



CLARK COUNTY FIRE DEPARTMENT
Fire Hazard & Prevention Services
575 E. Flamingo Road, Las Vegas, NV 89119
(702) 455-7316 FAX (702) 455-7347



105.8.c.10

TITLE: FOG EFFECTS

SCOPE: Fog Effects that utilize cryogenic liquids or liquid CO₂ shall be in accordance with this guide and the requirements contained in the 2005 Clark County Fire Code and CGA pamphlets for cryogenics and liquid CO₂.

PURPOSE: To provide standardized Clark County Fire Department (CCFD) requirements relating to the installation and permitting of Fog Effects that utilizes cryogenic liquids or liquid CO₂.

SPECIFICATIONS AND REQUIREMENTS

Three separate permits are required for Fog Effects:

1. Fire Protection Report which includes technical design of system (must be submitted and approved prior to additional submittals).
2. Cryogen or Compressed Gas (Liquid CO₂) Permit which includes material, tank or vessel, piping, valves and equipment (use permit – renewable)
3. Sensor Detection and Alarm Submittal (non-renewable).

Submittal packages are required to be submitted to the CCFD Plans Check Division. Three (3) sets of submittal package must be submitted for review and approval. Minimum permit and expedite fees (if required) must be paid at this time. Please see the Clark County Fire Department Permit and Service Fee Schedule for specific information. When plans have been reviewed, you will be notified by this office. If approved, an inspection will need to be scheduled. To schedule an inspection, go to <http://www.accessclarkcounty.com/fire/firedept.htm> . Click on “Services” in the teal strip on the top. Fog Effect System Permit (non-renewable) On the left side under **Inspection** click on “Fire Inspection” and follow the instructions to schedule a fire inspection.

This guideline provides CCFD requirements. However, CC Development Services may require permits for various systems, such as electrical, mechanical, and plumbing systems associated with the fog effect. Please contact CC Development Services at 455-3000 for further information.

Submitted packages shall include the following:

1. Fire Protection Report
 - a. Must be submitted by a Fire Protection Engineer
 - b. To establish design criteria for fog effect

- i. Following are checklist items that need to be addressed in the Fire Protection Report.
 - 1. General Description:
 - a. Description of building uses
 - b. Description of space containing fog effect
 - 2. Applicable Codes:
 - a. Indicate 2000 edition of the Uniform Fire Code with 2005 amendments
 - b. Indicate requirements of the Nevada State Fire Marshal
 - c. Indicate the applicable CGA Pamphlets
 - i. Liquid CO₂
 - ii. Cryogenic liquid to be used
 - d. Indicate the 2002 edition of NFPA 72
 - 3. Project Description
 - a. Location of fog effect
 - b. Proposed source of fog effect
 - c. Controlling of fog effect
 - d. Properties of liquid source
 - e. Equipment reference
 - 4. Life Safety Concerns
 - a. Frostbite
 - b. Asphyxiation
 - c. OSHA
 - 5. Life Safety Analysis
 - a. Tank and piping arrangement
 - b. Distance from storage to exposure
 - c. Storage conditions
 - d. Signage
 - e. Spill control and secondary containment
 - f. Ventilation systems
 - i. Source, description and capacity of make-up air
 - ii. Location of exhaust ventilation and capacity
 - g. Stand-by power
 - h. Tank and system pressure control
 - i. Emergency alarm
 - j. Clearance from combustibles
 - k. Fog Effect Discharge
 - l. Detection
 - i. Indicate sensor types, locations and settings
 - 1. Cryogenic liquids – O₂ sensors only with two critical values
 - a. Set 19.8 percent O₂ will shutdown supply, initiate local alarm and activate exhaust and make-up air automatically
 - b. Set 19.5 percent O₂ will initiate fire alarm signal for evacuation and send signal for emergency

- response from CCFD
 - 2. Liquid CO₂ requires both CO₂ and O₂ sensors, both with critical values
 - a. Set 0.5 percent CO₂ will shutdown supply, initiate local alarm and activate exhaust and make-up air automatically
 - b. Set 1.5 percent CO₂ will initiate fire alarm signal for evacuation and send signal for emergency response from CCFD
 - ii. Provide matrix describing safety output for each input from sensors
 - iii. Indicate supervision of detection system.
 - 6. Impact on Fire/Life Safety Systems
 - a. Sprinkler system
 - b. Visibility
 - c. Through-penetrations
 - d. Smoke detection
 - 7. Conclusion
2. Cryogen or Compressed Gas (Liquid CO₂) Tank or Vessel Permit (use permit – renewable)
 - a. Location of tank (indoor, outdoor). Refer to CGA pamphlets for guidance.
 - i. Indoor cryogenic liquid: requires secondary containment, sensors, ventilation and signage.
 - ii. Indoor liquid CO₂: requires upsizing of the emergency vent, sensors, ventilation and signage.
 - iii. Outdoor cryogenic liquid and liquid CO₂: address egress concerns, sensors and signage.
 - b. Vehicular protection, if outdoors; show detail on bollards
 - c. Show protection from breach
 - d. Show location of venting and provide calculations
 - e. Size (given in gallons)
 - f. Monitoring of indoor storage location
 - i. Cryogenic liquids – O₂ sensors only with two critical values
 - 1. Set 19.8 percent O₂ will shutdown supply, initiate local alarm and activate exhaust and make-up air automatically
 - 2. Set 19.5 percent O₂ will initiate fire alarm signal for evacuation and send signal for emergency response from CCFD
 - ii. Liquid CO₂ requires both CO₂ and O₂ sensors, both with critical values
 - 1. Set 0.5 percent CO₂ will shutdown supply, initiate local alarm and activate exhaust and make-up air automatically
 - 2. Set 1.5 percent CO₂ will initiate fire alarm signal for evacuation and send signal for emergency response from CCFD
 - g. Secondary containment
 - i. Cryogenic liquid only
 - ii. CO₂ changes to gas or solid at atmospheric pressure so no secondary

- containment is required
 - h. Manufacturer's specifications for tank
 - i. Piping
 - i. Size of pipe
 - ii. Manufacturer's specifications indicating piping suitable for application
 - iii. Drip pans under all connections and fittings
 - j. Insulation
 - k. Valves
 - l. Fittings
 - m. Vent line
 - n. Nozzles/device
 - i. Location and direction of fog
 - ii. Distance from people (must ensure people cannot be exposed to freezing liquid or fog)
 - o. Manufacturer's specifications for all components
3. Sensor Detection and Alarm Submittal (non-renewable) provide plan view
- a. Show plan locations and indicate mounting heights
 - b. Connect to the fire command center
 - c. Indicate alarms to be used (are they new or existing building fire alarm system)
 - d. Cryogenic liquids – O₂ sensors only with two critical values
 - i. Set 19.8 percent O₂ will shutdown supply of gas, initiate local alarm and activate exhaust and 100 percent fresh air make-up automatically
 - ii. Set 19.5 percent O₂ will initiate fire alarm signal for evacuation and send signal for emergency response from CCFD
 - e. Liquid CO₂ requires both CO₂ and O₂ sensors, both with critical values
 - i. Set 0.5 percent CO₂ will shutdown supply of gas, initiate local alarm and activate exhaust and 100 percent fresh air make-up automatically
 - ii. Set 1.5 percent CO₂ will initiate fire alarm signal for evacuation and send signal for emergency response from CCFD
 - f. Provide input/output matrix of operations

INSPECTIONS THAT MAY BE REQUIRED AND SCHEDULING INSTRUCTIONS:

If approved, an inspection will need to be scheduled. To schedule an inspection, also go to: www.accessclarkcounty.com/fire/firedept.htm. A fire inspector will review your site in accordance with the approved plans and this guideline. Check "Click 2 Build" for required inspections.

The Clark County Fire Department's Fire Prevention Bureau (FPB) may perform testing, acceptance, and maintenance of fire & life safety systems as required by and within the scope and authority of the Clark County Fire Code.

This Guideline does not take the place of the Fire Code and does not take precedence over any Fire Code requirement or position taken by the Fire Chief. When a conflict exists between the requirements of this Guideline and the Fire Code or the opinion of the Fire Chief, the Fire Code or opinion of the Fire Chief prevails.

Technical Assistance, when required by the fire chief, will require a Technical Opinion and Report prepared by a State of Nevada licensed: qualified engineer, specialist, laboratory, or fire safety specialty organization acceptable to the Fire Chief and the owner. The Fire Chief is authorized to require design submittals to bear the Wet Stamp and Signature of a professional engineer.

Acceptance of Alternative Materials and Methods requires a Technical Opinion and Report prepared by a State of Nevada licensed: qualified engineer, specialist, laboratory, or fire safety specialty organization acceptable to the Fire Chief and the owner. The Fire Chief is authorized to require design submittals to bear the Wet Stamp and Signature of a professional engineer.