall be not less than 36 square inches, independent of doors and windows. Louvred doors will be acceptable.

(b) All water heaters which use solid, gas or liquid fuels shall be connected, either directly or by means of smokepipes, to flues or vents, as set forth in Chapter 39, except as may be otherwise provided in Sections 4002 and 4003.

#### **4008 BOILERS**

**4008.1 GENERAL:** (a) All boilers and pressure vessels, including boilers generating steam under pressure, shall be designed and installed as specified herein. The standards of "The Boiler and Pressure Vessel Code" (1959) of the American Society of Mechanical Engineers, including all addendas thereto published prior to the adoption of this code, is hereby adopted to supplement, but not supersede, the requirements set forth herein.

(b) The installation, alteration, operation and inspection of any boiler or pressure vessel shall be as specified in Part I. Fees shall be as specified for additions or repairs to buildings. A Certificate of Inspection shall be required, stating the maximum allowable approved pressures, and shall be conspicuously posted.

(c) The Certificate of Inspection for a steam boiler operating in excess of 15 pounds per square inch, or for a boiler not having an unassisted gravity return, or for pressure vessel operating in excess of 60 pounds per square inch and having a volume in excess of five cubic feet, shall be for a fixed period not exceeding six months. Semi-annual inspection and compliance with this code for the renewal of the Certificate of Inspection shall be required.

(d) The Building Official shall require tests for new installations and for the annual inspection, as well as at any time as is, in his opinion, necessary in the interest of safety.

**4008.2 BOILERS, THREE HORSEPOWER OR LESS:** Boilers of three horsepower or less, generating steam at less than 100 pounds per square inch pressure, may be installed without enclosuresa shall not be placed on combustible flooring; and shall comply with the standard set forth in Paragraph 4001.2(c).

**4008.3 BOILERS OVER THREE HORSEPOWER:** (a) **HIGH PRESSURE:** Boilers generating steam at pressures exceeding 15 pounds per square inch shall be considered high-pressure boilers. High-pressure boilers over three horsepower shall be enclosed with walls of four-hour fire-resistive construction. There shall be no openings in enclosure walls except for ventilation. From the enclosure, there shall be not less than two exits, and such exits shall be remotely located and protected with Class B doors. Steam-supply lines, serving heating or other similar systems, shall be equipped with reducing valves to limit pressure to 15 pounds per square inch. An experienced, capable operator shall be in charge of all such boilers.

(b) **LOW PRESSURE:** Boilers generating steam at pressures not over 15 pounds per square inch shall be considered low-pressure boilers. Low-pressure boilers over three horsepower shall be enclosed with walls of three-hour fire-resistive construction and ceilings of two-hour fire-resistive construction, and there shall be no openings in enclosure walls except for ventilation and the entrance door thereto, which shall be a Class B door.

**4008.4 VENTILATORS AND CONNECTIONS:** Boiler enclosures shall be provided adequate ventilation, as set forth in Section 4004, and shall be connected to an approved flue or vent as set forth in Chapter 39.

**4008.5 REGULATIONS FOR MANUFACTURERS AND DEALERS:** Any person manufacturing or dealing in the sale of boilers or pressure vessels shall, on sale or delivery of such apparatus, notify the Building Official, giving the name and address of the purchaser. Second-hand or used pressure vessels shall be inspected by an agency approved by the Building Official, and a certificate shall be submitted and accepted by the Building Official before such apparatus is painted or offered for sale.

#### **4009 INCINERATORS**

**4009.1 GENERAL:** Incinerators for the reduction of refuse, garbage, or other waste materials shall not be permitted where, in the opinion of the Building Official, a nuisance or fire hazard may result. Incinerators, where permitted, shall be as set forth in this section.

**4009.2 SMALL DOMESTIC TYPE:** (a) Indoor installation of small domestic-type incinerators having a grate area of not more than nine square feet, shall have been tested and approved by a recognized testing agency and shall be installed in accordance with the conditions of approval, or shall have roofs and walls of not less than eight inches of solid brick masonry or fire clay or reinforced concrete, and have not less than 36 inches clearance from protected combustibles, or 48 inches from unprotected combustibles. Incinerators shall be mounted only on an incombustible floor and be connected to a Type A flue or vent.

(b) Outdoor installations of small domestic-type incinerators shall not be permitted.

**4009.3 COMMERCIAL AND INDUSTRIAL TYPE:** (a) Commercial industrial incinerators shall comply with recognized standards. Refuse chutes shall not feed directly to the combustion chamber but shall discharge into a room or bin enclosed and

separated from the incinerator room by not less than two-hour fire-resistive construction. The opening through which material is transferred from such room or bin to the incinerator room shall be equipped with a fire door having a Class A label. Chutes shall extend to, and not less than, four feet above the roof and shall be covered with a metal skylight glazed with a single, thick, plain glass.

(b) Commercial or industrial-type incinerators shall have a combustion chamber lined with not less than three and one-half inches of firebrick laid in fireclay mortar, including the space below the grate in downdraft incinerators, and shall have walls and roof of not less than eight inches of brick masonry laid in Portland cement mortar or reinforced concrete where having a grate area of not more than nine square feet, and 12 inches where having a grate area of more than nine square feet. Firebrick lining may be included in the required wall and roof thickness. The flue shall be constructed as set forth for chimneys, Chapter 39, and shall be covered with a corrosion-resistant spark arrester having a mesh not exceeding three-fourth inch and an area not less than twice the flue area.

#### 4010 SOLAR HEATERS

4010.1 Solar tanks, coils and systems shall be as set forth herein and in Part XII. Permits for the erection and alteration thereof shall be plumbing permits.

4010.2 Coil boxes shall be made of not less than 24-gage, corrosion-resistant metal, securely constructed, supported and anchored. Anchorage to sloping roofs shall be by bolting through the roof to the supporting members or rafters; and standard anchorage to wood-raftered roofs shall be by means of a 7/16-inch J-bolt, through the frame of the coil box and under the rafter, for each four square feet of coil box, but not less than four bolts. Anchorage for coil boxes, where the slope is different from that of the roof, shall be through back braces of 1¼" x 1¼" x ½" steel angle iron, spaced not more than four feet apart and bolted with not less than 7/16-inch bolts to the coil box and roof. Pitch pans shall be provided at roof anchor points where through bolts penetrate roofing felts.

4010.3 Tanks for solar heaters shall be of corrosion-resistant metal and shall be securely supported and anchored. No single tank shall exceed 60 gallons unless the supports are designed therefor.

Tanks shall be designed to operate under pressure not less than 100 pounds per square inch. Enclosures for tanks may be of wood, provided such wood is suitably treated for decay and water repellancy. Enclosures for tanks, of wood, shall be not less in size than a 2" x 4" and sheathed with one-inch sheathing or one-half inch, exterior-grade plywood, either of which is protected by expanded wire lath and stucco; or shall be a metal frame of 1¼ x 1¼ x ½ steel angle iron covered with expanded-wire lath and stucco; or shall be a cover box of .027-inch thickness of corrosion-resistant sheet metal. Tanks and enclosures shall be bolted through the roof to the supporting members with not less than four bolts, 7/16-inch in diameter.

## 4011 COMBUSTION ENGINES

**4011.1** Combustion engines shall not be installed in buildings or structures except with the approval of the Building Official. The Building Official may require approval of persons affected by the noise of such installation, and such approval may be requested in writing, at a public hearing, or from the elected officials in a public hearing.

**4011.2** Combustion engines shall be mounted on incombustible floors and, when required by the Building Official, shall be located in room enclosures, the walls and ceilings of which shall be two-hour fire-resistive material and sound proofed. Windows of such room enclosures shall be not larger in area than one square foot, and doors shall be Class B.

**EXCEPTION:** Combustion engines used for agricultural purposes may be enclosed in unprotected, combustibile construction where located not less than 50 feet from any other building or building line.

**4011.3** Exhaust pipes shall extend out-of-doors and above the roof not less than one foot, and above any nearby windows or building opening not less than three feet. The exhaust pipe shall be provided with an effective muffler.

**4011.4** Fuel supply for permanent installation in buildings of other than Type I construction shall be in underground tanks or may be gas-service connections, except that a five-gallon supply of Class III liquid may be approved. Supply lines shall be provided with a shut-off valve on the outside of the building in an easily-accessible and conspicuous place.





## Chapter 41 — Special Hazards

- 4101 TRANSFORMER VAULTS
- 4102 FLAMMABLE LIQUIDS
- 4103 VENTILATING DUCTS
- 4104 FILM
- 4105 EXPLOSIVES
- 4106 AIR CONTAMINENTS
- 4107 RADIATION PROTECTION
- 4108 PAINT SPRAY BOOTHS AND DIP TANKS

### 4101 TRANSFORMER VAULTS

**4101.1 STANDARDS:** Article 450, Transformers and Transformer Vaults, of the standard set forth in Paragraph 4505.1(a) herein supplements, but does not supersede, the requirements set forth herein for transformer vaults.

**4101.2 LOCATION:** Wherever such arrangement is practicable, transformer vaults shall be at or near the point of entrance of the service conductors to the building, ventilated to the outside air without the use of ducts and with access and egress directly from the exterior.

**4101.3 CONSTRUCTION:** (a) Transformer vaults shall be constructed in accordance with the following table

**REQUIRED THICKNESS OF WALLS —  
TRANSFORMER VAULTS**

	Reinforced Concrete	Solid Masonry	Hollow-Unit Masonry
Above Grade .....	6"	8"	12"
Below Grade .....	6"	8"	8"

Transformer-vault floors on the ground shall be of reinforced concrete, not less than four inches thick. Floors with open spaces below, and ceilings, shall be of reinforced concrete not less than six inches thick. Vault walls of hollow-unit masonry shall have a stuccoed surfacing not less than three-fourths inch in thickness on the inside. All openings in walls, floors, or ceilings shall be protected by Class B fire doors or wire-glass windows, except that ventilating openings to the exterior of the building may be provided with corrosion-resistance, incombustible louvers.

(b) A sill of sufficient height to confine within the vault one-third more oil than the capacity of the largest transformer, but not less than four inches high, shall be provided across all doors.

(c) Entrance doors shall be provided with a hasp for padlocking and shall be kept locked, with access available only to authorized persons.

**4101.4 DRAINAGE:** A transformer vault, located below ground water level or which, for other reasons, may be subject to flooding or water infiltration, shall be provided with an adequate system of drains and/or automatic ejectors. Above-grade vaults shall be provided with a gravity drain, terminating in a soakage pit. All vault-drainage installations shall be subject to the approval of the Building Official.

**4101.5 VENTILATION:** (a) Vaults shall be so designed that there shall be an air space of not less than six inches between any power transformer and a wall and not less than one foot between adjacent transformers in the same vault.

(b) Ventilation openings in transformer vaults shall be proportioned to the capacity of the transformers contained, to facilitate the movement of air and to prevent the development of excessive temperature.

(c) Ventilation openings shall be located as far as practicable from doors, windows, exit facilities and combustible materials. Such openings shall be covered with suitable grates, screens or louvres, constructed of corrosion-resistant, incombustible materials.

**4101.6 SPECIAL RESTRICTIONS:** No pipes for sanitary plumbing, water or gas supply or for any other purpose foreign to the vault installation shall pass through a transformer vault. No toilets or wash basins shall be installed in the vault. Any conduit or piping required in connection with sump pumps or similar necessary equipment shall be insulated electrically from the exterior of the vault. Vaults shall not be used for storage, nor for any other purpose than to contain and protect the transformers and the necessary equipment incident thereto.

#### **4102 FLAMMABLE LIQUIDS**

**4102.1 STANDARDS:** The "Standards for the Storage, Handling and Use of Flammable Liquids," NFPA Pamphlet No. 30, and "Standard for the Installation of Oil Burning Equipment," NFPA Pamphlet No. 31 of the National Board of Fire Underwriters is hereby adopted as a part of this Code to supplement, but not supersede, the requirements set forth herein.

**4102.2 SCOPE:** These provisions shall apply to new buildings, equipment and installation and to existing buildings, equipment and installations which constitute a hazard.

**4102.3 CLASSIFICATION:** (a) Flammable liquids shall be divided into three classes, according to the flash point, as follows:  
**CLASS I:** Liquids with a flash point below 25° Fahrenheit (-4° Centigrade), closed-cup tester.

**CLASS II:** Liquids with a flash point above that for Class I and below 70° Fahrenheit (21° Centigrade), closed-cup tester.

**CLASS III:** Liquids with a flash point above that for Class II and below 200° Fahrenheit (21° Centigrade), closed-cup tester.

Representative examples of the classes of flammable liquids are:

<b>CLASS I</b>	<b>CLASS II</b>	<b>CLASS III</b>
Acetone	Alcohol	Amyl Alcohol
Benzol	AniyI Acetate	Cleansing Solvents
Collodion	Ethel Acetate	Fuel Oil
Ether	Methyl Acetate	Kerosene
Gasoline	Toluoll	
Naptha		

(b) Any manufactured liquid or fluid commodity, such as paint, varnish, dryer, cleaning solution and polishing liquid, which contains flammable liquids shall be considered a flammable liquid and shall be classified according to the flash point of the mixture.

**4102.4 DETAILED REGULATIONS:** (a) No Class I, II or III liquids shall be stored in glass containers, except containers approved by ICC regulations.

(b) No Class I or Class II liquids shall be kept or stored in any building of Group A or B occupancy nor in Group C occupancies except in laboratories for experimental purposes.

(c) Except in sealed containers, no Class I or II liquids shall be stored within ten feet of any stairway or other path of egress unless separated therefrom by a fire-resistive wall or partition.

(d) In buildings other than Group I occupancy, there shall be not less than two remote paths of egress from the point of storage or use of Class I or II flammable liquids except that a single exit from a room may be permitted where the travel distance does not exceed 15 feet.

(e) Flammable liquids for agricultural use at the point of use shall be exempted from the requirements of this Section, subject to the approval of the Building Official, based on the location and hazard.

(f) Fuel-oil tanks shall not be located in garages attached to buildings of Group H or I occupancies.

(g) Containers of Class I or Class II liquids shall not be filled or used to fill other containers or appliances, unless outside of the building. Containers of Class III liquids of over five-gallons capacity shall not be filled, or used to fill other containers and appliances, unless outside of the building.

(h) All containers of Class I or Class II liquids shall be properly labeled, and conspicuously marked or painted, as set forth in the standards, Sub-section 4102.1 to indicate danger.

(i) In all rooms or parts of buildings which contain flammable liquids in open containers or in which the vapors from flammable liquids are present, or in which flammable liquids are used in any manufacturing process, open flame, sparks or smoking is prohibited. Suitable "NO SMOKING" signs shall be displayed.

(j) Flammable liquids shall not be drawn or handled in the presence of open flame or fire, but may be drawn and handled where lighting is by incandescent lamps installed to conform with Part XI herein.

(k) Pumps for dispensing gasoline to the tanks of operating equipment shall not be located inside of buildings or sheds that are more than 50 percent enclosed, and such pumps shall be not less than 15 feet from property lines and not less than ten feet from any building opening.

(l) Underground tanks shall be protected from damage caused by above-grade or lateral loads, shall be placed on a firm and well-tamped earth foundation and, where necessary to prevent floatation, shall be securely anchored or weighted.

(m) Underground storage tanks shall be equipped with pipe vents, independent of all other piping, and arranged to discharge to the open air. Vents shall be made of ample size to prevent abnormal pressure during filling, but not smaller than one and one-fourth inch pipe. Vent pipes shall drain to the tank. The top of the vent pipe shall not be closer than three feet to any building opening, shall be fitted with a weatherproof hood and shall not terminate in any areas where fumes may be trapped or may accumulate. The vent shall be protected by a flame arrester.

(n) Underground storage tanks shall be filled only through fill pipes, terminating outside of buildings at a point at least three feet from any building opening at the same, or at a lower level. Fill terminals shall be closed tight when not in use.

(o) Underground tanks temporarily out-of-service for a period exceeding 90 days shall have the vents and fill terminals capped and sealed with concrete. Underground tanks permanently abandoned shall be removed or filled with sand, and the responsibility for such protective measures shall be that of the owner of the property.

#### 4103 VENTILATING DUCTS

**4103.1 STANDARDS:** The "Standards" of the National Board of Fire Underwriters "For the Installation of Air Conditioning and Ventilating Systems of Other Than Residential Type," NFPA Pamphlet No. 90A, "For the Installation of Residence Type Warm Air Heating and Air Conditioning Systems," NFPA Pamphlet No. 90B, and "For the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal," NFPA Pamphlet No. 91, are hereby adopted as a part of this Code to supplement, but not supersede, the requirements set forth herein.

**4103.2 GENERAL:** (a) All air ducts shall be constructed entirely of metal or other approved incombustible materials of suitably-equal strength.

(b) In attic-fan installations, a firestat shall be installed to shut off the fan and a fusible link to close the opening in lieu of the afore-mentioned requirements.

(c) Ducts shall be tight throughout, with no openings except those essential to the required functioning of the system. Ducts shall be substantially braced or supported by metal hangers, brackets or their equivalents from substantial structural members.

(d) Ducts shall not pass through fire walls unless unavoidable, and in such cases, approved, automatic fire doors or shutters shall be provided.

(e) Ducts shall be constructed of metal or other incombustible materials to provide structural strength and durability at least equal to the requirements set forth in the "Standards," NFPA Pamphlet No. 90A.

**4103.3 HOODS OVER RESTAURANT EQUIPMENT:** (a) **HOODS REQUIRED:** Restaurant-type ranges, candy kettles and appliances for the frying of bakery or confectionery products shall be provided with ventilating hoods and ducts to take off the smoke, gases and vapors, unless such appliances are enclosed and vented in an approved manner.

**EXCEPTIONS:** (1) Hoods shall not be required in kitchens used solely for the preparation of food for one family.

(2) Hoods to carry off heat only from kitchen units such as dishwashers, coffee urns and water heaters, and where grease is not anticipated, may be exempt from the provisions of this subsection.

(b) **LOCATION:** Such hoods shall not be raised more than seven feet from the floor. The length and width of kitchen hoods shall extend a minimum of 12 inches beyond the appliance over which they are installed. Where space conditions permit, range hoods shall be not less than two feet high to provide a reservoir to confine momentary bursts of smoke and steam until the exhaust system can evacuate the hood. Range hoods shall be located as low as possible to increase their effectiveness. Exhaust connections to range hoods shall be made at the top and/or back of the hoods.

(c) **GAS-APPLIANCE VENTS:** Vents of gas-burning cooking appliances other than ovens shall extend through or beyond the grease screen or filter and shall be further regulated as set forth in Section 3905.

(d) **HOOD DESIGN:** (1) Hoods over kitchen-cooking equipment shall be constructed of incombustible materials, with tight joints and having a clearance of at least 18 inches from all unprotected combustible material.

(2) Duct systems shall create a conveying air velocity in the exhaust system of not less than 1500 feet per minute and not more than 2200 feet per minute. The average air velocity across the face of any hood in the exhaust system shall not be less than 100 feet per minute.

(3) Range or grease filters or equally-effective grease traps shall be installed in all commercial-use installations and shall be of non-combustible construction, proportioned not to decrease the air velocity in the duct below the limit set forth in Paragraph 4103.3(d) (2).

(4) In range hoods where mechanical draft is used, a suitable firestat shall be installed.

(e) **DUCTS:** (1) Ducts from hoods shall be constructed of 20 U. S. standard gage or heavier sheet metal, with tight joints and separated at least 18 inches from all unprotected combustible material. Inside laps in duct joints shall project in a direction against the air flow.

(2) Ducts shall lead as directly as possible to outside.

(3) The ducts shall constitute an independent system in no manner connected with any other ventilating system.

(4) Hand-holes, for inspection and cleaning purposes, equipped with tight-fitting sliding or swinging doors and latches, shall be provided in horizontal sections of exhaust ducts. Such openings should be at the side of the horizontal run in order to prevent dripping of residue. Spacing of such openings shall not exceed 20 feet.

(5) Vertical risers located outside of buildings shall be adequately supported by the exterior walls. Risers located inside of buildings shall be enclosed in a shaft of fire-resistive material, as set forth in Part V herein, extending continuously through the roof.

(6) At the base of each vertical riser, a residue trap shall be provided with provisions for cleanout.

(7) Exhaust ducts shall not pass through firewalls. Where ducts pass through partitions of combustible construction, the clearance shall be 18 inches unless insulated to provide at least one-hour fire-resistive protection; in which case, the clearance may be reduced to three inches.

#### **4103.4 EXHAUST SYSTEMS FOR FLAMMABLE VAPOURS:**

Exhaust systems for flammable vapors shall be as set forth in the "Standards for Blowers and Exhaust Systems for Dust, Stock and Vapor Removal," NBFU Pamphlet No. 91 or "Dip Tanks," NBFU Pamphlet No. 34 or "Spray Painting," NBFU Pamphlet No. 33. Where fans are used in connection with the exhausting of flammable vapors, protective devices shall be installed to stop the operation of the fan in event of fire.

#### **4104 FILM**

The storage and handling of cellulose nitrate motion-picture film shall conform to the "Standards for Storage and Handling of Cellulose Nitrate Motion Picture Film," NFPA Pamphlet No. 40, of the National Board of Fire Underwriters, except that the provisions of this section do not apply to the following:

(a) Films for amateur photographic use in original packages of "roll" and "film pack" films in quantities of less than 50 cubic feet.

(b) Safety film (cellulose—acetate base).

(c) Dental X-ray film.

(d) Films stored or being used in standard motion-picture booths.

#### 4105 EXPLOSIVES

The transportation, storage, use and handling of dynamite and other explosives shall comply with applicable state and local regulations. The Building Official may require that persons transporting, storing, using or handling dynamite and other explosives produce permits therefor where such permits are required. The Building Official may confiscate dynamite or other explosives transported to, or used on, construction work within the scope of his inspection authority where such transportation or use is, to his knowledge, in violation of applicable regulations or where, in his opinion, explosives in other than sealed containers or locked transporting boxes are unguarded or otherwise suitably protected against theft.

#### 4106 AIR CONTAMINENTS

**4106.1 SCOPE:** No person or firm shall discharge or cause the emission of any smoke, soot, fly ash, cinders, dust, fumes, obnoxious gases, odors or other air contaminants in excess of that permitted herein or endanger the health or safety of persons or property or cause injury or create a nuisance to the public from any portable, stationary or mobile open fire, flue, stack, locomotive, fire box, incinerator boiler or other device.

**EXCEPTION:** The requirements of this Section do not apply to:

(a) Agricultural operations within areas so zoned.

(b) Fires authorized by the Fire Chief in the performance of official duties.

(c) Heating and cooking purposes in connection with buildings of Group I occupancy.

(d) Open fires authorized by other applicable regulations.

**4106.2 STANDARDS:** "The Ringleminn Smoke Chart #2," as published and used by the U. S. Bureau of Mines, the "Air Pollution Abatement Manual," copyrighted 1951 by the Manufacturing Chemists Association, Inc., and the "Test Code for Dust Separation Apparatus" of the American Society of Mechanical Engineers, shall be applied as standards for preventing eliminating and controlling air contaminants.

**4106.3 PERMITS:** No person or firm shall erect, construct, alter, repair or operate any device which will generate or emit air contaminants without first having obtained a permit for such work.

Application for permit shall be on a form provided by the Building Official and shall describe, or be accompanied by fully descriptive plans, the work proposed, including the methods and/or devices proposed for the elimination of air contaminants. The Building Official may require the plans or specifications to be prepared by and bear the seal of a registered, professional engineer. The Building Official will approve the application and issue the permit only when, in his opinion, the proposed work complies with the requirements of this section. The issuance of a permit or the approval of an installation shall not be authority to emit air contaminants contrary to the requirements of this Code nor prevent the Building Official from enforcing the provisions herein.

**4106.4 INSPECTION:** The Building Official shall make inspections during the progress of the work, before concealment of parts and after completion, before the device for which a permit is required is in normal operation, to assure compliance with approved plans and this Code.

**4106.5 INSTALLATION AND PERFORMANCE:** (a) The Building Official may use any accepted and proven or provable methods, devices or equipment for measuring air contamination and shall make use of accepted recognized criteria in establishing maximum allowable concentration standards, applicable to the various types and kinds of air contaminants. Equipment, devices or contrivances designed to be installed for the purpose of preventing or eliminating the emission of air contaminants shall be of a type proven by actual operation to prevent or eliminate emission of air contaminants in excess of that permitted by this Code, or shall be certified by a registered, professional engineer to accomplish the purpose for which designed.

(b) The emission of smoke from any source to a density greater than that density described as "Ringleminn Smoke Chart #2" shall not be permitted; except that smoke in excess of this allowable density will be permitted for not more than three minutes in any 30-minute period.

**4106.6 EXISTING NONCONFORMING USE:** Nonconforming installations, devices and uses, in existence at the time of the effective date of this Code, shall be made to comply herewith within a period of one year from such effective date or the use thereof shall be discontinued.

#### **4107 RADIATION PROTECTION**

Radiation apparatus and devices for medical or industrial uses shall comply with the recommendations of the following National Bureau of Standards Handbooks:

**Handbook 48** Control and Removal of Radioactive Contamination in Laboratories

**Handbook 49** Recommendations for Waste Disposal of Phosphorous-32 and Iodine-131 for Medical Users

**Handbook 50** X-Ray Protection Design

**Handbook 51** Radiological Monitoring Methods and Instruments

**Handbook 53** Recommendations for the Disposal of Carbon 14 Wastes

**Handbook 54** Protection Against Radiations from Radium, Cobalt-60 and Cesium-137

**Handbook 55** Protection Against Betatron-Synchrotron Radiations up to 100 Million Electron Units

**Handbook 57** Photographic Dosimetry of X and Gamma Rays

**Handbook 58** Radioactive Waste Disposal in the Ocean

**Handbook 59** Permissible Dose from External Source of Ionizing Radiation



**Handbook 60 X-Ray Protection**

**Handbook 61 Regulations of Radiation Exposure by Legislative Means**

**Handbook 65 Safe Handling of Bodies Containing Radioactive Isotopes**

**Handbook 69 Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure**

Where recommended in the standards, radiation apparatus shall be used only where provided with the protective barriers and structural shielding as set forth. The safe working practices set forth in the standards shall be followed. The suitability of protective barriers and handling practices shall be effectively tested before the handling of radioactive isotopes is put in general use.

#### **4108 PAINT SPRAY BOOTHS AND DIP TANKS**

**4108.1 SCOPE:** The application of flammable or combustible paint, varnish, lacquer, stain or other flammable or combustible liquid applied as a spray in continuous or intermittent processes; and dip tank operations in which articles or materials are passed through contents of tanks, vats or containers of flammable or combustible liquids, including coating, finishing, treating and similar processes shall comply with the requirements of this section.

##### **4108.2 PAINT SPRAY BOOTHS**

(a) **WHERE REQUIRED:** (1) Paint spraying, spray finishing, or dipping operations shall not be conducted in a building of Group A, B, C, D, H or I Occupancy except in a room complying with the standards as set forth herein, and protected with an approved system of automatic sprinklers, and separated vertically and horizontally from other areas by construction having not less than 2 hours fire resistance.

(2) In buildings of Group E, F and G Occupancy where spraying apparatus is used repeatedly, such operations shall be conducted in spray booths or spray areas constructed as set forth herein.

(3) Spraying operations shall be confined to the smallest practicable space commensurate with the operation.

(4) Where quantity of spraying or dipping materials used in a day does not exceed 2 quarts and the total amount of materials stored does not exceed 20 gallons, the Building Official may waive or vary these requirements subject to the consideration of safety.

(b) **STANDARDS:** Paint spraying and spray finishing shall comply with the standard, "Spray Finishing" of the National Board of Fire Underwriters which is hereby adopted to supplement, but not supersede, the requirements set forth herein.

**4108.3a DIP TANKS:** Dip tank operations shall conform to the Standard "Dip Tanks" of the National Board of Fire Underwriters, which is hereby adopted to supplement but not supersede the requirements set forth herein.



## PART IX — SIGNS

### Chapter 42 — Signs

- 4201 GENERAL
- 4202 DEFINITIONS
- 4203 ERECTION PERMITS
- 4204 INSPECTION
- 4205 DESIGN
- 4206 LIMITATIONS ON ROOF SIGNS
- 4207 LIMITATIONS ON GROUND SIGNS
- 4208 LIMITATIONS ON PROJECTING SIGNS
- 4209 DETAILED REQUIREMENTS
- 4210 LIGHTING

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#### 4201 GENERAL

4201.1 The construction, alteration, repair and maintenance of all signs and outdoor display structures together with their appurtenant and auxiliary devices shall be as set forth herein.

4201.2 Where more restrictive in respect to location, size, use, height of signs and outdoor display structures, the limitations of zoning or other specific regulations shall apply.

#### 4202 DEFINITIONS

**AREA:** The area of a sign, for the purpose of this Chapter, shall be the area of that square or rectangle which would enclose all parts of the sign; its border, decoration, ornamentation, appendage and appurtenances, excepting the supporting columns or posts of a roof sign or a ground sign. The area definition set forth herein shall not be construed to be applicable to any zoning regulations and the area or measuring size for such purposes shall be that set forth in such applicable zoning regulation.

**AWNING SIGN:** Any sign painted, stamped, perforated or stitched on an awning, canopy, roller curtain or umbrella.

**BANNER SIGN:** Any sign having the characters, letters, illustrations or ornamentations thereof applied to cloth, paper or fabric of any kind.

**EMBELLISHMENT:** A part of the sign which is superimposed on the area. This definition shall not be construed to be applicable to any zoning regulations.

**FLAT SIGN:** Any sign attached to and erected parallel to the face of, or erected or painted on the outside wall of a building and supported throughout its length by such wall or building; or any sign in any way applied flat against a wall.

**GROUND SIGN:** Any sign wholly or partially supported directly on the ground.

**MARQUEE SIGN:** Any sign attached to or supported from a marquee.

**PROJECTING SIGN — HORIZONTAL:** Any sign attached to a building and projecting at any angle from the face of the wall, and which has a horizontal dimension greater than the vertical dimension.

**PROJECTING SIGN — VERTICAL:** Any sign attached to a building and projecting at any angle from the face of the wall, and which has a vertical dimension equal to or greater than the horizontal dimension.

**ROOF SIGN:** Any sign which is fastened to, supported by or erected over the roof of a building. This definition shall not be construed to be applicable to any zoning regulations.

**SIGN:** Any display of characters, letters, illustrations or ornamentations.

**SIGN SETBACK:** To be determined by the outer edge of the face of the sign or its embellishments.

**SIGN STRUCTURE:** The complete structure on which such characters, letters, illustrations or ornamentations may be supported or applied.

#### **4203 ERECTION PERMITS**

**4203.1 PERMIT REQUIRED:** No sign structure shall be hereafter erected, constructed, altered, or relocated until a building permit for a sign structure and an electric permit for any electrical construction in connection therewith shall have been issued, as set forth in Chapter 3 herein. No sign shall hereafter be erected, constructed, pasted, painted, altered, or relocated, except the changing of copy on a bulletin board or poster board or marquee, until application has been made and a permit therefor issued by the Building Official.

**EXCEPTIONS:** (a) Official traffic signs or sign structures and provisional warning signs or sign structures when erected by a legally constituted governing body.

(b) Signs or sign structures erected in connection with new construction work, where such signs or sign structures do not exceed two feet in height or three feet in width and are displayed only during such time as the actual construction work is in progress, and provided such signs are located at the site of the construction work in progress.

(c) No permit shall be required for signs under 2 x 3 feet.

**4203.2 APPLICATION:** (a) The Building Official shall require written consent of the property owner or lessee when application for permit is by any person other than the owner of the property on which the sign or sign structure is proposed to be erected or to which it will be attached.

(b) Applications for proposed signs or sign structures exceeding 24 square feet in area shall be accepted only from contractors holding current license as sign erectors or as general building contractors, or property owners, or lessees.

(c) Application for permit shall be accompanied by such drawings and information as are necessary to fully advise and acquaint the Building Official, and such other regulatory authorities having jurisdiction, with location, construction, weight, materials, methods of securing, manner of illuminating and advertisements to be carried.

(d) Computations, stress diagrams and stress calculations shall be submitted to show the structural adequacy of the sign and its supports when required by the Building Official; and the application for permit for all signs, other than a sign painted on a wall, exceeding 24 square feet in area, shall be accompanied by plans prepared by, and bearing the impress seal of, a registered professional engineer.

(e) The Building Official shall waive the requirements for plans for relatively small and obviously simply-constructed and erected signs less than 24 square feet, when, in his opinion, no public safety is affected thereby, but shall not waive the requirements for such plans for construction over public property or for roof signs.

#### **4204 INSPECTIONS**

**4204.1 ERECTION INSPECTION:** The permit holder shall request a structural and electrical inspection before enclosure and shall request a final inspection within 48 hours of the completion of the work.

**4204.2 UNSAFE SIGNS:** Any sign, found to be unsafe at any time, shall be ordered to be made safe. If, after due and reasonable notice, such sign is not made safe, it shall be ordered removed.

#### **4205 DESIGN**

**4205.1** All signs and their supporting structures shall be so designed and constructed as to admit of rational analysis, in accordance with accepted principles of mechanics.

**4205.2** The wind pressure on signs shall be computed as set forth in Chapter 23 based on the area of the proposed sign including all embellishments.

**4205.3** Design of primary members shall not be based on removal of panels during periods of high wind velocities.

**4205.4** Embellishments shall not extend more than 6 feet above the top of the sign nor more than 6 feet on each side of the sign. That portion of the embellishment extending beyond the sign area shall not exceed 25 percent of the sign area. Embellishments projecting below the base shall not be more than 10 feet in horizontal measurement. Nothing in this paragraph shall be construed to imply that an embellishment may exceed the limits of area, dimension or height as set forth in any applicable zoning regulations.

#### **4206 LIMITATIONS ON ROOF SIGNS**

**4206.1** Roof signs shall be constructed of only incombustible materials, except transparent plastic or letters.

**4206.2** Roof signs shall be limited in size and location so that the face of the sign parallel to or at any angle not exceeding 30 degrees with an outside wall of the building, parapet or overhang shall be not less than 3 feet from the outside wall of the building, parapet or overhang.

The ends of a roof sign at an angle of 30 degrees or more with the adjacent outside walls of the building may extend to, but not past, the outside face of the building, parapet or overhang.

**4206.3** No part of a roof sign shall extend horizontally beyond the building walls, parapet or overhang at the roof.

**4206.4** Roof signs shall be so placed as to provide a minimum of 18 inches vertical clear height above the roof, except that such vertical clearance above the roof shall not be required for signs ten feet or less in length where clear passage to all parts of the roof is not impeded thereby.

**4206.5** Roof signs exceeding 40 square feet in area shall be supported by steel or concrete.

#### **4207 LIMITATIONS ON GROUND SIGNS**

**4207.1** Ground signs shall be of only rot and deterioration resistant materials.

**4207.2** Ground signs shall be limited in size and location so that the face of the sign parallel to or at an angle not exceeding 30 degrees with a lot line shall be not less than 3 feet from the line and the end of such a sign may extend to the lot line.

The ends of a ground sign at an angle of 30 degrees or more with adjacent lot lines may extend to the lot line.

Nothing in the above paragraphs shall be construed to imply that an embellishment may exceed the limits of area, dimension or height as set forth in any applicable zoning regulations.

**4207.3** No ground sign shall be erected so that any part of such sign extends over public streets or sidewalks.

**4207.4** No ground sign or portion thereof which exceeds 40 inches in height, or which does not provide an eight-foot clearance between the bottom of the sign and the highest grade of the street adjacent thereto, shall be placed within the triangle formed by the point of intersection of the street lines, two legs of which triangle are measured along each street line or street lines projected for lots with radius corners, a distance of 30 feet from their intersection.

#### **4208 LIMITATIONS FOR PROJECTING SIGNS**

**4208.1** Projecting signs shall be constructed only of incombustible materials.

**4208.2** No sign projecting over public streets shall extend or project nearer than 18 inches to the curb.

**4208.3** No sign projecting over any part of a public sidewalk shall be erected less than nine feet, measured vertically, above any part of such sidewalk.

**4208.4** Projecting signs shall be so bolted or otherwise secured to their supporting members as to prevent their being unhooked.

**4208.5** Projecting signs erected over alleys shall be not less than 15 feet above the grade directly beneath such sign.

#### **4209 DETAILED REQUIREMENTS**

**4209.1** Signs shall be secured to their supports and supporting structures with rot-resistant fastenings such as galvanized iron, lead or brass. No wood or plastic plugs or pins shall be used.

**4209.2** No sign shall be placed to obstruct the required egress, light or ventilation, set forth in this Code.

**4209.3** No sign shall be constructed, erected, used, operated or maintained:

(a) Which involves motion or rotation of any part or displays, intermitting lights resembling, or seeming to resemble, the flashing lights customarily associated with danger or such as are customarily used by police, fire or ambulance vehicles, or for navigation purposes.

(b) Which uses the word "STOP" or "DANGER" or presents or implies the need or requirement of stopping or the existence of danger, or which is a copy or imitation of official signs.

(c) Which is so located and so illuminated as to provide a background of confusing, colored lights for traffic-signal lights when such traffic lights are viewed from a normal approaching position of a vehicle at a distance of from 25 to 300 feet.

**4209.4** Signs shall be constructed with adequate rain-water drains.

**4209.5** Structural flat signs shall not be erected where any part of such sign is less than nine feet, measured vertically, above any part of the public sidewalk directly beneath such sign.

#### **4210 LIGHTING**

**4210.1** Signs shall be illuminated by electrical means only.

**4210.2** Electrically-illuminated signs shall comply with the requirements of Part XI of this Code.

**4210.3** Goose-neck, spot or floodlights shall not be placed as to extend over public property.









# PART X — AWNINGS, CANOPIES AND TENTS

## Chapter 43 — Canvas Awnings, Canopies and Tents

- 4301 GENERAL
- 4302 DEFINITIONS
- 4303 PERMITS AND INSPECTIONS
- 4304 LOCATION AND USE
- 4305 CONSTRUCTION
- 4306 TESTS

### 4301 GENERAL

**4301.1 GENERAL:** Canvas awnings, canopies, and tents shall be of materials, proportions and strength as set forth in this Chapter. Where more restrictive in respect to location, use, size and height, the limitations of zoning or other specific regulations shall apply.

**4301.2 PURPOSE:** It is the intent and purpose of this Part to regulate construction and location of awnings and canopies on private property and to set forth the conditions under which awnings may be constructed over public property.

### 4302 DEFINITIONS

**AWNING:** Any movable rooflike structure, cantilevered, or otherwise entirely supported from a building, so constructed and erected as to permit its being readily and easily moved within a few minutes time to close an opening, or rolled or folded back to a position flat against the building or a cantilevered projection thereof, or is detachable.

**CABANA:** A sun and wind protection erected nearby and in connection with swimming areas having removable canvas roof and walls, on a fixed metal frame.

**CANOPY:** Any fixed rooflike structure, not movable-like an awning, and which is cantilevered or in whole or in part self-supporting, but having no side walls or curtains other than valances not more than 18 inches deep. Lean-to canopies, fixed umbrellas and similar structures are included in this classification. Structures having side walls or valances more than 18 inches deep shall be classified as a tent or cabana as set forth herein.

**CANVAS:** Cloth or any material similarly flexible or woven.

**ROLLER CURTAIN:** Shall be included in the classification of a movable awning and shall be defined as having a roller attached to the lower edge of a canvas and supported in whole or in part by the awning material.

**SELF-SUPPORTING:** Supported to the ground or construction below by columns or walls, but not cantilevered.

**TENT:** A canvas-roofed structure, wholly or partially self-supporting, with side walls of any material.

### 4303 PERMITS AND INSPECTIONS

**4303.1 PERMITS:** (a) A permit shall be required as set forth in Chapter 3 herein for the construction, fabrication, installation, repair or replacement of any awning, canopy, or any canvas structure erected over public property, or over private property used for business or industrial purposes, or over private property when such structure is in whole or in part self-supported.

**EXCEPTION:** Permits will not be required for the repair or replacing of canvas when the existing structural framework is not altered or removed and when such framework is in compliance with the requirements of this Code.

(b) Application for permit shall be accompanied by plans, when required by the Building Official, such plans shall be prepared by, and bear the seal of, a registered professional engineer.

(c) Where the proposed structure is to be erected over public property, applications will be accepted from only licensed contractors.

(d) Applications for the erection of a tent exceeding 100 square feet in area shall be accompanied by written approval of all residents or owners of property located within a radius of 200 feet of the erection site, except that where a tent is to be erected on private property for a period not to exceed 24 hours the permission of adjacent property owners will not be required.

(e) Permits for the erection of a tent shall be revocable on 24 hours notice and shall be temporary and for a period not exceeding 30 days.

**4303.6 INSPECTION:** (a) The permit holder shall request the Building Official to make a final inspection when the work is completed.

(b) The name of the manufacturer shall be affixed and shall be visible and legible.

#### **4304 LOCATION AND SIZE**

**4304.1 LOCATION:** (a) Canvas awnings and canopies located over public property or in areas accessible to the general public shall be constructed so that no rigid part of such canvas awning or canopy shall be less than seven feet and six inches from the grade directly below, and no part of the cloth drop shall be less than six feet six inches. The minimum clearance under awnings or canopies located over the state highway rights-of-way shall be as required by the Florida State Road Department.

(b) No cantilevered portion of an awning or canopy exceeding nine feet in projection shall extend over public property, nor shall any portion be closer than 18 inches to the curb line.

(c) Canopies, in whole or in part supported to the ground, shall comply with the zoning set back for buildings except as may be otherwise regulated in Chapter 36 or in applicable zoning regulations.

(d) Structures, in whole or in part of canvas, erected in connection with gasoline service stations may not be erected within 15 feet of where flammable liquids are transferred.

**4302.2 USE:** (a) Canvas awnings or canopies may be used for the shading and weather protection of windows, door entrances, fruit and vegetable display, restaurant tables not enclosed with insect screen and seats and playgrounds. Canvas awnings and canopies used for the shading or weather protection of cars or boats in connection with Group I Occupancies shall be limited to a size to cover not more than two such vehicles.

(b) Canvas awnings and canopies may not be used for general storage of combustible materials or goods packaged in combustible materials.

(c) Canvas awnings and canopies may not be enclosed with any material other than a valance not more than 18 inches in vertical depth or canvas roller curtains for temporary shade and weather protection.

**4305 CONSTRUCTION**

**4305.1 AREA:** (a) No canvas awning or canopy shall exceed the area of the building to which it is attached.

(b) No canvas awning or canopy shall exceed ten percent of the area of the lot on which such awning or canopy is located.

**4305.2 MATERIAL:** (a) Canvas used for purpose herein defined shall be a minimum of 10.10 army duck. Canvas for tents shall be flame-resistant.

(b) Supports for canvas awnings and canopies shall be of metal or similar durable material.

**4305.3 DESIGN:** (a) The minimum size of structural members for cantilevering awnings, or canopies or cabanas shall be not less than as set forth hereinafter, nor less than required to resist two-thirds of the wind load set forth in Sub-section 2306.6. Design of the structural frame shall not be based on the removal or repositioning of parts, or the whole, during periods of high wind velocity. All canvas shall be designed for quick removal.

**MINIMUM SIZE OF FRONT BARS**

3' width between supports	a . . . . .	1/2" pipe
9' width between supports	... a . e . a . a . .	3/4" pipe
14' width between supports	.....	1" pipe

**EXTENSIONS ON AWNINGS AND TRUSS**

**EXTENSIONS ON CANOPIES**

Rafters up to 5' in extension from supporting wall	... 1/2" pipe
Rafters up to 9' in extension from supporting wall	a . . 3/4" pipe
Rafters up to 12' in extension from supporting wall	... 1" pipe
Rafters on canopies shall be not more than five feet apart.	

**NUMBER OF SUPPORTS REQUIRED ON**

**ROLLER-GEAR AWNINGS**

Up to 20' in width parallel to supporting wall	.. no center support
20' to 30' in width parallel to supporting wall	... 1 center support
30' to 50' in width parallel to supporting wall	ea 2 center supports
50' to 60' in width parallel to supporting wall	.. a 3 center supports
60' to 70' in width parallel to supporting wall	... 4 center supports

**NUMBER OF ARMS REQUIRED FOR**

**ROLLER-GEAR AWNINGS**

Length of Awning	Quantity
Up to and including 20' . . . . . a . . . . .	2 arms
Up to and including 30' . . . . . a . . . . . e	3 arms
Up to and including 40' . . . . . ea . e . e . e	4 arms

(b) The cloth parts of canopies and awnings shall be securely laced, tied or otherwise fastened to the frame; no rafter or front bar will be permitted in pockets and in no case shall a rolling curtain be caused to operate over a canopy frame.

(c) The front bar of an awning, when pulled up, shall not be higher than the head of the awning.

(d) The awning head bar may be of wood, provided such wood is treated to resist rot and weather deterioration.

(e) When attaching awnings or canopies to masonry walls or columns, lags and expansion bolts in metal shields shall be required. Wood plugs are hereby prohibited. Fastenings shall be not less than three-eighths inch bolts, nor more than three feet apart.

(f) The horizontal projection of cantilevered portions shall not be greater than two times the height, except where the building construction does not permit a proper installation; in which case, variance may be permitted by the Building Official, based on special design and construction. All canvas awnings, except roller-gear awnings with folding arms, must be equipped with fire chains, one end of which fastens to the front bar or side arm, not more than six inches back of the front bar and the other end of which fastens to a point just under the head bar, but not to the head bar or head-bar fastenings. Such chains and fastenings shall be of sufficient strength to withstand the stress of the awning's being dropped and to keep the frame from going below the required minimum.

#### **4306 TENTS**

**4306.1** No profit-seeking or commercial activity of any kind or character whatsoever shall be transacted within an area covered by a tent, except a traveling organization regularly employing such means of weather protection, such as a circus or a convention.

**4306.2** Tents may not be used for general storage of any character whatsoever and may not be used for sleeping purposes.

**4306.3** All canvas, curtains, cloth, rope netting and decorative material used for, or in, or on, a tent shall be rendered flameproof, provided that flameproofing will not be required for tents open on one side and with standing capacity only for 20 or less persons. Tents required to be fire-resistant shall be inspected by the Building Official and the flameproofing certified on the Application for Building Permit, issued for the erection of such tent.

**4306.4** All tents shall be constructed and erected to withstand a wind pressure of ten pounds per square foot. No tier of seats shall rise to a height exceeding 12 feet. All lighting shall be by electricity. A minimum of two exits shall be provided where a tent is used as a place of assembly for 100 or more persons. Where tents are used as a place of assembly with a capacity of 500 or more persons, each exit shall be not less than nine feet wide; and the number of exits shall be one additional exit for each additional 500 persons, or major fraction thereof. Exits shall be spaced not more than 75 feet apart. Aisles shall be not less than 44 inches in width, provided such aisles shall not be less in width than the combined width of aisles that they connect. There shall be not more than ten seats between any seat and aisle, and if the seating capacity of such tent exceeds 500 persons, collapsible chairs shall be fastened together in banks of ten.

**4306.5** Tents shall not be less than 30 feet from side or rear property lines or from other buildings on the same property.

**4306.6** (a) No heating devices shall be allowed in connection with tents used for public assembly.

(b) No cooking, storage or dressing rooms shall be allowed in the same tent used for public assembly.



## Chapter 44—Rigid Awnings, Canopies & Screen Enclosures

- 4401 GENERAL
- 4402 PERMITS AND INSPECTIONS
- 4403 DESIGN
- 4404 LOCATION

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### 4401 GENERAL

**4401.1 GENERAL:** Rigid awnings and canopies and screen enclosures shall be of the materials, proportions and strength as set forth in this Chapter.

#### 4401.2 DEFINITIONS:

**AWNING:** Any fixed rooflike structure, cantilevered, or otherwise entirely supported from a building, so constructed and erected as to permit its being readily and easily moved within a few-minutes time to close an opening, or rolled or folded back to a position flat against the building or a cantilevered projection thereof, or is detachable.

**CANOPY:** Any fixed rooflike structure not movable like an awning and which is cantilevered or in whole or in part self-supporting, but having no side walls or curtains other than valances not more than 18 inches deep. Lean-to canopies, fixed umbrellas and similar structures are included in this classification. Structures having side walls or valances more than 18 inches deep shall be classified as a building of a Type of Construction as set forth in Part V.

**CANOPY SHUTTER:** Any fixed rooflike structure which is movable like an awning and which is cantilevered or in part supported to the ground or construction below by removable columns or posts, but having no side walls or curtains other than valances not more than 18 inches deep and which is so constructed and erected as to permit its being readily and easily moved within a few minutes time to close an opening by folding back to a position flat against the building when the building is unattended or act as a storm shutter during periods of high wind velocity.

**RIGID:** Not flexible, as distinguished from canvas.

**SCREEN ENCLOSURE:** A building or part thereof, in whole or in part self-supporting, and having walls of insect screening and a roof of insect screening, plastic, aluminum, or similar lightweight material.

**SELF-SUPPORTING:** Supported to the ground or construction below by columns or walls, but not cantilevered.

### 4402 PERMITS AND INSPECTIONS

**4402.1 PERMITS:** (a) A permit will be required as set forth in Chapter 3 herein for the construction, fabrication, installation, alteration or repair of any rigid awning, canopy, canopy shutter or screen enclosure.

(b) Application for permit shall be accompanied by plans, and when required by the Building Official, such plans shall be prepared by and bear the seal of, a registered professional engineer.

**4402.2 INSPECTION:** The permit holder shall request the Building Official to make a final inspection when the work is completed.



**4402.3 POSTING:** Structures designed to be readily removed or repositioned during periods of high wind velocity shall be posted with a legible and readily visible decal or painted instructions to the owner or tenant to remove or reposition the structure or part thereof during such periods of time as are designated by the U. S. Weather Bureau as being a hurricane warning or alert.

#### **4403 DESIGN**

**4403.1 LOADS:** Rigid awnings, canopies, canopy shutters and screened enclosures shall be designed to resist the loads set forth in Chapter 23 herein except that structures or parts thereof which are intended to be removed or repositioned during periods of high wind velocity shall be designed in their open or extended position to resist velocity pressures not less than that based on 75 MPH wind with applicable shape factors and to resist not less than 15 pounds per square foot roof live load. Where such structure is intended to be folded or otherwise repositioned to close an opening when the building is unattended or act as a storm shutter, the design in the closed position shall also comply with Sections 2306 and 3511.

**4403.2 ALLOWABLE STRESSES:** The allowable stresses shall not exceed those set forth in this Code for the materials of construction.

**4403.3 MATERIALS<sup>a</sup>** Rigid awnings, canopies, or canopy shutters located over public property shall be of incombustible materials, unless specifically exempted by zoning regulations.

**4403.4 DETAILED REGULATIONS<sup>a</sup> (a) SCREEN ENCLOSURES:** (1) The maximum allowable deflection of roof supporting members shall not exceed a ratio of  $L/80$  based on design load alone. The top flange of these members shall be laterally supported by positive means at spacings not to exceed 40 times the flange width of the composite member and the entire structure shall be braced in the plane of the roof.

(2) Vertical members shall be designed to resist applicable axial and bending loads. Positive rational means shall be provided to transmit beam reactions to the columns and column loads to the footings.

(3) The supporting members of screens having openings of less than 40 percent of the gross area shall be designed to resist 30 psf wind load on the screen. The supporting members of screens having openings of 40 per cent or more but not more than 60 per cent shall be designed to resist 20 psf wind load on the screen. The supporting members of screens having openings of more than 60 percent shall be designed to resist 10 psf wind load on the screen.

(4) Application for permit shall be accompanied by scaled drawings and, where required by the Building Official, shall be prepared by and bear the seal of, a registered Professional Engineer. Drawings shall show a foundation plan, roof framing plan, all elevations, plot plan, properties and dimensions of members and where required by the Building Official, computations of design.

(5) Screen enclosure walls shall be supported by a continuous concrete foundation not less than 8 inches deep and 8 inches wide and reinforced with one #5 continuous bar, or 16" x 16" pads with two #4 bars each way. The vertical members supporting beams, at all corners, and at least every 18 feet along all sides shall be attached to the foundation with at least a 3/8 inch diameter bolt at each such column.

(6) Screen enclosure roof framing members may be attached to a fascia at the end of rafter overhang only where such fascia is not less than one and 5/8 inches in thickness and the fascia is attached to each rafter with an anchor capable of resisting 1000 pounds vertical load. An analysis of the existing structure to carry the enclosure loads shall be made.

(7) Aluminum structural members shall be not less than .050 inches in thickness with .006 inch tolerance. Tests to determine the physical properties of any alloy may be required by the Building Official. All structural aluminum members shall be visibly marked to indicate the alloy and heat treatment.

(8) Aluminum columns supporting aluminum roof beams shall be designed in accordance with Chapter 30 herein for both axial and bending wind, dead and live loads.

(9) The minimum bolt size shall be 1/4-inch diameter for any structural attachment and sheet metal screws may be used only where approved by the Building Official based on the result of tests.

#### **4404 LOCATION**

**4404.1** Rigid awnings, canopies, or canopy shutters located over public property or such awnings or canopies located over private property shall be not less than seven feet above the grade directly below.

**4404.2** No cantilevered portion of any awning, canopy, or canopy shutter exceeding nine feet in projection shall extend over public property.

**4404.3** Rigid canopies, in whole or in part self-supporting, and screen enclosures shall comply with the zoning setbacks for buildings.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is crucial for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent data collection procedures and the use of advanced analytical techniques to derive meaningful insights from the data.

3. The third part of the document focuses on the role of technology in data management and analysis. It discusses how modern software solutions can streamline data collection, storage, and processing, thereby improving efficiency and accuracy.

4. The fourth part of the document addresses the challenges associated with data management, such as data quality, security, and privacy. It provides strategies to mitigate these risks and ensure that the data remains reliable and secure throughout its lifecycle.

5. The fifth part of the document concludes by summarizing the key findings and recommendations. It stresses the importance of a proactive approach to data management and the continuous monitoring and improvement of data processes.

6. The sixth part of the document provides a detailed overview of the data collection process, including the identification of data sources, the design of data collection instruments, and the implementation of data collection protocols.

7. The seventh part of the document discusses the importance of data validation and quality control. It outlines the steps involved in verifying the accuracy and completeness of the data, as well as the methods used to identify and correct any errors.

## **PART XI – ELECTRICAL**

### **Chapter 45 – Electrical**

- 4501 ADMINISTRATION**
- 4502 ALTERNATE MATERIALS AND TYPES OF CONSTRUCTION**
- 4503 PERMITS AND INSPECTIONS**
- 4504 DEFINITIONS**
- 4505 DETAILED REGULATIONS**
- 4506 QUALIFICATION AND LICENSING OF ELECTRICIANS**

#### **4501 ADMINISTRATIVE**

**4501.1 TITLE AND SCOPE:** (a) **TITLE:** This Chapter shall be known as "THE SOUTH FLORIDA ELECTRICAL CODE," may be cited as such, or as the "ELECTRICAL CODE."

(b) **PURPOSE:** The purpose of this electrical Code is to provide certain minimum standards, regulations and requirements for safe and stable design, methods of construction and uses of materials in electrical wiring, apparatus or equipment used for light, heat or power; and to secure the expressed intent for reasons of public safety.

(c) **SCOPE**<sup>a</sup> (1) New electrical systems and apparatus or parts thereof or additions, alterations, repairs or changes to existing systems or apparatus or equipment shall conform to the requirements of this code.

(2) A previously issued lawful electrical permit shall be valid under the terms of the electrical code under which it was issued.

(d) **MAINTENANCE**<sup>a</sup> Electrical wiring, apparatus and equipment, and installations for light, heat or power as are required and/or regulated in this electrical code, now existing or hereinafter installed, shall be maintained in a safe condition and all devices and safeguards maintained in good working order.

**4501.2 POWER AND DUTIES OF ELECTRICAL INSPECTOR:** There shall be appointed, by the appointing authority, a person qualified by holding a certificate of competency as a journeyman and having at least 10 years' experience as a journeyman electrician, or a degree in electrical engineering and 5 years as a master electrician or journeyman electrician working in the area of jurisdiction of this code and within the County in which the legally constituted authority adopting this code is located. Such person shall herein be termed the Electrical Inspector and shall have the responsibility and duty of enforcing this electrical code. The Electrical Inspector shall be construed to mean the chief or head of the division or department of electrical inspection.

(a) **EMPLOYEES:** The Electrical Inspector shall have the power to delegate powers and assignments to subordinate employees working under his authority. Such employees shall have the duties and powers as delegated by the Electrical Inspector except that the chief or head of the division or department of electrical inspection may not delegate authority to subordinates to interpret provisions of this code.

(b) **RIGHT OF ENTRY:** Upon presentation of proper credentials, the Electrical Inspector may enter, at any reasonable time, any building or structure or premises for the purpose of inspection as to prevent violations of this electrical code.

(c) **POWERS AND DUTIES:** (1) It shall be the duty of the Electrical Inspector to inspect all wiring, apparatus and equipment and installations for light, heat or power and to enforce all the laws, rules and regulations relating thereto in the area of jurisdiction, and to enforce all the provisions of this code.

(2) The Electrical Inspector will issue a Certificate of Approval on the wiring installations, apparatus, equipment or light fixtures provided they comply with rules and regulations of this electrical code. If defects, omissions, or violations exist on any other part of the wiring system, the issuance of a Certificate of Approval will be withheld until corrections have been made to the defective portion of the wiring system, and the same are made to comply with this code.

(3) A 30-day temporary electric service connection may be approved by the Electrical Inspector if the wiring installations, apparatus or equipment are found to be in a safe operating condition and provided an urgent necessity for electric current exists. Under these circumstances, an application for temporary service must be made in writing by the electrical contractor, firm, corporation or owner requesting the temporary service connection to the public utility system or isolated generating plant.

(4) The Electrical Inspector is hereby empowered to inspect or reinspect any wiring, equipment or apparatus conducting or using electric current for light, heat, or power, and if conductors, equipment or apparatus are found to be unsafe to life or property, the inspector shall serve notice in writing to the owner and/or operator of the hazardous wiring or equipment, to correct the condition within a reasonable period of time.

(5) The Electrical Inspector is hereby given the power to disconnect extension cords, temporary wiring, branch circuits, sub-feed conductors, or the main service supplying electrical energy to any portion of an electrical wiring system on or in buildings, or on premises, if this wiring is in the opinion of the inspector, considered to be hazardous to life or property. Any person, firm or corporation supplying current, must disconnect service from source of supply upon instructions from the Electrical Inspector where hazards are deemed to exist, after receiving written notice from the Electrical Inspector.

(6) The power and duties of the Electrical Inspector shall be subject to the powers vested in the Board of Rules and Appeals as set forth in Section 203.

(7) When an occupant of a commercial or public building moves out and removes electrical fixtures and/or electrical equipment, and the supplier of electricity has knowledge of these changes affecting the existing wiring system or electrical load characteristics, it shall be necessary to have a reinspection by the Electrical Inspector before service is rendered.

## 4502 ALTERNATE MATERIALS AND TYPE OF CONSTRUCTION

The provisions of this Electrical Code are not intended to prevent the use of type of construction or materials or methods of design as an alternate to the standards herein set forth, but such alternates may be offered for approval, and their consideration shall be as set forth in this section.

(a) **STANDARDS:** The types of construction or materials or methods of design referred to in this Electrical Code shall be considered as standards of quality. New types of construction or materials or methods of design shall be at least equal to these standards for the corresponding use intended.

(b) **APPLICATION:** Any person desiring to use a type of construction or materials or methods of design not specifically mentioned in this Electrical Code shall file with the Electrical Inspector authentic proof in support of claims that may be made regarding the sufficiency, and request approval and permission for use. The Electrical Inspector shall approve such alternates if it is clear that the standards of the Electrical Code are at least equalled. If, in the opinion of the Electrical Inspector, the standards of the Electrical Code will not be satisfied by the requested alternate, he shall refuse approval.

(c) **APPEAL:** Any person whose request for alternate types of construction or materials or methods of design has been refused by the Electrical Inspector, or any person in whose considered opinion an action by the Electrical Inspector in approving or disapproving construction under this Electrical Code does not satisfy the standards of the Electrical Code for reasons of safety or quality, may appeal to the Board of Rules and Appeals by written request to the Secretary of the Board, and such written request shall be transmitted to the Board at once.

## 4503 PERMITS AND INSPECTIONS

**4503.1 GENERAL:** (a) **PERMITS REQUIRED:** It shall be unlawful to do or commence to do any electrical work on a new installation of permanent or temporary wiring, any electrical apparatus or equipment, or make extensions and/or changes to existing wiring systems for light, heat, or power, upon premises inside or outside and/or attached to buildings or structures of any character without having first filed application and obtained an electrical permit therefore from the Electrical Inspector.

(b) **APPLICATIONS:** Application for electrical permit will be accepted only from Master and Sign Master Electricians who are fully qualified and licensed and for whom no revocation or suspension is pending; or from an owner as set forth in Paragraph 4503.1(d) or from duly registered maintenance electricians who qualify according to Paragraph 4503.1(c).

(c) **MAINTENANCE ELECTRICIANS:** Application for permit shall be accepted from duly qualified maintenance electricians for the maintenance and repairs to existing installations of wiring, apparatus or installed equipment contained, or used upon premises or contained in buildings owned or occupied by the person, firm or corporation by whom the maintenance electrician is regularly employed. Applications for permits must be made, and fees paid as set forth herein by the maintenance electrician so employed, before the work is started, when practical, but in cases of emergency, permits shall be applied for within the next 24 hours.

(d) **OWNERS:** Nothing herein contained shall prohibit any bona fide owner from personally installing electrical wiring in his own home, provided he complies with the following rules and regulations:

(1) Submit plans and specifications to the Electrical Inspector for approval.

(2) Satisfy the Inspector as to his ability and qualifications to install electrical wiring.

(3) Make application and secure an electrical permit before commencing electrical work of any kind.

(4) File an affidavit that he is the bona fide owner, and will personally install the work on his premises only.

(5) Pay the required permit fees hereinafter set forth.

(6) Perform the electrical work according to the rules and requirements and regulations contained in this Code.

(7) Notify the Electrical Inspector when the work is ready for inspections.

(8) Personal installation by an owner must be by himself, for himself, on his own premises and in his own home; without compensation or pay from anyone for his labor or the installation and he shall not employ anyone to assist him with the installation. The term "home" shall mean as used in this section only that portion of any building or structure actually used by the owner for living purposes for him/her and/or his immediate family.

**4503.2 PLANS:** Plans and specifications completely describing of all proposed electrical work shall be submitted to the Electrical Inspector at the same time application is made for a building permit. Plans shall be mechanically reproduced prints on substantial paper or cloth, drawn to scale except that an isometric or riser diagram need not be to scale. The location of the utility company point of service and the meter location, shall be shown on the plan. Plans for new construction requiring a service of over 400 amperes either residential, commercial, industrial or any public building shall be prepared by, and each sheet shall bear the impress seal and signature of a registered professional engineer who is proficient in Electrical Engineering. The plans shall show the size of service and sub-feeder wires and conduit, the location of service switches and center or centers of distribution, and the arrangement of circuits showing the number of outlets connected thereto. The Electrical Inspector shall examine all plans and, if the proposed electrical work shown thereon complies with the electrical code, he shall mark the plans "APPROVED."

**4503.3 PERMIT FEES:** Any Person desiring an electrical permit to be issued shall, in addition to filing an application therefore, and before such permit is issued, pay a permit fee as required.

**4503.4 CONDITIONS OF PERMIT:** The installation of the wiring, apparatus or equipment for light, heat, or power, within or attached to any building or premises, whether for private or public use, shall be done in accordance with the approved plans and specifications. Any changes or omissions in the wiring system from that shown on the approved plans must be approved by the Electrical Inspector and the request for the approval of such change shall be made by the permit holder, approved by the owner's architect or engineer, in the form of a letter to the Electrical Inspector setting forth the changes, and accepting the responsibilities for the changes.

**4503.5 INSPECTIONS:** (a) A request for the inspection of electrical work, such as roughing-in, equipment installations, final inspection of electrical work for light, heat or power of any character, shall be made at the office of the Electrical Inspector as soon as the job is ready. The request for inspection must be made by the person, firm or corporation installing the wiring. Failure to request such inspections constitutes a violation of this code.

(b) The Electrical Inspector shall inspect all work for which a request for inspection is made and shall, after inspection, either approve the work or shall serve proper notice to the permit holder stating wherein the work fails to satisfy the code and shall order corrections made within a reasonable period of time.

(c) Any person, firm or corporation who fails to correct defective work within five days after having been duly notified of such defects, shall not be issued any further permits by the Electrical Inspector until said defects have been corrected, inspected and approved.

(d) It shall be unlawful for any person, firm, or corporation, or their agents or employees, to cover or conceal any portion of the electrical installation for light, heat or power, until a Certificate of Inspection in the form of a sticker or tag is placed on the main distribution center or other conspicuous location by the Electrical Inspector, signifying that the wiring or equipment has been inspected and approved.

**4503.6 CERTIFICATE OF APPROVAL:** It shall be unlawful for any person, firm or corporation to energize any wiring system or portion thereof until a Certificate of Approval has been issued by the Electrical Inspector.

#### **4504 DEFINITIONS**

(a) The term "electrical construction" shall be held to include and govern all work and materials used in installing, maintaining and/or extending a system of electrical wiring for the use of light, heat, or power, and all appurtenances, apparatus, or equipment used in connection therewith, inside of or attached to any building or structure, lot or premises.

(b) The term "electrician," shall be held to mean a person who is engaged in the trade or business of electrical construction, and who is qualified under the terms and provisions herein.

(c) The term "master electrician" shall be held to mean a person who possesses the necessary qualifications, training and technical knowledge to plan, layout, and supervise the installation of electrical wiring, apparatus or equipment for light, heat, or power, and who is qualified under the provisions herein.

(d) The term "sign-master" shall be held to mean a person who possesses the necessary qualifications, training and technical knowledge to plan, layout and supervise the installation of any electrical sign apparatus or equipment, in or on said sign and shall be permitted to connect to the existing sign outlet provided by others and who is qualified under the terms and provisions herein.

(e) The term "journeyman electrician" shall be held to mean a person who possesses the necessary qualifications, training and technical knowledge to install electrical wiring, apparatus, or equipment for light, heat, or power, and who is qualified under the terms and provisions herein, and he shall be capable of doing electrical work according to the plans and specifications furnished to him by a duly licensed electrical contractor or master electrician, and in accordance with this electrical code.



(f) The term "sign-journeyman" shall be held to mean a person who possesses the necessary qualifications, training and technical knowledge to install electrical sign apparatus or equipment for signs and who is qualified under the terms and provisions herein, and he shall be capable of doing electrical sign work according to the plans and specifications furnished to him by a duly licensed sign contractor or sign master and in accordance with this electrical code.

(g) The term "maintenance-electrician" shall be held to mean a person who is a journeyman electrician qualified as to his knowledge of the electrical industry, pertaining to maintenance thereof. He shall not be employed by more than one person, firm or corporation at any one time. The qualification of journeyman electrician would be acceptable without further examination for a maintenance electrician's certificate. The work of the maintenance electrician shall be confined to the repair of existing branch circuits, fixtures, apparatus or equipment connected thereto, contained and used upon the premises or in building owned, occupied or controlled by the person, firm or corporation by whom the maintenance electrician is employed. His work shall not include the installation, alterations or replacement of service conductors, service equipment, or any feeder to any center or centers of distribution. All work shall comply with all rules and regulations governing this work.

(h) The term "electrical contractor" shall be held to mean a contractor doing work on any premises, or in any building or structure requiring the installation, repair, alteration, addition or changes to any system of electrical wiring, apparatus or equipment for light, heat or power and who is a master electrician.

(i) The term "sign contractor" shall be held to mean a contractor doing work on any premises or in any building or structure requiring the installation, repair, alteration or addition to electrical signs who is a sign master and an executive member of the firm and/or corporation.

(j) The term "apprentice electrician" as used herein shall mean any employed person at least sixteen years of age who is engaged in learning a recognized skilled trade, through actual work experience under the supervision of craftsmen, which training should be supplemented by properly coordinated studies of related technical and supplementary subjects; who has entered into a written agreement (hereinafter called an apprentice agreement) with an employer, an association of employers, or a local joint apprenticeship committee, providing for not less than four thousand hours of reasonably continuous employment for such person.

(k) The term "qualified person" shall be held to mean any person qualified under the terms and provisions herein, including any bona fide owner who desires to perform electrical work on his home in accordance with the terms and provisions of this electrical code.

#### **4505 DETAILED REGULATIONS**

**4505.1 STANDARDS:** The following standards are hereby adopted as a part of this code and supplement, but do not supersede, the specific requirements set forth herein.

(a) The 1965 edition of the National Electrical Code and its subsequent amendments.

(b) Underwriters' Laboratories, Inc., "Standard for Electric Signs," current edition.

(c) Underwriters' Laboratories, Inc., "Standard for Electric Lighting Fixtures and Portable Lamps," current edition.

(d) Building Exits Code, NFPA No. 101, current edition.

(e) State of Florida State Hotel Commission, Florida Statutes, current edition, "Emergency Lights."

(f) Safe Practice for Hospital Operating Rooms, NFPA No. 56, current edition.

(g) Rules and Regulations for Nursing Homes, Convalescent Homes and Homes for the Aged in the State of Florida, as adopted by the Florida State Board of Health, current edition.

(h) The minimum standards for grounding of portable electrical tools as recommended by Florida Industrial Commission.

**4505.2 SPECIAL RULES AND REGULATIONS:** (a) All services shall be run in rigid, galvanized or sherardized threaded conduit or approved bus-duct except as otherwise permitted herein. Underground services and feeders may be run in approved non-metallic raceways of the thin-wall type, encased in a concrete envelope not less than three inches thick on all sides of the raceways or multiples thereof, and shall maintain a minimum depth of 18 inches, coverage from the top of the envelope.

Underground services and feeders may be run in approved non-metallic raceways of the heavy-wall type without encasement in concrete, provided such non-metallic raceways have not less than 24 inches of cover and except that encasement shall be required at railroad, street and alleys.

The above mentioned non-metallic raceways shall not be used above ground on services, extended up poles or on buildings, but shall be limited to the underground portions of the service. Isolated metallic sections shall be grounded in accordance with the National Electrical Code.

(b) Service switches, conduit, and conductors shall be installed in accordance with Table 45-A.

**TABLE 45-A**

Service Size	Switch Size	Minimum Size Conductor or Ampere	Minimum Raceway Single-Phase	Minimum Ground Conductor and Rigid Threaded Conduit
30-amp.	30-amp.	#8 AWG	1 -inch	
60-amp.	60-amp.	60-amp.	1¼-inch	See Table
100-amp.	100-amp.	100-amp.	1½-inch	250-94 (a)
150-amp.	200-amp.	**150-amp.	2½-inch	and
150-amp.	200-amp.	**150-amp.	*2 -inch	Table #1
200-amp.	200-amp.	***200-amp.	2½-inch	NEC

\*—Residential (domestic) use only.

\*\*—2/0 Conductors approved.

\*\*\*—4/0 Conductors approved.

(c) Service wires or circuit-wires shall enter the meter cabinet or switch without the use of concealed backing box.

(d) All buildings of multiple occupancy (more than two occupancies) shall have an independent central electric meter room of adequate size to contain all equipment to be installed in this room. This meter room shall be equipped with a ventilated door, readily accessible to the outside, which may be locked in emergency cases only with the approval of the Electrical Inspector. The meter room shall be accessible to all occupancies of the building at all times. The meter room shall be provided with proper mechanical or cross ventilation. The purpose of this room

shall be to house the main switch or main switches, disconnecting equipment and its control devices, terminal equipment for telephone service (in separated area from electrician's area) and all the electric meters which serve the occupants throughout the entire building. The construction of this room shall conform to the same type of material and construction as the main building, and there shall be no storage or equipment in this room other than electric service equipment and appurtenances thereto. There shall be a waterpipe of three-fourths-inch minimum trade size, connected to the cold water system, provided at each meter location above grade for the purpose of grounding electrical service equipment. Where non metallic water piping is used, a multiple ground system shall be installed using a minimum of 1½" x 10'-0" copperweld ground rod installed directly under the service equipment interconnected to the water pipe ground.

There shall be no storage in this room and a durable, waterproof sign with letters not less than 7/16 inches high shall be mounted on the outside of the door reading "ELECTRIC METER ROOM. NO STORAGE PERMITTED."

(e) Each occupancy must have a main fused disconnect or circuit breaker located in a convenient and readily accessible place outside the building when a meter room is not available.

Each building or group of buildings having a combined electrical load in excess of 75 kilowatt shall provide adequate facilities and space to properly contain all special equipment required.

(f) Point of service drop conductors attachment to building shall be not less than 10 feet above the ground.

(g) All main switches and meter cans and sub-main switches shall be plainly marked so that the division, subdivision, or separate occupancies of the building which they control can be quickly and positively identified. The mark of identification shall be securely affixed to the device to prevent its loss or misplacement.

(h) The master service for a store or stores must provide at least 60-ampere capacity to each store, either single-phase, three-wire, or three-phase four-wire. The conductor size shall be not less than No.6.

(i) The sub-feeder to each store must provide at least three-wire, single-phase current or four-wire, three-phase current of 60-ampere capacity, and the conductor size shall be not less than No.6. The conduit raceway shall be not less than one-and-one fourth-inch trade size.

(j) The sub-feeder to each store shall be protected in the meter room with a disconnecting means, and over-current device to properly protect conductors to panels in each store.

(k) The minimum size feeder and service shall be not less computed by use of Tables 45-B and 45-C.

ways on poles used to protect high-voltage service on the pole end, be provided with an approved type port, insulated bushing, and be sealed with waste and pound made for that purpose. The end of the raceway ending shall be sealed in a like manner to prevent of moisture. Spare ducts shall be sealed or capped.

**TABLE 45-B**  
**RESIDENTIAL, APARTMENT, HOTEL & MOTEL ROOMS**  
**BRANCH CIRCUIT LOADING FOR THE COMPUTATION**  
**OF FEEDER AND SERVICE SIZES.**

Typical Circuit Load	Br. Cir. Voltage Level (B)	Br. Cir. Amperes (E)	Feeder 1 Phase (F)	Amperes 3 Phase (F)	No. of Outlets	Footnote
Appliance, (Small Appliance Circuits) (US) .....	120	20	4.5	3	4	(A)
Air Conditioner — Window (S) .....	120	(C)	(C)	(C)	1	(J) (R)
Air Conditioner — Window (US) .....	120	20	6	4	1	(J) (R)
Air Conditioner — Window (US) .....	208-240	20	12	8	1	(J) (R)
Air Conditioner — Window (S) .....	208-240	(C)	(C)	(C)	1	Spec. nameplate Amps (J) (R)
Air Conditioner — Pkg. Unit (S) (in amps—all auxiliaries) .....	208-240	(C)	(C)	(C)	1	(J) (R)
Circuit, spare or space in panel (future use) .....	120	15	3	2	—	
Circuit, spare or space .....	208-240	20	6	4	—	
Dishwasher (US) .....	120	20	4.5	3	1	
Dryer (US) .....	120-240	40	22.5	15	1	
Dryer (S) .....	120-240	(C)	(C)	(C)	1	
Freezer (US) .....	120	15	3	2	1	
Garbage Disposal .....	120	15	3	2	1	
Heater, Space (S) .....	120	20	(C)	(C)	(G)	(J) (R)
Heater, Space (US) .....	120	20	4.5	3	1	(J) (R)
Heater, Space (S) .....	208-240	(C)	(C)	(C)	(G)	(D) (J) (R)
Heater, Space (US) .....	208-240	30	9	6	1	(J) (R)
Ironer, Residential .....	120-240	30	15	10	1	#12 neutral permitted
Lighting (US) .....	120	15	3	2	10	(H)
Lighting (S) .....	120	15	(C)	(C)	(G)	(D) (H)
Lighting, Luminous Ceiling (S) .....	120	15	(C)	(C)	(G)	(D)
Motors (S) Rated amps .....	120-240	(C)	(C)	(C)	(G)	(D)
Outlet, Special Purpose .....	120-240	(C)	(C)	(C)	(G)	(D)
Oven, Residential .....	120-240	30	15	10	1	
Range, Cooking Top only .....	120-240	40	21	14	1	
Range, Residential .....	120-240	50	36	24	1	
Range, Less than 8¾ kw (S) .....	120-240	40	30	20	1	(T)
Receptacle (convenience outlet) .....	120	15	3	2	5	(H)
Receptacle — strip, multi-outlet .....	120	15	3	2		30' constitutes one cir.
Receptacle — strip, multi-outlet appliance .....	120	20	4.5	3		6' constitutes one cir.
Refrigerator .....	120	15	3	2	1	
Washing Machine .....	120	20	4.5	3	1	
Waterheater Residential (US) .....	208-240	20	15	10	1	
Waterheater Apt. (US) .....	208-240	20	9	6	1	
Waterheater (S) .....	208-240	(C)	(C)	(C)	1	

TABLE 45-C  
COMMERCIAL AND INDUSTRIAL BRANCH CIRCUIT  
LOADING FOR COMPUTATION OF FEEDER AND SERVICE SIZES

Typical Circuit Load	Br. Cir. Voltage Level (B)	Br. Cir. Amperes (E)	Feeder 1 Phase	Feeder 3 Phase (F)	No. of Outlets	Footnote
Emergency Lighting	120	20		(C)	12	(N)
Incandescent Lighting (US)	120	20	4.5	3	4	(Q) (N)
Incandescent Lighting (S)	120	(C)	(C)	(C)	(G)	(M) (D) (Q) (N)
Hi-Hats (US)	120	20	4.5	3	4	(Q) (N) (D)
Hi-Hat (S)	120	20		(C)	(G)	(N) (D)
Show Window Lighting (US)	120	20	4.5	3	8 (L)	(Q) (N) (D)
Show Window Lighting (S)	120	20			(G)	(L) (Q) (N) (D)
Lighting, Fluorescent (S)	120/277	20	(C)		(G)	(Q) (D) (N)
Lighting, Fluorescent (US)	120/277	20		3	4	(Q) (D) (N)
Iron, Commercial (US)	120	20	4.5	3	1	Pilot light & switch mandatory (J)
Motors (S) Less than 1/4 HP	120	20		(C)	(G)	(J) (D)
Motors (S) 1/4 HP	120	20		(C)	2	(J) (D)
Motors (S) Over 1/4 HP	120-240	(C)	(C)	(C)	1	(D) (Q) (R)
Receptacle general purpose (US)	120	20	3	2	4	(D)
Receptacle, Strip (US)	120	20	3	2	*	
*Each 30' in other than appl. areas, Each 6' for portable lamp display						
Outlet, Special Purpose (US)	120-240	20	(C)	(C)	1	(D)
Outlet, Special Purpose (S)	120-240	(C)	(C)	(C)	(G)	
Transformers, Sign (US)	120	20	4.5	3	3	(J) (N)
Signs (S)	120	20	(C)	(C)	(G)	(J) (N)
Spares or Spaces in Panel (future)		20	4.5	3		

NOTE: See Table No. 45-B for residential type of loads employed in Commercial or Industrial Buildings.

SUMMARY DEMAND FACTORS — COMMERCIAL AND INDUSTRIAL LOADS

Motor Loads, Intermittent	N.E.C.		That Portion Over 200 amps.
	First 100 amps.	Next 100 amps.	
Receptacles, General Use (US)	100%	75%	50%
Receptacles, Strip (US)	100%	75%	50%

SUMMARY DEMAND FACTORS — SECONDARY AND RESIDENTIAL

First 50 amperes (0 thru 50)	100%
Second 50 amperes (51 thru 100)	80%
Third 50 amperes (101 thru 150)	60%
Fourth 50 amperes (151 thru 200)	50%
Next 300 amperes	35%
That portion over 1000 amperes	30%

NOTE: Dryers, Ranges, Cooking Tops, Ovens and Water Heaters of the residential type, are to be included in residential demand.

**FOOTNOTES AS INDICATED BY LETTER DESIGNATION IN  
TABLES 45-B AND 45-C**

Note: (US) "Unspecified" denotes that a legend symbol has been employed and that the full name-plate data has not been shown on the drawing.

Notea (S) "Specified" denotes that the full name-plate data and information necessary to determine the branch circuit requirements per NEC are shown on the electrical drawings and that the computations for service and feeder sizes shall be provided by the designer.

Notea (A) Clock outlets shall not be installed on these circuits. They shall be installed on the lighting branch circuit and no load shall be computed for the outlet.

Notea (B) "Voltage Level" designates the usual voltage employed for the circuit, or the range of voltage normally permitted in residential wiring practice and in the majority of commercial and industrial systems.

Notea (C) This symbol indicates that full branch circuit, feeder and service capacity shall be employed for the individual item of load. See Note (J).

Notea (D) Under no circumstances shall the actual loading of the branch circuit exceed the rating of the branch circuit conductors, based on the use of insulation of the conductors and ratings as defined by the National Electrical Code.

Notea (E) "Branch Circuit Amperes" defines the rating of the circuit in amperes and assumes use of overcurrent devices (circuit breakers or fuses) of the branch circuit rating as a maximum size permitted, except for motor loads where requirements of the N.E.C. shall comply in questionable cases. This ampere rating also determines the rating of the branch circuit conductor and the size of conductor in turn determines the size of raceway per N.E.C. minimum requirements.

Notea (F) The column of "Amperes" represents the minimum value of the branch circuit contribution which must be supplied by service or feeder conductors in consideration of the individual branch circuit normal usage. Although in general agreement with technical requirements, these values have been approximated for convenience of application. 120/240 indicates single phase, three wire service or feeder. 120/208 indicates requirement for three phase, four wire "Wye" services or feeders.

Notea (G) The number of outlets per branch circuit must be flexible to best serve the particular "specified" load.

Notee (H) The number of outlets indicated are for that particular type of branch circuit only, as for instance all incandescent lighting outlets only. Since combinations of receptacles and lighting outlets are permitted on the same branch circuit, table 45-D will be used for such combinations.

Notee (J) "Summary Demand Factor" shall not be applied to this type of branch circuit load.

Notee (K) Conventional branch circuit voltage characteristics other than 120 volt, sixty cycle, alternating current will be permitted only where complete design analysis of the typical branch circuit conditions are clearly set forth on drawings by the designer.

Notee (L) There shall be provided not less than one branch circuit for each twelve (12) linear feet or less, of the show window (glass) as measured horizontally along its base.

Notee (M) Branch circuit loading of secondary areas of commercial and industrial structures may be computed in accordance with requirements of the residential loading table No. 45-B ("Summary Demand Factors" may be applied to such circuits).

Notee (N) Maximum loading of unspecified (US) continuous duty lighting branch circuits shall not exceed 80 percent of the branch circuit rating. ("Specified" loading must also comply with N.E. Code.)

Notee (P) For purposes of computation, motor loads rated in horsepower may be converted to volt-ampere requirements at the following rates:

Up through 1.0 HP	.....	2	KVA per HP
Over 1.0 HP through 10 HP	.....	1½	KVA per HP
Over 10 HP	.....	1	KVA per HP

Notee (Q) Summary Demand Factor shall not be applied to any loads which will normally be operated for long periods of time. Included in this category are such loads as: general illumination in stores, dining rooms, schools, commercial offices, banks and continuous duty motor loads.

Notee (R) Where air conditioning loads or other loads are automatically controlled for heating and cooling cycles and which cannot be operated simultaneously, the larger of the two load conditions must be considered as connected load.

Notee (T) In single family and multiple unit residential occupancies of 800 square feet or more per unit, when electric ranges are to be used, wiring shall be provided for a range of not less than 12KW. If occupancy is under 800 sq. ft., range name plate rating must be specified on plan.

The following Table 45-D shows the maximum number of outlets permitted per circuit in secondary commercial areas and residences per 15-ampere branch circuits.

**TABLE 45-D  
MAXIMUM NUMBER OUTLETS PER CIRCUIT  
FOR LIGHTS AND RECEPTACLES (US)**

Light Outlets	...	10	9	8	7	6	5	4	3	2	1	0
Receptacles	...	0	0	1	1	2	2	3	3	4	4	5

(o) Single outlets or taps for signalling transformers, bell ringing transformers, clocks and similar low current consuming appliances or equipment need not be counted when the location of the tap or outlet precludes the use of the tap or outlet for other purposes than for which it was installed.

**4505.3 GENERAL REQUIREMENTS** (a) Approved rigid metal conduit, surface metal raceways or electrical-metallic tubing shall be required for light, heat and power in the wiring of apartment buildings for two families or more in churches, schools, hotels, theaters, public buildings, commercial buildings, manufacturing establishments, private clubs or similar occupancy, residences having over four circuits, and in unfinished basements except that for any particular or unusual installation other methods may be approved by the Electrical Inspector.

(b) It shall be unlawful for any person to place tape around or otherwise conceal an improperly made joint on any light, heat or power circuit.

(c) The wiring for all electric ranges over  $8\frac{3}{4}$  KW shall be a minimum wire capacity of 50 amperes in one inch electric metallic tubing or conduit, to an accessible approved receptacle located within three feet of the range. For ranges of  $8\frac{3}{4}$  KW capacity or less, conductor size shall be of at least 40-ampere capacity, in raceway of not less than  $\frac{3}{4}$ " trade size. When oven unit is separate from surface unit, each unit shall be installed on a separate circuit, served with conductors of not less than 30-ampere capacity. An accessible approved method of connection shall be provided for each unit. (A range as referred to above would be a complete cooking unit, consisting of both oven and surface burners)

(d) (Deleted)

(e) The wiring for all water heaters shall have a minimum wire capacity of 20 amperes. Water heaters of 1,000 watts or over shall operate on not less than a 208 volt circuit. Non-automatic water heaters shall be equipped with a pilot light and indicating switch. The switch and pilot light shall be located in a conspicuous place inside the building, preferably in the kitchen or hall. Points of electrical connections for heaters and replacement of elements shall be readily accessible.

(f) Fixed motors of  $\frac{1}{2}$  H.P. and over shall be wired on separate circuits in metal raceway or conduit. This provision does not apply to Sec. 362.10 or 364.7 of the N.E. Code.

(i) Only galvanized or its equivalent threaded thick wall metal conduit or approved non metallic raceway, shall be installed where exposed to the weather.

(j) Flexible watertight raceway will be required for weather-proof flexible conduit where flexibility is needed.

(k) On all new construction, or alteration in construction of building, at refrigeration location, each domestic refrigerator shall be installed on a separate circuit.

(l) Only grounding type receptacles will be permitted for receptacle outlets installed over concrete or terrazzo floors or any other grounded surface. All outlets that can be reached from the floor must be grounded. All light outlets than can be reached from masonry floors or grounded surfaces, including light outlets in bathrooms, kitchens and any other similar location, must be wall switch controlled.

(m) Short-radius ells, often referred to as "telephone" ells, shall not be used.



(n) Receptacles shall be installed in every kitchen, dining room, breakfast-room, living-room, parlor, library, den, sunroom, recreation room and bedroom so that no point on the wall or floor at the perimeter of the room will be more than six feet distant from a convenient receptacle. Any wall space of two feet or more shall have a receptacle installed within that area, even though it may be nearer than 12 feet to another receptacle required in that section of the room. One wall receptacle shall be installed in every bathroom within three feet of a mirror and higher than the rim of the lavatory.

After N.E.C. requirements and table 45-B have been complied with, additional receptacles may be installed in anyone room without an increase in the number of branch circuits, provided the possible demand has not been increased.

(q) The use of non-metallic sheathed cable, referred to as "romex" shall be restricted to single family dwellings of frame construction which does not require more than four circuits. "Romex" is prohibited under the first floor unless the bottom of the floor joists is more than three feet above the finished grade line. Where "romex" is used in frame structures as provided above, it shall be run through holes bored in the center of joists. A running board shall be placed over the cable where it is run within six feet of the access opening to the attic.

(r) The wiring of music and sound systems, door bells, buzzers, chimes and fire detection system installations shall be made in a raceway. All low voltage control systems, when controlling equipment of 110 volts or more, shall be installed in a metallic raceway.

(s) Portable cords attached to music boxes, marble machines, floor or table lamps and other similar equipment, shall not exceed six feet in length when measured from the equipment to the outlet supplying its current. Cords shall not be nailed down, tacked or held with strings or other supports, but shall be left free and clear.

(t) Qualified electricians shall be required to supervise and patrol all temporary electrical installations for carnivals, circuses, and fairs during their operation in the area of jurisdiction of this code as well as any other similar wiring system using current for light, heat or power, in order that life and property may be protected. This supervision shall be required regardless of the manner in which the electricity is generated or supplied. The number of qualified electricians required to supervise in this manner shall be determined by the Electrical Inspector.

(u) All stairways and parts of buildings under demolition, erection or repair shall be adequately lighted while persons are engaged at work as set forth in Section 48-3318.

(v) All electric outlets used for portable electric tools shall be provided with three wire polarized plugs, and all portable electric tool cables shall be of the three-conductor type, and shall be grounded in accordance with the National Electrical Code.

(w) Metal ladders shall not be used in the vicinity of exposed electrical wiring.

(x) All electrical switches, panels, wiring and other temporary electrical equipment shall be maintained in a safe and serviceable condition by qualified electricians. Qualified electricians shall be required to patrol installations when considered

necessary by the Electrical Inspector, for safety to life while in use by other trades. The number of qualified electricians required shall be determined by the Electrical Inspector. All disconnect switches controlling temporary light and power, except emergency lighting such as barracades and walkways shall, when considered necessary by the Electrical Inspector for safety to life and property, be locked in the "off" position where there is no qualified electrician on the job.

(y) Temporary services for construction shall be installed on a substantially erected pole, braced or guyed to withstand the strain of a service-drop cable. A service rated at 30 amps. shall consist of not less than three No.18 service conductors in not less than one-inch rigid conduit to supply two 20-ampere, 3-wire polarized receptacles served by a separately fused circuit for each receptacle. When heavy loads will be encountered, such as terrazzo grinders or floor sanders, the service shall consist of not less than three No.14 conductors in 1¼ inch rigid conduit, supplying two 20-amp., 3-wire polarized receptacles (fused at 30-amps.) and a 50-amp. receptacle protected by the main fuses. A weather-proof switch may be used. In no instance may plug fuses be mounted in other than 30-amp. fuse holders. If other than weather-proof switch is used, a raintight box with hinged door must be built to contain the switch and receptacles. Receptacles of three-wire type shall not use neutral conductor for grounding purposes. Inspectors are empowered to disconnect immediately and without notice, any temporary service used to supply ungrounded or unfused equipment, and in no instance shall point of attachment of service drop conductors be less than 10 feet above the ground.

(z) Separately metered conductors shall not be installed in the same raceway, except in load gutter in meter room.

(aa) Low power-factor transformers and ballasts shall not be used. Any power-factor rating below 85 percent shall be considered low power-factor. Each ballast and/or auto transformer shall be provided with over-current protection on the primary side, either self-contained or otherwise, and by approved methods. (This does not apply to neon window sign transformers.)

(bb) Deleted.

(cc) For window display lighting, a minimum of two outlets shall be required, at least one above and one below. All fixed lighting shall be equipped with switches.

(dd) All music boxes requiring 600 watts or more shall be installed on a separate circuit and equipped with attachment cord not to exceed six feet. A convenience receptacle shall be within 18 inches of a wireless selector box, adequately grounded with 3-wire cord and attachment cap, and the bridge condensers or capacitors shall be installed by a licensed electrical contractor. The condensers or capacitors must be at least 600-volt AC rating, properly grounded if of the metal case type, and protected with fuse (in each lead) not over 15-amp. Pin ball machines, shuffleboards, and similar equipment not in excess of 5-ampere capacity may be plugged into an existing receptacle, but the attachment cord shall not exceed six feet in length.

(ee) Permanently installed electrical spaceheaters in bathrooms shall be installed so that heaters will not be easily exposed to combustible materials. A minimum height of five feet from floor to the lowest point of heater shall be maintained, but said heaters shall not be installed behind doors, under or near towel racks, or near shower curtains or window curtains. Conduit shall enter the heater can in an approved location. Space heaters that will not cause combustion are excluded from this rule.

(ff) One or more branch-circuits for signs shall be provided for each store frontage for each individual occupancy, said outlets to terminate outside on or near the front of the building.

(gg) Sign outlets and window lighting shall be controlled by wall switches.

(hh) Cut-nails shall not be used for securing boxes, panels, etc. in place, but may be used for securing straps in concealed dry areas if installed in a workmanlike manner.

(jj) The service and equipment ground shall be taken from the nearest possible point of the system service after the service is attached to the building. This ground shall start at the main switch, current transformer cabinet, meter can or gutter. Point of attachment of ground clamps or approved ground connectors shall be readily accessible, and shall not be in attics, under floors or behind any equipment. When copper waterpipe is used, ground connection shall be attached on a fitting only.

(kk) **SERVICE MASTS OF STEEL CONDUIT**  
**CONDUIT SIZE MAX. MAST LENGTH      LOADING**

2 "	30" ) Above the	650# pull for resi. &
2½"	57" ) last	small commercial.
3 "	92" ) Point of	Increase conduit size
3½"	96" ) Support	for greater pull on mast.

**NOTEa** There shall be no coupling above the last point of support. The service mast shall be of rigid steel conduit only.

(mm) Where fans are used in connection with the exhausting of flammable vapors, protective devices shall be installed to stop the operation of the fan in event of fire. Attic fan installations shall be as set forth in Paragraph 4103.2(b). Range hood installations shall be as set forth in Sub-Paragraph 4103.3(d)(4).

(oo) Raceways for telephone outlets when installed in the wall or floor spaces that will be in the concealed portion of the building after construction, must be approved by the Electrical Inspector, and where embedded under a concrete slab on fill shall be rigid threaded conduit. EMT or other approved raceway with approved fittings will be allowed elsewhere.

(pp) Circuit wiring of fluorescent or slim-line fixtures where placed end to end and used as a raceway shall conform to current NEC requirements. The only accepted use of the fixture as a raceway for additional circuits would be for those fixtures approved by the Underwriters' for that purpose.

\* **MULTIWIRE BRANCH CIRCUITS:** Continuity of neutral on multi-wire branch circuits shall not be made on any device as terminal blocks, but shall be spliced and a tap brought out, thereby assuring no opening of the neutral in the replacement of a device.

\* **COLOR CODE:** On all multi-wire lighting branch circuits, color code will be required in compliance with the National Electrical Code except switch legs may be of a color other than those of the circuit wires or neutral.

**4505.4 EXIT AND EMERGENCY LIGHTING:** Exit and emergency lighting, including exit signs and arrangement of circuits, shall comply with the standard in Paragraph 4505.1(d) and in Part III of this code.

**4505.5 SIGN INSTALLATIONS:** (a) All rules and regulations pertaining to the installation of low voltage wiring shall also apply to the installation of conductors for neon and cold cathode high-voltage tubing.

(b) Box signs shall be inspected in the shop before erection, and an appropriate sticker attesting to its acceptability affixed thereto by the Electrical Inspector. For remainder of inspection services, see Section 4204.

(c) Drain holes shall be provided in transformer enclosures exposed to the weather, and shall be reamed or otherwise trimmed to remove burrs that would hold water in the enclosure. The transformer enclosures shall be mounted on the parapet wall or roof by means of racks or frames made of galvanized band-iron or angle iron. These racks or frames shall be of sufficient strength to securely hold the weight of the transformer or transformers.

When transformer enclosures are mounted on the roof, they must be elevated at least two inches above the roof, the lid placed upward. Wood shall not be used as mountings, supports, or to elevate transformers, transformer enclosures, or raceways used for wiring same. Masonry bricks will be accepted for this support when properly strapped or attached.

(d) Tubulation glass and No. 14 bare wire shall not be used except as followse

(1) Short jumpers between neon units on wall signs and channel letters and on flat wall signs where the use of conduit or electric metallic tubing would disfigure the face of the building.

(2) Insulators shall be all glass and at least one and one-half inches long, spaced not more than 18 inches apart.

(3) Neon tubes and all jumpers, when mounted on any wooden surface exposed to the weather, shall be installed on four-inch glass standoff insulators. Open conductors and tubing of the sign shall not be installed on the roofside of the parapet or on top of any roof or parapet.

(4) Conductors and neon tubing shall maintain a height of at least eight feet from the ground, and shall not be installed on walls where they can be reached from platforms, balconies, fire-escapes, or through windows, doors, or other similar openings.

(e) All metal raceways shall be grounded in a manner which complies with the grounding regulations contained in the National Electrical Code.

(f) Each sign box shall have an approved indicating switch installed in the sign for each circuit. The rating of this switch must comply with the National Electrical Code requirements for sign switches.

(g) Metal boxes shall be bonded together so they will be suitable and properly grounded when used to house electrodes, transformers, or other apparatus used in connection with both primary and secondary circuits for neon lighting.

(h) Approved type connectors must be used on all secondary connections.

(i) Lighting of signs shall also comply with Part Nine of this code.

**4505.8 HIGH VOLTAGE WIRE:** All isolated runs of electric metallic tubing enclosing a high voltage wiring system shall be grounded regardless of length. The conductors which run from the grounded mid-point of ground terminal of a neon transformer may be 600-volt RC or TW wires, provided the run or section of neon tubes is fed directly in the center. Otherwise, the wire must be approved high-voltage cable. This wire from mid-point on transformer must be installed in rigid threaded conduit or E.M.T. raceway.

**4505.9 FLASHERS, TIME CLOCKS AND TRANSFORMERS:**

(a) When flashers and time clocks are to be installed, each of such connections shall be considered a special outlet, and permits for same are necessary.

(b) When tubes are removed for repairs, jumpers shall be installed in high-voltage wire, supported with the same clearance as tube, but the jumpers must be removed within seven days.

(c) Only window type and portable transformers may be plugged in. All other transformers shall be permanently connected with an approved method of wiring.

**4505.10 INTERIOR WINDOW SIGNS AND WINDOW BORDER LIGHTING:** (a) Window-type sign transformers shall be used for window signs, and they must be especially designed for this purpose, unless the signs are installed in compliance with Paragraph 4505.10(e).

(b) A sign of the above type shall be designed and installed to form a complete unit in itself. This unit or sign shall be designed so that the frame will carry the entire weight of the sign. This frame shall be fastened to the window sill or other part of the window so that the neon tubing will not carry the weight of the sign.

(c) When signs of this type are made up of two or more units, the tubing shall be so designed that the electrode used to connect the two units of the sign will be in the same plane with not more than a two-inch space between the electrodes. The electrodes and connections shall be arranged so that they can be covered by one straight glass alcove or housing.

(d) This straight glass sleeve, alcove, or housing, shall be securely fastened in place. The transformer wires feeding window signs shall drop in the same vertical plane from the transformer to the window signs. Electrodes on window signs which connect to the transformer wires shall be designed and placed so that the wires from the transformer will drop straight and be readily covered by straight glass sleeves of sufficient size.

(e) Transformer wires shall swing clear in the air and shall not be supported by or against any combustible material.

(f) Complete secondary wiring systems shall be installed in rigid threaded conduit, electric metallic tubing or flexible conduit. Other approved means may be used if special permission is obtained from the Electrical Inspector.

**4505.11 INTERIOR NEON OR COLD CATHODE LIGHTING**

(a) Approved housings and fittings must be used on all interior series neon or cold cathode lighting, regardless of the milliampere rating of the transformer or the color of the tubing. This shall include interior window border lighting.

(b) Neon transformers with a rating over 60-milliampere are not approved for use on any neon or cold-cathode tubing exposed to the weather, or in excess of 750 volts for residential use.

**4505.12 COVES:** Construction of coves for indirect light shall provide the following minimum dimensions for installation and maintenance:

(1) Minimum vertical depth, fourteen and one-half inches from ceiling.

(2) Minimum horizontal width for one tube, four and one-half inches (add two inches to width for each additional tube)

(3) Minimum lip or face of cove, four and one-half inches, to provide ten inches of free working space from top of lip to ceiling.

**4505.13 MATERIALS, DEVICES OR APPLIANCES MUST BE APPROVED:** (a) No electrical materials, devices or appliances designed for attachment to, or installation on any electrical circuit or system for light, heat or power, shall be installed, used, sold, or offered for sale in the area of jurisdiction of this code, unless they are in conformity with the approved methods of construction for safety to life and property.

(b) Conformity of electrical materials, devices or appliances with the standard of the Underwriters' Laboratories, Inc., shall be held to mean that these materials are included in an indicated list of inspected electrical appliances published and distributed by the Underwriters' Laboratories, Inc., and the standards approved by the American Standards Association.

(c) The maker's name, trade-mark, or other identification symbol shall be placed on all electrical material, devices, or appliances which are sold, or offered for sale or use in the area of jurisdiction of this Code. These markings and others such as voltage, amperage, wattage, and power-factor or appropriate ratings described in the National Electrical Code are necessary to determine the character of the material, device, or equipment, and the use for which it is intended.

**4505.14 FIRE-ALARM OR SIMILAR SYSTEMS:** Fire alarm systems or similar systems which are devised and installed for safety to life and property, must be installed by a qualified person, regardless of voltage or amperage, and permits obtained for same. Each of such systems shall be inspected semi-annually, and certified by the Electrical Inspector.

**4505.15 STRUCTURAL MEMBERS:** Conduit raceway and tubing embedded in concrete shall be as set forth in Sub-Section 2507.3. Cutting of holes in precast concrete members shall be limited as set forth in Sub-Section 2508.8 and Paragraph 2509t4(i)t Cutting of holes in steel members shall be limited to a hole not larger than one-sixth of the depth and located in the vertical center of the member. Notching or boring of wood studs shall be limited as set forth in Paragraphs 2905.2(k) and 2905.2(l). Notching or boring of wood joists shall be limited as set forth in Paragraph 2905.4(f)t

**4506 QUALIFICATION AND LICENSING OF ELECTRICIANS**

**4506.1 UNLAWFUL FOR PERSONS NOT QUALIFIED AS ELECTRICIANS TO INSTALL OR REPAIR ELECTRICAL WIRING, APPARATUS OR EQUIPMENTa**

(a) It shall be unlawful for any person not qualified as an electrician in accordance with the requirements in this area of jurisdiction to do any electrical construction or make any repairs, alterations, additions or changes to any existing system of electrical wiring, apparatus or equipment for light, heat or power, except as provided for in Paragraph 4506.1(b) and Paragraph 4503.1(d)t

(b) The provisions set forth herein shall not apply to installations or equipment employed by a railroad, electric or communication utility in the exercise of its functions as a utility, and located outdoors or in buildings used exclusively for that purpose, provided, however, that any such utility shall not install or connect their meters or their protective devices until a Certificate of Occupancy has been issued on the installation to be served through the meter.

(c) It shall be unlawful for any apprentice electrician to be left on installations in the absence of a supervising journeyman electrician.

**4506.2 PERSONS TO QUALIFY AS ELECTRICIANS BEFORE DOING ANY ELECTRICAL WORK:** It shall be unlawful for any person to work as a master, sign-master, journeyman, sign-journeyman or maintenance electrician, except as provided by Paragraph 4503.1(d)t without first qualifying as provided in the regulations requiring the examination and qualification of electricians and, after being qualified, having in his possession at all times a current Certificate of Competency.

## PART XII — PLUMBING AND GAS

### Chapter 46 — Plumbing

- 4601 ADMINISTRATION
- 4602 DEFINITIONS
- 4603 GENERAL
- 4604 MATERIALS
- 4605 DRAINAGE SYSTEM AND DISPOSAL
- 4606 INDIRECT WASTE PIPING AND SPECIAL WASTES
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- 4617 FIRE-EXTINGUISHING APPARATUS
- 4618 SWIMMING POOLS
- 4619 TRAILER COACHES AND TRAILER PARKS

#### 4601 ADMINISTRATION

4601.1 **TITLE AND SCOPE:** (a) **TITLE** This Chapter shall be known as "THE SOUTH FLORIDA PLUMBING CODE," may be cited as such or as the "PLUMBING CODE."

(b) **PURPOSE** The basic principles of the Plumbing Code are designated to protect the public health, welfare and safety by properly designing, installing and maintaining plumbing systems. While details of plumbing installations must of necessity vary, the basic principles of sanitation and safety remain the same. The following basic principles are necessary to obtain these results and while unforeseen situations will no doubt arise which are not included in this Code, the following principles may serve to define the intent.

(1) All premises intended for human habitation, occupancy or use shall be provided with a supply of pure and potable water, and shall not be connected to unsafe water supplies nor be subject to the dangers of backflow or backsiphonage, and shall be connected to an approved method of public or private sewer disposal.

(2) Plumbing fixtures, appliances and appurtenances shall be supplied with a sufficient supply of water at adequate pressure to enable them to function properly without undue noise under normal operating conditions.

(3) Appurtenances for heating and storing water shall be so designed and installed that dangers from overheating and explosion are eliminated.

(4) Each family dwelling on premises abutting on a sewer or with a private sewage disposal system shall have installed at least one kitchen sink, one water closet, one lavatory, one bathtub or shower and one clothes washing machine outlet.



(5) Every building having plumbing fixtures installed and intended for human habitation, occupancy, or use on premises abutting on a street, alley or easement in which there is a public sewer, shall have a connection with the sewer.

(6) The drainage system shall be designed so as to prevent fouling, deposits of solids and so provided with cleanouts that pipes may be readily cleaned.

(7) Every fixture connected to the drainage system shall be equipped with a water-seal trap.

(8) The drainage system shall be designed so as to provide a free circulation of air with no danger of siphonage or forcing of trap seals.

(9) No substance which will produce explosive mixtures, obstruct free flow in piping, destroy the pipes or joints, or interfere with the sewage disposal system shall be allowed to enter the drainage system.

(10) Proper protection shall be provided to prevent contamination of food, water and similar materials by backflow of sewage.

(11) All plumbing fixtures shall be installed in regard to spacing so that they will be readily accessible for their intended use.

(12) Plumbing shall be installed in such a manner as to preserve the strength of structural members.

(13) Sewage and other waste from a plumbing system which may be deleterious to surface or subsurface waters shall not be discharged into the ground or into any lakes, ponds, streams, ditches or tidal waters unless it has first been rendered innocuous by some form of treatment and approved by the Florida State Board of Health.

(14) The pipes conveying water to water-closets shall be of sufficient size to supply the water at a rate required for adequate flushing without unduly reducing the pressure at other fixtures.

(15) Plumbing fixtures shall be made of smooth non-absorbent materials, and shall be free from concealed fouling surfaces.

(16) Each vent terminal shall extend full size upward through the roof and have a free opening; the roof terminal being so located that there will be no danger of drain gas passing from it to any window, louver or air intake mechanism and no danger of clogging the pipe by articles being thrown into it, or of roof water drainage into it.

(17) Liquid wastes from air conditioning equipment, swimming pools, etc., shall be disposed of by an accepted and approved method, as hereinafter described.

(c) **SCOPE** (1) New plumbing or drainage systems or parts thereof or additions, alterations, repairs or changes to existing plumbing or drainage installations or fixtures or appliances shall conform to the requirements of this plumbing code.

(2) A previously issued lawful plumbing permit shall be valid under the terms of the Plumbing Code under which it was issued.

(d) **APPLICATION TO EXISTING PLUMBING INSTALLATIONS:** Nothing contained in this code shall be deemed to require any plumbing or drainage system or part thereof, or any other work regulated by this code and existing prior to the effective date of this code, to be altered, changed, reconstructed, removed or demolished if such work was installed in accordance with all applicable laws in effect prior to the date this code became effective, except when any such plumbing or drainage system or other work regulated by this code is dangerous, unsafe, insanitary or a menace to life, health or property, in the opinion of the Plumbing Inspector.

(e) **MAINTENANCE** (1) All installations regulated by this code or related drainage work shall be maintained and executed in such a manner as not to constitute a nuisance or to threaten or impair the health of any individual or the public in general. The contents of such installations shall not be permitted to overflow in a building, on a premises or upon the surface of the ground, street or sidewalk.

(2) It shall be unlawful for any person, firm or corporation whether owner or agent of owner, to create, keep, cause, maintain propagate or permit the existence of a nuisance as defined in this Code.

(3) The Plumbing Inspector shall have the power to abate any nuisance by the issuance of a notice in writing, to correct and/or eliminate the nuisance within a reasonable length of time.

**4601.2 PLUMBING INSPECTOR:** The appointing authority shall designate a member or members of the Building and Zoning Department as Plumbing Inspector.

(a) **POWER AND DUTIES:** The Plumbing Inspector or the Broward County Health Department is hereby authorized and directed to interpret and enforce all of the provisions of this Plumbing Code. The Broward County Health Department may, from time to time as directed by the appointing authority, be authorized to interpret and enforce those provisions as hereinafter specified.

(b) **EMPLOYEES:** The Plumbing Inspector shall have the power to delegate powers and assignments to subordinate employees working under his authority. Such employees shall have the duties and powers as delegated by the Plumbing Inspector; provided that all plumbing inspectors shall have had ten years' experience as a practical plumber.

(c) **RIGHT OF ENTRY:** Upon presentation of proper credentials, the Plumbing Inspector or the Broward County Health Department may enter, at any reasonable time, any building, structure or premises for the purpose of inspection or to prevent violations of this Plumbing Code.

(d) **STOP-WORK ORDERS:** Whenever any plumbing work is being done contrary to the provisions of this Plumbing Code or is being improperly installed or may create a structural or health hazard or nuisance, the Plumbing Inspector or the Broward County Health Department may order such work stopped or may order the violation corrected within a reasonable period of time, by notice in writing served on the person or persons engaged in the doing or causing, of such work, to be done and such persons shall immediately stop such work until arrangements in compliance with this Plumbing Code and satisfactory to the Plumbing Official or the Broward County Health Department, have been made, at which time he may order the work to proceed.

(e) **CONCEALED WORK:** The Plumbing Inspector may order portions of a building or structure to be exposed for inspection when, in his opinion, there is good reason to believe that plumbing or drainage systems or fixtures, or parts thereof, concealed therein are in an unsafe, dangerous or insanitary condition, or that there is willful or negligent concealment of a violation of this Plumbing Code.

(f) **OCCUPANCY:** Whenever any building or portion thereof is being used or occupied contrary to the provisions of this Plumbing Code, the Plumbing Inspector or the Broward County Health Department shall report such violation to the Building Official and the Building Official shall order such use or occupancy discontinued and the Building or portion thereof vacated as set forth in Sub-section 201.5.

**4601.3 UNSAFE BUILDING AND PREMISES:** (a) The Plumbing Inspector shall periodically, as may be practicable, inspect the plumbing and drainage systems of all buildings and premises, except buildings of Group I Occupancy and public works structures, for compliance with the Plumbing Code.

(b) The Plumbing Inspector shall examine or cause to be examined every plumbing or drainage system or fixture or appliance or portion thereof reported to be dangerous or insanitary or inadequate.

(c) Any building or premises found to be insanitary or inadequate, or which constitute a health or safety hazard, or which by reason of illegal use or improper use, occupancy or maintenance constitute a violation of the provisions of this Code, shall be deemed to be unsafe.

(d) Whenever any building or premises is, in the opinion of the Plumbing Inspector, unsafe for reasons set forth in this Sub-section, he shall proceed by any or all of the following methods, whichever are, in his opinion, reasonable to correct the condition of violation:

(1) The Plumbing Inspector shall serve notice in writing to the owner or person in charge of the building or premises stating the defects thereof. This notice shall require the owner or person in charge of the building or premises, within a reasonable length of time, to commence the required repairs or improvements or removal of the plumbing system or parts thereof or fixtures or appurtenances thereto, and all such work shall be completed within 30 days from the date of notice, unless otherwise stipulated by the Plumbing Inspector. If necessary, such notice shall also require the building to be vacated forthwith and not reoccupied until the required repairs and improvements are completed, inspected and approved by the Plumbing Official.

Proper service of notice shall be by personal service on the owner of record, if he shall be found. If the person or persons addressed with such notice cannot be found after diligent search, then such notice shall be sent by registered mail to the last known address of such person, and a copy of the notice shall be posted in a conspicuous place on the premises, and such procedure shall be deemed the equivalent of personal service.

(2) The Plumbing Inspector shall post a signed, red notice in a conspicuous place on the premises readinge "WARNING, THIS BUILDING AND/OR, PREMISES IS, IN THE OPINION OF THE PLUMBING INSPECTOR, UNSAFE, INSANITARY AND UNFIT FOR HUMAN OCCUPANCY. NOTICE HAS BEEN GIVEN AND THIS BUILDING AND/OR PREMISES SHALL NOT BE USED OR OCCUPIED. THIS NOTICE SHALL NOT BE REMOVED EXCEPT BY THE PLUMBING INSPECTOR."

**4601.4 ALTERNATE MATERIALS AND TYPES OF CONSTRUCTION:** The provisions of this Plumbing Code are not intended to prevent the use of types of construction or materials or methods of design as an alternate to the standards herein set forth, but such alternates may be offered for approval, and their consideration shall be as set forth in this Sub-section.

(1) **STANDARDS:** The types of construction or materials or methods of design referred to in this Plumbing Code shall be considered as standards of quality. New type of construction or materials or methods of design shall be at least equal to these standards for the corresponding use intended.

(2) **APPLICATION:** Any person desiring to use types of construction or materials or methods of design not specifically mentioned in this Plumbing Code shall file with the Plumbing Inspector authentic proof in support of claims that may be made regarding the sufficiency, and request approval and permission for use. The Plumbing Inspector shall approve such alternates if it is clear that the standards of the Plumbing Code are at least equalled. If, in the opinion of the Plumbing Inspector, the standards of the Plumbing Code will not be satisfied by the requested alternate, he shall refuse approval.

(3) **APEAL:** Any person whose request for alternate types of construction or materials or methods of design has been refused by the Plumbing Inspector, or any person in whose considered opinion an action by the Plumbing Inspector in approving or disapproving construction under this Plumbing Code for reasons of safety, quality or sanitation, may appeal to the Board of Rules and Appeals by written request to the Secretary of the Board and such written request shall be transmitted to the Board at once.

(4) **REPEATED TESTS:** The Plumbing Inspector may require tests of a fixture, method, device or appurtenance to be repeated if, at any time, there is reason to believe that an approved fixture, method, device or appurtenance no longer conforms to the characteristics on which its approval was based.

**4601.5 (a) PERMITS REQUIRED:** It shall be unlawful to commence work on any building or premises on which plumbing is required or is to be installed, perform any work covered by the Plumbing Code including, but not limited to, the excavation or obstruction of any public or private street, alley or other thoroughfare for the purpose of installing plumbing, sewer or drainage work or connect to any public or private water supply system and/or sewer or appurtenance thereof, commence the construction, reconstruction, alteration, repair and/or remodeling of any plumbing, sewer, septic tank, sewage or liquid waste treatment system, surface drainage, both private and public swimming pools, supply or drainage wells, fire lines, water supply and waste connections from air handling and heating units and/or other drainage work without first having filed application and obtained a plumbing permit from the Building and Zoning Department, except that no permit will be necessary for the repair of leaks, un-stopping of sewers or waste pipes, repairing faucets or valves or cleaning of a septic tank where such work is located within the property lines.

(b) **OTHER APPROVALS:** In addition to the plumbing permit, permits shall be required by other regulatory authority having jurisdiction. Following are some, but not necessarily all, other required permits From the Engineering Department, before obstructing or excavating in any public thoroughfare. From the Engineering Department before cutting any street paving, sidewalk curb or sewerage system or part thereof or appurtenance thereto or making a connection to or otherwise cutting, tapping or piercing any public sewer or appurtenance thereof. From the Building Official before the addition of any fixtures or the removal or alteration of any structural or load bearing members.

(c) **PRIVATE SEWER TAPPING:** No person shall cut, break, pierce or tap any main or private sewer or appurtenance thereof, or introduce any tube, pipe, trough or conduit into any public sewer or appurtenance thereof, without the written consent as may be required by the Plumbing Inspector.

(d) **APPLICATION:** (1) Any person desiring a plumbing permit to be issued by the Plumbing Inspector, as required hereby, shall file an application therefor in writing on a form furnished by the Plumbing Inspector for that purpose. Each Appli-

cation shall describe the land on which the proposed work is to be done; shall show the use or occupancy of the building or premises; shall be accompanied by plans and specifications as required hereafter; shall give such other information as reasonably may be requested by the Plumbing Inspector; and shall be signed by the permittee or his authorized agent, who may be required to submit evidence to indicate such authority.

(2) Application for plumbing permit will be accepted only from contractors currently licensed in their respective fields and for whom no revocation or suspension of license is pending; provided that application for a plumbing permit for excavation work for plumbing, on or in public streets or thoroughfares, and all sewer, drain, soil, waste or vent work will be accepted only from a person currently certified and having in his possession a Master Plumber's Certificate, valid within the limits of jurisdiction of the Plumbing Inspector, and for whom no revocation or suspension of license is pending; except that application for permit will be accepted from any owner personally installing plumbing in his own private residence provided that such owner shall conform to all other requirements of this plumbing code, that the work is on his own private residence, that all labor in connection therewith shall be personally done by him and that the doing of such work on more than one residence within any twelve-month period shall be construed to be acting as a master plumber.

(e) **PLANS AND SPECIFICATIONS:** (1) Each application for a plumbing permit shall be accompanied by two sets of plans and specifications when required by the Plumbing Inspector. The Plumbing Inspector may authorize the issuance of a plumbing or building permit without plans or specifications for relatively small and unimportant work.

(2) For all new buildings or additions or plumbing systems where more than 125 fixture units are proposed to be installed or added to an existing building, the plans and specifications shall be prepared by, and each sheet shall bear the impress seal of, a professional engineer duly registered in the State of Florida.

(3) Plans shall be mechanically reproduced prints on substantial paper or cloth with the main details, other than an isometric drawing, drawn to scale and shall be suitably descriptive and shall fully and clearly illustrate, together with the specifications, sufficient detail and data to show the nature, character and location of the proposed work. Where, in the opinion of the Plumbing Inspector, isometric plans are necessary to describe the proposed work, and particularly, but not limited to, proposed residential buildings having eight or more units or store buildings having five or more stores, riser diagrams and isometric plans shall be submitted. Any specification in which general expressions are used to the effect that "Work shall be done in accordance with the Plumbing Code" or "to the satisfaction of the Plumbing Inspector" shall be deemed imperfect and incomplete and every reference to the Plumbing Code shall be by section or sub-section applicable. Plans shall be adequately identified.

(f) **PRECONTRACT EXAMINATION OF PLANS:** Preliminary plans should be submitted by the designer to the Plumbing Inspector before a contract for the proposed work is entered into by the owner. It is the duty of the Plumbing Inspector to cooperate with owners, designers and contractors to provide precontract examination of plans and specifications, to insure the sufficiency and Plumbing Code compliance of such plans before final contracts for construction are made. Application for plumbing permit may not be required for such examination.

(g) **EXAMINATION OF PLANS** The Plumbing Inspector shall examine all plans and applications for permits. Plans and applications shall be examined in the order received, except that plans previously given pre-contract examination shall be examined first. When approvals by other agencies having authority may logically be required to be affixed to the plan before approval by the Plumbing Inspector, such approval shall be affixed on the plans before examination by the Plumbing Inspector. If the application or plans do not conform to the requirement of all pertinent laws or regulations, the Plumbing Inspector shall reject such application in writing, stating the reasons therefore. Plans which are rejected, as stated hereinabove, shall be returned for correction. Penciled notations on mechanically reproduced plans may be accepted for only minor corrections. If the application, plans and specifications, upon examination, are found to comply with the requirements of the Plumbing Code, the plans shall be signed and marked as approved.

(h) **PLUMBING PERMIT FEE** (1) Any person desiring a plumbing permit to be issued shall, in addition to filing an application and before such permit is issued, pay a plumbing permit fee as required.

(2) When work for which a plumbing permit is required is started or proceeded with prior to the obtaining of said permit, the fees as specified herein shall be doubled. The payment of such double fee shall not relieve any person, firm or corporation from fully complying with this Code nor from any penalties prescribed herein.

(i) **PERMITS AVAILABLE AT WORK SITE:** All permits shall be kept at the work site and shall be exhibited on request to do so by an authorized person.

**4601.6 INSPECTION AND TESTS:** (a) **INSPECTIONS:** (1) All materials and installations covered by the Plumbing Code shall be inspected by the Plumbing Inspector to insure compliance with the requirements of the Plumbing Code.

(2) The plumbing permit holder shall notify the Plumbing Inspector when the work is ready for test and inspection.

(b) **FINAL INSPECTION:** When the work for which a plumbing permit is issued is completed, the permit holder shall request final inspection and such request shall be made before the building or construction in which such work done is occupied or used and not more than 30 days after completion of the work.

(c) **TESTS** Before approving any plumbing system or addition thereto or part thereof for use the Plumbing Inspector may require that such system, in whole or in part, be tested to prove its sufficiency. All equipment, material, power and labor necessary for inspections and tests shall be supplied by the permit holder.

(d) **SYSTEM TEST:** All the piping of the plumbing system shall be tested with water or air. The Plumbing Inspector may require the removal of any cleanouts, plugs or caps to ascertain if the pressure has reached all parts of the system.

(e) **METHODS OF TESTING:** (1) **WATER TESTS: GENERAL:** For building sewer tests a fitting shall be placed at the property or curb line for the purpose of inserting a test plug and such building sewer shall be connected with proper fittings to the public sewer lateral at time of test. The water test may be applied to the drainage system in its entirety or by section. If ap-

plied to the entire system, all openings in the piping shall be tightly closed, except the highest opening above the roof, and the system filled with water to the point of overflow above the roof. When tested in sections, at least the lower five feet of the next section above shall be retested, so that every joint and pipe in the plumbing drainage system shall have been submitted to a test of not less than a five-foot head of water.

**AIR TEST:** The air test shall be made by attaching the air compressor or test apparatus to any suitable opening, and closing all other inlets and outlets to the system, then forcing air into the system until there is a uniform pressure sufficient to balance a column of mercury ten inches in height or five pounds-per-square-inch on the entire system.

(2) **WATER TESTS IN UNFRAMED ONE-STORY BUILDINGS:** For one-story, unframed buildings with bathtubs on the first floor and where plumbing is installed prior to completion of building walls, partitions and roofs, the test shall be made by plugging all openings except the terminus of the vent stacks and filling the system and waste branches, which are to be concealed with water to a point in vent stacks, five feet above the highest fixture branch. On ground inspections for one-story buildings entering a common sewer and having more than one stack, a five-foot head of water will not be required where steel or copper stacks are to be installed; provided one stack is filled to a point five feet above the highest fixture branch. Other stacks may be plugged above the fixture opening provided all lead joints are made and tested. Free standing stacks shall not exceed 14 feet above the horizontal soil line.

(3) **WATER TESTS IN FRAMED BUILDINGS:** Where building walls and partitions are in place and support the stacks, the water test shall be applied to test the entire system to the overflow point of the highest vent terminus above the roof.

(4) **BATHTUB CONNECTION WATER TEST:** After the test required in (2) and (3) has been applied and approved, the bathtub shall be set and properly connected and the drainage system and tub filled with water to the flood rim level of the tub. The water test above the required five feet head shall be waived and a visual inspection substituted provided all lead caulked, screwed or sweated type joints are properly made and accepted by the Plumbing Inspector.

(f) **COMBINED BATHTUB OR SEWER AND WATER PIPE INSPECTION:** The required bathtub and water pipe or sewer inspection shall be called for and made at the same time. Where separate inspections are made, a fee of three dollars, for so-doing shall be paid by the permit holder.

(g) **TESTS WHERE ALL PARTS OF SYSTEM ARE OUTSIDE OF BUILDING:** Where all parts of the soil, waste and vent lines are outside a building and visible the fixtures may be set and the system filled with water to the point of overflow of the lowest fixture on the highest floor.

(h) **COVERING OF WORK:** No drainage or plumbing system or part thereof shall be covered until it has been inspected, tested and approved. It shall be the duty and responsibility of the permit holder to determine if work has been inspected before it is covered or concealed. Any drainage or plumbing system or part thereof that is covered or concealed before being inspected, tested and approved shall be uncovered upon order of the Plumbing Inspector.

(i) **DEFECTIVE WORK:** If on inspection and tests any plumbing work shows defects, the defective work or material shall be replaced within three days and inspection and test repeated.

(j) **CORRECTION NOTICES:** The Plumbing Inspector shall make written notice of violation of the Plumbing Code and/



or corrections ordered and such notice shall be served on or mailed or delivered to the permit holder or his job representative or may be posted at the site of the work. Refusal, failure, or neglect to comply with such notice or order within ten days shall be considered a violation of this Code, and shall be subject to the penalties as set forth. Failure to comply with this Section, no further permits shall be issued to such person, firm or corporation.

(k) **TESTS OF ALTERATIONS, REPAIRS OR EXTENSIONS:** All alterations, repairs, or extensions which include more than ten feet in length of piping and fittings shall be inspected and tested before final approval.

(l) **TEST OF RAINWATER PIPES:** Rainwater pipes and their roof connections within buildings and extending to a point five feet outside the building shall be tested by the water test.

(m) **TEST OF WATER DISTRIBUTION SYSTEM:** Upon the completion of the entire water distribution system, it shall be tested, inspected and proved tight under a water pressure of not less than the maximum working pressure under which it is to be used. Water shock or hammer in water supply system will be cause for condemnation on final inspection. Air chambers or shock absorbers shall be installed and shall be not less than a 12-inch length of pipe one size larger than the pipe it serves.

(n) **TEST OF STANDPIPES:** (See Section 4617)s

(o) **WORKMANSHIP:** All plumbing work shall be done in a workmanlike manner, and in compliance with the provisions of this Plumbing Code.

(p) **CERTIFICATES OF APPROVAL:** After the satisfactory completion and final inspection of the plumbing system, or any part thereof, and upon request, a Certificate of Approval shall be issued by the Plumbing Inspector to the permit holder.

(q) **TEST OF EXISTING INSTALLATIONS:** The Plumbing Inspector may require that a suitable test be applied to any existing plumbing system which he has reason to believe has become insanitary or defective. The Plumbing Inspector shall notify the owner or agent of the property to apply such test within a reasonable length of time but not to exceed ten days. If defects or insanitary conditions are, by such tests, found to exist, correction of the defects or insanitary conditions shall be made within ten days.

(r) **INSPECTION AND TESTS — EXCEPTIONS:** A test shall not be required for a plumbing system or part thereof set up for exhibition or demonstration purposes and not to be used for the disposal of body wastes. A test shall not be required after the repairing or replacing of an old faucet or valve, nor after forcing out stoppages and repairing leaks. A test shall not be required for a building storm sewer.

(s) **DAMAGES RESULTING FROM REQUIRED TESTS:** Damage caused by breakage or faulty installation during required tests shall be the responsibility of the permit holder.

#### 4602 DEFINITIONS

Unless otherwise expressly stated, all words other than herein defined shall have the meaning implied by their context in the Code or their ordinarily-accepted meanings in the construction industry; words used in the present tense shall include the future; words in the masculine gender shall include the feminine and neuter; the singular number shall include the plural; and the plural number shall include the singular.

Wherein a definition set forth in this Chapter varies from a definition set forth in Chapter 4 herein, the definition set forth as follows shall be applicable to only this Chapter 46.

**ACCESSIBLE:** Visible, unobstructed and within physical reach.

**AIR GAP:** An air gap in a water-supply system is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood level rim of the receptacle.

**APPROVED:** Approved means accepted under an applicable specification stated or cited in this Code, or accepted as suitable for the purpose used under procedures and powers of the Administrative Authority.

**AREA DRAIN:** An area drain is a receptacle designed to collect surface or rain water from an open area.

**BACKFLOW:** Backflow is the flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water, and any other fixture or appliance, from any source or sources other than its intended course. (See Back-Siphonage.)

**BACKFLOW CONNECTION:** Backflow connection or condition is any arrangement whereby backflow can occur.

**BACKFLOW PREVENTER:** A backflow preventer is a device or means to prevent backflow into a potable water system.

**BACK-SIPHONAGE:** Back-siphonage is the flow of water or other liquids, mixtures or substances into the distributing pipes of a potable supply of water, or any other fixture, device, or appliance, from any sources other than its intended course, due to a negative pressure in such pipe. (See Backflow).

**BASEMENT:** A level of a building, the floor of which is two feet or more below grade and the ceiling of which is not more than four feet and six inches above grade.

**BATTERY OF FIXTURES:** A "battery of fixtures" is any group of two or more similar adjacent fixtures which discharge into a common horizontal waste or soil branch.

**BOILER BLOW-OFF:** A boiler blow-off is an outlet on a boiler to permit emptying or discharge of the water or sediment in the boiler.

**BRANCH:** A branch is any part of the piping system other than a main.

**BRANCH, FIXTURE:** See **FIXTURE BRANCH**.

**BRANCH, HORIZONTAL:** See **HORIZONTAL BRANCH**.

**BRANCH, INTERVAL:** A branch interval is a length of soil or waste stack corresponding in general to a story height, but in no case less than eight feet within which the horizontal branches from one floor or story of a building are connected to the stack.

**BRANCH VENT:** A branch vent is a vent connecting one or more individual vents with a vent stack or stack vent.

**BUILDING:** A building is a structure built, erected, and framed of component structural parts designed for the housing, shelter, enclosure, or support of persons, animals, or property of any kind.

**BUILDING CLASSIFICATION:** Building Classification is the arrangement adopted by law for the designation of buildings in classes based upon their uses and occupancy.

**BUILDING DRAIN:** The building (house) drain is that main part of the lowest horizontal soil piping of a building drainage system, including first floor soil branches, exclusive of storm sewer, which receives the discharge from soil, waste, and other drainage pipes from the main or accessory building inside or outside the walls of a building and conveys it to the building (house) sewer beginning five feet outside the building walls or a point five feet following the last branch connection.

The edge of a swimming pool patio, where such patio is not more than 5 feet in width and the wall of a screened enclosure having a permanent concrete floor, whether or not enclosing a swimming pool, shall for the purpose of this definition, be taken as the building wall.

**BUILDING SEWER:** The building (house) sewer is that part of the horizontal piping of a drainage system which extends from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sewer, private sewer, individual sewer-disposal system, or other point of disposal.

**BUILDING STORM DRAIN:** A building (house) storm drain is a drain used for conveying rain water, surface water, ground water, subsurface water, condensate, cooling water, or other similar discharge to a building storm sewer or a combined building sewer, extending to a point not less than five feet outside the building wall.

**BUILDING STORM SEWER:** A building (house) storm sewer is the extension from the building storm drain to the public storm sewer, combined sewer, or other point of disposal.

**BUILDING SUBDRAIN:** A building (house) subdrain is that portion of a drainage system which cannot drain by gravity into the building sewer.

**CODE:** The word "Plumbing Code" when used alone shall mean these regulations, subsequent amendments thereto, or any emergency rule or regulation which the Administrative Authority having jurisdiction may lawfully adopt.

**COMBINED BUILDING SEWER:** A combined building sewer receives storm water, sewage and liquid waste.

**COMMON VENT:** A common vent is a vent above the junction of two fixture drains installed at the same level in a vertical stack and serving as a vent for both fixture drains.

**CONDUCTOR:** A "Leader."

**CONTINUOUS WASTE:** A continuous waste is a drain connecting the compartments of a combination fixture to its trap or connecting other permitted fixtures to a common trap.

**CROSS-CONNECTION:** A cross-connection is any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other water of unknown or questionable safety, or any other kind of matter, whether element, compound or mixture, whereby water may flow from one system to the other, the direction of flow depending on the pressure differential between the two systems. (See Backflow and Back-siphonage.)

**DEAD END:** A dead end is a branch leading from a soil waste or vent pipe, building drain or building sewer which is terminated at a developed distance of two feet or more by means of a plug or other closed fitting.

**DEVELOPED LENGTH:** The developed length of a pipe is its length measured along the center line of the pipe and fittings.

**DIAMETER:** Unless specifically stated, the term "diameter" is the nominal diameter as designated commercially.

**DOWNSPOUT:** A "Leader."

**DRAIN:** A drain is any pipe which carries liquid, waste water or water borne wastes to an approved point of disposal.

**DRAINAGE SYSTEM:** A drainage system (drainage piping) includes all the piping within public or private premises, which conveys sewage, rain water, or other liquid wastes to a legal point of disposal.

**DRAINAGE WELL:** A drainage well, referred to in this Code is any cavity, drilled, driven or natural, which taps the underground water and into which surface waters, waste waters, industrial waste or sewage is placed.

**DURHAM SYSTEM:** Durham system is a term used to describe soil or waste systems where all piping is of threaded pipe, tubing, or other such rigid construction, using recessed drainage fittings to correspond to the types of piping.

**EFFECTIVE OPENING:** The effective opening is the minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

**FIXTURE BRANCH:** A fixture branch in a drainage system is the drain from the trap of a fixture to the junction of that drain with a vent.

**FIXTURE DRAIN:** A fixture drain is the drain from the fixture branch to the junction of that drain with any other drain pipe.

**FIXTURE UNIT:** A fixture unit is a design factor so chosen that the load-producing values of the different plumbing fixtures can be expressed approximately as multiples of that factor. For the purposes of this Code, one fixture unit flow rate shall be deemed to be one cubic foot or seven and five-tenths gallons of water per minute.

**FIRE LINES:** The fire control system, including water service, standpipe, siamese connections and pumps. (See Fire Standpipe System.)

**FLOOD-LEVEL RIM:** The flood-level rim is the top edge of the receptacle from which water or other liquids overflow.

**FLOOR DRAIN:** A floor drain is an opening or receptacle located at approximate floor level connected to a trap to receive the discharge from indirect wastes and floor drainage.

**FLUSHOMETER VALVE:** A flushometer valve is a device which discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure.

**GRADE:** Grade is the slope or fall of a line of pipe in reference to a horizontal plane. In drainage it is usually expressed as the fall in a fraction of an inch per foot length of pipe.

**GREASE INTERCEPTOR:** An "Interceptor."

**GREASE TRAP:** An "Interceptor."

**GUTTER:** An open channel for carrying away rainwater.

**HANGERS:** "Supports."

**HORIZONTAL PIPE:** Horizontal pipe means any pipe or fitting which makes an angle of more than 45 degrees with the vertical.

**HORIZONTAL BRANCH:** A horizontal branch is a drain pipe extending laterally from a soil or waste stack or building drain, with or without vertical sections or branches, which receives the discharge from one or more fixture drains and conducts it to the soil or waste stack or to the building (house) drain.

**INDIRECT WASTE:** An indirect waste pipe is a pipe that conveys liquid wastes (other than body wastes) by discharging them into an open plumbing fixture or receptacle, the overflow point of which is at a lower elevation than the item drained and which is properly connected to the drainage system, soakage pit or discharge well.

**INDUSTRIAL WASTES:** Industrial wastes are liquid wastes resulting from the processes employed in industrial establishments and are free of body wastes.

**INSANITARY:** Contrary to sanitary principles — injurious to health.

**INTERCEPTOR:** An interceptor is a device designed and installed so as to separate and retain deleterious, hazardous, or undesirable matter from normal wastes and permit normal sewage or liquid wastes to discharge into the disposal terminal by gravity.

**LEADER:** A leader (downspout) is the vertical water conductor from the roof to the building storm drain, combined building sewer, or other means of disposal.

**LIQUID WASTE:** Liquid waste is the discharge from any fixture, appliance, or appurtenance, in connection with a plumbing system which does not receive body waste.

**LOAD FACTOR:** Load factor is the percentage of the total connected fixture unit flow rate which is likely to occur at any point in the drainage system. It varies with the type of occupancy, the total flow unit above this point being considered, and with the probability factor of simultaneous use.

**LOOP VENT:** A series of fixtures installed on a horizontal branch. A vent shall be installed vertically within five feet down stream from the first fixture drain, and another vent installed vertically between the last two fixture branches; all fixture drains shall enter the circuit or loop vented branch at intervals not to exceed five feet.

**MAIN:** The main of any system of continuous piping is the principal artery of the system, to which branches may be connected.

**MAIN VENT:** The main vent is the principal artery of the venting system, to which vent branches may be connected.

**MAY:** The word "may" is a permissive term.

**MEZZANINE:** It is an intermediate floor placed in any story or room. When the total area of any such mezzanine floor exceeds  $33 \frac{1}{3}$  percent of the total floor area in that room or story in which the mezzanine floor occurs, it shall be considered as constituting an additional story. The clear height above or below a mezzanine floor construction shall be not less than seven feet.

**PERSON:** Person is a natural person, his heirs, executors, administrators or assigns; and includes a firm, partnership or corporation, its or their successors or assigns. Singular includes plural; male includes female.

**PITCH:** "Grade."

**PLUMBING:** Plumbing means, includes and refers to: (1) The materials including pipe, fittings, valves, fixtures and appliances attached to and a part of a plumbing system for the purpose of creating and maintaining sanitary conditions in buildings, camps and swimming pools on private property where people live, work, play, assemble or travel.

(2) That part of a water supply and sewage and drainage system extending from either the public water supply mains or private water supply to the public sanitary, storm or combined sanitary and storm sewers or to a private sewage disposal plant, septic tank, disposal field, pit, box filter bed or any other receptacle or into any natural or artificial body of water, water course upon public or private property.

(3) The design, installation or contracting for installation, removal and replacement, repair or remodeling, of all or any part of the materials, appurtenances or devices attached to and forming a part of a plumbing system, including the installation of any fixture, appurtenance or devices used for cooking, washing, drinking, bathing, swimming, cleaning, fire fighting, mechanical or manufacturing purposes.

**PENTHOUSE:** An enclosed structure extending not more than 12 feet above the roof of a building, other than a roof structure which occupies not more than 25 per cent of the roof area and considered a story.

**PLUMBER-MASTER:** A Master Plumber is a person holding a Certificate of Competency in effect from the examining board of plumbers specifying such person as a master plumber and is authorized to engage in, offer to engage in, and advertise or otherwise represent that he is permitted or qualified to engage in, the business of a master plumber or plumbing contractor, including planning, superintending, installation, maintenance and repair with respect to plumbing in all its branches, and the performance or the supervision of others in their performance of (1)

the physical or mechanical execution of plumbing work including installation, maintenance, replacement or repair of plumbing, or (2) of the work for which a septic tank operator or (3) solar heater installers license is required; and who has complied with all State Laws and local ordinances.

**PLUMBER-JOURNEYMAN:** A Journeyman Plumber holding a Certificate of Competency in effect from the examining board of plumbers specifying such a person as a journeyman plumber is authorized to engage, or offer to engage, as an occupation, or for money or other thing of value, in work or labor as a journeyman plumber, in the physical or mechanical execution of plumbing work, including installation, maintenance, replacement or repair of plumbing and to act as superintendent or foreman under the supervision and responsibility of a licensed master plumber.

**PLUMBER-APPRENTICE:** Plumber Apprentice shall mean a person at least sixteen years of age, who is engaged in learning and assisting in the installation of plumbing and drainage and such other work as is usually done by plumbers under the direct personal supervision and in the presence of a duly licensed master or journeyman plumber; and as set forth in Chapter 446 of the Florida Statutes.

**PLUMBING FIXTURES:** Plumbing fixtures are receptacles, devices, or appliances which are supplied with water or which receive or discharge liquids or liquid borne wastes, with or without discharge into the drainage system with which they may be directly or indirectly connected.

**PLUMBING INSPECTOR:** The chief administrative officer charged with the administration, enforcement, and application of the Plumbing Code and all amendments thereto. The duly authorized and appointed representative of the legislating authority adopting this Plumbing Code, charged with the inspection of all work performed under this code, the enforcement and application of this code, and such other duties, not inconsistent with the provisions hereof, as may be assigned him from time to time.

**PLUMBING SYSTEM:** The plumbing system includes the water-supply and water-supply distribution pipes; plumbing fixtures and traps; soil, waste, and vent pipes; building drains and building sewers; building storm drains and building storm sewers; liquid waste piping, and appliances and appurtenances; including their respective connections and devices, within the private property lines of the premises, and water and sewer-treating or water and sewer-using equipment; fire standpipe systems and swimming pool piping.

**PRIVATE SWIMMING POOL:** A private swimming pool is a pool together with its buildings and appurtenances, which is used by an individual, his family or house guests.

**POTABLE WATER:** Potable water is water which is satisfactory for drinking, culinary and domestic purposes, and meets the requirements of the Health Authority having jurisdiction.

**PRIVATE PROPERTY:** Private property for the purposes of this Code shall mean all property except streets or roads dedicated to the public and easements (excluding easements between private parties.) (See definition of Plumbing.)

**PRIVATE OR PRIVATE USE:** In the classification of plumbing fixtures, private applies to fixtures in residences and apartments and to fixtures in private bathrooms of hotel and similar installations where the fixtures are intended for the use of a family or an individual.

**PRIVATE SEWER:** A private sewer is a sewer privately owned and not directly controlled by public authority.



**PUBLIC OR PRIVATE USE:** In the classification of plumbing fixtures "public" applies to fixtures in commercial and industrial establishments, in restaurants, bars, public buildings, comfort stations, schools, gymnasiums, railroad stations, or places to which the public is invited or which are frequented by the public without special permission or special invitation, and other installations (whether pay or free) where a number of fixtures are installed so that their use is similarly unrestricted.

**PUBLIC OFFICIAL:** See Administrative Authority.

**PUBLIC SEWER:** A public sewer is a common sewer directly controlled by public authority.

**PUBLIC SWIMMING POOL:** A public swimming pool is a pool together with its buildings and appurtenances where the public is allowed to bathe or is open to the public for bathing purposes by consent of the owner.

**RELIEF VENT:** A relief vent is a vent, the primary function of which is to provide circulation of air between drainage and vent systems.

**RIM:** For the purpose of this Code a rim is an unobstructed open edge at the overflow point of a fixture.

**ROCK DRAINFIELD:** Three-quarter inch drainfield rock 100 percent passing a one inch screen and a maximum of ten percent passing a one-half inch screen.

**ROCK-OOLITE:** A rock consisting of small round grains, usually carbonate of lime, resembling the roe of fish cemented together.

**ROOF-DRAIN:** A roof drain is an outlet installed to receive water collecting on the surface of a roof and to discharge it into the leader (downspout).

**ROUGHING-IN:** Roughing-in is the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures. This includes drainage, water-supply, and vent piping, and the necessary fixture supports.

**SAND INTERCEPTOR:** See Interceptor.

**SANITARY SEWER:** A Sanitary sewer is a pipe which carries sewage and excludes storm, surface and ground water.

**SECOND HAND:** Second hand as applied to material or plumbing equipment is that which has been installed, and has been used or removed.

**SEPARATOR:** See Interceptor.

**SEPTIC TANK:** A septic tank is a watertight receptacle which receives the discharge of a drainage system or part thereof, and is designed and constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a sub-surface system of open-joint or perforated piping, or other approved methods.

**SEWAGE:** Sewage is any liquid waste containing animal, mineral or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

**SHALL:** The word "shall" is a mandatory term.

**SIZE OF PIPE AND TUBING:** See Diameter.

**SLOPE:** See Grade.

**SOIL PIPE:** A soil pipe is any pipe which conveys the discharge of water closets or fixtures having similar functions, with or without the discharge from other fixtures, to the building drain or building sewer.

**SPECIAL WASTE PIPE:** See Indirect Waste Pipe.

**STACK:** A stack is the vertical pipe of a system of soil, waste, or vent piping.

**STACK VENT:** A stack vent (sometimes called a waste vent or soil vent) is the extension of a soil or waste stack above the highest horizontal drain connected to the stack.

**STORM DRAIN:** See Building Storm Drains.

**STANDPIPE SYSTEMS:** A system of piping installed for fire protection purposes having a primary water supply constantly or automatically available at each hose outlet.

**STORM SEWER:** A storm sewer is a sewer used for conveying rain water and/or surface water.

**STORY:** That part of a building comprised between a floor and a floor or roof next above, including a basement with a ceiling which is four feet, six inches or more above the line and grade of the sidewalk, but neither a cellar, an attic or a penthouse.

**SUBSURFACE DRAIN:** A subsoil drain is a drain which receives only subsurface or seepage water and conveys it to a place of disposal.

**SUMP:** A sump is a tank or pit which receives sewage or liquid waste, located below the normal grade of the gravity system and which must be emptied by mechanical means.

**SUPPORTS:** Supports, hangers, and anchors are devices for supporting and securing pipe and fixtures to walls, ceilings, floors, or structural members.

**SUPPLY WELL:** Any artificial opening in the ground designed to conduct water from a source bed through the surface when water from such well is used for public, semi-public or private use.

**TRAP:** A trap is a fitting or device so designed and constructed as to provide a liquid seal which will prevent the back passage of air without materially affecting the flow of sewage or waste water through it.

**TRAP SEAL:** The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

**VACUUM BREAKER:** See Backflow Preventer.

**VENT STACK:** A vent stack is a vertical vent pipe installed primarily for the purpose of providing circulation of air to and from any part of the drainage system.

**VENT SYSTEM:** A vent system is a pipe or pipes installed to provide a flow of air to or from a drainage system or to provide a circulation of air within such system.

**VENTILATION-TOILET ROOMS:** The process or means of supplying or removing air which may or may not be conditioned for temperature and humidity by natural or mechanical means to and from the outside atmosphere.

**VERTICAL PIPE:** A vertical pipe is any pipe or fitting which is installed in a vertical position or which makes an angle of not more than 45 degrees with the vertical.

**WASTE:** See Liquid Waste and Industrial Wastes.

**WASTE PIPE:** A waste pipe is any pipe which receives the discharge of any fixture, except water closets or fixtures having similar functions and conveys it to the building drain or to the soil or waste stack.

**WATER-DISTRIBUTING PIPE:** A water-distributing pipe in a building or premises is a pipe which conveys water from the water-service pipe to the plumbing fixtures, appliances and other water outlets.

**WATER MAIN:** The water (street) main is a water supply pipe for public or community use.

**WATER OUTLET:** A water outlet, as used in connection with the water-distributing system, is the discharge opening for the water; (1) to a fixture; (2) to atmospheric pressure (except into an open tank which is part of the water-supply system); (3) to a boiler or heating system; (4) to any water-operated device or equipment requiring water to operate, but not a part of the plumbing system.

**WATER SERVICE PIPE:** The water-service pipe is the pipe from the water main or other source of water supply to the building served.

**WATER-SUPPLY SYSTEM:** The water-supply system of a building or premises consists of the water-service pipe, the water-distributing pipes, standpipe system and the necessary connecting pipes, fittings, control valves, and all appurtenances in or on private property.

**WET VENT:** A wet vent is a waste pipe which serves to vent and convey waste from fixtures other than water closets.

**YOKE VENT:** A yoke vent is a pipe connecting upward from a soil or waste stack to a vent stack for the purpose of preventing pressure changes in the stacks.

#### **4603 GENERAL**

**4603.1 CONFORMANCE WITH CODE:** All plumbing systems hereafter installed shall conform to the minimum requirements and provisions as set forth in this Code.

**4603.2 CHANGE IN DIRECTION:** Changes in direction in drainage shall be made by appropriate use of 45-degree wyes, long-or-short-sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or other approved fittings. Single and double sanitary tees and quarter bends may be used in vertical sections of drainage lines only where the direction of flow is from the horizontal to the vertical. No one-fifth bends or one-quarter bends will be allowed on horizontal soil or waste lines.

**4603.3 PROHIBITED FITTINGS AND CONNECTIONS:** (a) No fitting having a hub in the direction opposite to flow, or tee branch shall be used as a drainage fitting.

(b) No running threads, bands, or saddles shall be used in the drainage system.

(c) No drainage or vent piping shall be drilled or tapped.

(d) No four inch or four by three inch cast iron closet bends shall be used for floor connection to fixtures with integral trap.

**4603.4 REPAIR AND ALTERATIONS TO EXISTING PLUMBING:** Alteration, repair or renovation of existing plumbing or drainage installations may be made at variance from the provisions of this Code, provided such deviations conform to the intent of the Code and are approved in writing by the Plumbing Inspector. Any previously installed fixture or material found to be defective, deteriorated or dangerous to personal health or safety by the administrative authority shall be replaced in accordance with the provisions of this Code.

#### **4603.5 TRENCHING, EXCAVATION, AND BACKFILLING:**

(a) **SUPPORT OF PIPING:** Buried piping shall be securely supported in an approved manner to prevent sagging, misalignment and breaking.

(b) **OPEN TRENCHES:** All excavations required to be made for the installation of a plumbing piping system shall be open trench work and shall be kept open until the piping has been inspected, tested and accepted.

(c) **BACKFILLING:** Adequate precaution shall be taken to insure proper compactness of backfill around piping without damage to such piping. Backfilling to a point not less than 12 inches above the top of the pipe shall be placed in thin layers with clean fill which does not contain stones, boulders, cinder-fill, or other material which would damage or break the piping or cause corrosive action.

**4603.6 STRUCTURAL SAFETY<sup>a</sup>** The work of installing or repairing any part of a plumbing and/or drainage system shall not impair the structural safety of the building or premises. The building or premises shall be left in a safe structural condition in accordance with the requirements of this Code.

**4603.7 HIGHER REQUIREMENTS:** Nothing herein contained shall be construed to prevent the owner from using higher requirements than those set forth in this Code.

**4603.8 PROTECTION OF PIPES:** (a) **BREAKAGE AND CORROSION:** Pipes passing under or through walls shall be protected from breakage and strain or stress. Pipes passing through or under cinder or concrete or other corrosive material shall be protected against external corrosion by protective coating, wrapping, or other means which will prevent such corrosion.

(b) **CUTTING OR NOTCHING:** No structural member shall be weakened or impaired by cutting, notching, or otherwise, except to the extent permitted by the Building Official.

(c) **PIPES THROUGH FOOTINGS OR FOUNDATION WALLS:** All piping passing under a footing shall have a clearance of at least two inches between the top of the pipe and bottom of the footing. All piping passing through masonry walls or concrete construction shall be sleeved to provide  $\frac{1}{2}$  inch annular space around entire circumference of pipe to be sleeved.

**4603.9 DAMAGE TO DRAINAGE SYSTEM OR PUBLIC SEWER:** It shall be unlawful for any person to deposit by any means into the building drainage system or into a public or private sewer any ashes; cinders; rags; inflammable, poisonous, or explosive liquids; gases; oils; grease; or any other deleterious material which would or could obstruct, damage, or overload such system or sewer.

**4603.10 INDUSTRIAL WASTES:** Wastes detrimental to the public or private sewer system or detrimental to the functioning of the sewage-treatment plant shall be treated and disposed of as directed by the Plumbing Inspector or other authority having jurisdiction. Air conditioning equipment shall not discharge directly or indirectly into rainwater leaders which discharge into any surface gutter.

**4603.11 SLEEVES:** Annular space between sleeves and pipes shall be filled or tightly caulked with coal tar or asphaltum compound, lead, or other material found equally effective and approved as such by the Plumbing Inspector.

**4603.12 VERMIN PROOFING:** All lead work in a building not enclosed in concrete or fill, shall be made rat proof by covering with copper or galvanized wire cloth well secured. Interior openings through walls, floors, and ceilings shall be sealed vermin proof.

**4603.13 USED OR SECOND HAND EQUIPMENT<sup>a</sup>** It shall be unlawful to purchase, sell, or install used equipment or material for plumbing installations unless it complies with the minimum standards set forth in this Code.

**4603.14 CONDEMNED EQUIPMENT<sup>a</sup>** Any plumbing equipment condemned by the Plumbing Inspector because of wear, damage, defects, or sanitary hazards, shall not be re-used for plumbing purposes.

**4603.15 PIPING IN RELATION TO FOOTINGS<sup>a</sup>** Unless otherwise approved by the Building Official, by reason of a special design, no excavation for piping or drainage work shall be placed within the angle of pressure as transferred from the base of an existing structure to the sides of an excavation on a 45-degree angle, other than a pipe perpendicular to the wall.

**4603.16 CONNECTIONS TO PLUMBING SYSTEM REQUIRED:** All plumbing fixtures, drains, appurtenances, devices and appliances used to receive or discharge liquid wastes or sewage shall be connected to a drainage system, in accordance with the provisions of this code.

**4603.17 SEWER REQUIRED:** (a) Every building in which plumbing fixtures are installed shall have a connection to a public sewer if available.

(b) When a public sewer is not available for use, sewage and drainage piping shall be connected to an individual sewage, or waste disposal system.

**4603.18 LOCATION OF FIXTURES:** (a) **LIGHT AND VENTILATION:** Plumbing fixtures shall be located in compartments or rooms provided with ventilation and illumination as set forth in Part III.

(b) **IMPROPER LOCATION:** Piping, fixtures, or equipment shall not be located in a manner to interfere with the normal operation of windows, doors, or other exit openings.

**4603.18A FLOOR CONNECTIONS FOR INTEGRAL TRAP FIXTURES:** (a) **LEAD:** Four-inch lead bends and stubs shall be used on floor standing water closets or similar integral trap fixtures. The outlet may be dressed or swedged to receive a three-inch ferrule. No three-inch lead stubs will be permitted for fixtures with integral trap.

(b) **REDUCING:** Four-by-three-inch reducing one-quarter bends are acceptable.

**4603.19 DEAD ENDS:** In the installation or removal of any part of a drainage system, dead ends shall be avoided except where necessary to extend a cleanout so as to be accessible.

**4603.20 TOILET FACILITIES FOR WORKMEN:** (a) **MINIMUM FIXTURE REQUIREMENTS:**

Temporary Toilet Facilities for Workmen During Construction	No. of Persons	Water Closets
For each construction job and for each one hundred feet of residential structure, for multiple buildings ..	1 to 50	*2 1
For each five floors of a structure ..	1 to 50	*2 1

(Over 50 add 1 for each 75 persons or fraction thereof)

\*Permanent toilet facilities located in a structure where alterations or additions are being made or toilet facilities located within two hundred feet of construction work, may be used in lieu of temporary toilet facilities, provided the owner or party in possession thereof shall have given written consent for the use of such facilities during the entire period of construction: further, provided such written consent is attached to the approved plans for the proposed construction.

(b) **WATER SUPPLY:** The person holding the building permit shall employ a licensed plumbing contractor to install temporary water closets with flush tanks or flush valves connected to an approved disposal system and supplied by an approved community water supply. If an approved community water supply is not available, water under pressure shall be provided by means of a water pump and well.

(c) **PUBLIC SEWER AVAILABLE:** Where a public sewer is available, a permit to connect thereto shall be secured by the licensed plumbing contractor and a proper branch fitting inserted between the reducing fitting at the property line and the test fitting.

(d) **BUILDING SEWER CONNECTION:** Should it be deemed advisable, a permanent building sewer or drain may be installed to serve temporary water closets, provided all requirements of the Plumbing Code related thereto are observed.

(e) **REMOVAL OF TEMPORARY WORK:** Upon completion of the construction work, temporary water closet, sewer and water branches shall be removed and the sewer branch opening shall be closed by a licensed master plumber with a cast iron plug or cleanout caulked in place with an oakum and lead caulked joint. Water lines shall be permanently capped and plugged.

(f) **SEPTIC TANK CONNECTIONS:** Where a public sewer is not available the person, or persons holding the building permit shall provide temporary water closets, by: Employing a licensed master plumber to insert a proper fitting in the building sewer between the septic tank and the test fitting, or place the water closets over a septic tank on a temporary wood platform, by either removing the permanent concrete top cover or by providing a temporary wood platform over a space between sectional top covers or providing a temporary wood platform over septic tank manholes. Such temporary wood platforms shall be removed upon completion of the construction work and the permanent concrete cover properly cemented in place. It is prohibited to cut an opening into a septic tank cover for the insertion of a water closet outlet.

(g) **GENERAL REQUIREMENTS FOR TEMPORARY TOILETS SHALL BE AS FOLLOWS:** (a) Pit, bucket or ground surface privies are prohibited.

(b) No person, firm or corporation shall commence work in connection with temporary toilet facilities without first submitting plans for location of and securing approval as set forth in this Code.

(c) Inspection shall comply with requirements as set forth in this Code.

(d) No fixture vent for temporary water closets shall be required.

(e) Full caulked oakum joints without lead may be used for temporary water closet branches.

(f) Temporary toilet installations shall be removed as soon as permanent toilet facilities are available.

**4603.21 TEMPORARY TOILETS: (a) GENERAL (1)** Sanitary facilities shall be required at construction sites, fairs, carnivals, revivals, encampments and other locations where numbers of people congregate for short periods of time and sanitary facilities shall be permanent facilities as set forth therein or, where permanent facilities are not practicable, may be temporary toilets either of a water-borne flush type with sewer connection or of a portable chemical type, either of which shall comply with the requirements set forth herein.

(2) Pit, bucket, or ground surface privies are prohibited.

(3) Any persons desiring to provide or erect temporary toilet facilities shall first submit plans and secure approval as set forth in this Chapter.

(4) The permit for a temporary toilet shall be for such period of time as the facilities may actually be needed but not to exceed 3 months except that for construction sites such period may be for 6 months.

(5) Temporary facilities are acceptable only where permanent facilities are not available.

(6) Temporary toilets shall be not less than 50 feet from any wall and not less than 20 feet from property lines other than street lines.

(b) **CONSTRUCTION SITES: (1) PERMANENT TOILETS:** Permanent toilet facilities located in a structure where alterations or additions are being made, or toilet facilities within 200 feet of the construction work, may be used provided the owner

or party in possession thereof shall have given written consent for the use of such facilities during the entire period of construction and that a letter of written consent is attached to the approved plans.

(2) **MINIMUM FIXTURE UNITS:** A water closet shall be provided for the first 25 workmen or fraction thereof and one for each 50 workmen thereafter, and where the building under construction is multi-storied, such facilities shall also be provided on the fifth and tenth floors.

(c) **PUBLIC ASSEMBLY:** In places of public assembly such as fairs, carnivals, encampments and similar temporary assembly, where permanent facilities are not available, toilet facilities shall be provided as set forth in Table 46-P herein and such facilities may be of the temporary type as set forth herein.

(d) **TEMPORARY TOILET ENCLOSURE:** (1) For other than water-borne, flush type, temporary toilets shall be enclosed in fly-tight, weather protected, well ventilated buildings with self-closing doors or the containers shall be enclosed to be fly-tight and ventilated with screened vents having an area not less than 1/7 of the floor area.

(2) Doors to stalls shall be provided with internal lock.

(3) Urinals shall be non-absorbent, and non-corrosive and designed to drain completely.

(4) Toilet tissue shall be furnished.

(5) Enclosures shall be constructed of non-corrosive materials not readily absorptive of odor or moisture.

(6) Enclosures shall be maintained in sanitary condition and shall be thoroughly cleaned and disinfected at least twice weekly.

(7) Enclosure shall be not less than 11 square feet total inside area.

(e) **WATER-BORNE FLUSH TYPE:** (1) Flush tanks or flush valves shall be connected to an approved community water supply except that where community water supply is not available water pressure shall be provided by means of a well and pump.

(2) Where a public sewer is available, a permit to connect thereto shall be obtained and a proper branch fitting inserted between the reducing fitting at the property line and the test fitting. Upon completion of the construction work or termination of use of the temporary toilet, temporary sewer and water branches shall be removed and the branch sewer opening closed with a cast iron plug or cleanout caulked in place with an oakum and lead caulked joint. Water lines shall be permanently capped or plugged.

(3) A permanent building sewer or drain may be installed to serve temporary toilets provided such sewer or drain complies with all requirements of this Chapter.

(4) Where a public sewer is not available disposal may be to a septic tank and drain field. Fixtures may be connected by a proper fitting in the building sewer between the septic tank and the test fitting; except that at construction sites fixtures may be placed over the septic tank on a temporary wood platform, by either removing the permanent concrete top cover or by providing a temporary wood platform over a manhole. A hole shall not be cut into a septic tank cover for the insertion of a water closet outlet.

(5) Fixture vent shall not be required for temporary water closets.

(6) Full caulked oakum joints without lead may be used for temporary water closet branches.

(f) **PORTABLE CHEMICAL TYPE:** (1) Containers shall have a volume of not less than 12 gallon capacity.

(2) The bottom of the container shall be not less than 12 inches below the top of the seat.

(3) Sheet metal containers shall be of non-absorptive material.

(4) Drain line from urinal to container shall be minimum  $\frac{1}{2}$  inch ID plastic or non-corrosive material.

(5) Containers shall be completely emptied, thoroughly cleaned and disinfected at least twice weekly in accordance with Health Department requirements.

(6) An approved type disinfectant shall be used in sufficient quantity to provide odorless operation with normal usage.

(7) Waste shall be collected, transported and disposed of in a manner as approved by the Plumbing Inspector and Health Department.

(8) Units shall be marked with the name, address and telephone number of the servicing company.

#### 4604 MATERIALS

**4604.1 MATERIALS:** (a) **MINIMUM STANDARDS:** The materials listed herein shall conform to the standards cited when used in the construction, installation, alteration, or repair of any part of a plumbing and drainage system, except that the Plumbing Inspector shall allow the extension, addition, or relocation of existing soil, waste, or vent pipes with materials of like grade or quality.

(b) **USE OF MATERIALS:** Each material listed in Table 46-C shall conform to the standards cited opposite it. Its uses shall be further governed by the requirement imposed in other sections of this Code. Materials not included in the table shall be used only as provided in Paragraph 4604.1(a). Materials shall be free of manufacturing defects, or damage however occasioned, which would, or would tend to, render such materials defective, insanitary or otherwise improper to accomplish the purpose of this Code.

(c) **SPECIFICATIONS FOR MATERIALS:** Standard specifications for materials for plumbing installations are listed in Tables 46-A, 46-B, 46-C and 46-D. Products conforming to the specifications listed for a given material shall be considered acceptable.

**4604.2 MATERIALS FOR DRAINAGE SYSTEMS:** (a) **GENERAL:** Pipe, tubing and fittings for plumbing systems shall comply with the requirements of this section.



(b) **REQUIREMENTS ACCORDING TO HEIGHT:** For building three stories or less in height, cast iron pipe and fittings shall be not less than service weight. For the purpose of this paragraph, any space for human occupancy above the third story shall constitute an additional story. For buildings four stories or more in height, cast iron pipe shall be of extra heavy weight.

(c) **ABOVE-GROUND PIPING WITHIN BUILDINGS:** Piping for a drainage system within a building shall be of cast iron, galvanized wrought iron, galvanized steel, lead, brass or copper pipe, or copper tube type K, L, and M in sizes 1¼ inch and larger and DWV in sizes 3 inches and larger. No brass or copper tubing.

(d) **UNDERGROUND PIPING WITHIN BUILDINGS:** All drains within buildings where underground, shall be of cast-iron soil pipe, lead pipe, or brass pipe, except that copper tube and fittings Type K or L may be used for underground drainage installations for private residential or duplex work only, and for indirect waste lines.

(e) On all filled ground where the presence of hydrogen sulfide gas or other injurious elements is known, and in areas being or having been recently filled below high tide areas, all concealed soil, vent and waste piping and fittings shall be cast iron. Any fixture branch above ground may be of copper, lead or galvanized pipe.

(f) **FITTINGS:** Fittings on the drainage system shall conform to the material and type of piping used. Fittings on screwed pipe or copper tube shall be of the recessed drainage type.

**4604.3 BUILDING SEWER:** (a) **GENERAL:** The building sewer shall be of not less than four-inch diameter and shall be cast iron sewer pipe, bituminized fiber sewer pipe, asbestos cement pipe, plastic drain pipe, or vitrified clay pipe. Joints shall be water tight and root-proof.

(b) **BITUMINIZED FIBER BUILDING SEWER PIPE INSTALLATION:** (1) **USE:** Specific usage of bituminized fiber pipe shall be confined to:

(aa) Residential type buildings limited to single family residences and duplex only.

(bb) For building sewers serving buildings not over two stories in height.

(cc) The use of bituminized fiber pipe for soil, waste, vent, building drains or other plumbing pipes inside a building is expressly prohibited.

(dd) The pipe shall be laid in straight alignment and grade. With approved fittings for changes of direction. Cast iron spigot connections to bituminized fiber shall be made by the insertion of the spigot end of cast iron pipe into a bituminized fiber adaptor coupling or hub fitting.

(2) **JOINTS:** Bituminized fiber joints shall be tapered. The pipe taper shall be made by a field tooling lathe or field machine. Pipe and fittings shall be fully seated with no open space in the pipe invert. Pipe and fittings shall be joined together by driving on a wood block placed against coupling or fitting bumpers — never against face of pipe.

(3) **JOINT MATERIAL:** Joint material for bituminized fiber pipe and fittings shall be either of the following: An oakum and lead caulked joint, hot coal tar pitch, asphalt sewer pipe compounds, sulphur base compounds or other special acid-resisting material. In each case the manufacturer's directions shall be followed in the use of joint compounds.

(4) **PIPE BEDDING:** The bottom quadrant of bituminized fiber pipe shall be continuously and uniformly in contact with and supported by the trench bottom. Fine, uniform material 4 inch in depth that will pass through a ¼-inch screen shall be used to afford full support to the pipe. Hub and coupling projections shall be excavated so that no part of the pipe load is supported by the hub or coupling. Fine materials that will pass through a ¼-inch screen shall extend 4 inches on each side of the pipe.

(5) **BACKFILL AND COVER:** Backfill for bituminized fiber pipe shall be firmly compacted with fine, selected material which will pass through a ¼-inch screen from the trench bottom to a point six inches over the top of the pipe. The minimum cover over bituminized fiber pipe shall be 12 inches.

(c) **ASBESTOS CEMENT BUILDING SEWER PIPE INSTALLATION:** (1) **USE:** Specific usage of asbestos cement pipe shall be confined to:

(aa) Residential type buildings limited to single family residences and duplex only.

(bb) For building sewers serving buildings not over two stories in height.

(cc) The use of asbestos cement pipe for soil, waste, plumbing vents, building drains or other plumbing pipes inside a building is expressly prohibited.

(dd) The pipe shall be laid in straight alignment and grade, with approved fittings for changes of direction. Cast iron spigot connections to asbestos cement shall be made by the insertion of the spigot end of cast iron pipe into an asbestos cement adaptor coupling or hub fitting.

(2) **JOINTS:** Asbestos cement joints shall be tapered. The pipe taper shall be made by a field tooling lathe or field machine. Pipe and fittings shall be fully seated with no open space in the pipe invert. Pipe and fittings shall be joined together by driving on a wood block placed against coupling or fitting bumpers — never against face of pipe.

(3) **JOINT MATERIAL:** Joint material for asbestos cement pipe and fittings shall be an oakum and lead caulked joint, or with ring tight couplings. In each case the manufacturer's directions shall be followed in the use of joint compounds.

(4) **PIPE BEDDING:** The bottom quadrant of asbestos cement pipe shall be continuously and uniformly in contact with and supported by the trench bottom. Fine, uniform material 4 inch in depth that will pass through a ¼-inch screen shall be used to afford full support to the pipe. Hub and coupling projections shall be excavated so that no part of the pipe load is supported by the hub or coupling. Fine materials that will pass through a ¼-inch screen shall extend 4 inches on each side of pipe.

(5) **BACKFILL AND COVER:** Backfill for asbestos cement pipe shall be firmly compacted with fine, selected material which will pass through a ¼-inch screen from the trench bottom to a point six inches over the top of the pipe. The minimum cover over asbestos cement pipe shall be 12 inches.

(d) **PLASTIC BUILDING SEWER PIPE INSTALLATION:**

(1) **USE:** Specific usage of plastic pipe shall be confined to:

(aa) Residential type buildings limited to single family residences and duplex only.

(bb) For building sewers serving buildings not over two stories in height.

(cc) Plastic pipe and fittings shall not be used as a drain line for any kind of soil.

(dd) The use of plastic pipe for soil, waste, vent building drains or other plumbing pipes inside a building is expressly prohibited.

(ee) The pipe shall be laid in straight alignment and grade, with approved fittings for changes of direction. Cast iron spigot connections to plastic pipe shall be made by the insertion of the spigot end of cast iron pipe into a plastic adaptor coupling or hub fitting.

(2) **JOINTS:** Pipe and fittings shall be full-seated with no open space in the pipe invert. Pipe and fittings shall be joined together by the use of an approved thinner and/or an approved cement. Install and assemble in accordance with manufacturer's specifications.

(3) **JOINT MATERIALS:** Joint material for plastic pipe and fittings shall be an oakum and lead caulked joint, or with plastic cement joint compound. The manufacturer's directions shall be followed in the use of joint compounds.

(4) **PIPE BEDDING:** The bottom quadrant of plastic pipe shall be continuously and uniformly in contact with and supported by the trench bottom. Fine, uniform material 4 inches in depth that will pass through a ¼-inch screen shall be used to afford full support to the pipe. Hub and coupling projections shall be excavated so that no part of the pipe load is supported by the hub or coupling.

(5) **BACKFILL AND COVER:** Backfill for plastic drain pipe shall be firmly compacted with fine selected material which will pass through a ¼-inch screen from the trench bottom to a point eight inches over the top of the pipe. The minimum cover over plastic drain pipe shall be 12 inches.

(6) **FITTINGS:** Plastic drain pipe fittings for use with plastic drain pipe shall be of a sanitary pattern, and made of the same material as the pipe.

(e) **VITRIFIED CLAY PIPE:** Vitrified clay pipe shall conform to ASTM Specification C-200 extra strength including 4-inch size, with an approved, interlocking compression joint formed on vitrified clay pipe at the factory, and made of Plastisol (polyvinyl chloride) to specifications established by the National Clay Pipe Manufacturers, Inc. Installation methods for bedding, backfill and depth of cover of vitrified clay pipe shall be the same as that set forth for bituminous fiber or asbestos cement pipe. Joints shall be watertight and root-proof.

(f) **OLD BUILDING DRAINS AND SEWERS:** Old building drains and building sewers may be used in connection with new buildings or new plumbing and drainage work only when they are found, on examination or test, to conform in all respects to the requirements governing new building drains and building sewers.

(g) **BUILDING STORM SEWER:** The building storm sewers shall be clay pipe, cast iron, bituminized fiber, asbestos cement, plastic drain pipe or concrete pipe.

(h) **INSIDE LEADERS:** When placed within the walls of any building or run in an inner or interior court or shaft, all roof leaders shall be constructed of lead, or cast iron with oakum and lead caulked joints, copper tube, brass, galvanized wrought iron or galvanized steel pipe with recessed drainage fittings.

(i) **COLLECTION BOXES:** Connection to sheet metal collection boxes shall be made only with lead pipe wiped on a ferrule or an adaptor flared and soldered to the bottom of each box. Cast iron or brass roof drains with domes or strainers shall be connected with oakum and lead caulked joints, screw threads or copper tube with soldered sweat joints.

(j) **OUTSIDE LEADERS:** Outside rain leaders shall be installed as follows: Where located in a place accessible or exposed to vehicles, cast iron shall be extended five feet above grade. All other locations, cast iron shall be extended at least one inch above grade. Install foot block at bottom of leader eight inches above grade and six inches beyond leader.

(k) **DEFECTIVE LEADER PIPES:** When an existing leader pipe becomes defective, such leader shall be replaced by one which conforms to this Code.

**4604.4 MATERIAL FOR CLEANOUTS:** Cleanouts shall be a brass to iron or other approved connection and conform to the weight and materials required for pipe and fittings of the same metal, and extend not less than one-quarter-inch above the hub.

**4604.5 MATERIALS FOR VENTING: (a) VENTS** Pipe, tubing and fittings for the vent piping system shall comply with

nipples and bushings shall be red brass pipe, standard size conforming to FS WW-F-351 or ASTM Designation B251-64 or of heavy cast red brass of weight and dimensions in accordance with Table 46-B and 46-C.

**TABLE 46-B**

Size of Pipe (Inches)	Weight Per Foot		Size of Pipe (Inches)	Weight Per Foot	
	Lb.	Oz.		Lb.	Oz.
1¼	0	6	1	6	
1½	0	8	3	2	
2	0	14	4	8	

**TABLE 46-C  
MATERIALS FOR PLUMBING INSTALLATIONS**

<b>Materials</b>	<b>ASA</b>	<b>ASTM</b>	<b>FS</b>	<b>Other Standard</b>	<b>Remarks</b>
<b>NON-METALLIC PIPING</b>					
Clay Sewer Pipe . . . . .	A106.3	C13 C200	SS-P-361a	(1956)	Standard Strength Extra Strength
Concrete Sewer Pipe for Sizes 4" to 24"		C76 C14 C4-59	SS-P-375 SS-P-371a	(1956) (1956)	Reinforced Non-reinforced (Type I)
Concrete Draintile . . . . .					
Bituminous Fiber Sewer Pipe, and Fittings			SS-P-356	(1956)	CS-116-5A
Asbestos Cement Sewer Pipe . . . . .			SS-P-331a	(1955)	
Plastic Drain Pipe . . . . .					CS-228-60
<b>FERROUS PIPE AND FITTINGS</b>					
Cast-Iron Soil Pipe and Fittings XH . . .	A40.1-1935	A74-42	WW-P-401	(1951)	See 3, 2, 1 Extra Heavy
Cast-Iron Soil Pipe and Fittings Service Weight . . . . .		A74-42			CS-188-53
Cast-Iron Water Pipe . . . . .	A21.2-1953		WW-P-421a	(1955)	AWWA 1908
Cast-Iron (Threaded) Pipe . . . . .	A40.5-1943		WW-P-356	(1936)	
Cast-Iron (Screwed) Fittings . . . . .	B16.4-1949		WW-P-501c	(1956)	
Cast-Iron Drainage Fittings . . . . .	B16.12-1953		WW-P-491a	(1945)	
Wrought-Iron Pipe . . . . .	B36.2-1958	A72-55T	WW-P-441b	(1952)	
Steel Pipe . . . . .		A120-54	WW-P-406	(1944)	Type I and II
Open-Hearth Iron Pipe . . . . .	B36.23-1956	A253-55T	WW-P-406	(1944)	Type III only
Malleable-Iron Fittings . . . . . (300 lbs.)	B16.19-1951	A338-54*	WW-P-521c	(1956)	
<b>NON-FERROUS PIPE AND FITTINGS</b>					
Brass Tubing . . . . .		B135	WW-T-791	(1931)	
Brass Pipe . . . . .	H27.1-1958	B43-58	WW-P-351	(1930)	
Brass or Bronze Flanges and Flanged Fittings . . . . .	B16.24-1953 (150 & 300 lbs.)				
Cast Brass Soldered Joint Fittings . . . .	B16.18-1950				For copper water tube
Cast Brass Solder Joint Drainage Fittings . . . . .	B16.23-1960				
Bronze Screwed Fittings . . . . .	B16.15-1958		WW-P-460	(1945)	MSS-SP-10
Copper Pipe . . . . .	H26.1-1956	B42-58	WW-P-377b	(1955)	

TABLE 46-C (continued)

Seamless Copper Tubing .....		B75-59	WW-T-797	(1932)	
Copper Water Tube (KLM) .....	H23.1-1958	B251-59	WW-T-799a	(1946)	SPR-217-49
			(1)		
Wrought Copper and Wrought Bronze Solder Joint Fittings .....	B16.22-1951				
Copper Drainage Tube (DWV) .....		B306-59			
Flared Fittings for Copper (water) Tubes .....	A40.2-1958				
Lead Pipes and Traps .....			WW-P-325	(1944)	CS-95-41 CS-96-41
<b>MISCELLANEOUS</b>					
Caulking Lead .....			QQ-L-156	(1946)	CS-94-41
			Type I		
Sheet Lead ..... e.....			QQ-L-201-Ia	(1953)	Grade A
Sheet Brass ..... e..... e..... e.....		B36-56	QQ-B-611a	(1938)	
		B121-55	QQ-B-613	(1954)	
Sheet Copper ..... e.....		B152-58	QQ-C-576a	(1955)	
Galvanized Iron and Steel Sheetse.....	G8.2-1951	A93-55T	QQ-I-716	(1948)	
			(3)		

The shower pan is constructed of a lamination of materials to the following minimum specifications:

	LBS. EACH to LAYER PER REAM	TOTAL LBS. PER REAM
1 layer polyethylene .....	30	30
7 layers kraft paper "Satina" grade ..... e..... e.....	20	140
1 layer kraft paper "Creped" ..... e..... e..... e.....	70	70
3 layers glass fibers ..... e.....	9	27
7 layers catalytic asphalt .....	134.66	940
Total Weight Per Ream .....		1207 lbs.
Total Weight Per 100 Sq. Ft. ....		40.23

Between each of the laminations of kraft paper is placed a layer of asphalt and between three of the laminations is placed a layer of glass fibers.

The minimum weight of the material shall be 1207 pounds per ream of 3000 square feet, or 40.23 pounds per 100 square feet.

Any changes in these minimum specifications will require submittal of the new material for re-evaluation.

TABLE 46-Ca (continued)

Galvanized Pipe and Fittings . . . a.a . . .		A120-54	WW-P-406	(1944)	Section D6
Cement Lining . . . . .	A21.4-1953	A120-54	WW-P-406	(1944)	Section D7
Coal-Tar Enamel (protective coating) . .					AWWA 7A.6-1940 C-203-55 C-204-55
Silver Solder . . . . . a . . . . .	B260-52T	B-260-52T			
Soft Solder . . . . . a . . . . . a . . . . . a . . . . .		B32-58T	QQ-S-571c	(1958)	
Fixture Setting Compound . . . . . a . . . . .			HH-C-536a	(1954)	
Air Gap Standards . . . . .	A40.4-1942				
Backflow Preventors . . . . .	A40.6-1943				
Valves — Bronze Gate . . . . .			WW-V-54(2)54		
Cast-Iron Gate . . . . .			WW-V-58	(1945)	
*Intended only for use where ASA B16.3 (150 lb.) and ASTM B16.1 9 (300 lb.) are not adequate.					
	ASA	ASTM	FS		OTHER STANDARDS
Cast Iron Plumbing Fixtures . . . . .					CS-77-51 (TS-5278)
Drinking Fountain . . . . .	Z4.2-1942				
Earthenware (Vitreous glazed) . . . . .					CS-111-43
Formed Steel Enameled Sanitary Ware . .			WW-P-542a	(1950)	
Formed Metal Porcelain Enameled Sanitary Ware . . . . .					CS-144-47
Staple Porcelain Plumbing Fixtures . . . .					CS-4-29
Staple Vitreous China Plumbing Fixtures					CS-20-49
Hospital Plumbing Fixtures, N.B.S. Simplified Practice Recommendation . .					R106-41
Plumbing Fixtures (for) Land Use, F. S.			WW-P-541a	1950*	
Domestic Hot Water Heaters . . . . .	Z21.10-1953				W-H-196B Underwriters' Laboratories, Inc., 1948

\*Corrosion-resisting metal sinks shall be of either stainless steel or monel metal. Alloy compositions conforming to Nickel-copper alloy or corrosion-resisting steel as specified in WW-P-541a 1940 Table VIII or A.I.S.I. type number 302 or 430 will be acceptable. For domestic use the *minimum* permitted metal thickness shall be 0.0375 inches (#20 U. S. Standard Gauge for Sheet and Plate Iron and Steel) and for other than domestic use a minimum of 0.050 inches (#18 gauge). Bowls shall be seamless drawn or welded with well-rounded corners and edges. All exposed welds shall be made smooth and invisible and all visible surfaces shall have a smooth satin finish. The entire underside of fixture shall be coated with an adherent compound that will effectively deaden sound.



maintained in accordance with the provisions of this Code. (See Section 4615 for septic tank requirements.)

(c) In areas where no public sewer is provided or where a connection to the public sewer is not permitted by the Engineering Department, or where no sewer connection through an easement is available, plumbing and drainage of all properties shall be connected to a private disposal system constructed in compliance with the provisions hereinafter set forth. (NOTE:) Some public sewers are surcharged or over-loaded. In some instances, therefore, the Engineering Department may prohibit the disposal of additional waste to these sewers. Liquid wastes shall then be disposed of by means of an approved soakage pit, drainage well, or other approved means. Only storm drainage, roof water or rain-water may be discharged to a soakage pit.

(d) No septic tank, drainfield pipe, soakage pit, drainage well or water supply well or other drainage work shall be installed or discharged on any public property outside the property lines of the premises or structures served without first securing written approval to do so from the Engineering Department and the Plumbing Inspector.

Approval may be limited to certain specific conditions.

(e) **ENCROACHMENT ON PRIVATE PROPERTY—EASEMENT REQUIRED:** No sewer, septic tank, drainfield pipe, soakage pit, drainage well, water supply well or other drainage work shall be located or installed or discharged on any privately owned property outside the property lines of the premises or structures served except as specifically permitted herein. Permission for such installation may be granted upon presentation to the Plumbing Inspector of a properly executed easement which has been re-

corded with the Clerk of the Circuit Court. Such easement properly executed and recorded as aforesaid must be filed with the Plumbing Inspector before a permit for such work may be approved. The common ownership of the property for which such permit is approved and the property encumbered by such easement shall not waive any of the above requirements.

(f) **SEWER EASEMENT:** At the option of the owner of a property which does not abut a public sewer but where a sewer connection can be secured through an adjoining lot or property whether of the same ownership or not, a connection to the public sewer may be made through such adjoining lot or property by virtue of a properly executed and recorded easement under such conditions as the Plumbing Inspector and the Engineering Department shall permit, and as set forth in paragraphs 4605.1(d) and 4605.1(e).

(g) **PLANS AND SPECIFICATIONS AND INFORMATION REQUIRED:** Complete and detailed specifications, plans and other information shall be provided as required in this Code from the person designing the work and/or by the owner of the premises desiring to dispose of liquid waste or sewage before a permit is approved and construction work of any nature is commenced.

**4605.2 REGULATIONS GOVERNING THE DISCHARGE OF LIQUID WASTES AND/OR SEWAGE INTO THE PUBLIC SEWER SYSTEMS:** (a) The volume of liquid waste discharged into the public sewer system shall be regulated in such manner as not to impede or over-load or surcharge or cause the public sewer system to overflow or back up into private property or flood public thoroughfares or private property.

(b) **APPROVAL AND PERMITS REQUIRED BEFORE COMMENCING WORK:** No work shall be commenced before the approval of the Engineering Department is secured in writing upon plans submitted or before a building and plumbing permit is issued. The Engineering Department shall not give approval for the discharge of liquid waste to a public sewer except in accordance with the following terms and restrictions:

(c) **PROHIBITED DISCHARGES TO SEWERS:** Storm or rainwater or other liquid waste shall not discharge into a sanitary sewer, nor shall sewage discharge into a public storm sewer, except as herein provided for.

(d) **SEWER CONNECTIONS REQUIRED AND LIMITED:** Connection for the disposal of sewage and liquid waste shall be made to a public sewer when and where such connection can be made without impeding, over-loading or surcharging the public sewer system.

(e) **IMPEDING, IMPAIRING, OR SURCHARGING PUBLIC SEWER PROHIBITED:** Notwithstanding any other provisions of this Code, no person, firm or corporation shall permit any sewage, substance or liquid waste to discharge into a public or private sewer, which would injure, impede, impair, overflow, surcharge, overload, stop or clog such sewer. No person, firm or corporation shall permit any explosive or volatile substances, cleaning fluids, solvents, gas, smoke, exhaust fumes, gasoline, benzine, naphtha, steam, acid, oil, grease, sand, glass or any other deleterious substances to enter or discharge into a plumbing system or a public sewer system.

**4605.3 SEWAGE AND LIQUID WASTE DISPOSAL WHERE A PUBLIC SEWER IS AVAILABLE:** (a) Sewage and liquid waste shall discharge into a public sewer if such sewer is avail-

able and abutting the property except as herein provided. Rainwater only may discharge to street gutters (not over sidewalks) if permitted by the Plumbing Inspector and Engineering Department.

(b) **LIQUID WASTE DISPOSAL WHERE A PUBLIC SEWER IS AVAILABLE:** Liquid waste may discharge into a public sewer only upon approval of the Engineering Department. Such approval shall accompany request for plumbing plan approval and the permit therefor shall be obtained from the Plumbing Inspector. If not permitted to discharge into a public sewer, liquid waste may discharge to soakage pits or drainage wells; however, the responsibility for satisfactory operation shall rest upon the owner, and permits shall be issued conditionally with the owner (not the contractor or other person) assuming full responsibility for the maintenance and operation.

**NOTE:** Some types of liquid wastes cannot be successfully disposed of via pits or wells. Pits and wells receiving liquid wastes from establishments such as automobile wash floors, refrigerators, laundries, milk bottling plants, bars and food processing plants generally result in unsanitary conditions and public nuisance, and therefore must be abated by legal action. Soakage pits and drainage wells for rainwater or other clear water wastes have operated successfully in the majority of installations.

(c) **INTERCEPTING TANKS REQUIRED:** Until such time as the proposed public sewer and sewage treatment system is completed, a septic tank and drainfield shall be installed as required.

**4605.4 CONDITIONAL RETENTION AND TIME DISCHARGE TO PUBLIC SEWERS:** (a) Where the Engineering Department determines a public sewer to be over-loaded and/or surcharged at times of peak usage, said Department is hereby empowered and authorized to issue a conditional permit for the discharge of sewage or liquid waste to the public sewer system, provided that the owner and designer shall comply with all conditions and requirements set forth in said conditional permit and/or contained in this Code and before a sewer permit is issued. Conditional permits shall provide:

- (1) That a retention tank of suitable and acceptable size be provided, designed to hold and retain all of the sewage and liquid waste at times when the public sewer is over-loaded and surcharged and to discharge the contents of said tank at such time as the Engineering Department may require and specify.
- (2) That such tank be provided with an automatic time control device designed to limit and regulate the flow from the tank to the public sewer at a time when and in such quantity as within the capacity of the public sewer to care for same.
- (3) That the premises be open to inspection at such time and place as the Engineering Department and Plumbing Inspector may specify, and that the installation be maintained in good and proper working condition.
- (4) That upon violation of any of the provisions herein contained the conditional permit shall be revoked and the sewer connection be removed and plugged by a licensed master plumber.
- (5) That should such connection not be removed upon proper notice, the Engineering Department be and is hereby

authorized to cause a disconnection and assess the cost of same to the owner and/or management of the property.

(6) Any permit issued for connection to a public sewer under any of the conditions set forth in any of the foregoing sections, shall be issued and accepted conditionally.

(b) Such conditional permit shall be issued in writing by the Plumbing Inspector, and the acceptance of the terms and conditions of issuance shall be indicated thereon by the signature of the person to whom such permit is granted. It is expressly provided, however, that in the event of change of ownership and/or occupancy of the property and/or premises for which such permit has been granted then such permit shall become void and of no effect, unless renewed by the Plumbing Inspector. Upon the change of ownership and/or occupancy the person to whom a conditional permit is granted shall forthwith surrender such conditional permit to the Plumbing Inspector for regranting and/or cancellation. (See Table 45-F)e

(c) The volume of liquid waste permitted to discharge into the public sewer system shall be limited to a zone and a lot area basis of 7,500 square feet for a limited volume of liquid waste or sewage as permitted by the Engineering Department.

**4605.5 SEWAGE AND LIQUID WASTE DISPOSAL WHERE A PUBLIC SEWER IS NOT AVAILABLE:** (a) Where a public sewer is not available, sewage, all waste from plumbing fixtures, except liquid waste of a non-fecal character, shall discharge into a septic tank or other acceptable method of sewage disposal as hereinafter provided. Liquid wastes<sup>4</sup> of a non-fecal character shall discharge into an approved soakage pit, drainpipe field or bed or drainage well for that purpose only and/or shall be disposed of by a form of treatment acceptable to the Plumbing Inspector.

(b) Where a permit to connect to a public sewer is refused, or where no public sewer is available, the factors in Table 46-E shall govern and apply in the disposal of liquid wastes from establishments as herein set forth or similar establishments.

**TABLE 46-E**

Type of Liquid Waste	Type of Establishment	Method of Disposal
(a) Liquid wastes containing appreciable amounts of grease, oil, solids or other material in suspension or liquid wastes of like character from establishments such as:	Auto Wash Floors Bakeries Bottling Plants Candy Manufacturing Plants Dry Cleaning Plants Restaurants or places preparing or serving food Laundries Milk Plants Food Processing Plants	To separate disposal systems for such waste only.
(b) Liquid wastes which ordinarily do not contain appreciable amounts of oil, grease, solids or other materials in suspension from establishments such as: <sup>1</sup>	Air Conditioning Equipment Liquor or Beer Bars Juice Bars Soda Fountains not preparing or serving food Condensation from Refrigeration Boiler or Clothes Pressing Blow-Off Exhausts Ice Plants Fire Sprinkler Drains Drip or Overflow Pans Condensers De-humidifiers	May be discharged to disposal systems combined for liquid waste set out in paragraph (b). <sup>1</sup>

Rainwater to separate disposal system.



(c) **DILUTION TANK REQUIRED FOR CORROSIVE WASTES:** No corrosive waste which has a ph of less than 2.0 shall discharge into any plumbing pipe of any house drain or a house sewer of standard material and construction without first discharging into a neutralizing tank or basin. Every neutralizing tank or basin used for this purpose shall be constructed of earthenware or glass or other non-corrosive material and shall be provided with a standing waste and overflow or other approved means to insure neutralization. A chamber shall be provided to retain a sufficient quantity of lime or other approved neutralizing material which shall be removed as often as may be necessary to render such neutralization effective. Such neutralizing tank or basin shall be provided with a controlled supply of water or neutralizing medium to make its contents non-injurious to an ordinary plumbing system or to the public sewer system. All pipes and fittings to neutralizing tanks and to a point of approved neutralization in a plumbing system, including the connecting fitting in a main drain or sewer, shall be duriron or equal.

(d) **INDEPENDENT SYSTEMS:** The septic tank and drainage system of each building shall be separate and independent of any other building except that where buildings are built on a single lot or building site of single ownership and it is apparent that the lot cannot be subdivided and result in dual ownership, one septic tank and drainage system may be installed.

(e) **LIMITS FOR DISCHARGE OF LIQUID WASTE INTO SEPTIC TANKS AND DRAINAGE PIPES:** Liquid waste shall not discharge into an existing septic tank or drainpipe thereof when such septic tank and drainpipe constitute the minimum requirement of this Code for the disposal of sewage.

(f) **DISCHARGE OF SEWAGE OR LIQUID WASTE INTO NATURAL OR ARTIFICIAL BODIES OF WATER:** The discharge of any sewage or liquid waste (as herein defined) whether treated or untreated into any body of water natural or artificial is hereby prohibited except as expressly permitted by the Florida State Board of Health.

(g) **GARBAGE CONTRIBUTED TO SEWERS FROM DOMESTIC AND COMMERCIAL FOOD GRINDERS:** Garbage contributed from domestic and commercial food grinders shall not enter a sewer which conveys same to a sewer treatment plant unless approved by the proper administrative authority.

**4605.6 FIXTURE UNITS: VALUES FOR FIXTURES:** Fixture unit values as given in Table 46-G designate the relative load weight of different kinds of fixtures which shall be employed in estimating the total load carried by a soil or waste pipe and shall be used in connection with the tables of sizes for soil, waste, and drain pipes for which the permissible load is given in terms of fixture units.

**4605.7 DETERMINATION OF SIZES FOR THE DRAINAGE SYSTEM:** (a) **MAXIMUM FIXTURE-UNIT LOAD:** The maximum number of fixture units that may be connected to a given size vertical soil or waste stack is given in Table 46-H.

(b) **SIZES OF SEWERS AND DRAINS:** The required sizes of building drains, building sewers, and horizontal branches shall be determined on the basis of the total number of fixture units drained by them in accordance with the following table:

**TABLE 46-G  
BUILDING DRAINS, SEWERS AND HORIZONTAL BRANCHES**

Maximum No. of Fixture Units that May Be  
Connected to any Portion of the Building  
Drain or the Building Sewer.

Diameter of Pipe — Inches	Fall Per Foot		
	1/16 Inch	1/8 Inch	1/4 Inch
1¼	1	1	1
1½	2	4	6
2 <sup>3</sup>	4	10	21
2½	12	18	24
3 <sup>1</sup>	22	28	36
4 <sup>3</sup>	60	180	216
5	150	390	480
6	360	700	840
8	1,400	1,600	1,920
10	2,500	2,900	3,500
12	3,900	4,600	5,600
15	7,000	8,300	10,000

1 Not over two fixtures having integral traps requiring three or four-inch waste connections, residential buildings only.

2 No kitchen sinks or other sinks receiving greasy wastes or any pressure discharge fixture shall be installed on a waste pipe less than two inches in diameter; nor on any wet vent two inches or less in diameter.

3 Size of building sewers shall be a minimum of 4 inches, with the exception that if connected to a septic tank and if the developed length from the exterior of the building wall to the septic tank does not exceed 10 feet, the building sewer may be sized the same as the building drain.

4 On remodeling and additions to residential buildings where soil and vent lines are inaccessible and where it becomes necessary to install sewer lines outside of and around the existing buildings, such lines shall be considered horizontal branches and shall be installed in accordance with Table 46-G.

5 Where accessory residential buildings are on the same lot with an existing building, the sewer from such accessory building shall be considered a horizontal branch and shall be installed in accordance with Table 46-G provided such horizontal branch enters an existing building sewer.

(c) The required sizes and permitted lengths of vertical soil or waste stacks shall be independently determined by the total fixture units of all fixtures connected to the stack in accordance with Tables 46-H and 46-K.



**TABLE 46-H  
SIZE AND PERMITTED LENGTH OF SOIL AND WASTE  
STACKS**

Diameter of Pipe—in Inches	Maximum No. of Fixture Units	Permitted Length in Feet	Total Fixture Units at One Story or Branch Interval
1¼	1	45	1
1½	8	60	6
2	24	80	12
2½	36	105	18
3"	72	150	36
4	500	225	120
5	1,100	300	200
6	1,900	400	350
8	3,600	600	600

**4605.8 RESTRICTIONS:** No water closet shall discharge into a stack less than three inches in diameter. Not more than two water closets shall discharge into a three inch stack at the same point. Not more than four water closets shall discharge into a three inch stack at the same level. All horizontal soil and waste sections shall be governed by Table 46-G.

(a) **MINIMUM SIZE OF SOIL AND WASTE STACKS:** No soil or waste stack shall be smaller than the largest horizontal branch connected thereto except that a 3 x 4 one-quarter bend connected to a water closet outlet shall not be considered as a reduction in pipe size.

(b) **FUTURE FIXTURES:** When provision is made for the future installation of fixtures, those provided for shall be considered in determining the required sizes of drain pipes. Construction to provide for such future installation shall be terminated with a plugged fitting or fittings.

**4605.9 SUMPS AND EJECTORS — DRAINAGE BELOW STREET LEVEL:** (a) **SUMPS, SEWAGE AND LIQUID WASTE EJECTORS:** In all buildings in which the whole or part of the plumbing or drainage system serving fixtures or appliances lies below the crown level of the street, such sewage or liquid waste shall be lifted by approved mechanical means and discharged into the building sewer or building drain. Such sewage or liquid waste shall discharge into a sump or receiving tank by gravity from which sump or receiving tank the sewage or liquid waste shall be lifted and discharged into the building sewer or drain by ejectors. Such ejectors shall automatically empty the sump, which shall be large enough to receive peak flow for 30 minutes. Sump discharge pipes provided with a check valve located on the sump side of a gate valve located as close to the sump as possible.

(b) **MINIMUM NUMBER EJECTORS REQUIRED:** Single ejector for one or two family buildings. Duplex ejectors for all other buildings for sumps collecting sewage. (See definition of sewage) One ejector permitted for liquid waste provided such a single ejector is not located in a place where failure to operate will flood a place where food or drink is stored or prepared.

**4605.10 SUMP CONSTRUCTION:** Sump basins or receivers shall be of waterproof concrete adequately reinforced with steel rods or of cast iron or vitrified clay. If of vitrified clay pipe, the bottom shall rest on a concrete base extending at least six inches laterally from the pipe. All basins and receivers shall be watertight.

**4605.11 SUMP VENTS:** (a) Plumbing fixtures discharging into a sump shall be vented.

(b) All sumps receiving the discharge from plumbing fixtures shall be vented as follows:

(1) No less than a three-inch vent for sumps receiving body waste from plumbing fixtures.

(2) For clear water liquid waste, separate sump vent optional, no cover required.

(3) Vents from pneumatic ejectors or similar equipment shall be carried separately.

(c) Such sump and fixture vents may be connected to the plumbing system discharging into a public sewer or septic tank or extended independently to above the roof.

(d) All sumps shall be provided with a metal cover. (Exception: Sec. (2) of 4605.11(b)). Sumps receiving sewage or liquid waste shall be provided with a gas and air tight metal cover securely fastened in place and provided with an air and gas tight manhole for access for repairs.

**4605.12 MOTORS AND COMPRESSORS FOR EJECTORS:**

(a) All motors, air compressors, and air tanks shall be located where they are open for inspection and repair at all times. The air tanks shall be so proportioned as to be of equal cubic capacity to the ejectors connected therewith, in which there shall be maintained an air pressure of not less than two pounds per square inch for each foot of height the sewage is to be raised.

(b) **CONNECTIONS:** No direct connection of a steam exhaust, blowoff, or drip pipe shall be made with the building drainage system. Waste water when discharged into the building drainage system shall be at a temperature not higher than 140°. When higher temperature exists, proper cooling methods shall be provided.

(c) **SUBSOIL DRAINS:** Where subsoil drains are placed under the cellar or basement floor or are used to surround the outer walls of a building, they shall be made of open-jointed or horizontally-split or perforated clay tile, or perforated bituminized fiber pipe or asbestos cement pipe, not less than four inches in diameter. When the building is subject to backwater, the subsoil drain shall be protected by an accessibly located backwater valve. Subsoil drains may discharge into a properly trapped area drain or sump. Such sumps do not require vents.

(d) **BUILDING SUBDRAINS:** Building subdrains located below the public sewer level shall discharge into a sump or receiving tank, the contents of which shall be automatically lifted and discharged into the system as required for building sumps.

**TABLE 46-I  
FIXTURE UNITS PER FIXTURE**

Fixture Type	Fixture Unit Value in Load Factors	Minimum Size of Trap (Inches)
Bathtub (with or without overhead shower) . . . . . s . . . . . s . s . . . . . 2		1½
Bidet s . s . s . . . . . s . . . . . s . s . . . . . 2		1½
Dental unit or cuspidor . . . . . 1		1¼
Dental lavatory . . . . . 1		1¼
Drinking fountain . . . . . ½		1¼
Dishwasher, domestic . . . . . s . s . . . . . 2		1½
Floor drains . . . . . 3		3 or 4
Lavatory . . . . . 1	Small P.O.	1¼
Lavatory . . . . . s . . . . . s . s . . . . . 2	Large P.O.	1½
Lavatory, barber, beauty parlor . . . . . 2		1½
Lavatory, surgeon's . . . . . s . . . . . s . s . . . . . 2		1½
Laundry tray (1 or 2 compartments) . . . . . 2		1½
Shower stall, domestic . . . . . s . . . . . s . . . . . 2		2
Showers (group) per head . . . . . 3		2
<b>SINKS</b>		
Combination sink-and-tray . . . . . 3	Nominal	1½
Combination sink-and-tray with food disposal unit . . . . . 4	Separate traps	1½
Kitchen sink, domestic <sup>1</sup> . . . . . 2		1½
Kitchen sink, domestic with food waste grinder . . . . . 3	See 4613.10(b)	1½
Surgeon's sink . . . . . 3		1½
Flushing rim sink (with valve) . . . . . 8		3
Service sinks, trap standard . . . . . 3		3 or 4
Service (P trap) ordinary . . . . . 2		2
Pot, scullery, etc., sink <sup>1</sup> . . . . . 4		1½ or 2
Wash sink, <sup>1</sup> (circular or multiple), each set of faucets . . . . . 1		1½
Urinal, pedestal . . . . . s . s . . . . . s . . . . . 8	Nominal	3
Urinal, wall . . . . . s . . . . . 4		2
Urinal stall, washout . . . . . 4		2
Water closet, tank operated . . . . . 4	Nominal	3
Water closet, valve-operated . . . . . s . . . . . 8	Nominal	3
Automatic dishwasher (domestic) <sup>1</sup> . . . . . 2		1½
Automatic clothes washer . . . . . 4		1½

**NOTE:** <sup>1</sup>-See Sub-section 4605.13 and Table 46-J for method of computing unit value of fixtures not listed in Table 46-I or for rating of devices with intermittent flows.

**4605.13** Fixtures not listed in Table 46-I shall be estimated in accordance with Table 46-J.

**TABLE 46-J**

Fixture Drain or Trap Size	Fixture Unit Value
1¼ Inches and Smaller .....	1
1½ Inches .....	2
2 Inches .....	3
2½ Inches .....	4
3 Inches .....	5
4 Inches .....	6

**4606 INDIRECT WASTE PIPING AND SPECIAL WASTES**

**4606.1 INDIRECT WASTE PIPING:** (a) **GENERAL:** Wastes from the following shall discharge to the building drainage system through an indirect waste pipe serving the individual fixtures, devices, appliances or apparatus.

(b) **FOOD HANDLING:** Establishments engaged in the storage, preparation, selling, serving, processing, or otherwise handling of food shall have the waste piping from all refrigerators, ice boxes, bar sinks, cooling or refrigerating coils, laundry washers, extractors, steam tables, egg boilers, coffee urns or similar equipment discharge indirectly into a floor drain or as otherwise provided in this Code.

(c) **CONNECTIONS:** Indirect waste connections shall be provided for drains, overflows, or relief vents from the water supply system.

(d) **STERILE MATERIALS:** Appliances, devices or apparatus such as stills, sterilizers and similar equipment requiring water and waste connections and used for sterile material shall be indirectly connected and provided with an air gap between the trap and the appliance.

(e) **DRIPSt** Appliances, devices, or apparatus not regularly classed as plumbing fixtures but which have drips or drainage outlets, may be drained by indirect waste pipes discharging into an open receptacle or as permitted by the Plumbing Inspector.

**4606.2 MATERIAL AND SIZEt** (a) Indirect wastes when above the floor shall be a minimum of three-quarter-inch diameter but not less than the size of fixture or appliance outlet and if less than one and one-quarter inches diameter, shall be of copper tube. If galvanized waste pipe is used below floor slab or fill, it shall be encased in concrete throughout with drainage fittings. If waste is below slab or in fill it shall be a minimum of one and one-quarter inches in diameter and shall be cast iron pipe, lead, brass or copper tube with drainage fittings. Indirect waste piping shall be so installed as to permit ready access for flushing and cleansing.

(b) Indirect waste pipes carrying a discharge of not more than one fixture unit shall be not less than one and one-quarter inches in diameter. For a greater number of fixture units discharged, the indirect waste shall be sized in accordance with Table 46-G and 46-J except drains above floors from defrosting pans which may be a minimum of three-quarter inch tubing.

(c) Drip pipes from walk-in refrigerator floors or store room floors where food is stored shall be installed as indirect wastes and such drip pipes shall discharge into an approved fixture. The drip pipe shall be equipped with a flap check as close as possible to the drain outlet. Such floors shall be two inches above overflow point of floor drain.

(d) Any fixture or appliance where food or drink is stored and which is equipped with a drain shall be independently and indirectly connected to an approved fixture or receptacle whose overflow level is below the bottom of such fixture or appliance.

**4606.3 CLEAR WATER WASTES:** Water lifts, expansion tanks, cooling jackets, sprinkler systems, drip or overflow pans, or similar devices, which waste clear water only shall discharge into the building drainage system through an indirect waste, as permitted by the Administrative Authority.

**4606.4 CONDENSERS AND SUMPS:** No live steam pipe shall connect directly to any part of a drainage or plumbing system.

**4606.5 DRINKING FOUNTAINS:** Drinking fountains may be installed with indirect wastes only for the purpose of resealing required traps of floor drains installed to receive other clear wastes.

**4606.6 SPECIAL WASTES:** (a) Acid and chemical indirect waste pipes and fittings shall be of materials unaffected by the discharge of such wastes.

(b) Liquid wastes having a ph of less than 2 or more than 9 shall be properly neutralized and diluted before being discharged into any soil or waste pipe or any building drain or sewer.

(c) **NEUTRALIZING DEVICE:** In no case shall corrosive liquids, spent acids, or other harmful chemicals which might destroy or injure a drain, sewer or waste pipe and fittings or which might create noxious or toxic fumes, discharge into the plumbing system without being thoroughly diluted or neutralized by passing through a properly constructed and acceptable dilution or neutralizing device. Such device shall be automatically provided with a sufficient intake of diluting water or neutralizing medium, so as to make its contents noninjurious before being discharged into the soil or sewage system.

#### **4607 JOINTS AND CONNECTIONS**

**4607.1 TIGHTNESS:** Joints and connections in the plumbing system shall be gas-tight and water-tight for the pressure required by test, or use, with the exceptions of those portions of perforated or open-joint piping which are installed for the purpose of collecting and conveying underground or seepage water.

**4607.2 TYPES OF JOINTS:** (a) **CAULKED JOINTS:** Caulked joints for cast-iron bell-and-spigot soil pipe shall be firmly packed with oakum or hemp and filled with molten lead not less than one inch deep and extend up to not less than one-eighth inch below rim of hub. No paint, varnish, or other coatings shall be permitted on the jointing material until after the joint has been tested and approved.

(b) **THREADED JOINTS—SCREWED JOINTS:** Threaded joints shall conform to American National Taper Pipe thread, ASA B2. 1, or FS GGG-P-351a. All burrs shall be removed. Pipe ends shall be reamed or filed out to size of bore and all chips removed. Pipe-joint cement and paint shall be used only on male threads.

(c) **WIPED JOINTS:** Joints in lead pipe or fittings, or between lead pipe or fittings and brass or copper pipe, ferrules, solder nipples, or traps, shall be full wiped joints. Wiped joints shall have an exposed surface on each side of a joint not less than  $\frac{3}{4}$  inch and at least as thick as the material being jointed. Wall or floor flange lead-wiped joints shall be made by using a lead ring or flange placed behind the joints at wall or floor. Joints between lead pipe and cast-iron, steel, or wrought iron shall be by means of a caulking ferrule, soldering nipple or bushing. Minimum length of lead from wiped joint to fixture connection shall be four inches.

(d) **SOLDERED OR SWEAT TYPE JOINTS:** Soldered or sweat type joints for tubing shall be made with approved fittings. Surfaces to be soldered shall be cleaned bright. The joints shall be properly fluxed and made with approved solder in accordance with Table 46-C. Soldered or sweat joints, except those made with silver solder or brazed, shall not be used for joints located in or under concrete slabs on fill in Group I Occupancies.

(e) **HOT-POURED JOINTS:** Hot-poured compound for clay or concrete sewer pipe shall not be water absorbent and when poured against a dry surface shall have a bond of not less than 100 psi. All surfaces of the joint shall be cleaned and dried before pouring. If wet surfaces are unavoidable, a suitable primer shall be applied. Compound shall not soften sufficiently to destroy the effectiveness of the joint when subjected to a temperature of 160 deg. F. nor be soluble in any of the waste carried by the drainage system. Approximately 25 per cent of the joint space at the base of the socket shall be filled with jute or hemp. A pouring collar, rope or other device shall be used to hold the hot compound during pouring. Each joint shall be poured in one operation until the joint is filled. Joints shall not be tested until one hour after pouring.

(f) **PRECAST JOINTS FOR NON-METALLIC PIPE:** Precast collars shall be formed in both the spigot and bell of the pipe in advance of use. Collar surfaces shall be conical with side slopes of 3 degrees with the axis of the pipe and the length shall be equal to the depth of the socket. Prior to making joint contact, surfaces shall be cleaned and coated with solvents and adhesives as recommended in the standard. When the spigot end is inserted in the collar, it shall bind before contacting the base of the socket. Material shall be inert and resistant to both acids and alkalis.

(g) **BRAZED JOINTS:** Brazed joints shall be made in accordance with the provisions of Section 6 of the Code for Pressure Piping. ASA-B31.1.

(h) **CEMENT MORTAR JOINTS:** Cement joints shall be used only when specifically permitted in other chapters of this Code or when approved by the Plumbing Inspector, as sufficient to accomplish the purpose of this Code. A layer of jute or hemp shall be inserted into the base of the joint space and rammed to prevent mortar from entering the interior of the pipe. Jute or hemp shall be dipped into a slurry suspension of portland cement in water prior to insertion into bell. Not more than 25 per cent of the joint space shall be used for jute or hemp. The remaining space shall be filled in one continuous operation with a thoroughly mixed mortar composed of one part cement and two parts sand, with only sufficient water to make the mixture workable by hand. After one-half hour of setting, the joint shall be rammed around entire periphery with a blunt tool to force the partially stiffened mortar into the joint and to repair any cracks formed during the initial setting period. Pipe interior shall be swabbed to remove any material that might have fallen into the interior. Additional mortar of the same composition shall then be troweled so as to form a 45 degree taper with the barrel of the pipe.

(i) **BURNED LEAD JOINTS:** Burned (welded) lead joints shall be lapped and the lead shall be fused together to form a uniform weld at least as thick as the lead being joined.

(j) **ASBESTOS CEMENT SEWER PIPE JOINTS:** Joints in asbestos cement pipe shall be made with sleeve couplings of the same composition as the pipe, sealed with rubber rings. Joints between asbestos cement pipe and metal pipe shall be made by means of an adaptor coupling caulked as required in Paragraph 4607.2(a). All installations to be made in accordance with manufacturer's specifications.

(k) **BITUMINIZED FIBER PIPE JOINTS:** Joints in bituminized fiber pipe shall be made with tapered type couplings of the same material as the pipe. Joints between bituminized fiber pipe and metal pipe shall be made by means of an adaptor coupling caulked as required in Paragraph 4607.2(a). All installations to be made in accordance with manufacturer's specifications.

(l) **PLASTIC DRAIN PIPE JOINTS:** Joints in plastic drain pipe shall be made with couplings of the same material as the pipe. Joints between plastic drain pipe and metal pipe shall be made by means of an adaptor coupling caulked as required in Paragraph 4607.2(a). All installations shall be made in accordance with manufacturer's specifications.

**4607.3 SPECIAL JOINTS: (a) COPPER TUBING TO SCREWED PIPE JOINTS:** Joints from copper tubing to threaded pipe or threaded connection shall be made by the use of brass or copper converter fittings. The joint between the copper pipe and the fitting shall be properly soldered, and the connection between the threaded pipe and the fitting shall be made with a standard pipe size screw joint. See Paragraph 4607.2(b) and 4607.34(c).

(b) **WELDING OR BRAZING:** Brazing or welding shall be performed in accordance with requirements of recognized published standards of practice.

(c) **SLIP JOINTS:** In drainage and water piping, slip joints may be used only on the inlet side of the trap or in the trap seal. Only one slip joint connection shall be allowed on each exposed supply to a fixture.

(d) **EXPANSION JOINTS:** Expansion joints must be accessible and may be used where necessary to provide for expansion and contraction of the pipes.

(e) **GROUND JOINT BRASS CONNECTIONS:** Ground joint brass connections which allow adjustments of tubing but provide a rigid joint when made up shall not be considered as slip joints.

**4607.4 UNIONS (SCREWED): (a) DRAINAGE SYSTEM:** Unions may be used in the trap seal and on the inlet side of the trap. Unions shall have metal-to-metal seats.

(b) **WATER SUPPLY SYSTEM:** Unions in the water supply system shall be metal-to-metal with ground seats.

**4607.5 FLOOR CONNECTED FIXTURES WITH INTEGRAL TRAP:** A brass floor flange shall be wiped or soldered to pipe. The connection shall be bolted with an approved gasket or washer or setting compound between the earthenware and the connection. The floor flange shall be set on an approved firm base. The use of commercial putty or plaster is prohibited.

**4607.6 PROHIBITED JOINTS AND CONNECTIONS IN DRAINAGE SYSTEMS:** (a) Any fittings or connection which has an enlargement, chamber, or recess with a ledge, shoulder, or reduction of pipe area, that offers an obstruction to flow through the drain is prohibited. (Exception: Floor or urinal strainers may be caulked. A directional fitting may be used to connect a domestic food-waste-disposal unit in a two-compartment sink as set forth in Paragraph 4613.10(b).)

(b) No fitting or connection that offers abnormal obstruction to flow shall be used.

(c) The drilling and tapping of drains, sewers, soil leaders, waste, or vent pipes and the use of saddle hubs and bends is prohibited.

**4607.7 WATERPROOFING OF OPENING:** Joints at the roof, around vent pipes, shall be made water tight by the use of lead, copper or pitch pan. Exterior wall openings shall be made water tight.

**4607.8 INCREASERS AND REDUCERS:** Where different sizes of pipes, or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes.

**4608 TRAPS AND CLEANOUTS**

**4608.1 TRAPS:** (a) **FIXTURE TRAPS:** Plumbing fixtures, excepting those having integral traps, shall be separately trapped by a water-seal trap. (See Section 4606 Indirect Wastes.)

**TABLE 46-K  
HORIZONTAL DISTANCE OF FIXTURE TRAP FROM  
VENT OPENING**

Size of Fixture Drain (Inches)	Distance Trap to Vent (Feet)
1¼	5 feet
1½	5 feet
2	5 feet (2 ft. vertical)
Floor connected fixtures with integral traps	5 feet (2 ft. vertical)
Floor drains and interceptors	15 feet

(b) The top of the vent pipe opening serving a fixture branch except water closets, floor drains and similar fixtures shall not be below the crown weir of the fixture trap. The vertical drop of a pipe serving a floor connected integral trap fixture shall not exceed twenty-four inches. Floor drains requiring a vertical drop greater than eighteen inches on the inlet side of the trap may be installed by a vertical rise not to exceed six feet from the horizontal drain except that the horizontal section of the rise shall be a minimum of three feet from the outlet of the trap to the vertical section. Other fixture trap inlets shall not be more than eighteen inches measured vertically from the bottom of the fixture to the top of the trap seal. No offsets shall be permitted for the purpose of avoiding the requirements of Table 46-K.

(c) **HORIZONTAL DISTANCE OF FIXTURE TRAP FROM VENT:** The distance shall be measured along the center of the fixture branch from the crown weir of the trap to the vent opening except for fixtures with integral traps in which case the horizontal distance shall not exceed (Table 46-K) from the vent to the downstream edge of the vertical section of the fixture outlet branch.

(d) **TRAPS PROTECTED:** Every fixture trap shall be protected against siphonage and back pressure and air circulation shall be assured by means of a soil vent, waste vent, stack vent, a common vent, loop, circuit or wet vent. No crown vent shall be installed.

(e) **RELATION TO FIXTURE DRAINS:** No trap outlet shall be larger than the fixture branch to which it is connected.

(f) **TYPE OF TRAPS:** Fixture traps shall be self-cleaning except interceptor traps.

(g) **TRAPS PROHIBITED:** No form of trap which depends for its seal upon the action of movable parts shall be used. No bell trap, 3/4 S trap, drum trap, pot trap, running trap, or bottle trap shall be used.



Traps in covered or concealed places shall be of cast iron, cast brass or lead. Accessible traps except integral traps, including tail pieces, trap arms, overflow and trap assembly, shall be of cast iron, cast brass, lead, or (.045) 17 gauge brass or copper.

**4608.2 GENERAL REQUIREMENTS:** (a) **TRAP SEAL:** Each fixture trap shall have a water seal of not less than two inches and not more than four inches, except when deeper seals are required for interceptors.

(b) **TRAP CLEANOUTS:** Trap cleanouts are prohibited on all concealed traps.

(c) **TRAP LEVEL AND PROTECTION:** All traps shall be set level in relation to their water seals and protected from siphonage.

**4608.3 CLEANOUTS:** (a) A cleanout shall be required at the base of each soil and waste stack and for interior rainwater leaders not vertical throughout or of buildings more than 2 stories in height. Cleanouts in rainwater leaders shall be a minimum of 5 feet above floor level.

(1) Every building drain or branch drain shall have an accessible cleanout every 50 feet. Such cleanout shall be located in a basement or flush with finished floor or outside of building and brought to finish grade or in a vertical stack not more than five feet above finish floor.

(2) No cleanout shall be required in the base of a stack rising vertically from a horizontal building drain provided the building drain cleanout is upstream from the vertical stack connection.

(3) All cleanouts shall be accessibly located and have 18 inches clearance to permit downstream rodding. Wall cleanouts shall be flush with or protrude beyond finished walls or made accessible through access doors. Floor cleanouts shall be flush with finished floor and furnished with flush type plugs.

(4) In lieu of a cleanout at the base of a stack or in the vertical section of the stack, the cleanout may be extended from the upstream side of the stack base to the finished floor level, or to outside of building and brought to finish grade level, or to outside of building into a pit or box with metal cover brought to finish grade.

(5) The base of a stack shall be deemed to mean the lowest point of any vertical soil or waste stack inclusive of horizontal sections in such vertical stacks.

(b) **EXCEPTIONS:** In one story dwellings, motels and apartment houses in lieu of cleanouts at base of stack, cleanout locations may be as follows:

(1) Full size cleanout located outside, in building sewer line and within five feet of building wall from point of exit of house sewer and which permits upstream rodding to the base of the stack and downstream rodding, provided that the building drain or sewer has no more than one 90 degree change of direction. Such cleanout need not be brought to grade.

(2) Any tapped opening in a vertical stack receiving an exposed screwed fixture trap and which has no arms or bends between the trap outlet and stack opening.

(3) A waste stack extending full waste stack size through the roof and which is vertical throughout.

(c) Grease interceptor cleanouts shall be located in the stack above the interceptor waste branch connection.

(d) A cleanout fitting shall be provided in the horizontal arm sections of grease interceptors.

**4608.4 CLEANOUT SIZES:** Cleanouts shall be the same nominal size as the pipe into which they are installed up to six inches and not less than six inches for larger pipe.

#### **4609 HANGERS AND SUPPORTS**

**4609.1 STRAINS AND STRESSES:** Piping in a plumbing system shall be installed without undue strain and stresses and provisions shall be made for expansion, contraction and structural settlement.

**4609.2 VERTICAL PIPING:** (a) **ATTACHMENT:** Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents.

(b) **CAST IRON SOIL PIPE:** Cast iron soil pipe shall be supported at not less than at every story height and its base.

(c) **SCREWED PIPE COLD:** Screwed pipe (I.P.S.) shall be supported at not less than every story height.

(d) **SCREWED PIPE HOT:** Screwed pipe (I.P.S.) shall be properly supported to provide for expansion.

(e) **COPPER TUBING:** Cold copper tubing shall be supported at each story.

(f) **COPPER TUBING:** Hot copper tubing shall be properly supported to provide for expansion.

(g) **LEAD PIPE:** Lead pipe shall be supported at intervals not exceeding four feet.

**4609.3 HORIZONTAL PIPING:** (a) **SUPPORTS:** Horizontal piping shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.

(b) **CAST-IRON SOIL PIPE:** Cast-iron soil pipe shall be supported at not more than five foot intervals.

(c) **SCREWED PIPE:** Screwed pipe (I.P.S.) shall be supported at approximately ten foot intervals.

(d) **COPPER TUBING:** Copper tubing shall be supported at approximately eight foot intervals.

(e) **LEAD PIPE:** Lead pipe shall be supported for its entire length.

(f) **IN GROUND:** Piping in the ground shall be laid on a firm bed for the entire length, except where support is otherwise provided which is adequate in the judgment of the Plumbing Inspector.

**4609.4 HANGERS AND ANCHORS:** (a) **MATERIAL:** Hangers and anchors shall be of metal of sufficient strength to support the pipe and contents in proper alignment and to prevent rattling.

(b) **ATTACHMENT:** Hangers and anchors shall be securely attached to the building construction.

**4609.5 BASES OF STACKS:** (a) **SUPPORTS:** Bases of cast-iron soil stack shall be supported on masonry construction, metal brackets attached to the building construction, or by other methods approved by the Plumbing Inspector.

(b) **PIPING MATERIAL:** Other piping materials shall be so anchored as to take the load off the stack at the base.

#### **4610 VENTS AND VENTING SYSTEM**

**4610.1 VENT TERMINALS:** (a) Extension of vent pipes through a roof shall be terminated at least six inches above it.

(b) All extension of soil, waste, and vent stacks shall be run full size at least one-half foot above the roof. Vent stacks on the exterior walls of a structure with parapet walls shall extend six inches above same. Vent extension above the roof shall not exceed three feet if of cast-iron or ten feet if of screw pipe or copper tube. Screw pipe or copper tube shall extend in one piece at least five feet under the roof and be securely fastened to prevent wind damage.

(c) **FLASHINGS:** Each vent terminal shall be made watertight with the roof by proper lead flashings or pitch pan. Where vent pipes extend more than 12 inches above the roof a collar or draw band shall be installed around the top of the lead flashing and thoroughly caulked in place.

(d) **FLAG POLING:** Vent terminals shall not be used for the purpose of flag poling, TV aerials, or similar purposes.

(e) **ROOF TERMINAL:** The roof terminal of any vent pipe if within 12 feet of any door, window or ventilating opening shall extend at least three feet above such door, window or ventilating opening. No vent terminal of a sanitary system of a building shall be within 25 feet developed distance of any mechanical air intake opening unless approved by the Administrative Authority.

**4610.2 VENT GRADES AND CONNECTIONS: (a) GRADE:**

All vent and branch-vent pipes shall be so graded and connected as to drain dry.

(b) **VERTICAL RISE:** Where dry vent pipes connect to a horizontal soil or waste pipe, the vent shall be taken off above the center line of the soil pipe, and the vent pipe shall rise vertically, or at an angle not more than 45 degrees from the vertical to a point at least six inches above the flood-level rim of the fixture it is venting before offsetting horizontally or before connecting to the branch vent.

(c) **HEIGHT ABOVE FIXTURES:** A connection between a vent pipe and a vent stack or stack-vent shall be made at least six inches above the flood-level rim of the highest fixture served by the vent.

**4610.3 VENTS:** Where not more than two fixtures are located directly adjacent to one another and connect to a vertical stack at the same level, the fixture traps for the two fixtures may be served by a common vent. No sinks or urinals on two inch or less.

**4610.4 WET VENTING:** (a) Horizontal wet vents shall not exceed 15 feet and shall receive discharge from fixture branches only. (See Paragraph 4610.4(c).)

(b) Vertical wet vents connecting to a horizontal wet vent shall not exceed six feet. (EXCEPTION: See Combination Waste and Vent, Sub-section 4610.11)a

(c) The minimum size and the maximum capacity of wet vents shall be as follows:

(1) 2" vent: four fixture units other than urinals, pressure discharge fixtures or sinks except as set forth in Paragraph 4613.10(b).

(2) 2½" vents: ten fixture units. No water closets or fixtures requiring a waste opening greater than 2 inches will be permitted.

(3) 3" vent: sixteen fixture units. No water closets or fixtures having an opening greater than 3 inches.

(4) 4" vent: thirty-two fixture units. No water closets or fixtures having an opening greater than 4 inches.

(d) Above the points of intersection of fixtures in wet vents, vent size can be reduced to minimum requirements for dry vents providing all fixtures are on same floor level.

(e) Two water closets on a horizontal section may be vented by a wet or dry vent stack taken off vertically between the two water closets providing the vent intersection is within five feet horizontal developed length from each water closet vertical outlet, and all fixtures are on same story level.

**4610.5 CIRCUIT OR LOOP VENT:** (a) A series of adjacent fixtures may be installed on a horizontal drain. A vent shall be installed vertically within five feet downstream from the first fixture drain, and another vent installed vertically between the last two water-supplied fixture drains connected to the horizontal drain section provided all fixtures are located in the same or adjacent toilet rooms.

(b) **SIZE OF CIRCUIT OR LOOP VENT:** The pipe of the dry vent section of a circuit or loop vent may have a diameter of one pipe size less than the diameter of the pipe of the horizontal soil or waste drain it serves.

**TABLE 46-L**

Size of Pipe	Number of Traps	Size of Dry Vent Pipe
2"	Six 1¼" traps of four 1½" traps other than sink traps. No urinal traps allowed. a . . . . .	1½"
3"	Thirty (30) waste fixture units, other than urinal traps, or six (6) urinal traps. . . . .	2"
4"	Twelve (12) water closets and, in addition, thirty-six (36) waste fixture units may waste into such soil pipe. . . . . a . . . . . a	3"

**4610.6 CABANA SHOWERS:** Multiple cabana showers may be installed on a circuit or loop vented branch and not limited as to distance between fixture branches, provided all cabana shower drains shall waste independently through approved sand interceptor before entering the sewer, drainage or disposal system.

**4610.7 FIXTURES WASHED BY WATER CLOSETS:** Urinal traps and floor drains installed downstream from a water closet in a circuit or loop vent group shall be three inches. Any other fixture trap installed downstream from a water closet shall be reverted.

**4610.8 MAIN VENTS TO CONNECT AT BASE:** (a) All main vents or vent stacks shall connect full size at their base to the main soil or waste stack, at or below the lowest fixture branch of such waste stack. Such base shall be washed by a fixture or group of fixtures. The diameter of the vent pipe shall not exceed the diameter of the soil or waste stack to which it connects.

(b) **SIZE OF INDIVIDUAL VENTS:** The diameter of an individual vent shall be not less than 1¼ inches nor less than one-half the diameter of the drain to which it is connected. No vent for a water closet shall be less than two inches in diameter. (See Sub-section 4612.4 for interceptor vents.)

(c) **SIZE OF VENT PIPING:** The nominal size of vent piping shall be determined from its developed length and the total of fixture units connected thereto, as provided in Table 46-M.

**TABLE 46-M  
SIZE AND LENGTH OF VENT PIPING**

Diameter of Soil or Waste Stack	Maximum Fixture Units	Size and Maximum Length of Vent (Feet)												
		1¼	1½	2	2½	3	4	5	6	8				
1¼	1	70												
1½	4	70	190											
1½	8	50	175											
2	6	50	150	400										
2	12	45	75	300										
2	24	20	50	200										
2½	36		35	140	400									
3	12		30	100	300	1200								
3	36			50	200	800								
3	72			40	70	400								
4	100			35	150	300	1200							
4	200			30	100	240	900							
4	500			20	45	100	450							
5	200				35	80	450	1300						
5	500				30	70	300	1000						
5	1100				20	45	180	600						
6	350				30	50	200	600	1300					
6	620				15	30	150	400	1100					
6	960					25	100	300	1000					
6	1900					15	80	250	700					
8	600						80	200	600	1300				
8	1400						50	100	400	1300				
8	2200						40	80	350	1100				
8	3600						30	60	250	800				

Horizontal Section not to exceed 20 percent of the above total lengths.

**4610.10 SOIL WASTE AND VENT STACKS:** (a) For each building having a single building sewer receiving the discharge of a water closet there shall be at least one minimum size vent stack, extending above the building roof no less than three or four inches in diameter or of a larger diameter, as set out in Table 46-M.

(1) Main vent stack size for buildings having multiple building sewers. In buildings having more than one building sewer, each building sewer receiving the discharge of a water closet shall have at least one minimum size vent stack, no less than three or four inches in diameter or of a larger diameter extending above the building roof as set out in Table 46-M.

(2) Vent stacks for accessory buildings. For accessory buildings on a lot or building site connected by a common building sewer, the minimum size for a vent stack shall be as provided for in Table 46-M. If a water closet is installed in accessory building the minimum size vent shall be two inches.

(b) All soil, waste and vent stacks carried to the second floor level of a building shall extend full size above the roof, or shall be connected to a vent stack of the same diameter or larger. In a multi-story building soil and waste stacks may enter a horizontal building drain suspended below the second floor level and such horizontal section shall be considered a part of the building drain.

**4610-11 COMBINATION WASTE AND VENT:** (a) Fixture branches other than water closets or fixtures requiring a flushometer valve on the water supply and requiring a waste opening not greater than two inches shall be permitted and may be installed on a combined waste and vent stack as follows: Such branches will be allowed to discharge into a waste stack extended undiminished in size through the roof according to the following table provided that the stack is vertical throughout, and that no kitchen sinks be placed on a two inch combined waste and vent stack.

**TABLE 46-N**

Diameter of Stack	Fixture Units on Stack	Maximum Length
2 inch (No kitchen sinks)	4	30 feet
2½ inch	10	40 feet
3 inch	16	50 feet
3½ inch	25	75 feet
4 inch	32	100 feet
5 inch	50	200 feet

(b) For drinking fountains and fountain cuspidors, the fixture units may be increased ten times and the permitted length increased two times above those specified.

**4611 STORM DRAINAGE SYSTEM**

**4611.1 GENERAL: ROOF DRAINAGE:** The required sizes of storm water drains and sewers for roofs shall be determined on the basis of the total drained area in horizontal projection, except that where a building wall extends above the roof or court in such a manner as to drain onto the roof or court, one third of the vertical section shall be added to the horizontal projection and sized in accordance with the following table:

**TABLE 46-O  
SIZE OF STORMWATER DRAINS, LEADERS AND GUTTERS**

Nominal Pipe Size (Inches)	MAXIMUM ROOF AREA (Square Feet)			Gutters	Leaders
	Building Storm Sewers and Drains				
	⅛" per ft. slope	¼" per ft. slope	½" per ft. slope		
1½	127	190	222		222
2	270	380	460		460
2½	413	610	700		700
3	745	1,080	1,270	635	1,270
4	1,560	2,210	3,080	1,540	3,080
5	2,810	4,000	5,620	2,180	5,620
6	4,450	6,290	8,880	4,440	8,880
8	9,460	13,760	18,950	9,975	18,950
10	18,100	25,600	36,400	18,200	36,400
12	30,000	42,000	60,000		60,000
14	38,500	54,700	76,000		76,000
15	55,400	78,400	109,000		
18	91,000	129,000	182,000		
21	138,000	197,000	276,000		
24	195,800	279,000	390,000		
27	271,000	386,000	545,000		
30	362,000	510,000	715,000		

For required sizes of ground surface drainage, see Paragraph 4611.4 (h).

**4611.2 SIZE OF GUTTERS AND VERTICAL LEADERS:** (a)

No gutter or leader shall be less than set forth in the above table.

(b) There shall be no reduction in size of rainwater leaders or drains in the direction of flow.

(c) The above sizes of rain leaders are based on diameter of circular rain leaders, and gutters based on semicircular sheet-metal gutters with the top dimension given. Other shapes shall have the same sectional area.

(d) **DESIGN OF ROOF DRAIN STRAINERS:** Where roof surfaces drain through the roof, as to an inside leader, a strainer shall be provided and such strainer shall extend not less than four inches above the surface of the roof immediately adjacent to the roof drain; furthermore, such strainers shall have an available inlet area, above the roof level, of not less than two and one-half times the area of the conductor or leader to which the drain is connected, with the exception that roof drain strainers for use on sun decks, parking decks and similar areas, normally serviced and maintained, may be of the flat surface type, level with the deck and shall have an available inlet area of not less than two and one-half times the area of the conductor or leader to which the drain is connected.

**4611.3 CONNECTIONS WITH LEADERS PROHIBITED:**

Leader pipes shall not be used as soil, waste or vent pipes; nor shall any soil, waste or vent pipes be used as leaders. Air conditioning equipment shall not discharge into any surface gutter nor directly into any leader.

**4611.4 REQUIREMENTS GOVERNING THE DISPOSITION OF RAINWATER:** (a) Rainwater or other liquid wastes from any premises shall be disposed of where same originates and/or falls in such manner as herein provided. The disposal of any rainwater or other liquid wastes by causing or allowing same to be disposed of or flow on or across any adjoining property or sidewalk, either public or private, shall be deemed a nuisance, and shall be corrected by properly disposing of same in accordance with the provisions of this Code and/or as directed by the Plumbing Inspector.

(b) Rainwater shall be disposed of as follows with required preference in the order listed:

(1) To a storm sewer or storm sewer catch basin where permitted by the Engineering Department.

(2) To a street gutter but only if first approved by the Engineering Department.

(3) Into a drainage well, if approved by the Florida State Board of Health.

(4) Into a soakage pit. (See Sub-section 4611.6 and 4611.7).

(5) Upon pervious ground.

(6) All rainwater drainage openings which discharge sewer or other gases and which are within 12 feet of adjacent building openings, interior courts or air shafts, windows, ventilating openings, air intake equipment, or where roof is used by human beings for sun bathing or other purposes, shall be protected from discharging such gases by installation of accessibly located back water valves or automatic self sealing traps. Back water valves shall be constructed as to remain in a closed position when not discharging liquids.

(7) All rain or storm water drains shall be installed to drain dry.

(8) Rainwater pipes shall not discharge over sidewalks.



(d) No liquid waste, except rainwater, shall be discharged into rainwater pipes which terminate at a street or a sidewalk or above the ground surfaces.

(e) The following table based on United States Weather Bureau rainfall statistics of one-half inch rain in five minutes over one square foot of roof or impervious, or paved area, shall be used to compute the drainage for the disposal of rainwater.

1 minute	00833 cu. ft.	14.4 cu. inches	0625 gallons
2 minutes	01667 cu. ft.	28.8 cu. inches	1250 gallons
5 minutes	0417 cu. ft.	72.0 cu. inches	3125 gallons

(f) (1) Pipes to carry rainwater only, where located under a sidewalk and discharging into a street gutter, shall be cast iron pipe with oakum and lead caulked and/or one ring oakum and one-half cement and one-half sand mortar joints. (See sub-paragraph 4611.4(b) (2). Where such pipe cannot be installed by reason of the depth of the curb being less than the pipe, diameter plus the necessary concrete cover over such a pipe, bituminous fiber pipe, a 14-inch gauge (5/64") galvanized sheet metal flume box, asbestos cement oval flume, of equivalent cross sectional area may be substituted for the pipe.

(2) The following table shall be used to compute such cross-sectional area:

Diameter of Pipe	Area in Inches
2"	3.141
3"	7.068
4"	12.566
5"	19.635
6"	29.274
8"	50.265
10"	78.54
12"	113.09
14"	153.93

(3) A concrete cover not less than two inches thick, reinforced with 6" x 6" No. 10 gauge road mesh wire shall be required over a pipe or flume box under a public sidewalk. The bottom and sides of a flume box through which bituminous fiber or asbestos cement pipe pass shall be of poured concrete at least four inches thick and the concrete shall be of not less strength than 3000 psi in 28 days.

(4) In the construction and installation of flume boxes and/or pipe under sidewalks to street or street gutter for disposal of rainwater, all plumbing permits and inspection for work inside the property line shall be secured from the Plumbing Inspector. Permits and inspection for work outside the property line shall be secured from the Engineering Department.

(g) No public sidewalk or driveway may be patched. Public sidewalks and driveways which are cut, tunneled, channeled or which have a pipe driven under same shall be replaced with full size blocks.

(h) The minimum size for sloping rainwater drains and storm sewers for surface drainage (not including pipes or building drains for roof drainage) shall be not less than the following size based on the horizontal projection of the surface area drained:

**MINIMUM PIPE SIZES AND SLOPES FOR GROUND  
SURFACE STORM SEWERS**

Diameter of Pipe in Inches	Maximum Ground Surface Area for Storm Sewers of Various Slopes		
	1/8" per ft. slope	1/4" per ft. slope	1/2" per ft. slope
3	1,360	1,590	1,930
4	2,470	2,930	3,600
5	4,270	5,020	6,030
6	7,110	8,360	11,400
8	15,900	18,400	22,600
10	30,200	34,300	42,300
12	49,800	57,000	68,600
15	87,800	107,000	130,000
18	150,000	167,500	210,000
21	226,000	268,000	326,000
24	326,000	377,000	453,000
27	453,000	510,000	630,000
30	586,000	670,000	837,000

Where ground surface storm sewers are connected to the building storm sewer, the size of the combined storm sewer shall be as set forth in Table 46-O.

(i) Rainwater may be disposed to uncovered, pervious grass areas were not otherwise disposed of as set forth above. Sufficient uncovered pervious grass areas for rainwater seepage shall be provided on each building site on a minimum ratio of ten square feet of impervious area to one square foot of pervious area. For the purpose of this Code pervious area shall be deemed to mean ground, preferably a grass plot surface, unpacked by traffic or uncoated by any material. Where there is reason to believe the ground is of low porosity, the Plumbing Inspector may require that the owner submit the results of a percolation test to support his request for disposal thereto.

(j) All parking lots and similar paved areas shall be graded and/or paved in such a manner that all rainwater and/or other surface drainage shall drain into a collection basin or pervious area located on such property.

**4611.5 PROTECTION FROM MOSQUITOES:** (a) A film of oil or other equally effective substance shall be maintained on the surface of all liquid in any exposed basin, trap, tank or receptacle not in regular use. All rain or storm water drains shall be installed to drain dry.

(b) A flap check or flapper valve shall be placed on each soakage pit pipe inlet connection from rainwater surface catch basin and such flap or flapper shall be suitable to prevent the passage of mosquitoes and vermin. (See Sub-section 4611.6). The flap check shall be hung so as to completely close the pipe inlet when not in use.

(c) Emergency inverted overflow fittings of the same size as the leader pipe up to and including four inch shall be provided at the base of the rainwater leaders discharging directly into soakage pits. Such fittings shall discharge at points which, in the opinion of the Plumbing Inspector, are the least possible to become a nuisance to the public, to occupants of a premises, or to neighboring property. Should the overflow from such a fitting become a nuisance, it shall be sealed and some other acceptable method of disposal be provided. For leaders five inch and over, the emergency overflow shall be a minimum of four inch. All

overflow openings shall be screened to prevent entrance of mosquitoes.

**4611.6 SOAKAGE PIT LIDS:** (a) Soakage pit lids shall be designed to support the anticipated loadings but not less than that of a 10-ton truck. Not less than the following minimum slab thicknesses and reinforcement areas shall be permitted:

Trench Span	Slab Thickness		Reinforcement					
			#3	#4	#5	#6	#7	#8
2'	5"	Bottom Bars	6"	12"	12"	12"	12"	12"
3'	6"	" "	3"	7"	10"	12"	12"	12"
4'	7"	" "	No	6"	7"	10"	12"	12"
5'	7"	" "	No	No	5"	7"	10"	12"
6'	8"*	" "	No	No	No	6"	8"	10"

\*Eight-inch slab over six-foot trenches require additional #5 bars six inches oc placed  $\frac{3}{4}$ " from top of slab.

(b) Reinforcing across trench is to be placed  $\frac{3}{4}$ " up from bottom of slab. Temperature reinforcing lengthwise in the lid shall be #4 bars 9' oc.

(c) Support of slab lid shall be on block walls or on rock trench walls.

(d) If slab lid is supported on block walls, such walls shall be laid on a 8' deep by 10' wide footing and a reinforced beam, not less than 12 inches deep with not less than four #5 bars, shall be poured over the block. Vertical support shall be provided about every 15 feet by reinforcing two adjacent block cells with one #5 vertical bar and filling the cell with concrete.

(e) Support may be on rock trench walls, provided the rock is solid and free from honeycombing. A footing 10 inches deep (including slab thickness) by sixteen inches wide with two #5 bars, shall be provided. Trench width shall be computed from the center of such footing for the table given above.

(f) Any reasonable combination of these methods may be used. Under unusual conditions on filled soil where the entire pit will rest on such fill, a design by a registered engineer with plans to be approved by the Building Official shall be required.

(g) When the block wall bearing is used it is necessary that a properly designed cantilever, 18 inches in width, be constructed to retard or prevent back wash. Such cantilever shall be of the same thickness as the slab and the principal slab reinforcing shall be alternately bent bars.

(h) Concrete blocks shall be laid on mortar with the block cell vertical and with the vertical block intersection having a one-half inch gap without mortar.

(i) Plumbing inspection shall be required and requested when blocks are in place and sewer is connected to soakage pit, and before top form is placed over soakage pit.

(j) No concrete shall be poured until steel is tied and in place and approved by the Building Official.

#### **4612 INTERCEPTORS — SEPARATORS AND BACKWATER VALVES**

**4612.1 INTERCEPTORS AND SEPARATORS:** No grease interceptor shall be hereinafter installed which does not comply, in all respects, with the type or model of each size thereof approved.

(a) **WHEN REQUIRED:** Interceptors (including grease, oil and sand interceptors), shall be provided when, in the opinion of the Plumbing Inspector, they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand, plaster, ground glass and all other ingredients or liquids harmful to the building drainage system, the public sewer or sewage-treatment plant or processes.

(b) **APPROVAL:** The size, type, and location of each interceptor or separator together with drawings including all pertinent information, shall be submitted to the administrative authority for approval. No wastes other than those requiring treatment or separation shall be discharged into any interceptor.

(c) **SEPARATION:** A mixture of light and heavy solids or liquids and solids having various specific gravities may be treated and then separated in an interceptor, in accordance with Paragraph 4612.1 (b).

**4612.2 GREASE INTERCEPTORS:** (a) **COMMERCIAL BUILDINGS:** A grease interceptor shall be installed in the waste line leading from sinks, drains, or other fixtures in the following establishments when, in the opinion of the Plumbing Inspector a hazard exists; restaurants, hotel kitchens or bars, factory cafeterias or restaurants, clubs, processing plants or other establishments where grease can be introduced into the drainage system in quantities that can affect line stoppage or hinder sewage disposal.

(b) **GASOLINE, OIL AND SAND INTERCEPTORS:** The following places shall be provided with an approved gasoline, sand and oil interceptor with floor drains of a bucket type discharging into the same

- (1) Public storage garages where floor drainage is to be provided.
- (2) Where floor drainage is provided in a place where motor vehicles are repaired.
- (3) Any place where motor vehicles are washed, private individuals excluded.
- (4) Shops, manufacturing and assembling plants where parts are washed to remove oil and/or other greasy substances or anything deleterious to any public or private sewer.
- (5) Where oil, gasoline or other volatile liquid becomes a nuisance.

**4612.3 VENTING INTERCEPTORS:** Interceptors shall be so designed that they will not become air bound if closed covers are used. Each interceptor shall be properly vented.

**4612.4 ACCESSIBILITY OF INTERCEPTOR:** (1) Each interceptor shall be so installed as to provide ready accessibility to the cover and means for servicing and maintaining the interceptor in working and operating condition.

(2) A five-eighth-inch thick metal removable cover shall be provided for each interceptor basin when subjected to overbearing traffic loads; or a three-eighth-inch thick metal cover when not so located. In lieu of a metal plate an approved cast iron manhole and frame may be substituted. All covers shall be accessible and brought to grade level.

**4612.5 GREASE INTERCEPTOR EFFICIENCY:** (a) **FLOW RATE:** Interceptors shall be rated and approved for their efficiency by the Plumbing Inspector in accordance with generally accepted practice.

(b) **APPROVAL:** No grease interceptor shall be approved until it has successfully passed the testing and rating procedure as set up by a recognized testing laboratory, with equivalent or greater requirements than those of **THE PLUMBING AND DRAINAGE INSTITUTE.**

**4612.6 LAUNDRY: INTERCEPTORS:** Commercial laundries shall be equipped with an interceptor having a non-removable one-half inch mesh screen metal basket or similar device that will prevent strings, rags, buttons or other materials detri-

mental to the public sewerage system from passing into the drainage system. Such one-half inch screen metal basket or similar device shall be so designed as to be easily cleaned without completely removing such basket or device.

**4612.7 BOTTLING ESTABLISHMENTS: INTERCEPTORS:**

Bottling plants shall discharge their process wastes into an interceptor which is designed to provide for the separation of broken glass or other solids, before discharging liquid wastes into the drainage system. (See Paragraph 4612.1 and 4606.6 (b).

**4612.8 S L A U G H T E R H O U S E S : ( a ) S E P A R A T O R S :**

Slaughtering-room floor drains shall be equipped with metal screen type baskets and shall be piped to separators which shall prevent the discharge into the drainage system of feathers, entrails, and other materials likely to clog the drainage system. Metal screen type baskets shall prevent passage into the drainage system of solids not to exceed one-half inch.

(b) **INTERCEPTORS:** Slaughtering and dressing room drains shall be provided with interceptors in accordance with Paragraph 4612.1 (a).

**4612.9 MAINTENANCE:** Interceptors shall be maintained in efficient operating condition by periodic removal of accumulated contents.

**4612.10 GASOLINE, OIL AND SAND INTERCEPTOR: (a) WHERE REQUIRED:** Gas, oil and sand interceptors shall conform to requirements of this chapter.

(b) **MINIMUM DIMENSION:** Oil separators shall have a minimum depth of not less than two feet below the invert of the discharge drain and a minimum capacity of eighteen cubic feet per twenty gallon flow.

(c) **OIL INTERCEPTOR PIPE CONNECTIONS:** Inlet, outlet and vent pipes in connection with interceptors shall be installed as follows

- (1) The outlet shall be taken off the outer wall at the bottom of the interceptor basin at a 45 degree angle in such manner as to provide a trap seal of approximately twenty-four inches.
- (2) The invert of the drain inlet to the interceptor basin shall be located not less than one-inch above the water line.
- (3) The interceptor local vent for the interceptor basin shall be taken off vertically not more than six inches below the cover. Approved commercial interceptors may be used. The local vent for the interceptor basin shall be a minimum size of three inches. When service sinks, drinking fountains or novelty boxes are installed in or adjacent to wash areas, the interceptor local vent may be installed on the drain line for the purpose of receiving the wastes from such fixtures. Plans for approved interceptor may be secured from the Plumbing Inspector.

**4612.11 BACKWATER VALVES: (a)** The installation of backwater devices shall be in accordance with this Code.

(b) Backwater valves shall be so constructed as to insure a mechanical seal against backflow.

(c) Backwater valves, when fully opened, shall have a capacity not less than that of the pipes in which they are installed.

(d) Backwater valves shall be so installed as to provide ready accessibility to their working parts.

## **4613 PLUMBING FIXTURES AND REQUIREMENTS**

**4613.1 GENERAL REQUIREMENTS:** Plumbing fixtures shall be constructed from approved materials, have smooth impervious surfaces, be free from defects and concealed fouling surfaces, and except as permitted elsewhere in this Code, shall conform in quality and design to one of the standards in Table 46-C. Fixtures constructed of pervious material and equipped with a waste outlet to retain water, shall not be permitted.

**4613.2 OVERFLOWS:** (a) **DESIGN:** When any fixture is provided with an overflow, the waste shall be so arranged that the standing water in the fixture cannot rise in the overflow when the stopper is closed or remain in the overflow when the fixture is empty.

(b) **CONNECTION:** The overflow pipe from a fixture shall be connected on the house or inlet side of the fixture trap, and it shall be unlawful to connect such overflows with any other part of the drainage system.

**4613.3 INSTALLATION:** (a) **CLEANING:** Plumbing fixtures shall be installed and spaced in a manner to afford easy access for cleaning and their intended use. Where practical, all pipes from fixtures shall be run to the nearest wall. Any closet bowl or closet bend shall be roughed in so as to have not less than 18 inches from the center of the closet bowl outlet to any finished wall which is set parallel to the long axis of the closet bowl.

(b) **GROUTING OR SEALING:** Where fixture surface comes in contact with wall or floor, the point of contact shall be sealed watertight.

(c) **SECURING FIXTURES:** Floor-outlet fixtures shall be rigidly secured to brass flange and floor by brass bolts and/or screws.

(d) **WALL-HUNG FIXTURES:** Wall-hung water-closet bowls and urinals shall be rigidly supported by a concealed metal supporting member with brass bolts so that no strain is transmitted to the fixture pipe connection. Suitable backing shall be provided for other wall hung fixtures including shower rods.

(e) **SETTING:** Fixtures shall be set level and in proper alignment with reference to adjacent walls. (See paragraph 4613.3a).

**4613.4 PROHIBITED FIXTURES AND CONNECTIONS:** Fixtures, pan, valve, plunger, offset, washout, latrine, frostproof, and other water closets having an invisible seal or an unventilated space or having walls which are not thoroughly washed at each discharge, shall be prohibited. Any water closet which might permit siphonage of the contents of the bowl back into the tank shall be prohibited. Trough urinals are prohibited except for temporary use during construction. Pedestal urinals are prohibited in school installations.

**4613.5 WATER CLOSETS:** (a) **PUBLIC USE:** Water closet bowls for public use shall be equipped with open front seats.

(b) **FLUSHING DEVICE:** Water-closet tanks shall have a flushing capacity sufficient to properly flush the water-closet bowls with which they are connected.

(c) **FLOAT VALVES:** Float valves in flush tanks shall close tight and provide water to properly refill the trap seal in the fixture.

(d) **CLOSE-COUPLED TANKS:** The flush-valve seat in close-coupled water-closet combinations shall be one inch or more above the rim of the bowl.

(e) **AUTOMATIC FLUSH VALVE:** Flushometer shall be so installed that they will be readily accessible for repairing. When the valve is operated, it shall complete the cycle of operation automatically, opening fully and closing positively under the service pressure. At each operation the valve shall deliver water in sufficient volume and at a rate that will thoroughly flush the fixture and refill the fixture trap. Means shall be provided for regulating flushing-valve flow. Not more than one fixture shall be served by a single flush valve, except as approved by the Plumbing Inspector.

**4613.6 URINALS:** Tanks, or plumbing devices, flushing more than one urinal shall be automatic in operation and of sufficient capacity to provide the necessary volume to flush and properly cleanse all urinals simultaneously. All stall urinals shall be equipped with beehive strainers.

**4613.7 LAVATORIES:** Lavatories shall have waste outlets not less than one and one-fourth inches in diameter. Wastes may have open strainers or may be provided with stoppers.

(a) **LEAD:** (See Table 46-C) Sheet lead shall be not less than the following:

For safe pans, not less than 4 lb. psf.

For flashings of vent terminals, not less than 3 lb. psf.

Lead bends and lead traps shall not be less than  $\frac{3}{8}$  inch wall thickness. (8 lb. psf.)

(b) **COPPER:** Sheet copper shall be not less than the following:

Safe pans — 12-oz. per sq. ft.

Vent terminal flashings — 8-oz. per sq. ft.

**4613.8 SHOWER RECEPTORS AND COMPARTMENTS:** (a) **SHOWER:** All shower compartments shall have approved pans of lead, copper or other approved material that shall turn up on all sides at least one inch above the finished curb level. Pans shall be constructed so that they shall be securely fastened to the trap stubs at the invert of the one-fourth holes, making a water tight joint between the pan and trap. Shower receptacle waste outlets shall be not less than two inches and have removable strainers. Strainers shall have one and one-half times greater free area than the inside cross sectional area of stub. A separate shower pan may be omitted for shower compartments built integrally with a concrete slab on the first floor level where the construction provides a monolithic concrete curb having a height on the enclosed sides at least one inch higher than the entrance curb height so that the water level may not rise to the height of any surrounding wood plates or studs.

(b) **DIMENSIONS:** Shower compartments shall have not less than 1,024 square inches in floor area and if rectangular, square or triangular in plan, shall be not less than thirty inches in shortest dimension.

(c) **PUBLIC OR INSTITUTION SHOWERS:** Floors of public shower rooms shall be drained in such a manner that no waste water will pass over areas occupied by other bathers.

(d) **WALLS:** Walls of smooth, non-corrosive and non-absorbent water-proof materials shall be provided in showers to a height of 6 feet above the floor for shower compartments and stalls not having a tub, and to a height of 4 feet above the rim of the tub where a shower is provided in a tub.



(e) **JOINTS:** Built-in tubs with overhead showers shall have waterproof joints between the tub and the wall.

**4613.9 SINKS:** (a) **WASTE OUTLETS:** Sinks shall be provided with waste outlets not less than one and one-half inches in diameter. Waste outlets may have open strainers or may be provided with stoppers.

(b) **FOOD GRINDERS:** Where commercial food-waste grinders are installed, the waste from those units may discharge directly into the building drainage system and not through a grease interceptor. Installation to public sewers shall not be allowed until such time as sewers are adequate.

**4613.10 FOOD GRINDERS: — WHERE PERMITTED:** (a) **FOOD GRINDERS:** Sinks on which a food grinder is installed shall have a waste opening not less than three and one-half inches in diameter.

(b) **FOOD-WASTE DISPOSAL CONNECTIONS:** A domestic food-waste-disposal unit in a two compartment sink on a 2" line shall waste through a 2" x 1½" double tapped vertical sanitary tee (Hi-Lo) fitting. The tappings shall be not more than 6 inches apart on the vertical, and each compartment shall be separately trapped and separately wasted to the stack or vented branch. In existing sink installations where the second waste opening is not available, a domestic food grinder may be installed on a two-compartment sink and waste through a single 1½" trap provided an approved directional tee or wye is used.

(c) **GREASE INTERCEPTORS:** No food-waste grinder shall be connected through a grease interceptor.

(d) **COMMERCIAL-TYPE GRINDERS:** Commercial type grinders shall be provided with a waste line equal in size to the discharge opening of the machine, but not less than a two-inch waste line. Each waste shall be trapped and vented as provided in other sections of this Code.

**4613.11 DRINKING FOUNTAINS:** (a) **DESIGN AND CONSTRUCTION:** Drinking fountains shall conform to American Standard Specifications for Drinking Fountains.

(b) **PROTECTION OF WATER SUPPLY:** Stream projectors shall be so assembled as to provide an orifice elevation as specified by American Standard Air Gaps in Plumbing Systems. Drinking fountains equipped with water heating devices shall be equipped with pressure and temperature valves in accordance with Sub-section 4614.21 and Table 46-D herein.

**4613.12 FLOOR DRAINS:** (a) **PROHIBITED LOCATIONS:** Floor drains serving indirect waste pipes serving food or drink storage rooms or appliances shall not be installed in any toilet room nor in any inaccessible or unventilated space such as a closet or storeroom. No floor drain or other plumbing fixture shall be installed in a room containing air handling machinery. Equipment drains shall be conveyed through an indirect waste to a floor drain located outside such rooms or other approved point of disposal.

(b) **FLOOR DRAIN TRAPS:** Floor drains shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The floor drain inlet shall be so located that it is at all times in full view. When subject to backflow or back pressure, such drains shall be equipped with an approved backwater valve.

One or more floor drains may be connected to the same fixture branch without a re-vent, provided that all traps are within 15 feet measured horizontally from the vented sewer line.

(c) **WATER TRAP SUPPLIES:** Every trap which is directly connected to the drainage system, shall be provided with a permanent water seal, fed from an approved source of water, or by means of an approved automatic priming device designed and installed for that purpose except where in the opinion of the Plumbing Inspector such water seal is not necessary for safety or sanitation.

(d) **FLOOR DRAINS:** Floor drains sized three inches and larger may be installed within 15 feet, measured horizontally, from a vented sewer line without a revent; provided that no floor drain shall connect to a soil line within five feet of the base of a soil stack, serving more than six water closets or equivalent fixture units.

(e) **FLOOR DRAINS SHALL BE PROVIDED WITH TRAPS AND STRAINERS:** Approved bucket type traps shall be provided for filling stations, garages, garbage areas, chicken and fish cleaning areas, bottling plants, food processing plants and other floor areas where solids could find entry into a drainage system.

(f) **FLOOR DRAINS CONSIDERED FIXTURES:** A floor drain shall be considered a plumbing fixture.

**4613.13 DISHWASHING MACHINES:** (a) Domestic dishwashing machines shall comply with the requirements set forth in Sub-paragraph 4614.4.

(b) Gravity discharge dishwashing machines installed on ground floor shall have an emergency overflow not less than one inch diameter connected to the machine tailpiece and terminating outside of building wall above grade.

(c) Wastes from dishwasher with pump discharges shall rise to a height equal to the height of the underside of dishwasher top and may connect to tailpiece of sink by means of a "Y" connection. If a food-disposal unit is provided, the domestic dishwasher shall connect to the inlet side of the food-disposal unit.

**4613.14 MULTIPLE WASH SINKS:** (a) **CIRCULAR TYPE:** Each 18 inches of wash sink circumference (circular type) shall be equivalent to one lavatory.

(b) **STRAIGHT-LINE TYPE:** Multiple wash sinks of the straight-line type shall have hot and cold combination spouts not closer than 18 inches from adjacent similar spouts and each spout shall be considered the equivalent of one lavatory.

**4613.15 GARBAGE-CAN WASHERS:** (a) **DISCHARGE:** Garbage-can washers shall not discharge through a trap serving any other device or fixture.

(b) **BASKETS:** The receptacle receiving the wash from garbage cans shall be provided with a bucket type strainer or similar device to prevent the discharge of solids into the building drainage system.

(c) **CONNECTIONS:** Water supply connections shall conform to Sub-section 4614.4.



**4613.16 LAUNDRY TRAYS:** Each compartment of a laundry tray shall be provided with a waste outlet not less than one and one-half inches in diameter and with a stopper.

**4613.17 BATHTUBS:** Bathtubs shall be provided with waste outlets not less than one and one-half inches in diameter.

**4613.18 SPECIAL FIXTURES AND SPECIALTIES:** (a) **WATER AND DRAIN CONNECTIONS:** Baptiseries, ornamental pools, aquaria, ornamental fountain basins, developing tanks or sinks and similar construction when provided with water supplies shall be protected from back-siphonage as required in Sub-section 4614.4.

(b) **APPROVAL:** Specialties requiring water and waste connections shall be submitted to the Plumbing Inspector for approval before installation.

**4613.19 MINIMUM FACILITIES:** Wherever installation of plumbing fixtures is required, the minimum number of each type of fixture installed shall be in accordance with the following table, Table 46-P, unless otherwise specifically provided:

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**TABLE 46-P**  
**MINIMUM FIXTURE REQUIREMENTS — GENERAL**  
(See Footnotes No. 13 and No. 14)

Type	Water Closets	Lavatories	Tub or Shower	Kitchen Sinks	Laundry Tub or Washing Machine			
Single Family, Duplex	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	1 minimum (See Footnote 1)			
Apartments, Apartment Houses	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	1 minimum (See Footnote 1)			
Factories, (Stores*), Office Buildings, Places of Employment or Similar Establishments See Footnote No. 5, 7 and 10	1-9 Employees — 1 Water Closet and 1 Lavatory for the use of both sexes. (See Footnote 2) (Males and Females)							
	MALES			FEMALES				
	No. of Males	Water Closets	Urinals	Lavatories	No. of Females	Water Closets	Urinals	Lavatories
Arcades containing stores which are 400 sq. ft. or less in area, may have centrally located toilet facilities accessible to all stores in the arcade sector.	10-30	1	1	2	1-12	1		2
	31-46	2	1	3	13-34	2		3
	47-63	2	2	4	35-58	3		4
	64-80	3	2	5	59-83	4		5
	81-96	3	3	6	84-109	5		6
	97-116	4	3	7	110-138	6		8
	117-136	5	3	8	139-170	7		9
	137-156	5	4	9	171-200	8		11
*Stores Each store shall have a minimum of one lavatory or sink and a one and one-half (1½) inch fixture branch connected to a three (3) or four (4) inch waste stack. (See Chapter 9 for dry vent requirements).	157-177	6	4	10	1 Water Closet and 1 Lavatory for each 30 Females over 200.			
	178-200	7	4	11				
	1 Water Closet or 1 Urinal, and 1 Lavatory for each 25 males over 200.							
	For service sink requirements see Footnote No. 9.							
	For Drinking Fountain requirements see Footnotes No. 6 & 8.							
	1 Shower shall be provided for each 15 persons subject to excess heat or to contamination, infections or irritating material.							

**TABLE 46-P (Continued)**  
**MINIMUM FIXTURE REQUIREMENTS**  
**WHERE FOOD AND DRINK ARE SERVED**

Juice Bars,

Where no alcoholic beverages or food are served and where employees and patrons do not exceed 20, one toilet room with a minimum of one water closet and one lavatory shall be provided. Where employees and patrons exceed 20, use restaurant schedule.

See Footnote 11 for bar space. Curb service to be based on a minimum of one person per 100 sq. ft. of parking area.

	MALES				FEMALES			
	No. of Males	Water Closets	Urinals	Lava-tories	No. of Females	Water Closets	Urinals	Lava-tories
Barbeque Stands, Drive-in Stands, Cafeterias, Counter Service and Similar Establishments, where no alcoholic beverages are served.	1-62	1	1	1	1-30	1		1
	63-98	2	1	1	31-62	2		1
	99-138	2	2	2	63-98	3		1
	139-181	2	3	2	99-138	4		2
	182-226	3	3	2	139-181	5		2
	227-272	3	4	3	182-226	6		2
	273-320	3	5	3	227-272	7		3
	321-369	4	5	3	273-320	8		3
	370-420	4	6	4	321-369	9		3
					370-420	10	Three compartment sink and floor drain required.	4

	MALES				FEMALES			
	No. of Males	Water Closets	Urinals	Lava-tories	No. of Females	Water Closets	Urinals	Lava-tories
Restaurants, Beer and Liquor Bars, Nite Clubs, and Eating and Drinking Establishments.	1-42	1	1	1	1-20	1		1
	43-65	2	1	1	21-42	2		1
	66-90	2	2	2	43-65	3		1
	91-117	2	3	2	66-90	4		2
	118-147	3	3	2	91-117	5		2
	148-178	3	4	3	118-147	6		2
	179-212	3	5	3	148-178	7		3
	213-247	4	5	3	179-212	8		3
	248-282	4	6	4	213-247	9		3
	283-317	4	7	4	248-282	10		4
	318-352	5	7	5	283-317	12		4
	353-390	5	8	5	318-352	12		5
					353-390	13	See Footnote No. 3. Three compartment sink and floor drain required.	5

**TABLE 46-P (Continued)**

**MISCELLANEOUS REQUIREMENTS WHERE FOOD OR DRINK ARE PREPARED OR SERVED TO THE PUBLIC:**

- (a) One 3 compartment sink (16x16x16) shall be required.
- (b) Floor drains shall be provided for each 50 square feet of back-bar or back-counter working space. Accessibly located in bar or counter area adjacent to fixtures drained.
- (c) Sinks must have a constant supply of hot water not less than 140°F, and dish-washing machines must have a constant supply of hot water to final rinse of 180°F.
- (d) Where the number of employees exceed 9, added toilet facilities shall be provided for employees as per schedule for places of employe ent.

**FOOTNOTES:**

- Footnote No. 1 At least 1 laundry tub or the rough supply required. For single family and duplex apartments 1 required. Apartment houses 1 for the first five apartments and 1 for each additional ten apartments.
- Footnote No. 2 Where the minority sex exceeds 3 persons, separate toilet rooms and facilities shall be provided for each sex. Where there are more than 5 males, a urinal shall be added.
- Footnote No. 3 Female urinals may be substituted for water closets up to one-half of the required number of water closets.
- Footnote No. 4 Wash-up sinks may be substituted for lavatories where type of employment would warrant.
- Footnote No. 5 For factories the above requirements are minimum and may be adjusted upward depending upon the provisions of work periods, and type of operation, when it is considered that these minimum requirements will not provide adequate facilities.
- Footnote No. 6 One drinking fountain shall be provided accessibly within 50 feet of all operational processes and at least 1 drinking fountain for each 75 persons.
- Footnote No. 7 Toilet facilities shall be provided on each floor for each sex using that floor and shall be located to be readily accessible except that in a building where the two lower levels, such as a first floor and mezzanine or the first floor and second floor where there is no mezzanine, are occupied by a single tenant and the toilet facilities are not for public use, the combined total toilet facilities required for these two levels may be located on either the first or second level. Total facilities accessible only through private offices shall be considered in addition to the above minimum requirements and the personnel occupying such offices may be subtracted from the total employment.  
**EXCEPTION:** Toilet facilities for public use in Group A or B Occupancies, restaurants, bars, transportation terminals and similar locations shall be provided on each floor for each sex.

Footnote No. 8 One drinking fountain shall be provided if there are over 10 employees and 1 drinking fountain for each 75 employees. Such drinking fountains shall be conveniently located and accessible to the offices served. Not to be located in any toilet room or vestibule to a toilet room. Where there are 10 offices or rooms or more, and 25 employees or persons, a service sink shall be provided on each floor. Where members other than the Caucasian race are employed, separate and equal facilities are to be provided for each sex and race. Seating capacity shall be determined as follows: Restaurants and eat and drink establishments where no alcoholic beverages are served, 30" of counter space and/or 15 square feet of dining room area shall be equal to 1 person. Where alcoholic beverages of any kind are served, 18" of counter or bar space and/or 15 square feet of serving area shall equal 1 person. All toilet rooms shall be of easy and convenient access to both patrons and employees, and shall be located on the same floor with, and under the responsible direction of the management of the premises served, and shall not be over 50 feet developed length from the nearest exit to the dining room, bar or food service area. Passenger terminals, such as railroad, bus, or airline terminals are not included in this classification. Such establishments are special problems and shall be submitted to the Plumbing Inspector for approval. Hotels, places of public assembly, public toilet rooms, places of employment, stores, hospitals, convalescent homes, schools, dormitories, day nurseries, rooming houses, filling stations, places of detention, community toilets and all locations that may be classed other than private residential or private apartments shall have open-front seats on all water closets. All calculations shall be on the basis of equal numbers of male and female where sanitary facilities are required for both sexes.

**TABLE 46-P (Continued)**  
**MINIMUM FIXTURE REQUIREMENTS — HOSPITALS**

No. of Males	Water Closets	MALES			No. of Females	FEMALES		
		Urinals	Lava-tories	Bed Pan Washers		Water Closets	Lava-tories	Bed Pan Washers
1-25	1	1	1	1	1-20	1	1	1
26-40	2	1	2	1	21-40	2	2	1
41-55	2	2	2	2	41-60	3	3	2
56-70	3	2	3	2	61-90	4	4	2
71-85	3	3	3	3	91-130	5	5	3
86-100	4	3	4	3	131-170	6	6	3
101-130	4	4	4	4	171-210	7	7	4
above 130	1 per 60	1 per 60	1 per 60	1 per 60		1 per 40	1 per 40	1 per 80

**MISCELLANEOUS REQUIREMENTS:**

Other requirements, such as sterilizers, slop sinks, special fixtures, etc., shall be special problems, and shall be submitted to the Plumbing Inspector for approval.

See schedule for "Places of Employment" for employees facilities.

**MINIMUM FIXTURE REQUIREMENTS — PLACES OF DETENTION**

Fixture requirements in places of detention are special problems and plans for proposed installation shall be submitted to the Plumbing Inspector for approval.



**TABLE 46-P (Continued)**  
**MINIMUM FIXTURE REQUIREMENTS — PLACES OF**  
**PUBLIC ASSEMBLY**  
 Theatres, Churches, Arenas, Stadiums, Lodge Halls, etc.  
 (See Footnote No. 12)

No. of Males	MALES			No. of Females	FEMALES	
	Water Closets	Urinals	Lavatories		Water Closets	Lavatories
1-100	1	1	1	1-50	1	1
101-250	2	1	1	51-140	2	1
251-360	2	2	1	141-250	3	2
361-470	2	3	2	251-360	4	2
471-580	3	3	2	361-470	5	3
581-700	3	4	3	471-690	6	3
701-820	3	5	3	691-960	7	4
821-975	4	5	4	961-1300	8	4
976-1150	4	6	4	1301-1640	9	5
1151-1325	4	7	4	1641-2000	10	6
1326-1490	5	7	5	2001-2350	11	7
1491-1675	5	8	5	2351-2700	12	8
1676-1875	5	9	5	Above 2700 add one water closet for each additional 350 females and one lavatory for each additional 500 females. Female urinals may be substituted for water closets up to one-half of the required number of water closets.		
1876-2075	6	9	6			
2076-2250	6	10	6			
2251-2475	6	11	6			
2476-2700	6	12	7			
Above 2700 add 1 water closet and 1 lavatory for each additional 500 males and 1 urinal for each additional 300 males.						

**MISCELLANEOUS REQUIREMENTS:**

Drinking fountains shall be provided at a ratio of 1 for each 200 persons up to 800 total number of persons, over 800 to be considered a special problem and design is to be submitted for approval.

The occupancy control of drive-in theatres shall be based on 3 persons per parking space.

**TABLE 46-P (Continued)**  
**MINIMUM FIXTURE REQUIREMENTS — DORMITORIES**

Water Closets	MALES		Water Closets	FEMALES	
	Urinals	Lavatories		Lavatories	Drinking Fountains
1 for the first 10 males. Over 10, 1 for each additional 25 males.	1 for each 25 males up to 150 males. Over 150 males add 1 for each 50 additional males.	1 for each 12 males up to 75 males. Over 75 1 for each 20 males. Additional separate dental lavatories should be provided in communal toilet rooms at 1 for each 20 males.	1 for the first 8 females. Over 8, one for each additional 20 females.	1 for each 12 females up to 75 females. Over 75, one for each additional 15 females. Additional separate dental lavatories should be provided in communal toilet rooms at 1 for each 20 females.	One per each 75 persons and a minimum of one per floor and a minimum of 2 per dormitory.

For service sink requirements see Footnote No. 8.

**MINIMUM FIXTURE REQUIREMENTS — FILLING STATIONS**

MALES			FEMALES	
Water Closets	Urinals	Lavatories	Water Closets	Lavatories
1	1	1	1	1

**MISCELLANEOUS REQUIREMENTS:**

At least one basket-type floor drain and trap connected to a gas and oil interceptor.

**TABLE 46-P (Continued)**  
**DAY NURSERIES**

Total No. of Children	Water Closets	Lavatories	Bathtubs or Showers	Drinking Fountains
<b>Day Care</b>				
1-10	1	1	1	1 for each 50.
11-15	1	2	1	Minimum of 2;
16-30	2	3	2	1 inside building
31-50	3	4	2	and one on playground.
<b>Night Care</b>				
1-8	1	1	1	
9-18	2	2	2	
19-30	3	3	3	
31-50	4	4	3	

**MISCELLANEOUS REQUIREMENTS:**  
Toilets shall be accessible from the playground as well as from inside building: 10" rim height on water closets for children under 8 years; 13" rim height for children 8 years or over.

**MINIMUM FIXTURE REQUIREMENTS — SCHOOLS**

One water closet, lavatory and drinking fountain in each classroom, or common toilet rooms  
**Kindergarten Through 2nd Grade**

Water Closets	MALE		Drinking Fountains	FEMALE	
	Urinals	Lavatories		Water Closets	Lavatories
1 per 30 males		1 per 30 males (26" rim height)	One in each classroom	1 per 30 females	1 per 30 females
<b>3rd Through 6th Grade</b>					
1 per 75 males	1 per 30 males	1 for each 50 males, minimum of one. (28" rim height)	1 per 75 pupils and a minimum of 1 per floor and a minimum of 1 accessible to the playground area. (28" height)	1 per 35 females	1 per 50 females
<b>7th Through 12th Grade</b>					
1 per 75 males	1 per 30 males	1 per 50 males, minimum of one. (30" rim height)	1 per 75 total pupils and a minimum of 1 per floor and one accessible to the playground area. (36" height)	1 per 45 females	1 per 50 females

**MISCELLANEOUS REQUIREMENTS:**

Showers shall be provided wherever there is a gymnasium at a rate of one for each 5 boys and one for each 4 girls, based on the maximum number that can use the facilities. (The number of each sex to be provided for, may be calculated on the number of classrooms multiplied by 2.5 or the known total number of pupils (boys and girls) divided by 12.)

**I** example school has 16 classrooms.

$$16 \times 2.5 = 40 \text{ of each sex to be provided for.}$$

hence  $40 \div 5 = 8$  showers for the boys

$$40 \div 4 = 10 \text{ showers for the girls}$$

**II** example total school enrollment — 480 pupils

$$480 \div 12 = 40 \text{ of each sex to be provided for.}$$

$$40 \div 5 = 8 \text{ showers for the boys.}$$

$$40 \div 4 = 10 \text{ showers for the girls.}$$

**TABLE 46-P (Continued)**  
**NUMBER FIXTURE REQUIREMENTS — ROOMING AND BOARDING HOUSES**

No. of Males	Water Closets	Urinals	Lava-tories	Tub or Shower	No. of Females	Water Closets	Lava-tories
1-11	1	1 <sup>See</sup> Below	1	1	1-11	1	1
12-18	2	1	2	2	12-18	2	2
19-26	3	1	3	3	19-26	3	3
27-33	4	1	4	4	27-33	4	4
34-41	5	1	5	5	34-41	5	5
42-48	5	2	6	6	42-48	6	6
49-56	6	2	7	7	49-56	7	7
57-63	7	2	8	8	57-63	8	8
64-71	7	3	9	9	64-71	9	9
72-78	8	3	10	10	72-78	10	10
79-86	9	3	11	11	79-86	11	11
87-93	10	3	12	12	87-93	12	12
94-101	10	4	13	13	94-101	13	13

**MISCELLANEOUS REQUIREMENTS:**

Over 5 males a urinal is required.

The above schedule applies for each floor.

Both hot and cold water shall be supplied to showers, tubs and lavatories.

Where accommodations exceed 15 persons per floor a service sink is required on each floor.

## 4614 WATER SUPPLY AND DISTRIBUTION

**4614.1 QUALITY OF WATER SUPPLY:** (a) **PUBLIC WATER SERVICE REQUIRED:** All premises intended for human habitation or occupancy, including but not limited to, establishments to be used for household, domestic, food processing, food handling, restaurant, dairy or bottling purposes, public buildings and places of assembly or other establishments where a water supply is or may be used for human consumption, shall be supplied from the approved public water mains, where such mains are available. Where a water supply is not available from approved public water mains such premises shall be supplied with potable water (as herein defined) from a privately-owned well or other source which has been properly approved by the authorities having jurisdiction.

(b) **APPROVAL:** No water supply of a non-potable nature shall be used for commercial or industrial purposes unless such use and the source of supply has first been approved by the Florida State Board of Health and Plumbing Inspector and/or other authority having jurisdiction.

(c) **ACCEPTABLE SOURCES:** Where a public supply of potable water is not available, the requirements of the Florida State Board of Health shall be satisfied.

**4614.2 WATER SUPPLY MANDATORY:** Every building in which plumbing fixtures are installed and are for human occupancy or habitation shall be provided with an ample supply of pure and wholesome water.

**4614.3 PROTECTION OF POTABLE WATER SUPPLY:** (a) **WATER DISCHARGE OUTLETS:** Potable water supply piping and water discharge outlets shall have backflow prevention devices or similar equipment and shall not be so located as to make possible their submergency in any liquid or substance.

(b) **APPROVAL OF DEVICES:** Before any device for the prevention of backflow or back-siphonage is installed, it shall have first been certified as meeting the requirements of ASA A40.6 by a recognized testing laboratory acceptable to the Plumbing Inspector. Devices installed in a potable water supply for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices. The Plumbing Inspector having jurisdiction may inspect such devices and, if found to be ineffective or inoperative, shall require the replacement thereof.

(c) **BACKFLOW:** The water-distributing system shall be protected against backflow. Every water outlet shall be protected from backflow, preferably by having the outlet end from which the water flows spaced a distance above the flood-level rim of the receptacle into which the water flows sufficient to provide a "minimum required air gap" as defined in ASA A40.4. Where it is not possible to provide a minimum air gap, the water outlet shall be equipped with an accessibly located backflow preventer complying with ASA A40.6, installed on the discharge side of the manual control valve.

(d) **SPECIAL DEVICES:** Where it is not possible to provide either a minimum air gap or a backflow preventer, as may be the case in connection with cooling jackets, condensers or other industrial or special appliances, the Plumbing Inspector shall require other approved means of protection.

**4614.4 VACUUM BREAKERS AND AIR GAPS:** (a) **FLUSHOMETER:** Flushometer shall be equipped with an approved vacuum breaker. The vacuum breaker shall be installed on the discharge side of the flushing valve with the critical level at least one inch above the top of any fixture or appliance with integral waterway.

(b) **FLUSHING TANKS:** Flushing tanks shall be equipped with an approved ball-cock. The ball-cock shall be installed with the critical level of the vacuum breaker at least one inch above the full opening of the overflow pipe. In cases where the ball-cock has no hush tube, the bottom of the water supply inlet shall be installed one inch above the full opening of the overflow pipe.

(c) **LAWN SPRINKLERS:** Lawn sprinkler systems using potable water shall be equipped with an approved backflow preventer on the discharge side of each valve. The backflow preventer shall be at least six inches above the highest head, and at no time less than six inches above the surrounding ground.

(d) **VALVE OUTLET:** The hot and cold water supply to fixtures with hose attachments, and other appliances physically connected to a water supply system, shall be protected from backflow, back-siphonage and back pressure. Where hot and cold water valves are connected to supply tempered water to another valve for use in fixtures such as bed pan washers, bidets and needle showers, check valves or combined valve and check devices shall be provided to prevent the cross flow of water in the water distributing system.

**4614.5 WATER SERVICE PIPE:** (a) The water-service pipe may be placed in the same trench with the building drain and building sewer provided the following conditions are satisfied:

- (1) The water-service pipe and all other pipe or piping or conduit, shall be placed on a solid shelf excavated at one side of the common trench, with a minimum of ten inches between pipes or conduits.
- (2) The number of joints in the service pipe shall be kept to a minimum.
- (3) The materials and joints of sewer and water-service pipe shall be installed in such manner and shall possess the necessary strength and durability to prevent the escape of solids, liquids, and gases, therefrom, under all known adverse conditions such as corrosion, strains due to temperature changes, settlement, vibrations and superimposed loads.

(b) **STOP-AND-WASTE VALVE COMBINATION:** Combination stop-and-waste valves and cocks shall not be installed in an underground service pipe.

(c) **PRIVATE WATER SUPPLY:** No private water supply shall be interconnected with any public water supply.

**4614.6 WATER PUMPING AND STORAGE EQUIPMENT:**

(a) **PUMPS AND OTHER APPLIANCES:** Water pumps, tanks, filters, softeners, and all other appliances and devices shall be protected against contamination.

(b) **WATER-SUPPLY TANKS:** Potable-water-supply tanks shall be properly covered and screened to prevent the entrance of foreign material or insects into the water supply. Soil or drainage lines shall not pass directly over such tanks.

(c) **CLEANING, PAINTING, REPAIRING WATER TANKS:** A potable-water-supply tank used for domestic purposes shall not be lined, painted, or repaired with any material which will affect either the taste or the potability of the water supply when the tank is returned to service. Tanks shall be disconnected from the system during such operations, to prevent any foreign fluid or substance from entering the distribution piping.

**4614.7 WATER-SUPPLY HOUSE TANKS:** (a) **WHEN REQUIRED** When the water pressure from the community mains during flow is insufficient to supply all fixtures freely and continuously, the rate of supply shall be supplemented by a gravity house tank or booster system.

(b) **SURGE TANKS:** In any structure that requires an auxiliary pump to supplement the available water supply, such pump shall be supplied from a surge tank to be supplied with water from public or private main through a float valve. Upon acceptance by both the local water company and the administrative authority, the requirement for a surge tank may be waived where controlled pumps are provided.

(c) **AUXILIARY PRESSURE. SUPPLEMENTARY TANK:** If the residual pressure in the system is below the minimum allowable at the highest water outlet when the flow in the system is at peak demand an automatically controlled pressure tank or gravity tank shall be installed, of sufficient capacity to supply sections of the building installation which are too high to be supplied directly from the public water mains.

(d) **SUPPORT:** All water-supply tanks shall be supported in accordance with the building code or other regulations which apply.

(e) **OVERFLOW FOR WATER-SUPPLY TANKS:** Overflow pipes for gravity tanks shall discharge to an approved point of disposal. Rain water gutters discharging into a street gutter are not considered approved points of disposal. Adequate overflow pipes properly screened against the entrance of insects and vermin shall be provided.

(f) **HOUSE TANK SUPPLY:** The water-supply inlet within the house tank shall be at an elevation not less than is required for an air gap in an open tank with overflow, but in no case shall the elevation be less than four inches above the overflow. If a drop pipe is added to the ball cock or filling device an air inlet shall be inserted in the drop pipe at least two inches above the overflow.

(g) **DRAINS:** Water-supply tanks shall be provided with valved drain lines located at their lowest point and discharged as an indirect waste or as required for overflow pipes in Paragraph 4614.7(e).

4614.7 (h) **SIZE OF OVERFLOW:** Overflow drain openings for water supply tanks shall not be less than 12 square inches of free openings.

(i) **PRESSURE TANKS:** Pressure tanks used for supplying water to the domestic water distribution system, combined supply to fire standpipes and domestic water systems, or to supply standpipes for fire equipment only, shall be equipped with an accessible water and pressure gauge.

4614.8 **WATER-DISTRIBUTION PIPE, TUBING AND FITTINGS:** (a) Materials for water-distributing pipes and tubing shall be brass, copper, lead, cast iron water pipe, wrought iron, block tin or steel, with appropriate approved fittings. All wrought iron and steel pipe and fittings shall be galvanized (zinc coated). Copper pipe and tubing shall be type K or type L.

(b) Pipes conveying fire lines and domestic water lines shall not be installed underneath a concrete slab on fill in any location inside the building walls of buildings on filled ground where the presence of hydrogen sulfide gas or other injurious elements is known, and in areas being or having been recently filled below high tide areas. Such piping and fittings may be installed in concrete trenches with removable covers or in an approved conduit.

4614.9 **ALLOWANCE FOR CHARACTER OF WATER:** (a) **SELECTION OF MATERIALS:** When selecting the material and size for water-supplying pipe, tubing, or fittings, due consideration shall be given to the action of the water on the interior and of the soil, fill or other material on the exterior of the pipe. No material that would produce toxic conditions in a potable-water-supply system shall be used for piping, tubing or fittings.

(b) **USED PIPING:** No piping material that has been used for other than a potable-water-supply system shall be reused in the potable-water-supply system.

**4614.10 WATER SUPPLY CONTROL:** (a) Each building shall have a separate water control valve, independent of the meter valve. Each apartment or store in a building shall have a separate independent control valve controlling all the pipe and fixtures in such apartment or store. Main control valves shall be located at or near the foundation line outside the building above the ground or in a separate approved box with cover.

(b) Supply lines taken from pressure or gravity tanks shall be valved at or near the tank. Tanks in connection with a domestic water system shall have a drain cock installed on the discharge side of such valve.

(c) Each water closet and urinal supply shall have an independent water control valve placed above the floor and all single fixtures or groups of fixtures in hotels, office buildings, hospitals, clinics, places of public assembly and manufacturing plants shall either have separate fixture control valves or a single control valve for each group of fixtures in a single room. Each hotwater storage tank shall have a water control valve and draw off valve.

(d) A shut-off valve minimum size three-quarter-inch, shall be provided in the cold water branch line, accessible and adjacent to each water storage tank or each water heater.

**4614.11 WATER SUPPLY DISTRIBUTION:** (a) **WATER SERVICE PIPE:** The water-service pipe from the street main to the water-distribution system for the building shall be of sufficient size to furnish an adequate flow of water to meet the requirements of the building at peak demand and in no case shall be less than three-quarters-inch nominal diameter. If flushometers or other devices requiring a high rate of water flow are used, the water-service pipe shall be designed to supply this flow.

(b) **DEMAND LOAD:** The demand load in the building water-supply shall be based on the number and kind of fixtures installed and the probable simultaneous use of these fixtures.

**4614.12 PROCEDURE IN SIZING THE WATER DISTRIBUTION SYSTEM OF A BUILDING:** The sizing of the water distribution system shall conform to good engineering practice. Methods used to determine pipe sizes shall be approved before use by the Plumbing Inspector and shall be in accordance with Table BMS66, National Bureau of Standards, or the following tables:



**TABLE 46-Q**  
**MINIMUM WATER SERVICE PIPE SIZE FOR**  
**ONE- AND TWO-STORY BUILDINGS**  
**Hotels, Motels and Residential Occupancy Only**

No. of Bathrooms and Kitchens		Diameter of Water Service Pipe	Recom- mended Meter Size	Appx. Pres- sure Loss Meter and 100' of Pipe	No. of Bathrooms and Kitchens	
Tank Type	Closets				Flush Valve Closets	Closets
Copper	Galv.	Inches	Inches	p.s.i.	Copper	Galv.
1-2		3/4	3/8	27	...	...
...	1-2	3/4	3/8	40	...	...
...	...	1	1	30	1	...
3-4	...	1	1	22	...	...
...	3-4	1	1	24	...	...
...	...	1 1/4	1	32	2-3	...
...	...	1 1/4	1	36	...	1-2
5-9	...	1 1/4	1	28	...	...
...	5-8	1 1/4	1	32	...	...
...	...	1 1/2	1 1/2	29	4-10	...
...	...	1 1/2	1 1/2	30	...	3-7
10-16	...	1 1/2	1 1/2	17	...	...
...	9-14	1 1/2	1 1/2	21	...	...
...	...	2	1 1/2	26	11-18	...
...	...	2	1 1/2	32	...	8-18
17-38	...	2	1 1/2	27	...	...
...	15-38	2	1 1/2	32	...	...
...	...	2	2	25	19-33	...
...	...	2	2	24	...	19-24
39-56	...	2	2	25	...	...
...	39-45	2	2	24	...	...
...	...	2 1/2	2	28	34-57	...
...	...	2 1/2	2	32	...	25-57
57-58	...	2 1/2	2	28	...	...
...	46-78	2 1/2	2	32	...	...
...	...	3	3	16	58-95	...
...	...	3	3	19	...	58-95
79-120	...	3	3	16	...	...
...	19-120	3	3	19	...	...

Note: This table is applicable to only the most favorable conditions, where water main pressure does not fall below 60 p.s.i. at any time.

In general for 3- or 4-story buildings, or where main pressure falls below 60 p.s.i., the next larger size group should be used.

Where conditions do not conform to the above table, the provisions of BMS-66 National Bureau of Standards publications shall apply.

**TABLE 46-Q (Continued)**  
**MINIMUM WATER SERVICE PIPE SIZE FOR**  
**ONE- AND TWO-STORY BUILDINGS**  
**Commercial**

No. of Fixture Units Flush Tank Water Closet		Size Service	Size Meter	Appr. Loss	No. of Fixture Units Flush Valve Water Closet	
Copper	Galv. Iron or Steel	Nom. Size Inches	Nom. Size Inches	p.s.i.	Copper	Galv. Iron or Steel
18	...	3/4	3/8	30	...	...
...	15	3/4	3/8	30	...	...
19-55	...	1	1	30	...	...
...	16-36	1	1	30	...	...
...	...	1	1	30	9	...
56-85	...	1 1/4	1	30	...	...
...	37-67	1 1/4	1	30	...	...
...	...	1 1/4	1	30	10-20	...
...	...	1 1/4	1	30	...	14
86-255	...	1 1/2	1 1/2	30	...	...
...	68-175	1 1/2	1 1/2	30	...	...
...	...	1 1/2	1 1/2	30	21-77	...
...	...	1 1/2	1 1/2	30	...	15-52
226-350	...	2	1 1/2	30	...	...
...	176-290	2	1 1/2	30	...	...
...	...	2	1 1/2	30	78-175	...
...	...	2	1 1/2	30	...	53-122
351-550	...	2	2	30	...	...
...	291-450	2	2	30	...	...
...	...	2	2	30	176-315	...
...	...	2	2	30	...	123-227
551-640	...	2 1/2	2	30	...	...
...	451-580	2 1/2	2	30	...	...
...	...	2 1/2	2	30	316-392	...
...	...	2 1/2	2	30	...	288-343
641-1340	...	3	3	22	...	...
...	581-1125	3	3	22	...	...
...	...	3	3	22	393-940	...
...	...	3	3	22	...	344-785

Note: This table is applicable to only the most favorable conditions, where water main pressure does not fall below 50 p.s.i. at any time.

In general for 3- or 4-story buildings, or where main pressure falls below 50 p.s.i., the next larger size group should be used.

Where conditions do not conform to the above table, the provisions of BMS-66 National Bureau of Standards publications shall apply.

**TABLE 46-R  
RATE OF FLOW AND REQUIRED PRESSURE DURING FLOW  
FOR DIFFERENT FIXTURES**

Fixture	Flow	
	Pressure (a) psi	Flow Rate gpm
Ordinary basin faucet .....	8	3.0
Self-closing basin faucet .....	12	2.5
Sink faucet — 3/8 inch .....	10	4.5
Sink faucet — 1/2 inch .....	5	4.5
Bathtub faucet .....	5	6.0
Laundry tub cock — 1/2 inch .....	5	5.0
Shower .....	12	5.0
Ball-cock for closet .....	15	3.0
Flush valve for closet .....	10-20	15-40(b)
Flush valve for urinal .....	15	15.0
Garden hose, 50 ft. and sill cock	30	5.0

(a) Flow pressure is the pressure in the pipe at the entrance to the particular fixture considered.

(b) Wide range due to variation in design and type of flush-valve closets.

**4614.13 SIZE OF FIXTURE SUPPLY:** The minimum size of a fixture-supply pipe from the riser or main to the wall opening shall be as follows:

Type of Fixture or Device	Pipe Size (Inches)
Bathtubs .....	1/2
Combination sink and tray .....	1/2
Drinking fountain .....	3/8
Dishwasher (Domestic) .....	1/2
Hot water heaters .....	3/4 Minimum
Kitchen sink, residential .....	1/2
Kitchen sink, commercial .....	3/4
(over one compartment)	
Lavatory .....	1/2
Laundry tray, 1, 2 or 3 compartments .....	1/2
Shower (single head) .....	1/2
Sinks (service, slop) .....	1/2
Sinks flushing rim .....	1
Urinal (flush tank) .....	1/2
Urinal (direct flush valve) .....	3/4
Water closet (tank type) .....	1/2
Water closet (flush valve type) .....	1
Hose bibbs .....	3/4

Every group of three fixtures shall be connected to a 3/4" cold water supply line to first fixture branch.

For fixtures or appliances not listed, the minimum supply branch shall be 3/4-inch.

Remote control units for supplying water to fixtures may be installed under the following conditions:

- (1) The hot and cold water supply branches and the manifolds feeding the solenoid valves shall be no less than 3/4-inch pipe size. For larger remote units, Table 46-A shall govern the size of the supply branches and manifolds.
- (2) The 1/4-inch pipe size is to be increased immediately upon leaving the cabinet to 3/8-inch pipe size — the run not to exceed 20 feet. All runs over 20 feet shall be 1/2-inch pipe size.
- (3) There shall be a strainer installed on both the hot and cold water lines before entering the manifold for the protection of the solenoid valves. There shall be installed a temperature control valve to prevent scalding in the event of failure of the solenoid valves.

**4614.14 MINIMUM PRESSURE:** Minimum, fairly constant, service pressure, at the point of outlet discharge shall not be less than 8 p.s.i. for all fixtures except for direct flush valves, for which it shall be not less than 15 p.s.i., and except where special equipment is used requiring higher pressure. In determining the minimum pressure, allowance shall be made for the pressure drop due to friction loss in the piping system during maximum demand periods as well as head, meter, and other losses in the system.

**4614.15 VARIABLE STREET PRESSURES:** When the street main has a wide fluctuation in pressure during the day, the water distribution system shall be designed for minimum pressure available.

**4614.16 HAZARD AND NOISE:** Water pipe installations shall be adequately protected from water hammer by use of air chambers or other approved devices. Air chambers shall be installed in such manner that will permit draining without disconnecting fixture supply. Air chambers or shock absorbers shall be installed and air chambers shall be not less in volume than a 12-inch length of pipe and one size larger than the pipe it serves.

**4614.17 HOT WATER DISTRIBUTION:** The sizing of the hot-water distribution piping shall conform to good engineering practice.

**4614.18 SAFETY DEVICES:** (a) **PRESSURE-RELIEF VALVE:** Pressure-relief valves with lever handles shall be installed on all equipment used for heating or storage of hot water. The rate of discharge of such a valve shall limit the pressure rise for any given heat input within ten per cent of the pressure at which the valve is set to open.

(b) **TEMPERATURE RELIEF VALVES:** Temperature relief valves with lever handles shall be installed for equipment used for the heating or storage of domestic hot water. Each temperature relief valve shall be of the reseating type and shall be rated as to its BTU capacity. In all cases the BTU rating of the temperature relief valve shall be greater than the BTU input rating of the appliance. (See Table 46-S).

(c) **APPROVALS:** Combination pressure and temperature relief valves with lever handles, separate pressure and temperature relief valves with lever handles, which have been tested and approved by, or meet the specification requirements of the American Gas Association, A.S.M.E. or other recognized approval authorities, shall be considered acceptable.

(d) **RELIEF-VALVE LOCATION:** Combination pressure and temperature valves, or temperature relief valves shall be located in the tank or in hot water outlet from tank so as to be actuated by the water in the top of the tank served and in no case more than four inches developed length away from such tank. Pressure-relief valves may be located adjacent to the equipment they serve. There shall be no check valve or shutoff valve between a relief valve and the heater or tank for which it is installed.

(e) **RELIEF OUTLET WASTES:** The outlet of a pressure, temperature, or other relief valve shall not be connected to the drainage system as a direct waste.

(f) **DRIPS-LOCATION FOR BUILDINGS:** Each temperature and pressure relief valve or combination thereof shall be provided with a drip pipe connected to the valve discharge outlet. The minimum size of the discharge pipe shall be no smaller than the discharge opening of the temperature and pressure relief valve, or temperature relief valve. Drip pipes shall discharge as follows:

(1) For hot water storage tanks placed above the roof — as in (2) and (3) or upon the roof.

(2) In cases where a building covers an entire lot — to any suitable plumbing fixture or floor drain terminating above the floor level except a water closet, urinal, bidet, bath or shower.

(3) In all other buildings except those described in the foregoing — to an observable point outside the building. The terminus of all drip pipes shall be without a thread. Where terminating outside a building — pointing down to within six inches of ground level.

**4614.19 STORAGE TANKS: (a) APPLICABLE REQUIREMENTS:** All storage tanks for domestic hot water shall meet the applicable A.S.M.E. and listed requirements of Table 46-C.

(b) **MARKING:** Any tank hereafter installed for the storage of domestic hot water shall have clearly and indelibly stamped in the metal of the tank, or marked upon a plate welded thereto, or otherwise permanently affixed, the maximum allowable working pressure and the hydrostatic test pressure which the tank is designed to withstand, and the year of manufacture. Such marking shall be placed in an accessible position so inspection and reinspection may be readily accomplished.

(c) **MINIMUM PRESSURES:** The minimum hydrostatic test pressure shall be 300 lbs. per square inch and the working pressure shall be not more than 42½ per cent of the indicated hydrostatic test pressure.

(d) **DRAIN COCK:** All storage tanks shall be equipped with adequate accessible drain cocks.

(e) **LINE VALVES:** Valves in the water-supply distribution system, except those immediately controlling one fixture supply, when fully opened shall have a cross-sectional area of the smallest orifice or opening through which the water flows at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

(f) **WATER USED FOR PROCESSING:** Water used for cooling of equipment or similar purposes shall not be returned to the potable-water distributing system. When permitted, the waste water shall be discharged through an indirect waste pipe or air gap to the drainage system or other approved point of disposal.

## **4615 SEPTIC TANK REQUIREMENTS**

**4615.1 SIZE OF SEPTIC TANKS:** (a) **GENERAL:** The minimum effective capacity of any septic tank installation shall be 600 gallons.

(b) **HOTELS, APARTMENT HOUSES AND ROOMING HOUSES:** Septic tank installations for hotels, apartment houses, rooming houses, and similar establishments shall be based on the following requirements: a 600 gallons effective capacity for the first four persons served plus an additional 50 gallons effective capacity for each person over four. The number of persons to be served shall be computed on the basis of two persons per bedroom, or on the basis of the actual number of persons to be served by the tank; whichever may be greater.

(c) **PUBLIC BUILDINGS:** (1) Public buildings, such as courthouse, jails, post offices, passenger stations, and similar structures requiring septic tanks in excess of twelve-hundred (1200) gallons capacity shall be considered special problems and complete plans for the installation of any sewage and/or liquid waste disposal system for such structures shall be submitted to the Plumbing Inspector and the Florida State Board of Health before permit for same is issued.

(2) Septic tank installations for schools, hospitals, bathing places or swimming pools, and/or other establishments not specifically covered in this Code shall be considered special problems and shall be first submitted to the Florida State Board of Health and to the Plumbing Inspector for approval before permit is issued.

**4615.2 APPROVALS:** For septic tanks over 1200 gallon capacity, plans and specifications shall be first submitted to the Florida State Board of Health for approval and such plans together with the said approval of the Florida State Board of Health shall then be submitted to the Plumbing Inspector for approval before construction work of any kind shall be commenced or a permit issued.

**4615.3 UNLAWFUL TO SELL:** No person, firm or corporation shall install, contract for, sell, manufacture or offer for sale within the area of jurisdiction of this code, any septic tank, liquid waste or sewage treatment system or similar device, including chemical additives, which does not conform to the requirements of the Florida State Board of Health and who has not received approval thereof from the Florida State Board of Health and the Plumbing Inspector.

**4615.4 PERMITS:** No septic tank shall be constructed or installed until a permit for such construction or installation has been obtained.

**4615.5 DESIGN, CONSTRUCTION AND SPECIFICATIONS OF SEPTIC TANK AND DRAINFIELDS:** (a) Septic tanks shall be rectangular in shape, or of a general rectangular design, and the design therefor shall be approved by the Bureau of Engineering of the Florida State Board of Health and the Plumbing Inspector or Broward County Health Department.

(b) Septic tanks shall be constructed of concrete, either precast or poured in place. All concrete used in the construction of septic tanks shall have a strength of not less than 3000 psi in 28 days. Tests to determine watertightness where required shall be made by filling tank with water to overflow point at the time inspection is called for. Metal, block, brick or sectional tanks of any description are prohibited. The interior wall of all septic tanks shall be finished smooth and impervious. Voids, pits, or protuberances on or in the inside walls of septic tanks are prohibited. Water tests of tanks may be required.

(c) Precast septic tanks shall have a minimum wall thickness of two inches. Tops shall have minimum thickness of three inches, and be reinforced with #3 bars set on six inch centers across the carrying span and 12 inches on centers for temperature reinforcement. Precast tanks shall be sufficiently reinforced to resist cracking during handling or installation with a minimum reinforcement of 6 x 6 — 10/10 wire mesh or mesh of equivalent area. Precast septic tanks shall have a monolithically poured bottom. Precast septic tanks shall not be located where vehicular traffic or other over-burden loads are anticipated unless permanent above grade construction arrangement is erected to guard the tank, or positive arrangement provided to prevent such loads from bearing on the tank. Where such support over the tank is required, it shall be on block walls or rock trench walls as set forth in Sub-section 4611.6.

(d) (1) Cast-in-place septic tanks shall have a minimum wall, floor and lid thickness of 4 inches of concrete.

(2) Cast-in-place septic tanks subject to overburden loads not in excess of 2 feet of fill and not subject to vehicular loads shall be as follows:

Walls and floors shall be reinforced with #4 bars 6 inches on centers each way with continuity around corners. Bars shall be located in the center of the wall or floor slab. Lids spanning not more than 4 feet 6 inches may be reinforced with #4 bars 6 inches on centers short way and #3 bars 6 inches on centers long way and such bars shall be located one inch from the bottom of the slab.

(3) Cast-in-place septic tanks subject to overburden loads in excess of the loads set forth in Sub-paragraph (2) above shall support the load of a ten-ton truck and shall have poured concrete lids having not less than the following thickness and reinforcing:

SPAN OF LIDS	SLAB THICKNESS	BOTTOM REINFORCING — SPACING				
		#4	#5	#6	#7	#8
4'	7"	6"	7"	10"	12"	12"
5'	7"		5"	7"	10"	12"
6'	8"			6"	8"	10"

In addition to the bottom bars shown in the table, place #4 bars 6 inches o. c. in top of slab parallel to the bottom bars. Bottom bars shall be placed 3/4 inches from bottom of slab.



Temperature reinforcing lengthwise in the lid shall be No. 4 bars spaced 10 inches o. c.

Traffic lids for cast-in-place septic tanks subject to loads other than those described in this sub-section shall, when deemed necessary in the opinion of the Building Official, be designed by a Registered Professional Engineer.

(e) Ventilation of septic tanks and drainpipes shall be provided through septic tank inlet and outlet tees thence through the plumbing system and in no other manner.

(f) (1) All septic tank inlet tees shall be terra cotta or concrete and outlet tees shall be of terra cotta or concrete with a wall section of at least one inch and a cross-section area not less than the building sewer in connection therewith and not more than two times greater. Minimum difference between inlet and outlet invert elevation, 1 inch. (Inlet invert highest) Inlet and outlet tees shall be installed at ends of a septic tank and extended as follows: 5 inches above, 18 inches below liquid level line.

(2) Inlet and outlet tees shall be accessible through manholes provided in poured in place septic tank covers located directly above the tees. Such manholes shall be of a size not less than 22 inches by 22 inches.

(g) Septic tanks, drainfields, soakage pits, and drainage wells shall not be located within any structure.

(h) No septic tanks, drainfield or soakage pit shall be located, installed, and/or maintained within 50 feet, measured horizontally, from any water supply well where water from such well is or may be used for human consumption, bathing or swimming.

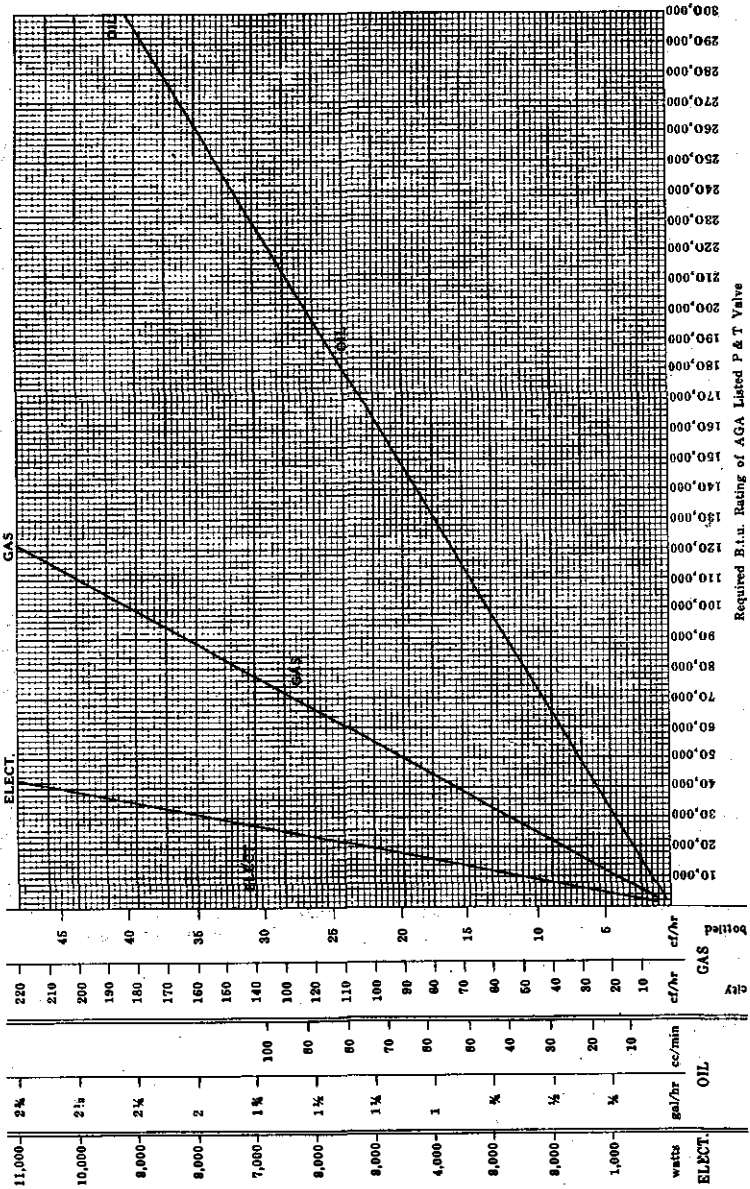
(i) Unless otherwise approved by the Building Official, by reason of special design, no excavation shall be made within the angle of pressure as transferred from the base of an existing structure to the sides of an excavation on a 45 degree angle.

**4615.6 FACTORS GOVERNING THE TYPE AND METHOD OF DISPOSAL OF SEWAGE AND LIQUID WASTES:** (a) Any person or persons designing, constructing and/or installing sewage and/or liquid waste disposal systems shall in the design, installation or construction of such systems may be governed by the following factors:

Where a public sewer exists, factors governing shall include:

- (1) The character and quality of sewage and/or liquid waste.
- (2) The availability of a public sewer.

**TABLE 46-S**



- (3) The design or unused flow capacity of the available public sewer as set forth in Sub-sections 4605.2 and 4605.4.
- (4) For rainwater disposal Sub-sections 4605.2 and 4605.4.
- (5) The design or unused flow capacity of the existing plumbing system; whether such system is capable of accommodating the load as determined by the Plumbing Inspector and as otherwise limited by this Code.

Where no public sewer exists or where a public sewer or plumbing system is inaccessible or is not capable of accommodating an added load, governing factors shall include

- (1) The character and quality of sewage and/or liquid waste.
- (2) Location of the disposal system.
- (3) Soil porosity.
- (4) Underground water level.
- (5) Underground potable water.
- (6) Chloride content of underground water.
- (7) For rainwater disposal see Paragraph 4611.4(b).
- (8) The design or unused flow capacity of the existing plumbing system; whether such system is capable of accommodating the proposed load as determined by the Plumbing Inspector and as otherwise limited by this Code.
- (9) Elevation of ground level.

**(b) ABSORPTION OF DRAINAGE** Any liquid wastes containing material which retards or prevents absorption of drainage in the ground shall be disposed of and treated in a manner acceptable to the Plumbing Inspector and the Florida State Board of Health.

**(c) EXCEPTION TO DRAINFIELD REQUIREMENTS:** Where ground is exceptionally impervious where the water table is too close to the surface; in an old installation to correct an unsanitary condition; or where other exceptional conditions prevail making the installation of a drainfield in accordance with the provisions of this Code impractical, then the Plumbing Inspector or Broward County Health Department may waive the usual requirements herein and permit the installation of such type of drainfield or substitute therefor as he and the Florida State Board of Health may deem practical.

**(d) PERCOLATION TESTS REQUIRED:** Where soil porosity appears to be of a less than usual character, the Plumbing Inspector or Broward County Health Department may require, when in his opinion it is necessary, a percolation test and/or core boring to be made. The results of such tests shall be submitted to the Plumbing Inspector or Broward County Health Department and shall determine deviation from requirements as set forth in this Code. The person designing such work and/or the owner shall furnish and supply such information.

**TABLE 46-T**  
**MINIMUM REQUIREMENTS FOR SEPTIC TANKS FOR NORMAL RESIDENTIAL USE UP TO 8 BEDROOMS**  
**(Based on 2 persons per bedroom) AND 1200 GALLONS EFFECTIVE CAPACITY\***  
**(For Tanks over 1200 Gallons, see Sub-section 4615.2)**

Persons Connected	Capacity Required	Capacity for Plan	Length Inside	Width Inside	Top Slab Section**	Air Space	Liquid Depth	Bedrooms Served	Drainile Requirements
1- 4	600	630	7'-0"	3'-0"	3"	8"	4'	2	120 sq. ft.
5- 6	700	735	7'-0"	3'-6"	3"	8"	4'	3	140 sq. ft.
7- 8	800	825	7'-6"	3'-8"	3"	8"	4'	4	160 sq. ft.
9-10	900	920	8'-0"	3'-10"	3"	8"	4'	5	180 sq. ft.
11-12	1000	1020	8'-6"	4'-0"	4"	8"	4'	6	200 sq. ft.
13-14	1100	1125	9'-0"	4'-2"	4"	3"	4'	7	220 sq. ft.
15-16	1200	1215	9'-0"	4'-6"	4"	8"	4'	8	240 sq. ft.

\*The minimum requirements for residences are based upon the following factors: 600 gallons capacity and 100 sq. ft. of drainile for the first 2 bedrooms. An additional 100 allons capacity and an additional 25 feet of drainile for each added bedroom up to a maximum of 1200 allons capacity and 250 feet of drainile.

\*\*Top slabs require No. 3 steel, set six inches on centers each way for normal overbearing loads. One-piece top slabs poured in place require four inch tops. For tanks placed under driveways, or elsewhere where overbearing load is above normal, see Paragraph 4615.5(g).

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**Broward County Health Department after site consideration.**

**TABLE 46-U**  
**MINIMUM CAPACITIES UP TO 1200 GALLON CAPACITY FOR SEPTIC TANK AND LENGTH OF DRAINPIPES**  
**FOR SINGLE STORE, FACTORIES AND/OR OTHER PLACES OF EMPLOYMENT, NOT INCLUDING STORES**  
**OCCUPIED AS BARS, AND/OR EAT AND DRINK ESTABLISHMENTS**  
 (See separate liquid waste disposal requirements, as set forth in Paragraph 4615.6(d))

10 person occupancy* or 1 store	15 person occupancy* or 2 stores	20 person occupancy* or 3 stores	30 person occupancy* or 4 stores	50 person occupancy* or 5 stores	Over 50 person occupancy*
600 gallon Septic Tank, 120 square feet draintile.	700 gallon Septic Tank, 140 square feet draintile.	800 gallon Septic Tank, 160 square feet draintile.	1000 gallon Septic Tank, 200 square feet draintile.	1200 gallon Septic Tank, 240 square feet draintile.	Over 1200 gallon, see Section 4615.2.

\* Occupancy shall be deemed to mean the number of persons who work in a store.

**TABLE 46-V  
MINIMUM CAPACITIES FOR SEPTIC TANKS AND LENGTH  
OF DRAINPIPES FOR WATER CLOSETS, URINALS AND  
LAVATORIES IN BARS, AND/OR EAT AND DRINK  
ESTABLISHMENTS.**

**Paragraph 4615.6(d)**

Up to 25 persons	26 to 50 persons	51 to 100 persons	For tanks over 1200 gallons. see Paragraph 4615.2 for requirements.
600 gallon Septic Tank with 100 sq. ft. draintile.	900 gallon Septic Tank with 175 sq. ft. draintile.	1200 gallon Septic Tank with 250 sq. ft. draintile.	

Drive-in restaurants. One person per 100 square feet of parking area. Occupancy content shall be determined on the basis of 30 linear inches of counter space for establishments serving food, but no alcoholic beverages, or 18 linear inches of counter space for establishments where alcoholic beverages are sold or shall be determined as set forth in Part III herein.

**4615.7—GENERAL PROVISIONS COVERING THE CONSTRUCTION OF DRAINFIELDS:** The following provisions shall apply to and govern the installation, design and method of all work and material in connection with septic tanks, drainfields, soakage pits and drainage wells:

(a) Drainfields from private sewerage and liquid waste disposal systems shall not be placed under any impervious paving or in an area where they may be subject to damage by vehicles.

(b) To provide equal distribution of effluent from a septic tank, distribution boxes having a minimum size of 18 inches by 18 inches inside dimension shall be in all installations as follows:

(1) Where more than two branch lines are taken off of the main effluent line of a septic tank, all branches shall be taken off the main line within ten feet of the septic tank outlet.

(2) Where more than one reservoir type lateral is required, each field lateral line shall be connected separately to the distribution box and shall not be subdivided.

(3) The invert of all box outlets shall be level and the inlet invert of all lines shall be at least one inch above the invert of the box outlet.

(c) The minimum requirements for septic tanks and square feet of drainfield shall be as set out in Tables 46-T, 46-U and 46-V. The minimum size of soakage pits shall be as set out in Paragraph 4615.6(g).

(d) Minimum spacing of drainfield tiles from center to center when laid in trenches shall be . . . . . 32 inches

(e) Minimum cover over drainfield tile shall be . . . 10 inches

(f) Maximum cover over drainfield tile shall be . . . 20 inches

(g) Grade of drainfield tile shall be not less than two inches nor more than four inches per 100 feet.

**NOTE:** A grade of two inches per 100 feet is approximately one-sixteenth inch per three feet; four inches per 100 feet is approximately one-eighth inch per three feet.

(h) Maximum length of a single drainfield tile line shall be 75 feet.

(i) Maximum width of drainfield tile trenches shall be 24 inches.

**NOTE:** One lineal foot of four-inch tile in a 16-inch wide trench shall be considered equivalent to one square foot trench.

(j) Minimum inside diameter of drainfield tile shall be four inches.

(k) Minimum depth of washed drainfield rock required under drainfield tile for the full width of a sixteen inch trench shall be 6 inches.

(l) Drainfield tile shall be enclosed in washed drainfield rock for the full width of the trench and brought up to the top of the drainfield tile.

(m) The space between ends of drainfield tiles shall be one-fourth inch.

(n) Minimum width and length of bituminous saturated paper (or equal) required over space between drainfield tile shall be four inches by sixteen inches.

(o) Minimum weight of bituminous saturated paper shall be thirty pounds per square.

(p) Minimum distance from structure foundation for any drainfield shall be 5 feet.

(q) Minimum distance of edge of excavation for septic tanks, drainfields and soakage pits to lot lines not including street property lines shall be 24 inches.

(r) Minimum distance, as measured horizontally, from septic tanks, drainfields and soakage pits from any domestic water supply well shall be 50 feet.

(s) Minimum distance from drainfields to soakage pit shall be 10 feet.

(t) Minimum distance from drainfields and/or soakage pit to basement walls or to lower terraced area shall be 10 feet.

(u) The reservoir type drainfield may be substituted for four-inch drantile under the following conditions:

(1) The units comprising the reservoir in this type of drainfield shall have an internal or storage capacity or area equivalent to four times that of the internal area or capacity of four-inch drantile.

(2) The excavation for the reservoir type drainfield shall be a maximum width of four feet and a minimum length consistent with Tables 46-T, 46-U and 46-V based on the square feet area of the trench bottom. The standards and specifications for drantile as set forth in the American Society for Testing Materials Standard C4 shall be approved, where applicable; such applicability to be determined by the Plumbing Inspector acting for and in the public interest. The Plumbing Inspector may assume all prerogatives as are assigned to the purchaser by C4, if such prerogatives are not exercised by the purchaser in fact.

**4615.8 COMPRESSION AND STRENGTH TESTS:** For compression and strength tests and testing procedure see Sub-section 4615.11.

**4615.9 CONSTRUCTION AND INSTALLATION:** (a) The minimum width of reservoir drainfield trench shall be four feet. The minimum depth of drainfield rock under the reservoir unit shall be six inches.

(b) Minimum drainfield rock on both sides of the reservoir unit shall extend the full width of the trench and to a height not lower than the top of the reservoir unit.

(c) Grade away from the septic tank or distribution box shall be a minimum of two inches per 100 feet and a maximum of four inches per 100 feet.

(d) The length of a single reservoir drainfield line shall be a maximum of 75 feet.



(e) Adjacent reservoir units shall be butted to each other where a suitable slot or fixed opening is provided in the construction of the reservoir unit for effluent seepage. Where such slot or opening is not provided, a distance of one-quarter inch shall be maintained between adjacent reservoir units.

(f) The top seam created by the joining of adjacent blocks shall be covered by one of the following methods:

(1) Each seam shall be covered by a strip of 30 pound per square bituminous saturated paper four inches by suitable length to cover the top, seam, and four inches down each side.

(2) The reservoir unit shall be covered for the entire length of the field with a piece of 30 pound per square bituminous saturated paper of suitable width to cover the top and four inches down each side.

(3) The joints shall be mortared.

(4) Strips of 36 inch wide 30 pound per square bituminous saturated paper shall cover the entire length of field.

**NOTE:** If option 1, 2, or 3 are used, a strip of non-treated paper 48-inches wide shall be placed over the rock area the entire length of the field before backfilling.

(g) A tight-jointed pipe, from either the septic tank or the distribution box, shall be laid into the fixed reservoir unit and the pipe mortared closed.

(h) The tight-jointed pipe shall enter or connect with the reservoir unit to make useable, without flooding the inlet pipe to the septic tank, the storage capacity used in calculating the required capacity of the reservoir unit. **EXCEPTION:** Officially designated critically low areas.

(i) The lower end of terminus of the reservoir drainfield shall be sealed by mortar or by mortaring a concrete block across the opening.

(j) No single change of direction of a reservoir drainfield shall exceed 90 degrees.

(k) The minimum cover over the top of the reservoir unit shall be six inches.

(l) The maximum cover over the top of the reservoir unit shall be twelve inches.

**4615.10 DISPOSAL OF DOMESTIC, CLOTHES WASHER LIQUID WASTE FOR SINGLE AND DUPLEX RESIDENCES:** Liquid waste discharged from domestic clothes washers may be disposed of as follows:

(a) One machine; 40 square feet area of drainfield.

(b) Two machines; 80 square feet area of drainfield.

**TABLE 46-W**  
**QUANTITIES OF SEWAGE ANTICIPATED FOR DESIGN OF**  
**DISPOSAL SYSTEMS ON LARGE (over 1200 gal. day) UNITS**

Type	Gal/Day/Person
<b>RESIDENCES, SINGLE</b>	
Small dwellings and cottages . . a . a . . . . .	50
Large dwellings with numerous fixtures . . . . .	75-100
Luxury residences and estates . . . . . a . a . . . . .	100-150
<b>RESIDENCES MULTIPLE AND HOTELS</b>	
Apartment houses . . . . .	50
Rooming houses . . . . .	50 (no kit.)
Boarding houses . . . . .	50
Hotels with connecting baths . . . . . a . . . . .	50
Hotels with all private baths (2 persons/room) . . . . .	50 (State)
<b>SCHOOLS, THEATER, CHURCH</b>	
Day schools without cafeterias or gym . . . . .	8
Day schools without cafeterias but with gym . . . . .	16
Day schools with cafeterias but no gym . . . . .	12
Day schools with cafeterias and gym (showers) . . . . .	20
Day workers at schools and offices . . . . .	15
Boarding schools . . . . .	75
Theater (school auditoriums separate sys- tem) (7 sq. ft. of floor area per seat) . . . . .	2
Church, per seat . . . . .	2
<b>MISCELLANEOUS</b>	
Hospitals . . . . .	150-250 plus
Public institutions other than hospitals . . a . . . . .	75-125
Public picnic parks (toilet wastes only) per picnicker . . . . .	5
Public picnic parks with bathhouse, showers, toilets . . . . . a . a . a . . . . .	10
Swimming pools & bathing places . . . . .	10
Country clubs per resident member . . . . .	100
Country clubs per member present . . . . .	25-50
Factories (per person per shift) (exclusive of industrial waste) . . . . .	15-35
<b>TRAILERS AND CAMPS</b>	
Tourist camps or trailer parks with individual bath units . . . . .	50
Trailer Parks per trailer with own baths . . . . .	120 (per trailer)
Trailer Parks with central bath house (use 3 persons per trailer space) . . . . .	35

**4615.11 TESTING, STRENGTH REQUIREMENTS AND REPORTING OF TESTS:** (a) **THREE-QUARTER INCH DRAINFIELD ROCK:** All rock referred to herein which is designed as a filter material for use in connection with drainage works shall meet the specifications of  $\frac{3}{4}$  inch drainfield rock. Three-quarter inch drainfield rock shall be held to mean washed rock 100 percent of which will pass a one-inch screen and 0 to 100 percent of which will pass a one-half inch screen. (See 4615.11 (d).)

(b) **FOUR-INCH DRAINTILE FOR NON-VEHICULAR TRAFFIC AREAS:** Four-inch draitile for non-vehicular traffic areas shall conform to A.S.T.M. specifications for draitile (C4-55). Physical test requirements shall not be less than those of standard draitile. A monthly report of tests shall be required. (See 4615.11 (d)c)

(c) **RESERVOIR DRAINFIELD UNIT:** Reservoir drainfield units shall conform to or exceed the following strength requirements where anticipated loads will not be in excess of H-10 or 10 ton trucks. The provisions of C-4 shall apply where applicable. Physical tests shall be conducted as follows:

(1) Where the unit is of one piece construction, the lower surface (which in an actual installation would be in contact with the gravel bed) shall be tested in a plaster of paris bed, or placed in a sand box having a sand bed not less than two-inches thick.

(2) Where the unit is made up of component parts these components shall be assembled as in an actual installation and bedded as above.

(3) The application of the test load shall be as set forth in C-4 section 29 and the load transmitted through an eight-inch by eight-inch steel plate sufficiently thick to uniformly transmit the anticipated loads. The eight-inch plate may be bedded to compensate for inequalities of the upper surface and shall be so placed on the upper surface of the reservoir unit as to render the most severe test conditions.

(4) Tests shall be made on not less than five individual specimens of random selection. The average load sustained shall be 5,500 pounds total load and no single specimen shall fall below 25 percent of the average.

(5) Where there is a single span and vertical supporting sides to the reservoir unit, the above provision shall apply. Where uniqueness of shape or multiple spans indicate deviation from the above provisions then such additional information shall be supplied by the manufacturer or his agent to the satisfaction of the Plumbing Inspector or Broward County Health Department. Such information and/or evidence shall be provided prior to consideration for acceptance and the requirements of test procedure and strength shall become a condition of acceptance and/or continued acceptance.

(d) **TESTS and REPORTS:** All persons, firms or corporations selling or offering for sale three-fourths-inch drainfield rock, four-inch draitile or reservoir drainfield units or components of reservoir drainfield units shall have such tests made as are necessary to maintain product control within the limits set forth above and cause to have not less than one monthly report made to the Plumbing Inspector or Broward County Health Department by a recognized, qualified and independent testing laboratory stating all test results of the preceding month.

(e) **TEST RESULT:** Any product, the required monthly reports of which do not show maintenance of minimum product standards as set forth in this Code shall not be approved for use. Any installations made during a period when monthly reports indicate the product fails to comply shall be investigated and representative tests made. If the products in such installation fail to comply, the Plumbing Inspector shall order removal of the products from the site or redesign based on the qualities indicated by test.

#### **4616 POTABLE WATER SUPPLY WELLS**

**4616.1 POTABLE WATER SUPPLY WELLS:** (a) All premises intended for human habitation or occupancy shall be provided with a supply of pure and wholesome water.

(b) Well casing shall be continuous, of new pipe, and shall be driven to a suitable aquifer. Pipe six inches or less in diameter shall be galvanized.

(c) Well shall be developed and free of all loose sand and stone.

(d) Draw down shall not be excessive.

(e) A tee, of the same size as the casing, shall be installed on the top of the well to allow for proper inspection, introduction of disinfecting agents, and for measurements of depth and static water level.

(f) A soft seat valve of 200 pounds water test, either spring-loaded or flapper type, shall be installed as close to the wall as is practicable. Check valves shall be all brass up to and including two-inch size and for three inches or over may be brass or iron body.

(g) The suction line shall be of a size to furnish water in sufficient volume and adequate pressure.

(h) The suction line from the well to the pump shall be not less than one-inch size, shall pitch toward the well and shall contain no loops or high points. Suction pipe 40 feet or more in length shall be increased to the next pipe size.

(i) A union or slip coupling shall be installed in the suction line just before the pump.

(j) Piping, from pump to tank, shall not be smaller than the discharge outlet size of the pump.

(k) A gate valve, with handle removed, shall be installed in the piping between the pump and tank, where the tank is more than 42-gallon size. All tank installations should be provided with a minimum  $\frac{3}{4}$ -inch valve on the discharge side of such valve.

(l) Tank shall be of a size to maintain water storage to adequate capacity and to prevent excessive cycling of pump, and shall not be less than 42 gallon capacity for each single family residence.

When the yield or storage capacity of a well is limited, or if in the opinion of the Plumbing Inspector, additional storage is necessary, pressure tanks of larger storage capacity may be required.

(m) Adequate pressure switch and air volume control or other means of providing balance of air and water in the tank shall be provided.

(n) The pump and tank system shall be subject to such tests as will effectively disclose all leaks and defects.

(o) Pump and tank shall be installed with regard to spacing as to be reasonably accessible for repair.

(p) Wells shall be so located as to be free of danger of contamination from unsafe water supply and shall be at least 50 feet from a septic tank, drain field, soakage pit or discharge well and of sufficient depth to provide pure and wholesome water.

(q) Before a new potable water supply well, or one which has been repaired, is placed in use, it shall be disinfected in accordance with the method approved by the Broward County Health Department and shall be pumped clear of the disinfecting agent after the disinfection has been completed.

(r) A water supply well used for domestic purposes shall be drilled to a depth of not less than 20 feet, except and unless a lesser depth is specifically approved by the Broward County Health Department.

(s) The type and capacity of the pump, equipment, suction and pressure lines and tank shall not be less than specified in Table 46-X.

(t) No well shall be located within any structure, nor under the roof or projection of any building structure unless specific approval is granted by the Plumbing Inspector.

(u) A concrete pad, 4 inches thick shall be poured around the well, and shall extend 18 inches on all sides. This pad shall be placed immediately below the tee and suction line and shall slope outwardly.

**4616.3 WATER SUPPLY WELLS FOR IRRIGATION AND PRIVATE SWIMMING POOLS:** Water supply wells for irrigation purposes and for private swimming pools shall be as set forth in Paragraphs 4616.1(a), (b), (c), (d), (e), (p) and (t).

**4616.4 CLOSED WELL SYSTEMS:** (a) Location of air conditioning supply wells shall be as distant as practicable or as necessary from disposal wells to minimize cross-circulation.

(b) Air conditioning supply wells shall be located not less than 25 feet horizontally from a septic tank, drain field, or soakage pit.

**4616.5 DISPOSAL AND DISCHARGE WELLS:** (a) A discharge well shall be drilled to an aquifer yielding water having a chloride content of not less than 1500 P.P.M. as chloride. A discharge well for a public swimming pool shall, if such stratum is not available, then be deeper than any supply well in the area. A discharge well for any area drain, rainwater or roof water disposal shall be preceded by a settling tank of approved design and capacity.

(b) Disposal wells shall be approved by the Broward County Board of Health before a permit is issued.

**TABLE 46-X**  
**(Predominately for Flush Tanks)**  
**TANK AND PUMP SIZE REQUIREMENTS**

Fixture Units	Supply Required G. P. H.	Diameter of Suction	Diameter Pressure Pipe	Diameter Service Pipe	Size of Tank	H. P.	Families	Stores	Well Size
23	720	1	$\frac{3}{4}$	$\frac{3}{4}$	42	$\frac{1}{2}$	1		$1\frac{1}{2}$
30	900	$1\frac{1}{4}$	1	1	82	$\frac{3}{4}$	1		2
40	1200	$1\frac{1}{4}$	1	1	120	$\frac{3}{4}$	1		2
11	720	1	$\frac{3}{4}$	$\frac{3}{4}$	42	$\frac{1}{2}$		1	$1\frac{1}{2}$
24	900	$1\frac{1}{4}$	1	$\frac{3}{4}$	82	$\frac{3}{4}$	2	2	2
37	1300	$1\frac{1}{2}$	$1\frac{1}{4}$	1	120	$\frac{3}{4}$	3	3	2
45	1500	$1\frac{1}{2}$	$1\frac{1}{4}$	1	220	1	4	4	2
53	1650	2	$1\frac{1}{4}$	$1\frac{1}{4}$	220	1	5	5	2
62	1880	2	$1\frac{1}{4}$	$1\frac{1}{4}$	220	$1\frac{1}{2}$	6	6	2
71	2130	2	$1\frac{1}{2}$	$1\frac{1}{4}$	315	$1\frac{1}{2}$	7	7	$2\frac{1}{2}$
80	2400	2	2	$1\frac{1}{2}$	315	2	8	8	$2\frac{1}{2}$
89	2600	2	2	$1\frac{1}{2}$	525	2	9	9	$2\frac{1}{2}$
98	2700	2	2	$1\frac{1}{2}$	525	3	10	10	3

**EXCEPTIONS:** Variance from the above table may be permitted provided that detailed plans and calculations are submitted to the Plumbing Inspector for approval. Such calculations shall be based on Table 46-Q and B.M.S. 66 National Bureau of Standards Publication.

## 4617 FIRE-EXTINGUISHING APPARATUS

**4617.1 STANDPIPES:** (a) **WHERE REQUIRED** Wet standpipes having a primary water supply constantly or automatically available at each hose outlet shall be provided in buildings hereafter erected, or existing buildings altered to increase the area or height of occupancy, as set forth in Section 3803. A permit for a standpipe system shall be required as set forth in Sub-section 4601.5 and inspections shall be as set forth in Sub-section 4601.6

(b) **STANDARDS:** Standpipe systems and materials required by this Code shall comply in all respects with the regulations of the National Board of Fire Underwriters standards where not contrary to the specific requirements set forth herein.

(c) **MATERIALS:** Standpipes shall be of wrought iron or galvanized steel, and together with fittings and connections shall be of sufficient strength to withstand 100 pounds per square inch of water pressure at the topmost outlet.

(d) **TESTS:** (1) Tests shall be conducted by the owner or contractor in the presence of the Plumbing and/or Fire Inspector. The tests shall be applied at the top or bottom connections of such standpipes and the owner or contractor shall be responsible for any damage caused by breakage or faulty installation while such tests are being conducted.

(2) Standpipe systems four inch in size and over shall be tested hydrostatically at not less than 200 pounds per square inch pressure.

(3) Standpipe systems under four inch in size including service lines shall be tested at normal working pressures.

(e) **SIZES:** (1) Standpipes shall have an internal diameter sufficient to deliver 250 gallons of water per minute under 100 pounds per square inch pressure at any two hose connections for buildings of Groups A and B occupancies and any one hose connection for buildings of any other occupancy. In no case shall the internal diameter of a standpipe be less than two inches.

(2) Recognized formulas which determine pipe sizes on a pressure-drop basis shall be used to determine pipe sizes for standpipe systems. The Plumbing Inspector may require delivery and pressure tests on completed standpipe systems before approving such systems.

(f) **HOSE-STATION VALVE OUTLETS:** All standpipe hose stations shall be equipped with a two and one-half inch valve, adapted for a two and one-half inch N-S-T fire department hose connection in each outlet, including the basement, and located not less than five feet and six inches, nor more than six feet, above the floor. Easily removable two and one-half by one and one-half inch adapters may be placed in valve outlets. All standpipes in buildings three stories or three stories or more in height shall extend above the roof a minimum of 18 inches and be equipped

with a two and one-half inch gate valve and a two-way two and one-half inch outlet, adapted for a Fire Department two and one-half inch N-S-T hose connection.

(g) **HOSE AND HOSE REELS:** Each hose station outlet shall be fitted with a hose not less than one and one-half inches minimum in diameter. Such hose shall be equipped with an approved brass or bronze nozzle and shall be of the required length but not exceeding 100 feet. An approved standard form of wall-hose reel or rack shall be provided for the hose and shall be located so as to make the hose readily accessible at all times, recessed in the walls or protected by suitable cabinets.

**4617.2 WATER SUPPLY:** (a) **REQUIRED:** All sprinkler systems, standpipe and yard hydrants shall be connected to the community water supply wherever available, in accordance with Section 4613. "Available" shall be considered to be within 150 feet from a street water main of not less than four-inch diameter as measured from the nearest point of the building. Where community water service is not available or where the water pressure is insufficient to maintain 25 pounds pressure at the topmost outlet, connection to a gravity tank, pressure tank or fire pump shall be required; and such supply shall be sufficient to furnish 25 pounds of pressure at the topmost outlet. The minimum size for water supply service shall not be less than the required size for the equipment served.

(b) **GRAVITY TANKS:** (1) Tanks shall have a capacity of not less than 2500 gallons for the first standpipe plus 1000 gallons for each additional standpipe and/or an amount to operate a hose-outlet and the sprinkler system (if any) on anyone floor for a period of not less than ten minutes. Such tanks shall be located to provide not less than 25 pounds pressure at the topmost outlet for its entire supply; and where storage tanks are used for domestic purposes, the supply pipe for domestic purposes shall be located to maintain such minimum-required fire-fighting capacity.

(2) Tanks shall be equipped with a ladder and platform, drain pipe, water and pressure gauges. Incombustible supports shall be provided for all supply tanks. Supply pipe for fire-extinguishing apparatus shall lead from the bottom of the tank and shall be provided with a horizontal check valve protecting the tank.

(3) Where pressure on fire hose openings exceed 65# P.S.T., an adequate calibrated pressure reducing valve shall be installed at each hose station valve outlet.

(c) Every water supply service for fire-extinguishing apparatus that required a fire-department connection shall have an approved Underwriters' horizontal check valve accessibly located inside the property line.

(d) **PRESSURE TANKS AND FIRE PUMPS:** Detailed plans shall be submitted to the Building Official, Fire Department and Plumbing Inspector where pressure tanks and fire pumps are proposed. Pressure tanks and fire pumps shall be permitted only where a qualified building superintendent, acceptable to the Building Official is employed. Pressure tanks shall be designed and maintained as required for gravity tanks and shall be tested and proved tight at a hydrostatic pressures 50 percent in excess of the working pressure required. Fire pumps shall have a capacity of not less than 250 gallons per minute with a pressure of not less than 25 pounds at the top-most outlet. The source of water supply



shall be a street water main of not less than four-inch diameter or a well or cistern containing a one-hour supply. Pumps shall be supplied with an adequate source of power and shall be automatic in operation.

**4617.3 FIRE-DEPARTMENT CONNECTIONS:** (a) Every standpipe system for inch and over and every sprinkler system, shall have a siamese fire-department inlet connection on a street-front wall of the building located not less than one foot, nor more than three feet, above the sidewalk or grade. Piping shall not project over public property. Approved, Underwriter, flush-type siamese shall be installed. Where a building is required to have two or more standpipes and faces on two streets, there shall be a siamese connection located on each street from wall, and all standpipes shall be cross-connected at their bases.

(b) Siamese inlet connections shall be not less than a two and one-half inch N.S.T. hose connection and/or a sufficient number of inlet connections to provide not less than 75 percent of the combined pipe area of standpipes. A legible sign with letters at least one inch high shall be securely attached to the exterior of the building adjacent to the siamese connection, and such sign shall read: "STANDPIPE" and/or "SPRINKLER" as applicable.

(c) All fire-department connections and all two and one-half inch valve outlets shall have N.S.T. hose threads uniform with that of the local Fire Department.

(d) Location of all fire-department connections shall be approved by the local Fire Department.

**4617.4 YARD HYDRANTS:** (a) Where required, yard hydrants shall not be located over 250 feet apart.

(b) The piping for yard hydrants shall be not less than four inches and shall be connected by screw fittings, flanges or unions.

(c) Hydrants shall have two and one-half inch connections with N.S.T. threads uniform with that of the local fire department and shall be housed in a hosehouse together with not less than 100 feet of standard two and one-half inch fire hose and an approved-type nozzle. Hosehouses shall have painted thereon the words, "FIRE HOSE," in legible letters not less than six inches high on all exposed sides. Locations of all yard hydrants shall be approved by the local Fire Department.

#### **4618 SWIMMING POOLS**

Public and private swimming pools shall be installed and maintained as set forth in Chapter 50 and in this Section.

#### **4619 TRAILER COACHES AND TRAILER PARKS**

**4619.1 SCOPE:** The design and installation of toilets and other plumbing facilities within dependent trailer coaches, and plumbing installations within trailer parks for the accommodation, use, and parking of independent trailer coaches, shall be as set forth herein.

**4619.2 DEFINITIONS:** (a) **BRANCH SERVICE LINE:** That portion of the water distributing system extended from the park service main to a trailer site and includes connections, devices and appurtenances.

(b) **DEPENDENT TRAILER COACH:** A trailer coach not equipped with plumbing fixtures for sewage disposal.

(c) **INDEPENDENT TRAILER COACH:** A trailer coach equipped with plumbing fixtures for sewage disposal.

(d) **PARK DRAINAGE SYSTEM:** The entire system of drainage piping used to convey sewage or other wastes from the trailer drain connection at its connection to the trailer site trap to a public sewer or private sewage disposal system.

(e) **PARK WATER MAIN:** That portion of the water distribution system which extends from the street main, water meter, or other source of supply to the branch service lines.

(f) **SERVICE CONNECTION** That portion of the water distribution system which extends from the termination of the park branch service line to the inlet fitting at the trailer.

(g) **TRAILER COACH:** A self-contained unit designed for the shelter of one or more persons as a residence or for other use, complying with the zoning or other applicable ordinances or laws, which can be readily moved or transported from one locality to another on its wheels.

(h) **TRAILER DRAIN CONNECTION or HOSE CONNECTION:** The removable extension, part of which shall be flexible connecting the trailer drainage system from the trailer outlet to the trap inlet on the trailer.

(i) **WATER-DISTRIBUTING SYSTEM:** All of the water supply piping within a trailer park extending from the main public supply, or other source of supply to, but not including the trailer service system, and shall include branch service lines, fixtures, devices, and appurtenances.

**4619.3 TRAILER PARKS: (a) SANITARY FACILITIES REQUIRED FOR DEPENDENT TRAILERS:** The minimum number of fixture units provided shall be as follows

<b>WOMENS</b> 1 toilet for each	<b>MEN:</b> 1 toilet seat for each
15 women	20 men
1 lavatory for each	1 urinal for each
20 women	25 men
1 shower bath for each	1 lavatory for each
20 women	20 men
	1 shower bath for each
	20 men

For completely sewerred trailer parks, the toilet facilities shall be based on  $\frac{1}{3}$  of the above requirements. For parks exceeding 100 trailers, the  $\frac{1}{3}$  ratio may be reduced to  $\frac{1}{4}$ . A minimum of one fixture of each type shall be installed for each sex.

There shall be one 2-compartment laundry tray for every fifty trailer coach spaces.

In determining the number of persons, the occupant content of each trailer shall be taken as three persons.

**4619.4 PERMIT REQUIRED:** (a) Before parking or permitting the parking of any trailer used or intended to be used by persons for any purpose other than only dead storage or strictly sales display, the owner of the property or the trailer park operator shall file application and obtain a permit from the Building Official as set forth in sub-section 4601.5. Plans and specifications shall be submitted with the application and such plans and specifications shall be in detail and shall clearly describe the following:

(1) A plan of the park, drawn to scale, indicating the spaces, area, site, or portion of the park for the parking of trailers.

(2) Detailed description, specification and location of the park sewerage and drainage system.

(3) Detailed description, specifications and location of water supply lines and source of water or details of water treatment plant, if independent source is used.

(b) Plumbing required herein shall comply with all applicable plumbing and health ordinances and regulations.

**4619.5 MATERIALS.** (a) All plumbing materials, fixtures, and appliances shall comply with the standards set forth in Table 46-C.

(b) All piping material hereafter installed in the park drainage system shall be of service weight cast iron.

**TABLE 46-Y  
SOIL PIPE DIAMETER AND NUMBER OF TRAILERS  
ON DRAINAGE SYSTEM**

<b>Size of Soil Pipe (inches)</b>	<b>Maximum Number of Trailers Individually Vented System</b>
3 .....	2
4 .....	30
5 .....	42
6 .....	100
8 .....	400
10 .....	1000

(1) Each trailer coach shall be considered as six fixture units in determining discharge requirements in design of sewage disposal systems.

(2) Branch lines or sewer laterals to individual trailer site shall be not less than three inches in diameter and may extend not more than 15 feet, measured horizontally, from a vented sewer line without a revert.

(3) All vent pipes shall be located at least ten feet from an adjoining property line and shall extend at least ten feet above ground level. All ventpipes shall be strapped and supported by at least the equivalent of a 4 x 4" post securely anchored in the ground. Supports shall be of rot and deterioration resistant material.

**4619.6 SEWER CONNECTIONS:** (a) Each sewer lateral shall terminate with a three-inch P trap into which shall be caulked a three-inch sanitary tee which shall terminate not less than four inches above grade, and be capped for use of trailers not properly trapped or vented. A three inch WYE shall be installed on the downstream side of the three inch trap and brought to grade and capped for use of trailers properly trapped and vented. No trap shall be more than 24 inches below grade.

(b) To provide the shortest possible trailer drain connection between the trailer outlet and trap inlet, all sewer laterals shall terminate with the trap located with reference to the location of the trailer on the site; traps shall be located at least 12 inches outside the area of the left wheels and within six feet of the rear third quarter of the trailer coach.

(c) Cleanouts shall be not less in size than the line they serve, but in no event need they be larger than four inches. A cleanout shall be provided at the upper terminal of each park drainage system, and at intervals of not more than 75 feet in straight runs. Cleanout shall also be located at any point in the line where a deviation occurs in excess of 45 degrees from a

straight line. Cleanouts shall be accessible and brought to grade.

(d) No sewage, waste water, or any other effluent shall be allowed to be deposited on the surface of the ground.

**4619.7 WATER DISTRIBUTING SYSTEM:** (a) Every trailer site shall be provided with an individual branch service line delivering safe, pure, and potable water. The outlet of the branch service line shall terminate on the same side of the site as the trailer sewer lateral.

(b) Each trailer park water distributing system shall be so designed and maintained as to provide a pressure of not less than 20 p.s.i. at each trailer site under normal operating conditions.

(c) The water distributing system shall be designed as otherwise set forth in this Chapter. The quantity of water required to be supplied to each trailer site shall be as required for six fixture units. The minimum size pipe in the water distributing system shall be not less than three-quarter inch in diameter.

(d) Where an independent trailer coach is connected to the park service connection an approved back flow prevention device shall be installed on the branch service line to each independent trailer at, or near, the trailer service connection.

(e) A separate service shut-off valve shall be installed in each branch service line. Where a backflow protective device is installed in accordance with sub-paragraph (d) of this sub-section, the service shut-off shall be located on the supply side of such device.

(f) The service connection shall be not less than three-quarter inch diameter; no rigid pipe may be used. Flexible metal tubing is permitted. Fittings at either end shall be of a quick disconnect type not requiring any special tools or knowledge to install or remove. Water supply lines to each trailer site shall have the point of connection with the individual trailer in either a horizontal or downward position.

**4619.8 CONNECTIONS TO SERVICE FACILITIES:** (a) When it is evident that there exists, or may exist, a violation of these rules, the owner, operator, lessee, person in charge of the park, or any other person causing a violation shall cause to be corrected immediately or disconnect the service connection and trailer drain connection from the respective park branch service line and sewer lateral.

(b) Trailer drain connections shall be of approved semi-rigid and non-collapsible hose having smooth interior surface and not less than three inches inside diameter. Drain connections shall be equipped with a standard quick disconnect screw or clamp-type fitting, not less in size than the trailer outlet. Drain connections shall be gas tight and no longer than necessary to make the connection between the trailer coach outlet and the trap inlet on the site.

**4619.9 MAINTENANCE:** All required devices or safeguards, shall be maintained in good working order. The owner, operator, or lessee of the trailer park or his designated agent shall be responsible for their maintenance.

**4619.10 TRAILERS PARKED NOT MORE THAN SEVEN DAYS:** The owner of a trailer and the owner, operator or lessee of the trailer park shall be responsible for the sanitation of the trailer where such trailer is to be parked for less than seven days and the sanitation in connection with such trailer shall be as set forth herein.

## Chapter 47 — Gas

The design, fabrication, installation, tests and operation of appliances, apparatus, accessory devices and systems using gas for heat, light or power, whether manufactured gas, natural gas, bottle gas or liquefied petroleum gas (L.P.) or mixtures thereof and the transportation, storage, handling, selling, offering for sale or installing of equipment using such gases shall be as set forth herein and in Chapters 39, 40 and 41.

Persons, firms or corporations engaged in the transporting, storing, handling, selling, offering for sale or installing equipment using liquefied petroleum gas shall comply with Chapter 24302, Acts of Florida 1947 and the 1955 and 1957 Amendments thereto and it shall be the duty of the inspection authority having jurisdiction to recognize only such persons as qualified as comply with this Act.

No person, firm, or corporation, other than the inspection authority and the owner of a distribution system, container and meter, shall set or remove, turn on or off, or in any way interfere with or tamper with such meters and such authorized person shall have the right to install and connect or disconnect and remove meters and their protective devices at their option and without permit when, in their opinion, the interest of safety are protected thereby.

## PART XIII — MECHANICAL VENTILATION

### Chapter 48 — Forced Ventilation

#### 4801 GENERAL

#### 4802 REQUIREMENTS BASED ON USE

##### 4801 GENERAL

**4801.1 SCOPE:** All portions of buildings customarily occupied by human beings shall be provided with ventilation by openings to the exterior as set forth in Part III, "Requirements Based on Occupancy," or by mechanical ventilation.

**4801.2 APPLICATION:** Mechanical ventilation shall be forced ventilation supplying outside air, as set forth in this chapter, or shall be air conditioning, as set forth in Chapter 49. Required forced ventilation supplying outside air shall be in operation when the building or portion thereof is occupied by human beings, and each room or space shall be separately considered; except that closets and similar minor spaces connected to the properly-ventilated main rooms need not be individually ventilated. The Building Official may waive or vary the requirements for forced ventilation and the supply of outside air or the exhaust of noxious, hazardous or otherwise objectionable fumes or vapors, subject to the consideration of the hazards, arrangement of building components and equipment, and of special equipment for specific conditions of use. The published "Standards" of the National Board of Fire Underwriters and the "Guide," as published by the American Society of Heating and Refrigerating and Air Conditioning Engineers, Inc., shall be accepted as standards of good practice.

##### 4802 REQUIREMENTS BASED ON USE

Subject to the consideration of the standards of good practice as set forth in Sub-section 4801.2, there shall be not less than one complete change of air in each occupied room or space every 30 minutes, except as follows:

(a) In buildings of Group A, B, C, or D occupancy there shall be a minimum of ten cubic feet per minute of outside air per occupant, but not less than one change of air every 30 minutes. If the velocity at the intake exceeds ten feet per second, the intake shall be placed not less than eight feet above the floor directly beneath.

(b) In all buildings used for storage or handling of automobiles operating under their own power, and in all buildings where flammable liquids are used or stored, exhaust ventilation shall be provided to produce one complete change of air every ten minutes. Such exhaust ventilation shall be taken from a point at or near the floor.

(c) In buildings or portions thereof used for dry-cleaning plants, there shall be a complete change of air every three minutes.

(d) In toilet rooms there shall be a complete change of air every three minutes.

(e) In below-grade vaults and equipment rooms, unless continuous ventilation is provided, there shall be a complete change of air every three minutes during periods of human occupancy.

(f) In paint-spray booths, woodworking shops, manufacturing places using plastics and similar hazardous locations, there shall be a complete change of air every minute.

## Chapter 49 — Air Conditioning and Refrigeration

### 4901 GENERAL

### 4902 STANDARDS

### 4903 DETAILED REQUIREMENTS

#### 4901 GENERAL

**4901.1 SCOPE** All air conditioning and refrigeration equipment shall be as herein set forth and existing installations not conforming with the requirements of this Chapter shall be made to comply when relocated, resized, or when altered or repaired, the cost of which exceeds 25 percent of the value of the existing installation.

**4901.2 PERMITS** (a) A permit, as set forth in Chapter 3, shall be required for the installation, alteration, or major repair of any air-conditioning or refrigeration system. A permit shall not be required for repairs that do not change the location, size or capacity of a compressor, condenser, coil, cooling tower, duct, or evaporating condenser.

(b) Application for permit shall be accepted only from a person or firm currently licensed and holding a Certificate of Competency as an air-conditioning or refrigeration contractor or from an owner, provided such owner is competent and otherwise qualified to do the work proposed.

(c) Applications for permit shall be accompanied by sufficient description to clearly define the proposed work. When the proposed work is for the installation or major alteration of a system of more than one and one-half ton capacity or is connected to two or more separately occupied areas, application for permit shall be accompanied by plans describing the proposed work. When the proposed work serves an occupant content of 100 or more persons, or has a value of ten thousand (\$10,000) dollars or more, such plans shall be prepared by and bear the impress seal of a qualified Registered Professional Engineer.

**4901.3 INSPECTION:** Inspections shall be requested and made at the following stages

- (a) Before concealing any portion of the system.
- (b) Final inspection.

#### 4902 STANDARDS

**4902.1** The following standards are hereby adopted as a part of this Code and supplement, but do not supersede, the specific requirements set forth hereina

(a) The American Standards Associations "Safety Code for Mechanical Refrigeration," ASA B9.1.

(b) The National Board of Fire Underwriters Pamphlet 90A.

(c) The National Board of Fire Underwriters Pamphlet 90B.

(d) The American Standards Associations "Code for Pressure Piping," ASA B31.1.

**4902.2** "The Guide," as published by the American Society of Heating and Refrigerating and Air Conditioning Engineers, Inc. shall be accepted as a standard of good practice.

## 4903 DETAILED REQUIREMENTS

**4903.1 WINDOW TYPE AIR CONDITIONING UNITS** All individual air-conditioning units installed in walls or windows shall be securely anchored to the walls by approved methods. Units installed over public property, paths of egress or more than ten feet above grade shall be secured to the structure by bolts or screws to resist horizontal wind loads. Such units cantilevering more than eight inches on the exterior of a building shall be supported by steel angle brackets secured by bolting. Bolts to masonry shall be set in lead shields or similarly rot-resistant fastenings.

**4903.2 NOISE CONTROL:** The following special requirements shall apply to the control and regulation of noise nuisance from air-conditioning machinery:

(a) All equipment, existing or hereafter installed, regardless of location, shall be maintained in good working order. Equipment so located that normal operating noises create a nuisance to adjacent owners or occupants shall be provided with sound proofing, or sound absorbing baffles, or enclosures, as approved, to insure maintenance of a reasonable noise level.

(b) All equipment on outer walls, on roofs, or in other exposed locations, which are unduly noisy, and which cause valid complaints from adjoining property owners or occupants, may be required to be relocated, redesigned and/or enclosed in noise retarding materials when, in the opinion of the Building Official, such enclosure is necessary or would be effective.

(c) Special consideration shall be given to the planning of all future installations to minimize the noise nuisance to adjoining property owners or occupants, and the Building Official shall have authority to reject or require the re-design, of any system which, in his opinion, would cause such a noise nuisance.

**4903.3 WASTE WATER:** Special consideration shall be given to the disposal of waste and over flow water, and means of disposal shall be subject to approval of the Building Official.

**4903.4 MAINTENANCE OF SYSTEMS:** All refrigerating systems shall be maintained by the user in a clean condition, free from accumulations of oily dirt, waste, and other debris, and shall be kept readily accessible at all times.

**4903.5 SIGNS REQUIRED:** (a) Each refrigerating system shall be provided with legible and securely attached permanent sign indicating thereon the names and addresses of the manufacturer and installer, the kind and total number of pounds of refrigerant required in the system for normal operations, and the refrigerant leak field test pressure applied.

(b) It shall be the duty of the person in charge of the premises on which a refrigerating system containing more than 50 pounds of refrigerant is installed, to maintain a conspicuously posted card as near as practicable to the refrigerant compressor giving directions for the operation of the system, including precautions to be observed in case of a breakdown or leak as follows:

(a) Instruction for shutting down the systems in case of an emergency.

(b) The name, address, and day and night telephone numbers for obtaining service.

(c) The name, address, and telephone number of the Building Official and instructions to notify said Building Official immediately in case of emergency.



**4903.6 LOCATION AND ACCESS:** (a) All air-conditioning and/or refrigerating equipment shall be located to be readily accessible for inspection or repair. To be accessible, such equipment shall have reasonable and adequate work room on all sides and above with all parts capable of being readily reached.

(b) No corridor, stair enclosure, passageway or other path of egress in a building, any part of which is normally used for sleeping purposes, shall be used for the supply or return of air; nor shall any air-conditioning or refrigeration equipment be installed therein.

(c) No attic, basement or concealed space in a building shall be used as an integral part of a duct system, unless it conforms to all the requirements for ducts.

**4903.7 OUTSIDE AIR SUPPLYS** All spaces where air-conditioning or mechanical refrigeration equipment is installed and which are normally occupied by persons shall be provided with outside air at a rate of not less than seven and one-half cubic feet per minute per person, except that such outside air shall not be required where a unit or units serve a single-family residence of Group I occupancy.

**4903.8 RESERVED**

**4903.9 COOLING TOWERS:** The recommendation set forth in "Standard on Water-Cooling Towers" adopted June, 1959 by the National Fire Protection Association shall be used as a guide to fire-protection of water cooling towers. Induced draft cooling towers of combustible construction located on the roofs of buildings more than two stories in height where the ventilation arrangements and/or use of the building are such that the tower may be anticipated to be out of service for more than a week at a time, shall be protected with automatic sprinkler devices as set forth in the standard.

## PART XIV — SWIMMING POOLS

### Chapter 50 — Swimming Pools

- 5001 GENERAL
- 5002 DESIGN
- 5003 CONSTRUCTION DETAILS
- 5004 WATER SUPPLY AND DISPOSAL
- 5005 EQUIPMENT
- 5006 INSPECTION

#### 5001 GENERAL

Pools shall comply with the requirements herein and public pools shall be constructed and operated to comply with the requirements of the State Board of Health. A pool type structure not more than 18 inches in depth nor more than 250 square feet in water surface area shall not, for the purpose of this Code, be considered a pool.

The standards set forth in this Chapter shall supplement, but not supersede other sections of this Code and specifically Part VI, Engineering and Construction Regulations.

#### 5002 DESIGN

**5002.1 PERMITS** (a) Applications for permit for the construction, installation, alteration, or major repair of a swimming pool shall be as set forth in Sub-section 302.1. Plans in duplicate shall be submitted for the approval of the Building Official and shall be in sufficient detail to show the following: a Plot plan to scale with relative elevations, description of sub-soil material, pool dimensions, depths, and volume in gallons, structural details of walls and floor, type and size of filter system (if any) with filtration and backwash capacities, pool piping layout with all pipe sizes shown, the pool pump capacity and the pressure or head at filtration and backwash flow when applicable, and waste disposal system, and details of the hydrostatic valve and collection bed where applicable.

(b) Application for permit to construct or operate a public swimming pool, bath house or related appurtenance shall be accompanied by plans with the State Board of Health approval stamped thereon.

**5002.2 MINIMUM REQUIREMENTS:** Every swimming pool design shall admit of rational analysis according to accepted engineering principles and all criteria hereafter noted are to be considered as minimum standards only.

**5002.3 PROFESSIONAL DESIGN:** Plans shall be prepared by and bear the seal of a Registered Professional Engineer for the following:

(a) A public pool as defined by the Florida State Board of Health.

(b) A private pool except that the Building Official may waive this requirement at his own discretion.

(c) Any pool requiring special consideration due to unstable soil or unusual ground water conditions.

**5002.4 HYDROSTATIC UPLIFT:** Any pool to be constructed in an area in which residual ground water creates hydrostatic head against the pool structure shall have a hydrostatic relief valve or sufficient mass weight and be designed to prevent floatation and structural failure.

**5002.5 MINIMUM EQUIPMENT** (a) All pools shall have at least one main outlet at the deepest point, one overflow connection for interior pools, one inlet and a filter system.

(b) Inlets and drains to pool shall be arranged to get effective and uniform circulation of the incoming water throughout the pool.

(c) Where approved, the filter system may be omitted in favor of a flow-through system.

(d) The turnover rate for all private pools shall be a minimum of once every 18 hours of operation. In a flow-through pool the water shall be wasted at this rate.

### 5003 CONSTRUCTION DETAILS

**5003.1 GENERAL:** (a) Reinforced concrete shall comply with Chapters 23, 24, and 25 and shall be Portland cement concrete having a 28-day compressive strength of not less than 2500 p.s.i.

(b) Floors shall have a minimum thickness of 4 inches of concrete and walls of reinforced concrete shall have a minimum thickness of six inches.

(c) Where practicable, reinforcing shall have three inches of concrete cover or be centered with the slab.

(d) Surrounding areas and/or walkways shall be constructed so as to not drain into the pool.

**5003.2 UNIT MASONRY WALLS:** Unit masonry walls of private swimming pools shall be designed and constructed as set forth in Chapters 23, 24, and 27. Block shall be 2-cell block laid with nominal 8-inch thickness in the wall and all voids shall be poured full with concrete having a minimum strength of 2500 p.s.i. in 28 days, and containing no aggregate larger than will pass a #3 sieve. Filling of voids will proceed in stages not to exceed 24 inches in height, or 12 times least dimension of void, whichever is the greater. Concrete shall be thoroughly rodded into voids. Walls with a height greater than 3' 4" shall have minimum vertical steel of #3 bars, 16" o.c.

**5003.3 PNEUMATICALLY PLACED CONCRETE:** Pneumatically placed concrete shall be as set forth in Sub-sections 5003.1 and 5003.2 except that walls may have a minimum thickness of six inches at the bottom and four inches at the top with reinforcing centered therein.

**5003.4 OTHER MATERIALS:** Other methods of construction of steel, plastic, aluminum and rot and corrosive resistive materials may be used for private pool subject to rational analysis based on accepted engineering principles and approval by the building Official.

**5003.5 WATER TIGHTNESS:** Any completed pool shall be watertight.

### 5004 WATER SUPPLY AND DISPOSAL

**5004.1 APPLICATION OF PLUMBING:** Piping in connection with swimming pools shall not be considered as being under the Plumbing Code, Chapter 46, except that pool piping will require plumbing permits and be subject to inspection by the Plumbing Inspector and that actual connections to potable water supply and sanitary sewers shall be in accordance with Chapter 46.

**5004.2 WATER SUPPLY:** The water supply for a swimming pool shall conform to the requirements of the State Sanitary Code.

**5004.3 DISPOSAL:** A suitable method of disposing a backwash water and for emptying the pool shall be provided.

(a) Where disposal is to sewers carrying sanitary or storm sewage or to a disposal well this connection shall be as set forth in Chapter 46 and there shall be no direct connection.

(b) Disposal to a drainfield, sprinkler system, open waterway, sump or irrigation or other approved means is permissible except that backwash water shall not be discharged through the sprinkler system.

#### 5005 EQUIPMENT

**5005.1 FILTRATION EQUIPMENT** Filtration equipment for public pools shall be in accordance with State Board of Health requirements. Filtration equipment for private pools shall be as follows:

(a) **SAND FILTERS — PRESSURE TYPE:** Pressure sand filters shall have a filtration rate not to exceed five gallons per minute per square foot of filter area and a minimum backwash rate of twelve gallons per minute per square foot of filter area. Filtering material shall consist of not less than 19 inches of suitable grades of screened sharp silica filter sand properly supported on a graded silica gravel bed, with the effective size of the particles of sand 0.4 to 0.5 mm with a uniformity co-efficient of 1.5 to 2.0. There shall be sufficient freeboard above the surface of the sand to the over flow troughs or pipes of the filter to permit a fifty per cent expansion of the sand during backwash cycle without loss of sand. Sand pressure filters shall be provided with pressure gauges on the influent and effluent lines and sight glass on the backwash line. The filter tank shall be of sheet steel construction either riveted or welded, hydrostatically tested to a pressure of 50 p.s.i. minimum. An inlet baffle shall be provided, and an indirect under drain to prevent loss of sand, and re-entry of sand into the pools proper. Tanks placed underground shall be steel at least 10 gauge in thickness, with non-corrosive exterior coating. A manhole, 11" x 15" minimum, and cover shall be provided on tanks 24-inch or larger. Tanks of construction other than steel may be used subject to the approval of the Building Official.

(b) **DIATOMACROUS EARTH FILTERS.** Pressure or vacuum type diatomaceous earth filters may be used providing the manufacturer's recommendations for filtration rate are not exceeded and that 3 gallons per minute per square foot of filter area is not exceeded. All diatomite filters are to have provisions for removing the filter cake by either backwash or by disassembly. Pressure filters are to be provided with a pressure gauge.

(c) **PUMPS:** All pumps supplied with and installed with a particular filter system shall be capable of the filtration and backwash rate at a head or pressure suitable for the filter and piping system with which it is used.

(d) **AIR RELIEF VALVE** An air-relief valve device shall be installed on each pressure filter tank at the high point of the filter tank.

(e) **GRAVITY FILTER:** A gravity type filter may be constructed providing a minimum of 36 inch deep filter bed, properly graded, and filter rate shall not exceed 1 gpm/sq. foot of filter surface area.

(f) **OTHER TYPE** Other types of filtration equipment may be used if approved by the Building Official. The minimum backwash rate shall be 12 gallons per minute per square foot of filter area.

**5005.2 SURFACE SKIMMING** An approved skimming device shall be installed on each filter pool or a scum gutter extending across the entire width of the pool at the one end shall be built into the pool structure. The water from the skimming device

shall be re-circulated. The water from the scum gutter shall be wasted as set forth in Section 5004.

**5005.3 PIPING:** (a) Copper, brass, cast-iron, wrought iron or standard weight galvanized pipe shall be acceptable and shall comply with the minimum standards set forth in Section 4604 for such materials. Plastic pipe may be used for all lines except potable water supplies on all private swimming pools as follows:

(1) The plastic pipe fittings shall meet the minimum requirements of the Society of Plastic Industries and the National Sanitation Foundation.

(2) Plastic pipe and fittings shall be extruded and molded from rigid unplasticized P.V.C. compound, or approved equal.

(3) All pipe shall be continuously marked to indicate its size, type, and schedule.

(4) High-impact P.V.C. or its approved equal may be used for all applications in private swimming pools except where an installation of superior chemical resistance is required and approved by the inspection authority having jurisdiction.

(5) Normal-impact P.V.C. or other approved material may be used when a chemical resistance material is required or when temperatures exceed those recommended for high impact P.V.C.

#### PHYSICAL PROPERTIES OF P.V.C.

PHYSICAL PROPERTIES	MATERIAL GRADE	
	High Impact	Normal Impact
Tensile Strength, room temperature p.s.i.	6,000	7,000
Modules of Elasticity in Tensions, p.s.i.	350,000	415,000
Flexural Strength, p.s.i.	11,500	14,500
Izod Impact, Ft. lb./in., notched, room temperature	10.0/15.0	0.8
Thermal Expansion, per Oc x 10 <sup>-5</sup>	10.	5.
Maximum operation temperature	130°F.	150°F.
Flammability, In Min.	Self Extinguishing	

(C) Piping shall be sized to operate at the rate flows for filtering and cleaning. In general, the water velocity in the pool piping should not exceed 10 feet per second. Where velocity exceeds 10 feet per second calculations should be submitted to show that rated flows are possible with the pump and piping provided.

(d) Materials not meeting the above characteristics shall be limited to pressure lines and must be rated at 75 p.s.i. at 77 degrees F. or over. Any applications of these materials shall be in strict conformance with the manufacturer's recommendations both as to materials and to installation procedure.

**5005.4 DIVING BOARD:** No diving board shall be installed in a pool whose greatest depth is less than 8 feet. A depth of not less than 8 feet and 6 inches shall be required for a one meter board. A depth of not less than 10 feet shall be required for a three meter board. The deepest section of the pool shall be no closer than ten feet from the deep end where the board is attached, and the break point in slope shall be four feet and six inches or deeper at a distance of twenty or more feet from the deep end wall. The diving board shall be so placed that the lateral distance between the center of the diving board and a side wall shall be at least seven feet six inches on a rectangular pool and the board shall extend at least two feet from the deep end wall. No diving board shall be installed in a pool less than 34 feet long.

**5005.5 WALL SLOPES:** All walls shall be vertical, except pool walls may run to the floor slab in a circular arc starting from the bottom of a 30-inch vertical section of wall measured downward from the waterline in depths of 3 feet 6 inches or greater.

**5005.6 LADDER:** Pools having a depth greater than 3½ feet shall be provided with a ladder or steps.

#### **5006 INSPECTION**

Inspection shall be requested by the permit holder and made by the inspection official for the following:

**5006.1 ELECTRICAL:** The Electrical Inspector shall require a permit for and inspect the installation of all wet and dry niche pool lights, pump motors, and other electrical equipment or accessories installed in conjunction with a private pool and such electric work and inspection shall be as set forth in Chapter 45.

**5006.2 PLUMBING:** The Plumbing Inspector shall require a permit for and inspect the installation of the water supply and disposal as set forth in Section 5004 and Chapter 46. Pool pressure piping, filter installation and waste disposal shall be tested and approved with all joints visible.

**5006.3 POOL:** The Building Official shall require inspection for the following:

(a) All reinforcing before any concrete is placed for floor, walls, and decks.

(b) Final inspection. Every installation shall have a test set for pH and chlorine. A waterproof instruction sheet shall be conspicuously posted at the control station which shall show the following:

(1) Complete instruction in the filter and backwash operation and the requirements for pool cleanliness.

(2) Regular use of chlorine or an equivalent sterilizing agent to insure a sterile pool. Quantity and frequency to be used. Such quantity and frequency shall conform to Section 21, Chapter XX of the State Sanitary Code.

(3) General instructions on techniques of adding required chemicals.

(4) Instructions for emptying pool if pool structure is subject to hydrostatic pressure.

(c) The owner shall demonstrate competent operation and knowledge of the system or method of chlorination before final approval for use of the pool. The Building Official may prohibit the use of a pool improperly maintained.

## LIST OF CODE STANDARDS

<u>SECTION</u>	<u>STANDARD</u>
515	ASA A117.1-61
1502.3	NFP A102-1957
2403.4(c)	ASTM E96-63T
2404.3(c)	AWPA C1-64 AWPA C3-64 AWPA C12-51
2404.6(f)	ASTM A-252-63AT ASTM A-245-64
2404.7	ASTM A-7-61T
2502.1	ACI 318-63
2502.2	ACI 711-56
2502.3	ACI 315-64
2502.4	ASTM A431-64
2502.5	ASTM A432-64
2502.6	AWS 12.1-61
2504.1	ASTM C150-61
2504.2	ASTM C33-64 ASTM C330-64T
2504.3	ASTM A15-64 ASTM A16-57T
2505.2(a)	ASTM C31-59 ASTM C39-64
2505.2(d)	ASTM C42-64
2506.2(d)	ASTM C94-64
2510.2(a)	ASTM 150-65
2510.3(b)	ASTM C39-64
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2604.1(b)	ASTM A185-64 ASTM B6-62T ASTM A90-53
2702.2(b)	ASTM C67-62
2702.2 (c) (1)	ASTM C62-62
2702.2 (c) (2)	ASTM C73-51
2702.2 (c) (3)	ASTM C55-64T
2702.5(b)	ASTM C90-64T
2702.6(b)	ASTM C112-52
2702.6 (c) (1)	ASTM C34-62
2702.6 (c) (2)	ASTM C57-57
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2702.7(b)	ASTM C473-62
2702.7(c)	ASTM C52-54
2702.10(a)	ASTM C270-64T
2702.10(b)	ASTM C144-62T
2704.2 (h) (2)	ASA A41.1
2801.3 (a)	AISC (see Section)
2801.3 (b)	AWS (see Section)
2801.3 (c)	AISC (see Section)
2801.3 (d)	AISC and ASTM
2802.2	ASTM A325-61T
2808.1	SJI May 27, 1959
2809.2	AISI Gage Metal, 1960
2902.1	NLMA Booklet - 1960
2902.2	CS 45-55 CS 122-56



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2902.3	R-16-53
2902.4	AITC 2nd Edition-1956
2902.5	CS 253-63
2904.2	Douglas Fir Plywood ASTM A361-64T
2905.9	CS 122
3001.2(a)	Alum. Alley 6061-T6, Vol. 82 No. ST3, May, 1956
3001.2(b)	Alcoa Structural Hdbk., 1960
3201.2(a)	ASA A17.1a, 1963
3201.2(b)	ASTM A90.1
3315	FIC LAD-1959 and 1960
3405.1	ASTM C222
3502.1	ASA A42.4-55
3502.2	ASTM C37-54
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3503.2 (d)	ASTM C61-64 C91-64
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3510.8	ASTM C36-62 ASA A97.1-1958
3701.1	ASTM E119-61
3706.1	UL & NBFU (see Section)
3710.2	ASTM E84-61
3801.2(a)	NFPA No. 13-65
3802.2	NFPA No. 12-64
3807.2	NFPA No. 10-65
3905.3	NFPA No. 90B-65 (incl. 62 amendments)
4001.2(a) (1)	NBFU "Heat App," 1955
4001.2(a) (2)	NBFU Pamphlet No. 54, June, 1959
4001.2(a) (3)	NBFU Pamphlet No. 58, June, 1961
4001.2(a) (4)	NBFU Pamphlet No. 59, June, 1962
4001.2(a) (5)	NBFU Pamphlet No. 52, June, 1956
4001.2(b)	ASA B31.1-1955
4002.6(c) (3)	ASTM B251-60 B16.22-51
4003.2	NBFU Pamphlet No. 31, 1963
4008.1(a)	ASME "Boiler & Pressure Vessel Code, 1959"
4102.1	NFPA 30-63

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4103.1	NFPA 31-65 NFPA 90A-65 NFPA 90B-65 NFPA 90A-63 NFPA 91-61
4103.2	NFPA 90A-63
4103.4	NBFU Pamphlet No. 33, 1961 Pamphlet No. 34, 1959 Pamphlet No. 91, 1961
4104	NFPA 40-1962
4106.2	ASME 1941
4107	Natl. Bureau of Standards  Handbook No. 48 Handbook No. 49 Handbook No. 50, 51 Handbook No. 53, 54, 55 Handbook No. 57, 58, 59, 60, 61 Handbook No. 65 Handbook No. 69
4108	NFPA 34-63
4505.1	NFPA 70-1965 NEC, 1962
4505.1(d)	NFPA Bldg. Exits Code, No. 101-63
4505.1(e)	S. OF FLA. HOTEL COMMISSION
4505.1(f)	NFPA No. 56, current edition
4604.3(c)	ASTM C200-64T
4604.6(a)	FS WW-P-351
4604.6(b)	FSsWW-F-351 ASTM B251-64
Table 46-C	ASA A106.3-1958 A40.1-1935 A21.2-1953 A40.5-1943 B16.4-1949 B16.12-1953 B36.2-1958 B36.23-1956

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H26.1-1963  
H3.1-1963  
B16.22-1963  
A40.2-1958  
G8.2-1964  
A21.4-1953  
B260-52T  
A40.4-1942  
A40.6-1943  
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C200-59T  
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A74-42  
A72-55T  
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B135-63  
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B121-55  
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A93-55T  
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SS-P-371a-1956  
SS-P-375 1956  
SS-P-356 1956  
SS-P-331a-1955  
WW-P-401 1951  
WW-P-421a-1955  
WW-P-356 1936  
WW-P-501C-1956  
WW-P-491C-1945  
WW-P-441b-1952

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WW-P-351 1930  
WW-P-460 1945  
WW-P-377b-1955  
WW-T-797 1932  
WW-T-799a-1946  
WW-P-325 1944  
QQ-L-156 1946  
QQ-L-201-Ia-1953  
QQ-B-611a-1938  
QQ-B-613 1954  
QQ-C-576a-1955  
QQ-I-716 1948  
WW-P-405 1944  
QQ-S-571c-1958  
HH-C-536c-1954  
WW-V54(2) 1954  
WW-V-58 1945  
WW-P-542a-1950  
WW-P-S41a-1950  
WW-P-541a-1950

CS 116-54  
CSs228-60  
CS 188-53

AWWA 1908

MSS SP-10

SPR 217-49

CS-95-41  
96-41  
94-41

AWWA 7A.6-1940

C-203-55

C-204-55

CS-77-51 (TS-5278)  
CS-111-43  
CS-144-47  
CS-4-29  
CS-20-49

R106-41

W-H-196B, UL, 1948

4607.2(b)	ASA B2.1-1960 FS GGG-P-351a
4607.2(g)	ASA B31.1-1955
4614.13(b)	ASA A40.6-1943
4614.13(c)	ASA A40.4-1942
4615.7(u)§2)	ASTM C4-59
4615.11	ASTM C4-55
4902.1(a)	ASA B9.1-1964
4902.1(b)	NFPA Pamphlet No. 90A-65
4902.1(c)	NFPA Pamphlet No. 90B-65 August, 1961
4902.1(d)	ASA B31.1-1955

**ASTM — American Society for Testing & Materials**

**AWPA — American Wood Preservers Association**

**ACI — American Concrete Institute**

**ASA — American Standards Association**

**AISC — American Institute of Steel Construction**

**AWS — American Welding Society**

**SJI — Steel Joist Institute**

**AISI — American Iron and Steel Institute**

**NLMA — National Lumber Manufacturing Association**

**CS — Commercial Standard, U.S. Dept. of Commerce,  
National Bureau of Standards**

**AITC — American Institute of Timber Construction**

**NBFU — National Bureau of Fire Underwriters**

**ASME — American Society of Mechanical Engineers**

**NEC — National Electrical Code Committee**

**UL — Underwriters Laboratories**

**NFPA — National Fire Prevention Association**

**FS — Federal Specification, U.S. Dept. of Commerce**

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