THE CITY OF SAN DIEGO

# Sprinklers, Standpipes, Fire Pumps and Secondary Water Supply for High-Rises

TECHNICAL BULLETIN

**FIRE-9-1**

CITY OF SAN DIEGO DEVELOPMENT SERVICES
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The purpose of this Technical Bulletin is to establish the minimum requirements for the design of sprinkler systems, standpipes, secondary water supply, and fire pumps in high-rise buildings. High-rise buildings are defined in the California Building Code (CBC) as a building having an occupied floor located more than 75 feet above the lowest level of fire department vehicle access.

## Documents Referenced in this Technical Bulletin

- **2013 California Building Code, (CBC)**
- **2013 California Fire Code, (CFC)**
- **National Fire Protection Association (NFPA) Standard for the Installation of Sprinkler Systems (NFPA 13)**
- **NFPA Standard for the Installation of Standpipe and Hose System (NFPA 14)**
- **NFPA Standard for the Installation of Stationary Pumps for Fire Protection (NFPA 20)**
- **NFPA Standard for Water Tanks for Private Fire Protection (NFPA 22)**

## I. SPRINKLER SYSTEMS

The fire sprinkler system shall be designed in accordance with NFPA 13, 2013 Edition, as modified by the 2013 California Building and Fire Codes and City of San Diego policies.

### A. Control Valves

Each floor shall be provided with an individual approved, supervised indicating sprinkler control valve at the point of connection to the riser. The valves shall be monitored in accordance with the CFC.

### B. Water-Flow Alarms

A sprinkler water-flow alarm-initiating device shall be provided for each floor.

### C. Water Discharge

The discharge from the drain(s) shall not empty directly or indirectly into the storm drain. The discharge must return to the on-site secondary water supply.

### D. Riser Location

Sprinkler risers shall be located in vestibules provided as a part of a smokeproof enclosure. The standpipe location is not permitted to obstruct egress when the hose lines are connected and charged.

### E. Redundant Risers

Buildings more than 420 feet in building height shall be supplied by a minimum of two sprinkler risers or combination standpipe system risers located in separate shafts. Each sprinkler system must be hydraulically designed so that if one connection is shut down, the other connection is capable of supplying the sprinkler system design demand.

### F. Fire Department Connections

Fire department connection (FDC) shall be located on the address side of the building and must be provided with threaded, male caps. Two separate locations for the FDC are required for high-rise structures. The number of inlets provided shall be determined based upon NFPA 14.

Permanent signage shall be provided to indicate the minimum pressure required for the fire apparatus to pump into the FDC. Example of required signage:

**FD Minimum Pump Pressure 225 psi**

### G. Test Header

A test header shall be located adjacent to the Fire Department Connection (FDC).

### H. Pressure Regulating Devices (PRVs)

If PRVs are installed on the floor control valves for the sprinkler system, the PRVs must be factory-set with no field adjustment capabilities.

## II. STANDPIPE SYSTEMS

The standpipe systems shall be designed and installed in accordance with NFPA 14, 2013 Edition, except as modified by the 2013 California Building and Fire Code, City of San Diego policies, and the following requirements.

### A. Maximum Pressure

Where the static pressure at a 2 ½ inch hose connection exceeds 175 psi, an approved pressure-regulating device shall be provided to limit static and residual pressures at the outlet of the hose connection to 175 psi. Pressure-regulating hose connections shall be field-adjustable.

### B. Minimum Pressure and Design

Standpipes shall be hydraulically designed and field tested to provide a minimum residual pressure of 100 psi at the outlet of the hydraulically most remote 2 ½ inch hose connection. Pressure

loss through the hose valve shall be calculated as required by NFPA 14. The minimum flow rate shall be 500 gpm through the two most remote 2½ inch outlets and 250 gpm for each additional standpipe to a maximum of 1000 gpm for buildings that are sprinklered throughout, and 1250 gpm for buildings that are not sprinklered throughout, in accordance with NFPA 13.

**C. Drains and Test Riser**

A permanently installed drain riser shall be provided to each standpipe equipped with pressure-regulating devices to facilitate tests of each device. The drain shall be sized large enough to handle the full flow required from the largest pressure-regulating device but shall not be less than 3 inch to facilitate testing of 2½ inch pressure-regulating devices. The drain riser shall be equipped with a 2½ inch inlet to allow for a 2½ inch diameter fire hose to be connected between the pressure-regulating device and the drain.

## III. SECONDARY WATER SUPPLY

In addition to connection(s) to the City main, an automatic secondary on-site water supply shall be provided for all new high-rise buildings. The design and installation of the on-site water supply must meet the requirements set forth in NFPA 22, 2013 Edition and the following requirements.

**A. Sizing**

An automatic secondary on-site water supply shall be provided for all new high-rise buildings. The secondary water supply shall have a usable capacity of not less than the hydraulically calculated sprinkler demand plus 100 gpm for the inside hose stream allowance, for a duration of not less than 30 minutes OR as determined by the sprinkler system design occupancy hazard classification in accordance with NFPA 13 but not less than 15,000 gallons, whichever is greater.

The duration required to be provided for the secondary water supply shall be based upon the worst-case hazard classification of the high-rise portion of the building. The Class I standpipe system demand is not required to be included in the water supply calculations.

**B. Water Discharge**

The public water supply shall discharge directly into the water storage tank.

**C. Tank Water Level Indicator**

Provide a tank water level indicator visible to the fire pump operator.

**D. Low Water Signal**

Provide a low water level supervisory signal in the tank connected to the Fire Alarm Control Panel to indicate when the tank water level drops to 9 inches below the full water line. This will signal that more water is being pumped from the tank than is being replenished, allowing time to open the manual fill valve or to alert the proper parties of this condition.

**E. Fill Connections**

To maintain the minimum required capacity of the tank at all times, the tank fill shall be designed for and capable of refilling the tank at 150 percent of the fire pump rated capacity. At a minimum, at least one manual and one automatic fill connection shall be provided for the water tank.

**F. Overflow Discharge**

The water storage tank overflow must discharge in a location per the City of San Diego Storm Water Standards.

**G. Bypass**

A bypass line, sized equal to the diameter of the inlet of the pump, shall be provided in the event of fire pump failure.

**H. Very Tall Buildings**

NFPA 20 sets forth specific requirements for water supply required in very tall buildings. For projects in the City of San Diego, a very tall building is a building that is more than 500 feet in building height, as defined by the CBC.

## IV. FIRE PUMPS

Provide a fire pump sized in accordance with NFPA 13, NFPA 14, and NFPA 20 and the following requirements.

**A. Room Designs**

The fire pump room must be designed with adequate space for all equipment necessary for the installation in accordance with the manufacturer's specifications. A door or doors and an unobstructed passageway must be provided into the fire pump room in order to allow for the removal of the largest piece of equipment.

**B. Pressures**

The system pressures shall not exceed the listed pressure rating of the equipment being used.

**C. Redundant Fire Pumps**

A redundant fire pump system must be provided for all buildings having an occupied floor more than 200 feet above the lowest level of fire department vehicle access. Each fire pump system shall be capable of automatically supplying the required demand for the sprinkler and standpipe systems.

**D. Fuel Supply**

Fire pumps must be provided with an on-premises fuel supply, sufficient for not less than 8-hour full-demand operation at 100 percent of the rated pump(s) capacity in addition to all other supply demands in accordance with Section 9.6 and 11.4.2 of NFPA 20.

**E. Water Supply**

Required fire pumps must be supplied by connections to at least two water mains located in different streets unless one of the exceptions below is met. Separate supply piping is required between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps must be sized for the flow and pressure required for the pumps to operate. A connection to two separate water mains is not required only if complying with one of the following exceptions.

**1.** Two separate connections to the same main will be permitted only if the main is valved so that an interruption can be isolated so that the water supply can continue without interruption through no fewer than one of the connections.

**2.** High-rise buildings not having an occupied floor more than 120 feet above the lowest level of fire department vehicle access where a secondary water supply is provided.