

Mandatory Permitting for Fog Effects Systems

PURPOSE: The Board of Rules and Appeals has developed these mandatory guidelines to provide uniform direction to the Authority Having Jurisdiction in the submission of construction documents for plan review, permitting, and inspection relating to systems installed in buildings and structures that deliver cryogenic liquid nitrogen or liquid CO₂ as agents for visual effects.

SPECIFICATIONS AND REQUIREMENTS

GENERAL REQUIREMENTS:

- A. Fog effects that utilize cryogenic liquid nitrogen or liquid CO₂ shall be in accordance with this guideline and other applicable codes as referenced in the Florida Building Code and the Florida Fire Prevention Code.
- B. Provide a narrative describing procedures relating to the system's normal function.
- C. Provide a narrative explaining emergency safety procedures.
- D. Provide operator training methodology and training to crowd manager (occupant load ≥ 250) specific to hazards.
- E. Provide material safety sheet.
- F. Obtain respective discipline permits and inspections as may be required. (i.e., plumbing, building, mechanical, electrical)
- G. Comply with all the requirements of building, electrical, mechanical, and plumbing trades as applicable to the project.
- H. Need to evaluate projected maximum N₂ or CO₂ levels and O₂ levels. Possible use of signage to warn occupants of using materials that may affect them.

Note: This guideline does not take place of, nor take precedent over, the Florida Building Code or the Florida Fire Prevention Code. When a conflict exists between the requirements of this guideline and the Florida Building Code or the Florida Prevention Code, the codes will dictate the requirements that must be followed.

SITE-SPECIFIC DESIGN

Shall be submitted, signed, and sealed by a Florida Licensed Professional Engineer to establish design criteria for fog effect, including but not limited to the following checklist:

1. General Description:

- a. Description of building uses.
- b. Description of space containing the fog effect.
- c. Net volume accounting for maximum occupant load.
- d. Amount of agent to be dispensed and time intervals.
- e. Volume analysis of space based on both controlled and uncontrolled release.
Provide minimum and maximum concentration of product and O₂ per cubic feet of total volume of space.

2. Project Description:

- a. Location of the fog effect.
- b. Proposed source of fog effect.
- c. Controlling of the fog effect.
- d. System interlocks to prevent extended-release.
- e. Ventilation Systems:
 - 1) Source, description, and capacity of make-up air.
 - 2) Location of exhaust ventilation and capacity.
 - 3) Proximity of exhaust discharge to an air intake.
- f. Properties of the liquid source.
- g. Equipment reference.
- h. Manufacturer's specifications for all components.

3. Tank Requirements:

- a. Manufacturer's specifications for tank
- b. Vehicular protection, if outdoors; show details on bollards
- c. Distance from storage to exposure
- d. Storage conditions and location, temperature limitations based on specific installation
- e. Signage
- f. Spill control and secondary containment.
- g. Tank and system pressure control
- h. Clearance from combustibles
- i. Distance from openings (doors, windows, etc.) into assembly or other occupancy
This will ensure that any leakage/release will not readily enter assembly or other occupancy.

4. Delivery system:

- a. Size of pipe
- b. Manufacturer's specifications indicate that the piping and all connected devices suit the application.
- c. Drip pans under all nozzles or points of discharge
- d. Wall penetration and fire protection insulation
- e. Pipes
- f. Valves
- g. Fittings
- h. Vent lines
- i. Nozzles/devices:
 - 1) Location and directions of fog.
 - 2) Distance from people (must ensure persons cannot be exposed to freezing liquid or fog)
 - 3) Drip pans.
 - 4) Nozzle specifications and support details.
 - 5) Emergency shut-off or shut-down, such as a dead-man switch, in case the operator becomes incapacitated.

5. Alarm and Sensor Detection (As may be determined by the Engineer):

- a. Indicate the type of alarm to be used.
- b. Show plan locations and indicate mounting heights.
- c. If applicable, connect to the fire command center using the equipment that is listed as compatible.
- d. Cryogenic fluids – O₂ sensors only, with two critical values:
 - 1) Set 19.8 percent O₂ to shut down the gas supply, initiate a local alarm, activate the exhaust, and automatically install 100 percent fresh air makeup.
 - 2) Set 19.5 percent O₂ to initiate an alarm signal for evacuation.
- e. Liquid CO₂ requires both CO₂ and O₂ sensors, both with critical values:
 - 1) Set 0.5 percent CO₂ to shut down the gas supply, initiate a local alarm, and automatically activate exhaust and 100 percent fresh air make-up.
 - 2) Set 1.5 percent CO₂ to initiate an alarm signal for evacuation.
- f. Emergency alarm for indoor storage:
 - 1) Indicate the type of alarm to be used.
 - 2) Show plan locations and indicate mounting heights.
 - 3) Connect to the fire command center with compatible listed equipment.
 - 4) Cryogenic liquid requires O₂ sensors with two critical values:
 - a. Set 19.8 percent O₂ to shut down supply, initiate a local alarm, and activate exhaust make-up air automatically.
 - b. Set 19.5 percent O₂ to initiate an alarm signal for evacuation.
 - 5) Liquid CO₂ requires both CO₂ and O₂ sensors, both with critical values:
 - a. Set 0.5 percent CO₂ to shut down the supply, initiate a local alarm, and activate exhaust make-up air automatically.
- g. Set 1.5 percent CO₂ to initiate an alarm signal for evacuation.
- h. Stand-by power.