



# City of National City Fire Department

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## **NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances**

**Date:** July 12, 2022  
**Project:** All Projects  
**Reviews:** R. Hernandez/Fire Marshal

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APPROVAL CONTINGENT UPON FINAL FIELD INSPECTION AND COMPLIANCE WITH ALL APPLICABLE CODES AND ORDINANCES. THE INFORMATION PROVIDED IS MEANT AS A GUIDELINE AND DOESN'T TAKE THE PLACE OF A THOROUGH UNDERSTANDING AND APPLICATION OF THIS CODE IN ITS ENTIRETY

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### **Installation Work**

Installation work shall be performed by fully experienced and responsible persons. The authority having jurisdiction shall always be consulted before the installation or remodeling of private fire service mains. The potable water supply to automatic sprinkler and standpipe systems shall be protected against backflow as required by the Health and Safety Code Section 13114.7 and Sweetwater Authority. Back-flows and control devices shall be installed at front of property (PL) to allow for clear immediate visibility and direct access for fire personnel. **The National City Fire Department requires all backflow/control devices to be equipped with tamper monitoring units. All devices shall be monitored by an approved fire alarm system monitored by a central station**

## **City Engineering Department**

Fire main underground design which may be required on engineering documents, does not take the place for required underground submittal required by the National City Fire Department

### **Connection to Waterworks Systems**

A connection to a reliable waterworks system shall be an acceptable water supply source. Please contact the water authority for this jurisdiction (*Sweetwater Authority*). The volume and pressure of a public water supply shall be determined from water flow test data or other approved method

### **Installation Requirements**

Piping, valves, hydrants, gaskets, and fittings shall be inspected for damage when received and shall be inspected prior to installation. The tightness of bolted joints shall be verified by the bolt torque or by the method described in the listing information or manufacturer's installation instructions

Pipe, valves, hydrants, and fittings shall be clean and free from internal debris. When work is stopped, the open ends of piping, valves, hydrants, and fittings shall be plugged or covered to prevent foreign materials from entering. All piping, fittings, valves, and hydrants shall be examined for cracks or other defects while suspended above the trench and lowered into the trench using appropriate equipment. Plain ends shall be inspected for signs of damage prior to installation. Piping, fittings, valves, hydrants, and appurtenances shall not be dropped, dumped or rolled or skidded against other materials. Pipe shall be buried a minimum of three feet

Pipes shall be supported in the trench throughout their full length and shall not be supported by the bell ends only or by blocks. If the ground is soft, other means shall be provided to support the pipe. Valves and fittings used with nonmetallic pipe shall be supported and restrained in accordance with the manufacturer's installation instructions. Piping shall be listed for fire protection service and shall comply with the standards of NFPA 24. Steel piping shall not be used for general underground service unless specifically listed for such service. Underground fire services utilities shall be AWWA C-900 Class 200 pipe.

Valves on connections to water supplies, sectional control and isolation valves, and other valves in supply pipes to sprinklers and other fixed water-based fire suppression systems shall be supervised by one of the following methods:

- (a) Central station, proprietary, or remote station signaling service

- (b) Local signaling service that causes the sounding of an audible signal at a constantly attended location
- (c) An approved procedure to ensure that valves are locked in the correct position
- d) Fire department connections shall be equipped with listed plugs or caps that are secured and arranged for easy removal by fire departments. Please see the National City Fire Department for direction
- (e) The National City Fire Department requires Knox Locking Plugs on all Fire Department Connections. Please contact the National City Fire Department for direction and application

NOTE: The National City Fire Department requires all backflow/control devices to be equipped with tamper monitoring units. All devices shall be monitored by an approved fire alarm system monitored by a central station

**NOTE: The National City Fire Department requires ALL control devices to be monitored for tamper, and shall report to a central monitoring company as supervisory**

- (1) Fire department connections shall be located on the street side of buildings. Fire Department Connections shall be facing the street so as to provide immediate emergency connections
- (2) Fire department connections shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects, including buildings, fences, posts, or other fire department connections. FDC shall be installed at proper code required height

### **Size of Fire Mains/Private Fire Service Mains**

Hydraulic calculations shall show that the main is able to supply the total demand at the appropriate pressure.

### **Mains Not Supplying Hydrants**

For mains that do not supply hydrants, pipe sizes less than 6 in. (150 mm) nominal size shall be permitted to be used subject to the following restrictions:

1. (1)

The main shall supply only the following types of systems:

1. (1) (a) Automatic sprinkler systems
2. (1) (b) Open sprinkler systems
3. (1) (c) Water spray fixed systems

4. (1) (d) Foam systems
  5. (1) (e) Standpipe systems
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2. (2) Hydraulic calculations shall show that the main is able to supply the total demand at the appropriate pressure
  3. (3) Systems that are not hydraulically calculated shall have a main at least as large as the riser.

### **Backflow Prevention Assemblies**

The backflow prevention assembly shall be forward flow tested to ensure proper operation. The minimum flow rate tested in this chapter shall be the system demand, including hose stream demand where applicable. Consultation with local water authority shall be accomplished for direction prior to design and installation (*Sweetwater Authority*). A certification of compliance shall be furnished to the AHJ prior to final

### **Post Indicator Valves.**

Where post indicator valves are used, they shall be set so that the top of each post is 32 in. to 40 in. (800 mm to 1.0 m) above the final grade. Where post indicator valves are used, they shall be protected against mechanical damage where needed

### **Identifying and Securing Valves.**

Identification signs shall be provided at each valve to indicate the valve's function and the part of the system the valve controls. Please see the National City Fire Department for necessary sign requirements listed for the AHJ. All valves shall be secured in the open position using a combination of lock and or chain or both

### **Private Fire Service Mains Under Buildings.**

Except as allowed, private fire service mains shall not be allowed to run under buildings

Private fire service mains supplying fire protection systems within the building shall be permitted to extend no more than 10 ft (3.0 m), as measured from the outside of the building, under the building to the riser location. Pipe joints shall not be located directly under foundation fittings. Piping shall be installed a minimum of 12 in. (300 mm) below the bottom of building foundations or footers. The requirements of this chapter shall not apply when the piping is sleeved with an approved material

Where approved, private fire service mains supplying systems within the building shall be permitted to extend more than 10 ft (3.0 m) under the building when all the requirements of this chapter are met. Where the piping is installed under the building, all foundations or footers over the private fire service main shall be arched to create a minimum of 24 in

(600 mm) clearance. It shall be acceptable to install the piping in covered trenches where the trenches are accessible from within the building

All joints shall be mechanically restrained. A valve shall be installed before the piping enters under the building and within 24 in. (600 mm) of where the piping enters the building. Calculations shall show that the main is able to supply the total demand at the appropriate pressure

**Steep Grades.** On steep grades, mains shall be additionally restrained to prevent slipping. Pipe shall be restrained at the bottom of a hill and at any turns (lateral or vertical). The restraint specified in 10.7.1.1 shall be to natural rock or to suitable piers built on the downhill side of the bell. Bell ends shall be installed facing uphill. Straight runs on hills shall be restrained as determined by a design professional

**Thrust Blocks.**

Thrust blocks shall be permitted where soil is stable and capable of resisting the anticipated thrust forces. Thrust blocks shall be concrete of a mix not leaner than one part cement, two and one-half parts sand, and five parts stone. Thrust blocks shall be placed between undisturbed earth and the fitting to be restrained and shall be capable of resisting the calculated thrust forces. Wherever possible, thrust blocks shall be located so that the joints are accessible for repair

**Material.**

Clamps, rods, rod couplings or turnbuckles, bolts, washers, restraint straps, and plug straps shall be of a material that has physical and chemical characteristics that indicate its deterioration under stress can be predicted with reliability

**Corrosion Resistance.**

After installation, rods, nuts, bolts, washers, clamps, and other restraining devices shall be cleaned and thoroughly coated with a bituminous or other acceptable corrosion-retarding material. The requirements of this chapter shall not apply to epoxy-coated fittings, valves, glands, or other accessories. Tracer wire is required

Private fire service mains utilizing one or more of the following connection methods shall not require additional restraint, provided that such joints can pass the hydrostatic test of this chapter without shifting of piping

1. Threaded connections
2. Grooved connections
3. Welded connections
4. Heat-fused connections
5. Chemical or solvent cemented connections

**Backfilling.**

Backfill material shall be tamped in layers or in puddles under and around pipes to prevent settlement or lateral movement and shall contain no ashes, cinders, refuse, organic matter, or other corrosive materials. Backfill material shall not contain ash, cinders, refuse, organic matter or other corrosive materials. Rocks shall not be used for backfill. Frozen earth shall not be used as backfill material. In trenches cut through rock, tamped backfill shall be used for at least 6 in. (150 mm) under and around the pipe and for at least 2 ft (600 mm) above the pipe. Where using piping listed for private fire service mains, the manufacturer's installation instructions for backfill shall be followed. Tracer wire and tape are required and shall be in accordance with AWWA

### **Approval of Underground Piping.**

The installing contractor shall be responsible for the following:

1. Notifying the AHJ and the owner's representative of the time and date testing is to be performed
2. Performing all required acceptance tests
3. Completing and signing the contractor's material and test certificate(s) shown found in this chapter

### **Flushing of Piping.**

Underground piping, from the water supply to the system riser, and lead-in connections to the system riser, including all hydrants, shall be completely flushed before the connection is made to downstream fire protection system piping. The flushing operation shall be continue until water flow is verified to be clear of debris

### **Hydrostatic Test.**

All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at gauge pressure of 200 psi (13.8 bar) or 50 psi (3.4 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure at gauge pressure of  $\pm 5$  psi (0.34 bar) for 2 hours. A 24 hour hydro shall be required for all pipe that is completely buried. Please contact the National City Fire Department for direction prior to installation. Acceptable test results shall be determined by indication of either a pressure loss less than gauge pressure of 5 psi or by no visual leakage. The test pressure shall be read from one of the following, located at the lowest elevation of the system or the portion of the system being tested:

1. A gauge located at one of the hydrant outlets
2. A gauge located at the lowest point where no hydrants are provided

### **Joint Backfill**

The trench shall be backfilled between joints before testing to prevent movement of pipe. Where required for safety measures presented by the hazards of open trenches, the pipe and joints shall be permitted to be backfilled, provided the installing contractor takes the responsibility for locating and correcting leakage

### **Protection of Piping.**

Aboveground piping for private fire service mains shall not pass through hazardous areas and shall be located so that it is protected from mechanical and fire damage. Aboveground piping shall be permitted to be located in hazardous areas protected by an automatic sprinkler system. Where aboveground water-filled supply pipes, risers, system risers, or feed mains pass through open areas, cold rooms, passageways, or other areas exposed to freezing temperatures, the pipe shall be protected against freezing by the following:

1. Insulating coverings
2. Frost proof casings
3. Other reliable means capable of maintaining a minimum temperature between 40°F and 120°F (4°C and 49°C)

Where corrosive conditions exist or piping is exposed to the weather, corrosion-resistant types of pipe, fittings, and hangers or protective corrosion-resistant coatings shall be used. To minimize or prevent pipe breakage where subject to earthquakes, aboveground pipe shall be protected in accordance with the seismic requirements of NFPA 13. Mains that pass through walls, floors, and ceilings shall be provided with clearances in accordance with NFPA 13

### **Fire Hydrants**

Hydrants shall be listed and approved. The connection from the hydrant to the main shall not be less than 6 in. (150) (nominal). A control valve shall be installed in each hydrant connection. Valves required by this chapter shall be installed within 20 ft (6.1 m) of the hydrant. Valves shall be clearly identified and kept free of obstructions. Where valves cannot be located in accordance with this chapter, valve locations shall be permitted where approved by the AHJ

The number, size, and arrangement of outlets; the size of the main valve opening; and the size of the barrel shall be suitable for the protection to be provided and shall be approved by the AHJ. Independent gate valves on 2<sup>1</sup>/<sub>2</sub> in. (65 mm) outlets shall be permitted

Hydrant outlet threads shall have NHS external threads for the size outlet(s) supplied as specified in NFPA 1963. Where local fire department connections do not conform to NFPA 1963, the AHJ shall designate the connection to be used

### **Number and Location.**

Hydrants shall be provided and spaced in accordance with the requirements of the AHJ. Public hydrants shall be permitted to be recognized as meeting all or part of the requirements of this chapter. Hydrants shall be located not less than 40 ft (12 m) from the buildings to be protected. Where hydrants cannot be located in accordance with this chapter, hydrants located closer than 40 ft (12 m) from the building or wall hydrants shall be permitted to be used where approved by the AHJ

### **Installation.**

Hydrants shall be installed on flat stones, concrete slabs or other approved materials. Small stones or an approved equivalent shall be provided about the drain. Where soil is of such a nature that the hydrants will not drain properly with the arrangement specified in this chapter, or where groundwater stands at levels above that of the drain, the hydrant drain shall be plugged before installation. Hydrants with drain plugs shall be marked to indicate the need for pumping out after usage. The center of a hose outlet shall be not less than 18 in. (450 mm) above final grade. The center of a hose outlet shall not be more than 36 in. (914 mm) above final grade. The center of a hose outlet located in a hose house shall not be less than 12 in. (300 mm) above the floor

Hydrants shall be restrained in accordance with the requirements of this chapter. Hydrants shall be protected if subject to mechanical damage, in accordance with the requirements of this chapter. The means of hydrant protection shall be arranged so that it does not interfere with the connection to, or operation of, hydrants

The following shall not be installed in the service stub between a fire hydrant and private water supply piping:

1. Check valves
2. Detector check valves
3. Backflow prevention valves
4. Other similar appurtenances

### **Hydrant Operating Test.**

Each hydrant shall be fully opened and closed under system water pressure. Dry barrel hydrants shall be checked for proper drainage. All control valves shall be fully closed and opened under system water pressure to ensure proper operation. Where fire pumps supply the private fire service main, the operating tests required by this chapter shall be completed with the pumps running

### **General.**

A private fire service main and its appurtenances installed in accordance with this standard shall be properly inspected, tested, and maintained in accordance with NFPA 25 to provide at least the same level of performance and protection as designed





