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.

I. FIRE SPRINKLER SYSTEMS

Fire sprinkler systems shall be designed and installed in accordance with NFPA 13, as modified by the California Building and Fire Codes (CBC & CFC), City of San Diego policies, and the following requirements.

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 Devices

Each floor shall be provided with an individual approved, supervised sprinkler water-flow alarm-initiating device at the point of connection to the riser. The water-flow device shall be monitored in accordance with the CFC.

C. Water Discharge from Drains

The discharge from drains serving the sprinkler and standpipe systems shall not empty directly or indirectly into the storm drain. The discharge must return to the on-site secondary water supply.

D. Redundant Risers

Fire sprinkler systems in buildings more than 420 feet in building height shall be supplied by connections to a minimum of two sprinkler or combined sprinkler/standpipe system risers. Each sprinkler system must be hydraulically designed so that the worst-case system demand can be supplied through only the hydraulically most remote riser.

E. Riser Locations

Standpipe and combined sprinkler/standpipe system risers must be located within exit stair enclosures. Where the exit stair is a smokeproof enclosure that is accessed by a vestibule, the system risers shall be located in the vestibules. The standpipe location within the vestibule or exit enclosure is not permitted to obstruct egress when the hose lines are connected and charged, and the hose valves are not permitted to be obstructed by open doors. Where redundant risers are required by CBC 403 (see Section I-D above), they shall be installed in separate smokeproof enclosures that are remotely located in accordance with CBC 1007.

F. Fire Department Connection (FDC)

Two FDCs, at separate locations on the building’s exterior, must be provided for high-rise buildings. At least one of the FDCs must be located on the
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from the public water distribution system must discharge directly into the on-site water supply tank, thereby allowing the tank to serve as both the primary and secondary water supply for the building’s fire suppression systems.

C. Tank Water Level Indicator
A tank water level indicator must be provided at a location that is visible to the fire pump operator. When an electronic-type water level indicator is installed, provide standby power to the device or equipment.

D. Low Water Signal
A low water level supervisory switch must be installed in the on-site water storage tank. The switch must be connected to the Fire Alarm Control Panel (FACP) 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 and to initiate a supervisory signal at the FACP.

E. Water Supply Connections
To maintain the minimum required capacity of the on-site water storage tank at all times, the tank water supply connections, including all piping, valves and fittings between the public water main POCs and the tank fill connections, must be sized for the flow and pressure required to refill the water storage tank at a rate equal to 110% of the total fire protection system demand (i.e. the worst case sprinkler demand plus 100 gpm hose stream, determined as required for sizing the tank). When the automatic fill valves have electronic actuators and/or solenoids, provide standby power to all electronic components.

F. Multiple Water Supply Connections
In buildings with an occupied floor more than 120 feet above the lowest level of FD vehicle access, water supply to the on-site water storage tank must be provided by no less than two separate connections to the public water distribution system.

When water supply to the on-site water storage tank is provided by multiple supply connections to the public water distribution system, the supply connections must be configured using one of the following two options:
1. The supply piping must be connected to at least two different public water mains located in different streets, or
2. The supply piping can be connected to a single water main when the main is valved such that an interruption can be isolated so that water supply will continue without interruption through at least one of the supply connections.

When multiple water supply connections are provided, each connection must be sized so that it can independently supply the flow and pressure required to refill the water tank as described in Section III-E above.

G. Fill Valves
Each on-site water storage tank supply connection must be provided with at least one automatic and one manual fill valve. All fill valves must be sized to refill the water storage tank at a rate equal to 110% of the total fire protection system demand (i.e. worst case sprinkler demand plus 100 gpm hose stream, determined as required for sizing the tank). When the automatic fill valves have electronic actuators and/or solenoids, provide standby power to all electronic components.

H. Overflow Discharge
Per the City of San Diego Storm Water Standards, overflow from the on-site water storage tank must discharge to a sanitary sewer inlet. That inlet and the attached sanitary sewer system piping must be properly sized for the maximum expected flow rate, and the inlet shall be located outside of the fire pump room.

I. Bypass
A bypass line, sized equal to the diameter of the inlet of the pump, and supplied from one of the tank water
supply connections, shall be provided in the event of fire pump and/or water storage tank failure.

J. 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 fire pump(s) sized in accordance with NFPA 13 and NFPA 14, as modified by the CFC, NFPA 20, and the following requirements.

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

B. System Working Pressures
System working 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. Fire Pump Test Header/Test Loop
Fire pump installations must be provided with a means for testing the pump at rated pressure and flow. Acceptable means for performing this testing include providing a test header located on the exterior of the building or providing a flow meter test loop that discharges back into the water storage tank. When a test header is provided, it shall be located adjacent to one of the two required FDCs.

E. 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 NFPA 20 Chapters 9 & 11.