

4.20 Design of Fire Pump Suction Piping, Fire Pump Location, and Water Storage Tanks (2019)

Reference: 2016 NFPA 20 4.15.4, 4.15.6.1 and 4.2.3; 2019 SFFC 913; 2019 CBC 403.3.2; 2019 CFC 914.3.1.2.

Purpose:

1. **Suction Pipe General**--Design of the fire pump suction pipe must be approved by the Fire Department. As required by NFPA 20, fire pump suction piping from the city main and fire water storage tank to the fire pump suction flange shall be designed and installed to avoid air pockets.
2. **Dual Fire Service Tie-In: Horizontal and Vertical Turbine Fire Pump Rooms**--To clarify the basic design parameters of how a dual fire service** will terminate in the fire pump room in combination with the piping arrangement for fire pumps with a bypass. For a high-rise building, the required fire pumps shall be supplied from a dual fire service comprised of two separate fire service mains which will terminate downstream of the backflow preventers in the fire pump room. The piping arrangement will be different for horizontal split-case fire pumps and vertical turbine fire pumps.

Suction Pipe General:

- I. The location of the fire pump SHALL be reviewed and approved by the San Francisco Fire Department before the site permit is approved and issued. **NOTE: The fire pump/room location is a critical component of the building's life safety design, and generally should be located at/near an exterior wall (nearest to point of connection).**
- II. Per SFPUC requirements, an approved Backflow Prevention Assembly is required to be installed as close to the point of connection as practical; **but not to exceed 25 feet from this point.**
- III. For new building installations, air pockets in the fire pump suction piping are not allowed.
- IV. Providing an automatic release valve for the air pockets, instead of avoiding air pockets, is NOT acceptable.
- V. For existing buildings, design of the fire pump suction piping must avoid air pockets. If it is impossible to do so, the San Francisco Fire Department will review these installations on a case by case basis.
- VI. The Jockey Pump suction line shall connect up-stream of the Fire Pump Suction OS&Y and downstream of the backflow preventer, and its discharge line shall connect downstream of the Fire Pump Discharge Valve, all piping shall be in the Fire Pump Room.

Dual Fire Service Tie-in and Bypass Manifold at Fire Pump Rooms--High-Rise. (For Non-High Rise single fire service, all other required items apply):**

HORIZONTAL SPLIT-CASE FIRE PUMP ROOMS:

- I. The dual fire service** will terminate in the fire pump room. Each fire service will have an isolation valve located just inside the wall where the fire service enters the room. When the backflow preventer in each fire service is located in the fire pump room, the isolation valve downstream of the backflow preventer can be used as the fire service isolation valve.

- II. Each fire service** isolation valve shall be tagged or labeled with wording approved by the district fire inspector (e.g. each street name for connections on different streets, or street name and cross street for connections on the same street).
- III. The tamper switch for each fire service** isolation valve must be identified on the Fire Alarm (FA) annunciation panel in the FCC room to delineate which fire service line is being taken out of service.
- IV. Each fire service** isolation valve will be piped to a tie-in / bypass manifold which will supply a single auto-fill valve and a manual fill valve to fill or replenish the fire water storage tank (FWST). The tie-in / bypass manifold will also supply a single bypass line size at least as large as the dual fire service piping to conform with NFPA 20.
- V. Termination of the bypass line will be on the system side of all fire pump discharge piping isolation valves as well as any fire protection system PRV outlet isolation valves located in the fire pump room.
- VI. The tie-in / bypass manifold will also supply a fire pump suction line with a single PRV upstream of the connection to the suction line from the fire water storage tank (FWST). Thus allowing all required fire pumps to take suction from either fire service or the fire water storage tank (FWST).
- VII. For existing buildings: Any complete fire pump replacement and/or fire pump controller replacement shall require an associated FIRE permit and inspection.

VERTICAL TURBINE FIRE PUMP ROOMS:

- I. The dual fire service** will terminate in the fire pump room. Each fire service** will have an isolation valve located just inside the wall where the fire service enters the room. When the backflow preventer in each fire service is located in the fire pump room, the isolation valve downstream of the backflow preventer can be used as the fire service** isolation valve.
- II. Each fire service** will have an isolation valve and shall be tagged or labeled with wording approved by the district fire inspector (e.g. each street name for connections on different streets, or street name and cross street for connections on the same street).
- III. The tamper switch for each fire service** isolation valve must be identified on the Fire Alarm (FA) annunciation panel in the FCC room to delineate which fire service line is being taken out of service.
- IV. Each fire service** isolation valve will be piped to a bypass manifold which will supply a minimum of three (3) automatic auto-fill valves and a manual fill valve to fill or replenish the fire water storage tank (FWST). The bypass manifold will also supply a single bypass line size at least as large as dual fire service piping to conform to NFPA 20.
- V. Termination of the bypass line will be on the system side of all fire pump discharge piping isolation valves as well as any fire protection system PRV outlet isolation valves located in the fire pump room.