



## PREVENTION MANUAL

### FIRE EXTINGUISHING SYSTEMS

#### 405.12 REDUCED HYDRAULIC DEMAND SPRINKLER SYSTEM DESIGN (Formerly COF Limited Area Sprinkler Systems)

**EFFECTIVE: AUGUST 2013**

## SCOPE

This standard provides an alternative, equivalent, reduced hydraulic design fire sprinkler standard to National Fire Protection Association (NFPA) 13 under specific conditions. These conditions include: light and ordinary hazard occupancy buildings under 12,000 square feet, in areas where a fire sprinkler system is not required by the California Building or Fire Code based on occupancy, specific use, allowable area or height increases, one-hour construction substitution, etc.

### **Note:**

1. This standard is not permitted to be used to protect areas greater than 20 feet in height.
2. This standard is not permitted for protection of paint spray booths, which are required to be designed to Extra Hazard Group II.
3. This standard generally precludes building additions (including mezzanines) without major modification to interior piping and water supply.
4. This standard is not permitted to be used for future changes in building use to restaurants or bars with an occupant load of greater than 100 persons.
5. This standard is not permitted to protect high-piled storage.
6. Use of extended coverage sprinklers is not permitted.
7. This standard is not permitted unless approved by the Fire Marshal (or designee).

## PURPOSE

This policy permits a significant reduction in the hydraulic design area and the type of underground fire service required by NFPA 13, which results in lower installation costs, while still providing an acceptable level of fire protection for light and ordinary hazard occupancies. As this is not a nationally recognized design standard, insurance companies may not offer the normal fire insurance discount that is provided by a compliant NFPA 13 installation.

## BACKGROUND

This standard originated (and was formerly referred to) as “The City of Fresno Limited Area Fire Sprinkler Standard” and was first adopted in 1979. The former title predates the description of a “limited area system” in NFPA 13 with the same name that is only applicable to partially sprinklered buildings. This standard’s adoption was part of a larger City of Fresno Fire Sprinkler Ordinance mandating fire sprinkler installations in all commercial buildings over 5,000 square feet.

Authors of the standard were Fire Marshal, Richard Borgard and Fire Protection Engineer, Craig Meyer. Justification for the reduced hydraulic design area was based on data available at the time which indicated that 90% of fires in light and ordinary hazard occupancies were controlled with three or less fire sprinklers operating. The effectiveness statistics have been consistent over the past 30 years, and a 2007 NFPA report on fire sprinkler effectiveness indicated 93% of fires in buildings with fire sprinklers are controlled with four or fewer sprinklers operating.

## REQUIREMENTS

Except as noted below, all other aspects of the reduced hydraulic design standard (including materials and installation) shall conform to NFPA 13:

1. Fire service underground:

**Note:** The provisions of this sub-section are applicable only where the Fire Department Connection (FDC) is connected to the riser after the check valve. If an FDC is located on the underground water supply pipe to the riser, a minimum four-inch fire service with detector check and PIV is required. All pipe and fittings shall be listed and installed for fire service.

- a. A two-inch fire service may be permitted. Such service is a two-inch domestic water service installed without a water meter or reduced pressure backflow device requirement. It is normally impossible to use a combination domestic/fire service water supply because of the reduced pressure principal backflow prevention device requirement. Resulting friction loss severely impacts hydraulic design.
- b. The water supply to the riser from the City of Fresno Water Division installed service point box at the property line may be installed with any pipe approved for domestic water supply and buried a minimum of 12 inches per the California Plumbing Code. This pipe may be pressure tested at water system normal operating pressure.
- c. The riser transition shall be wrapped, galvanized or other approved domestic water metallic pipe above grade.

2. Hydraulic design requirements:

- a. The remote area shall be a minimum of 500 square feet (30% increase for sloped ceilings exceeding 2" in 12" is applicable).
- b. A minimum of four sprinklers shall be used for the design area.
- c. The maximum coverage area per head shall be 130 square feet for both light and ordinary hazard.
- d. The friction loss criteria noted below (from the public main through the two-inch fire service point box) shall be included in the hydraulic calculations:
  - I. The City of Fresno uses two- inch polyethylene (PE) tubing for this installation. The interior diameter of this tubing is 1.629 inches.
  - II. The designer shall add 15.1 feet equivalent length for fittings used with the PE tubing (e.g., corp. stop and angle meter stop).

- III. The designer must know the exact length of PE tubing from the public main to the water service box

and;

add two PVC elbows for the transition out of the service point box to the on-site supply line.

3. Other specific requirements:

- a. All sprinklers shall be quick response for both light and ordinary hazard designs.
- b. Fire sprinklers may be omitted under combustible construction roof projections over landscaped or pedestrian walkway areas in excess of four feet in depth, provided the area under such projections is not used for storage or handling of any combustible material. Projections over loading docks, vehicle parking (including a porte-cochere), outdoor seating areas, and trash receptacles require sprinkler installation. Combustible concealed spaces above the projection, such as mansards require fire sprinklers to be installed within the space.
- c. For light-hazard occupancies, the "small room rule" of NFPA 13 may be used in rooms not exceeding 225 square feet (effectively a "single sprinkler, small room rule"). See 2010 NFPA 13 Figure A.8.6.3.2.2(a) for clarification).
- d. Main drains shall be one inch in diameter. Larger drains may distort the main drain test results because of the relatively low water demand of these systems.
- e. All fire sprinkler systems with more than 20 sprinklers must be monitored as required by California Fire Code section 903.4.1.

## CODE REFERENCES

Fresno Municipal Code, Section 10-50903.3.1

US Experience with Sprinklers and Other Automatic Fire Extinguishing Equipment,  
2007

NFPA 13