



DIVISION OF  
FIRE AND LIFE SAFETY

# CITY OF SCOTTSDALE

## SCOTTSDALE FIRE DEPARTMENT

# Interpretations and Applications of NFPA 13D (2022 edition)

**EFFECTIVE: January 1, 2023**

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CITY OF SCOTTSDALE FIRE DEPARTMENT  
PLANNING & DEVELOPMENT SERVICES DEPARTMENT

**INTERPRETATIONS & APPLICATIONS**  
**OF THE 2022 MODIFIED NFPA 13D**

The following are additions and amendments to NFPA 13D



## CHAPTER 4 – GENERAL REQUIREMENTS

### 4.4.1 SUBMITTAL REQUIREMENTS *added*

Fire sprinkler plans submitted to the City shall comply with the following:

- (1) All plans, calculations, and data sheets shall be digital format only (PDF).
- (2) Hydraulic calculations shall include all information required by NFPA 13 - 28.4.
- (3) Include product data for all system components.
- (4) All submittals shall be signed and sealed with review and expiration date by a minimum level III NICET Certified Engineering Technician (CET) automatic sprinkler systems or an Arizona Registered Professional Engineer (PE).

**Exception:** Addition or alteration of five (5) or less fire sprinklers to existing approved fire sprinkler systems shall not require plan submittal. Where sprinklers are located at the remote end of the system, plans and calculations will be required. Fire inspection is required.

For digital plan submittals, see the City of Scottsdale website at:  
<https://eservices.scottsdaleaz.gov/bldgresources/Plans>

### 4.4.2 WORKING PLANS *added*

A scaled drawing shall include the following:

- (1) Address
- (2) Size and type of domestic line, including length to city connection
- (3) Water meter size
- (4) Current static water pressure
- (5) Interior walls
- (6) Model, manufacturer, temperature, and orifice size of sprinklers
- (7) Type of pipe
- (8) Hanger spacing requirement per the pipe manufacturer
- (9) Riser detail
- (10) Installing contractor information
- (11) Hydraulic calculations
- (12) Sprinkler symbol legend
- (13) Room names

- (14) Ceiling heights, ceiling height changes
- (15) Sloped ceilings exceeding 3:12 degrees, indicate degree of slope. For ceilings 3:12 degrees or less, indicate "No Slope".
- (16) Beam sizes and soffit depths
- (17) Dimensioning of sprinklers as necessary for determining proper sprinkler spacing
- (18) Pipe lengths, center to center
- (19) Clearly identified calculated areas (on plans and calculations)
- (20) Inspector's test
- (21) Riser location
- (22) Alarm bell location
- (23) General notes as required

#### **4.4.3 REMODEL/ADDITION SUBMITTALS *added***

Remodels and additions shall include the following:

- (1) Scope of work
- (3) Size and type of domestic line, including length to city connection
- (4) Existing and proposed water meter size
- (5) Current static water pressure
- (6) Model, manufacturer, temperature, and orifice size of sprinklers
- (7) Where not provided, plans must demonstrate that no calculations are necessary. If piping is inaccessible (i.e., flat roof), the following will be acceptable as a means of proving adequate water flow for system:
  - i. Perform a bucket test proving hydraulic flow
  - ii. Calculate system at worst case scenario using ¾-inch CPVC piping

#### **4.5.1 CPVC CERTIFICATION**

When installing CPVC piping, the factory issued certification card must be carried by pipe fitter during installation and is to be made available to an inspector upon request.

## **CHAPTER 6 – WATER SUPPLY**

### **6.2 (6) WATER SUPPLY SOURCES**

The water supply shall be provided by the domestic service line. A dedicated fire service line for the fire sprinkler system is not permitted.

#### **6.2.2.1 PUMP SYSTEM CRITERIA FROM CITY WATER SUPPLY *added***

- (1) A combination pump system supplying both domestic water and the fire sprinkler system shall be required.
- (2) A bypass line shall be installed
- (3) Submit manufacturer's specifications for pump, including pump curve
- (4) See Appendix "C" for pump system from city water supply diagram

**6.2.2.2 PUMP SYSTEM CRITERIA FROM STORED WATER SUPPLY *added***

- (1) A combination pump system supplying both domestic water and the fire sprinkler system shall be required.
- (2) A low water alarm shall be actuated when water level drops to minimum quantity specified for fire sprinkler system. Low water alarm shall be audible and installed in a central location of normally occupied livable structure. The alarm shall produce a sound pressure of 15 decibels above ambient noise levels.
- (3) An FDC shall be installed below alarm bell, accessible to Fire Department (National Standard Thread with a 1 ½-inch snoot).
- (4) Submit manufacturer's specifications for pump, including pump curve
- (5) See Appendix "D" for pump system from well water supply diagram

**6.3 MULTI-PURPOSE PIPING SYSTEMS *added***

**6.3.5** Multi-purpose systems shall be pressure tested at 130 psi for 2 hours before being connected to any residential fixtures.

**6.3.6** Multi-purpose systems shall be hydraulically calculated proving pressure demand is met at most demanding sprinkler(s) on all plan submittals.

- (a) An additional 20% will be added to total pipe length for friction loss due to curving or bending of pipe in hydraulic calculations.

**6.3.7** All multi-purpose systems shall have an inspector's test valve installed.

**CHAPTER 7 – INSTALLATION**

**7.1.5 FIRE RISER COMPONENTS *added***

The components of a riser assembly must include the following:

- (1) Aboveground horizontal or vertical pipe between water supply, cross mains or feed mains.
- (2) A combination control valve installed prior to domestic water and the fire sprinkler system tee.
- (3) Rubber faced check valve
- (4) Pressure gauge
- (5) Main drain with a pressure relief valve
- (6) Supervisory capable electric flow switch
- (7) See Appendix "A" for riser diagram

**7.1.5.1 FIRE RISER ASSEMBLY LOCATION AND ACCESS *added***

- (1) The riser shall be constructed within a garage or other secured location approved by Fire Code Official or within a wall cabinet or other acceptable enclosure with an access panel or door suitable for access to all riser components.
- (2) All riser assemblies shall be braced and secured
- (3) CPVC piping shall be protected from damage up to 7 feet from floor level

## **7.2 DRAIN AND TEST CONNECTIONS *added***

**7.2.1.1** The main drain shall be ½-inch or larger, located above check valve and flow switch.

**7.2.1.2** There shall be a fixed non-adjustable pressure relief valve branched off the main drain that will activate at pressures no lower than 150 psi and no higher than 175 psi.

## **7.2.4 INSPECTOR'S TEST CONNECTIONS *amended***

- (1) Each sprinkler system shall have an inspector's test valve and drain connected at the highest most remote possible point in the system.
- (2) Piping shall be same size as the piping to the most remote sprinklers.
- (3) Detached structures served by an underground water supply shall be provided with an inspector's test. This may be used as the only inspector's test if it is a remote location.

## **7.2.5 INSPECTOR'S TEST ORIFICE SIZE AND LOCATION *amended***

- (1) The test valve shall have an orifice the same size as the remote sprinklers
- (2) The test valve may be located on exterior wall in an accessible area or within a wall cabinet or other acceptable enclosure with an access panel or door.
- (3) The test valve shall be accessible to the Fire Department in such a place where it will not sustain damage and where water can be flowed without damage to the structure or contents.
- (4) Discharge shall be above grade and unobstructed
- (5) Discharge from the orifice shall be confined to the property

## **7.2.6.1 PRESSURE REDUCING VALVES *added***

Pressure reducing valves shall be installed on domestic side of tee.

## **7.3.4 PRESSURE GAUGES *added***

Pressure gauges shall be installed on the system side of the check valve.

## **7.6 ALARMS *amended***

Local water flow alarm bell shall be provided on all sprinkler systems as follows:

- (1) A 110-volt AC 6-inch minimum size alarm bell shall be supplied by house current
- (2) A dedicated circuit or GFI is not permitted
- (3) The bell shall be mounted on the exterior of the structure, visible from the street, and not more than 3 feet from front.
- (4) The bell must be at a height readily visible from street or drive and no higher than the plane made by the bottom of the eaves.
- (5) The alarm bell shall receive its signal from a UL listed local water flow switch
- (6) The alarm bell color shall be red

### 7.7.1 THERMAL PROTECTION *added*

Copper pipe may be installed in the same manner as CPVC in open attic spaces and unfinished garages. Insulation products used for either copper or nonmetallic piping shall be rated to protect from freezing down to minimum temperatures of 0° F.

## CHAPTER 8 – SPRINKLER POSITION AND LOCATION

### 8.1 DESIGN CRITERIA

#### 8.1.5 BIG BOX SINGLE FAMILY RESIDENCE *added*

Single family homes over 12,000 sq. ft. in area within exterior enclosing walls including all floors shall be provided with attic sprinkler protection in accordance with the following modified 13D requirements:

- (1) Minimum 1 1/2-inch domestic meter
- (2) Minimum 2-inch domestic line
- (3) Attic design area of 500 sq. ft. calculated at .1 gpm per sq. ft. discharge density
- (4) Interior space design area, 4 sprinklers calculated at .05 gpm per sq. ft. density.
- (5) Copper or steel sprig-ups are permitted on CPVC in 13D installations. CPVC sprig-ups are not permitted unless installed with sprinklers specifically listed to protect CPVC in concealed space applications.

#### EXCEPTION:

Single family homes with additional challenges including, but not limited to, access and/or size, as determined by Fire Code Official, shall be required to have sprinkler protection in accordance with NFPA 13 standards.

#### 8.1.6 RESIDENTIAL BARN *added*

- (1) 1501-5000 square foot barns may be piped from the domestic service. Calculate a minimum of two commercial QR sprinklers using .1 gpm per sq. ft. discharge density per NFPA 13. Install in accordance with NFPA 13 Standards.
- (2) 5001 square foot and larger barns shall require a separate fire service line connected to a city water main. Install in accordance with the City of Scottsdale Interpretations and Applications and NFPA 13. Calculate 4 using 0.1 gpm per square foot per sprinkler.

#### 8.1.7 DETACHED STRUCTURES *added*

Detached garages (as determined by the Building Code and Zoning Ordinance), guest houses, and similar structures exceeding 1500 square feet shall require a separate water supply, fire sprinkler riser, inspector's test, and alarm bell.

### **8.1.8 EXTENDING EXISTING SYSTEMS TO NEW ADDITIONS *added***

Extending an existing fire sprinkler system to an attached new addition may be done in the following manner:

- (1) Connect into existing piping system
- (2) Connect new supply line at top of existing fire sprinkler riser and run pipe overhead or underground to point of connection

**Note:** See sections 4.5.3, 4.5.3.1, 4.5.4, 4.5.5 for submittal requirements.

### **8.3.1.1 LOCATION OF SPRINKLERS *added***

Sprinklers shall be installed in all areas including, but not limited to the following:

- (1) Garages
- (2) Attached carports
- (3) Bathrooms
- (4) Entrance foyers
- (5) Water heater closets
- (6) Utility and mechanical closets
- (7) Washer and dryer closets
- (8) Accessible areas under stairs and landings
- (9) Closets under stairways
- (10) Area beneath stairway when open to the room
- (11) Covered patios when there is livable space above
- (12) Covered vehicle pass throughs when there is livable space above
- (13) Where an attached built-in barbeque with open attic space above is constructed, a 200-degree QR 7/16-inch orifice commercial sprinkler shall be provided in an approved location near where the flue passes through roof structure.

### **8.3.3 LOCATION OF SPRINKLERS *amended***

Sprinklers shall not be required in clothes closets, linen closets, and pantries that meet all of the following conditions:

- (1) The area of the space does not exceed 24 ft<sup>2</sup> (2.2 m<sup>2</sup>)
- (2) The shortest dimension does not exceed 3 ft (0.9 m)
- (3) The walls and ceilings are surfaced with noncombustible or limited combustible materials as defined in NFPA 220



### 8.3.5 LOCATION OF SPRINKLERS *amended*

Sprinklers shall not be required in:

- (1) Elevator machine rooms
- (2) Floor/ceiling spaces
- (3) Elevator shafts
- (4) Crawl spaces and other concealed spaces that are not used or intended for living purposes and do not contain fuel-fired equipment.

## Chapter 10 - DISCHARGE AND HYDRAULIC CALCULATIONS

### 10.4.2.3 NETWORK SYSTEMS *added*

- (11) Piping runs shall be installed per manufacturer's color coding for ease of inspection.

### 10.4.3 HYDRAULIC CALCULATION METHOD *amended*

The pipes shall be sized using one of the following techniques:

- (3) The hydraulic calculation procedure for NFPA 13
  - (a) Pipe sizes 2-inch or less shall include 3 psi fixed loss for the flow switch, or per manufacturer specifications.
  - (b) Calculations shall maintain a 10% pressure safety margin from field water pressure tests. Pressure used for hydraulic calculations shall not exceed 72 psi. When additional fittings have been installed in a sprinkler system not accounted for in design, revised drawings and hydraulic calculations may be required.
  - (c) Domestic water lines shall be 1-inch minimum in new construction
    - (i) Water meters shall be sized to meet calculated demand.
    - (ii) Additions or alterations to existing R-3 occupancies may use an existing 5/8-inch or 3/4-inch meter hydraulic calculations support water supply capacity for the fire sprinkler system.

## CHAPTER 11 - SYSTEM ACCEPTANCE

### 11.1.3 ROUGH INSPECTION *amended*

- (1) All tests shall be witnessed by Scottsdale Fire Department.
- (2) All components of system shall be in place and secured.
- (3) The system shall be connected to the permanent water supply source.
- (4) Approved fire sprinkler system plans shall be on-site.
- (5) Concealed fire sprinkler cover plates shall not be installed.
- (6) When CPVC piping systems are hydrostatically tested, plugs shall be installed in fittings. Ceilings greater than 16 feet in height may have sprinklers installed at time of hydrostatic test.

- (7) Installation of CPVC pipe requires factory issued certification card to be carried by pipe fitter during installation and is to be made available to an inspector upon request. Installer shall follow all manufacturer guidelines for installation.
- (8) All fire penetrations shall be filled with approved material and nail plates shall be in place at the time of pressure test. Where metal studs are used, piping shall be protected with either a sleeve or grommet.
- (9) All new systems shall be tested using a cold-water test, minimum of 200 psi for 2-hours. System must show adequate pressure per approved plans. No visible leakage or pressure reduction is permitted.
- (10) When adding or altering more than 10 sprinklers on an existing system, it shall be tested using a cold-water test, minimum of 140 psi for 2 hours.
- (11) When adding or altering 10 sprinklers or less on an existing system, it shall be connected to the permanent water supply for 2 hours prior to inspection.
- (12) CPVC product shall be installed per manufacturer's specifications and compatibility requirements.

#### **11.1.4 FINAL INSPECTION *added***

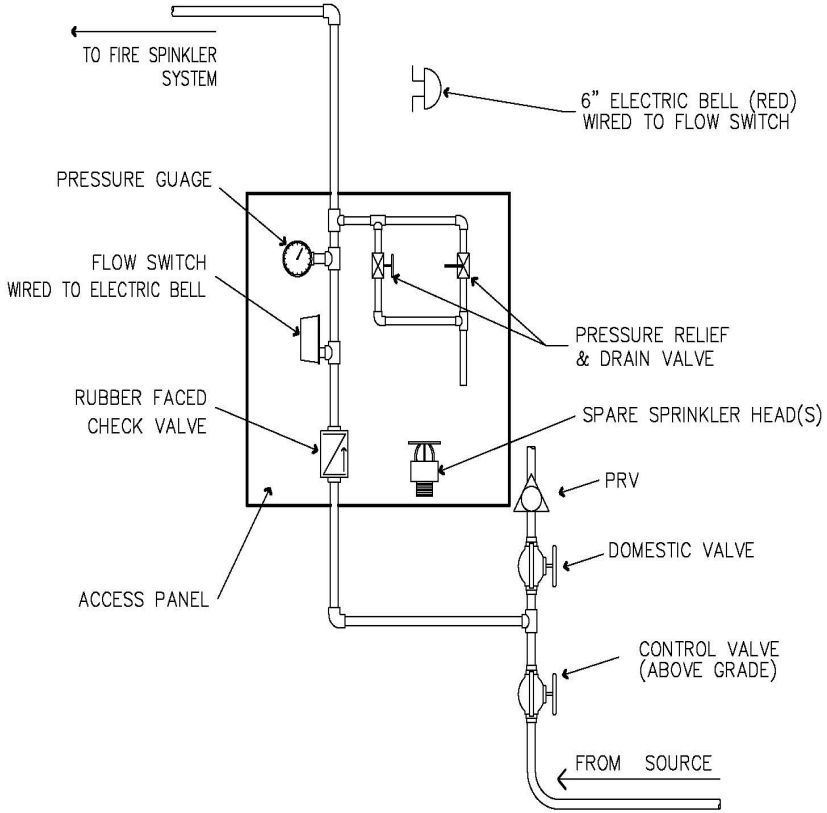
- (1) All sprinkler system components shall be in place and the system shall be flowed to verify activation of the flow switch and bell.
- (2) All risers shall have a hydraulic design placard in accordance with Appendix "B".
- (3) Spare sprinklers shall be in the riser compartment.
- (4) Fire Department Inspection form from rough inspections must be on job site at time of test if there was a stipulation for rough approval.
- (5) Verify manufacturers sprinkler tolerance with the escutcheon in place and check for paint, obstructions, plaster, etc.
- (6) Concealed sprinkler cover plates shall not be installed.

#### **11.1.5 REINSPECTION FEES *added***

A fee may be assessed for each reinspection, including but not limited to the following:

- (1) Approved plans with SFD approval stamp not on-site during inspection.
- (2) Installation is not complete.
- (3) Corrections from previous inspections not complete
- (4) Two or more inspection cancellations.
- (5) Late notice of cancellation (less than 2 hrs. prior)

# RISER DIAGRAM



NOT TO SCALE

# APPENDIX "A"

# CALCULATION DESIGN PLACARD FOR 13D

ABC SPRINKLER CO.  
1234 N. SCOTTSDALE RD.  
SCOTTSDALE, AZ.

PHONE: 000-000-0000

## HYDRAULIC CALCULATION DATA

BASED ON WATER PRESSURE OF  
\_\_\_\_\_ @ RISER

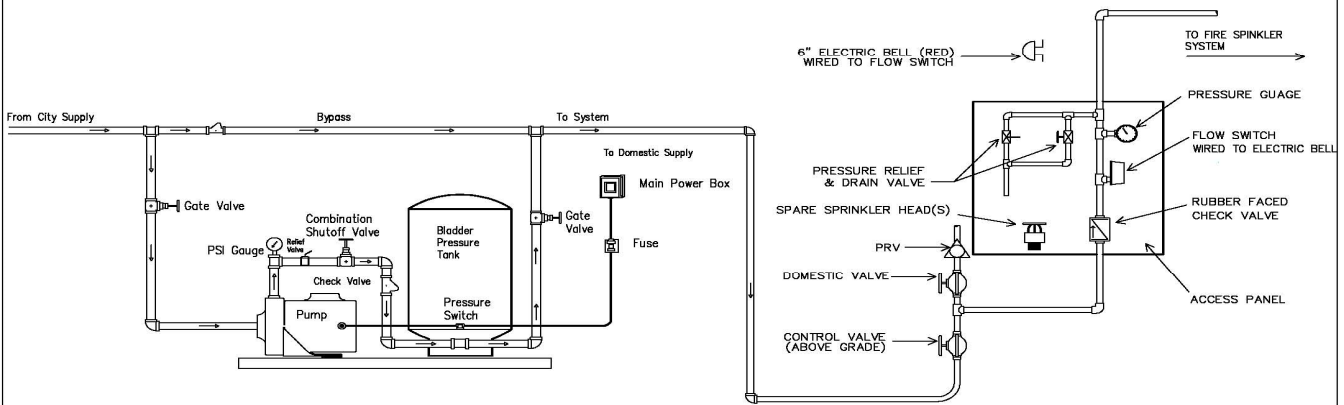
TWO HEAD CALCULATION:  
\_\_\_\_\_ GPM @ \_\_\_\_\_ PSI

ONE HEAD CALCULATION:  
\_\_\_\_\_ GPM @ \_\_\_\_\_ PSI

MINIMUM SIZE: 3" X 5"

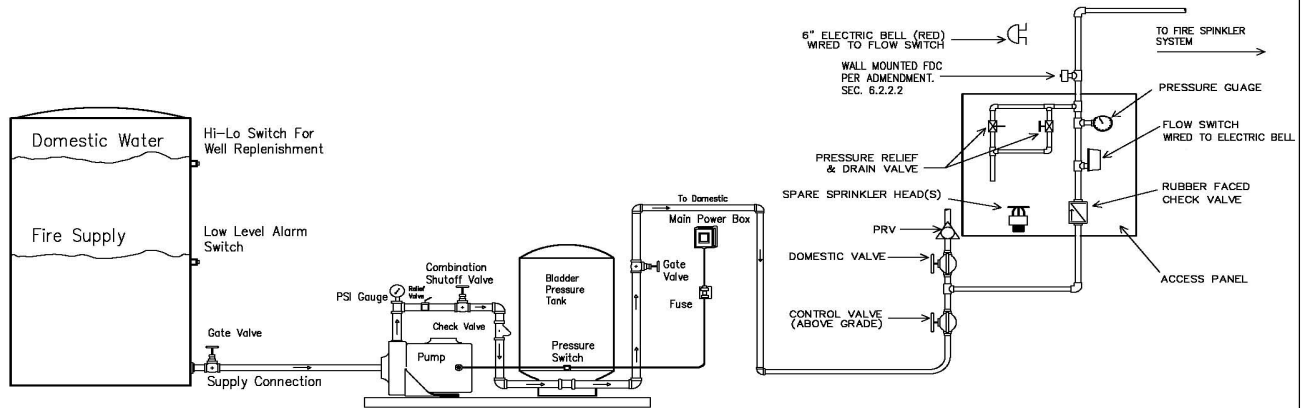
## APPENDIX "B"

## EXAMPLE OF A COMBINATION FIRE/DOMESTIC PUMP SYSTEM FOR CITY WATER SUPPLY



## APPENDIX "C"

## EXAMPLE OF A COMBINATION FIRE/DOMESTIC PUMP SYSTEM FOR WATER STORAGE TANK



Sprinkler System Design using Tyco LF II  
 16 X 16 spacing 14 GPM @ 11.1 PSI  
 33 GPM (2 Heads flowing)  
 X 15 minutes = 495 Gallons  
 X 1.1 (10% buffer) = 545 Gallons  
 600 gallons required for sprinkler system.

The tank size shall be determined by the fire  
 sprinkler requirement, in addition to domestic use.

## APPENDIX "D"