Buckeye Fire Department
Fire Prevention Division

NFPA 13D (2010 Edition)

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Chapter 4 – General Requirements

4.1.2.1 LINTELS ***ADDED***

Large, beamed ceilings are not intended to be given credit as a compartment enclosure, even if they have an 8" depth. The openings from the compartment are generally based on a 36" wide door opening.

4.8.1 WORKING PLANS ***ADDED***

A scaled drawing shall show 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 (Current within 6 months of submittal date)
5. Interior walls
6. Model, manufacturer, temperature, orifice size and spacing requirements of sprinkler
7. Type of pipe
8. Hanger spacing requirement per the pipe manufacturer
9. Riser detail
10. Head symbol legend
11. Installing contractor information
12. Hydraulic calculation data
13. Room names
14. Ceiling heights, ceiling height changes
15. Sloped ceilings exceeding 2:12. Indicate "no sloped ceilings" if applicable
16. Beam sizes and soffit depths
17. Dimensioning of heads as necessary for determining proper head spacing
18. Pipe lengths, center to center
19. Clearly identified calculated areas (On plans & calculations)
20. Inspectors test
21. Riser location
22. Electric bell location
23. General notes as required
24. All sheets shall be sized the same

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4.9 SUBMITTAL REQUIREMENTS *ADDED*

New construction and remodel plans submitted to the City shall comply with the following:

1. Submit a minimum of 3 sets of all working drawings
2. Submit one set of hydraulic calculations and manufacturer data sheets
3. Acceptable paper size shall be limited to 24 x 36 or 30 x 42, minimum scale shall be 1/8”
4. All submittals shall bear a dated review certification and signature of a minimum level III NICET certified engineering technician (CET) automatic sprinkler systems or an Arizona Registered Professional Engineer
5. An approved set of plans shall be at the structure at the time of scheduled inspections. Deviations from approved plans will require approval of the fire chief.

4.9.1 REMODEL/ADDITIONS SUBMITTAL *ADDED*

Remodel and additions submitted to the City when calculations are not required:

1. When calculations are not required, submittals may be faxed or emailed (DWF format) on a scaled floor plan (3/16” minimum) 8-1/2 x11” size paper
2. No NICET or P.E. stamp is required
3. The scope of work must be clear & demonstrated that no calculations are necessary
4. Fax submittals shall be limited to one sheet

4.9.2 REMODEL/ADDITIONS INFORMATION *ADDED*

Information provided on remodel and addition submittals shall include but not limited to:

1. Project information
2. Meter size
3. Underground size and length
4. Current static PSI
5. Existing and new head type

Note: If the original sprinkler was installed at less than .05 density, calculations will be required when using other than an approved replacement head, unless it is obviously close to the riser.

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(For digital submittals: see the City of Buckeye website at: www.Buckeyeaz.gov)

4.10 TESTS AND INSPECTIONS *ADDED*

4.10.1 ROUGH INSPECTION *ADDED*

1. All components of the system shall be in place. Secured and connected to the water supply at the time of test.
2. All new systems shall be tested using a cold water test/minimum of 175 PSI for 24 hours. System must show adequate pressure per approved plans. No visible leakage or pressure reduction is permitted.
3. When adding/relocating 4 or more heads to an existing system, it shall be tested using a cold water test/minimum of 140 PSI for 24 hours. 3 heads or leads shall be connected to the permanent water supply for 24 hours prior to inspection.
4. All fire penetrations should be filled with approved material and nail plates shall be in place at the time of the pressure test. Where metal studs are used piping shall be protected with either a sleeve or grommet.
5. Systems tested with sprinkler heads installed at time of test may have up to 10% of the heads removed for orifice obstruction inspection. (Not required if plugs are used) If solvent glue or other foreign objects are found within the sprinkler head at time of inspection, then the system shall be tested using plugs in lieu of sprinkler heads. The sprinkler contractor will then be required to install all sprinkler systems using plugs in lieu of sprinkler heads for a period of one year from that date for each inspection.
6. An approved set of sprinkler plans shall be on the job site at the time of inspection.

4.10.2 FINAL INSPECTION *ADDED*

1. At the final inspection all sprinkler system components shall be in place, and the system shall be flowed with the activation of the flow switch and bell.
2. All risers shall have a calculation sticker and appropriate spare heads installed in the riser compartment. See Appendix “B” for calculation sticker detail.
3. Fire Department inspection form from rough-in inspection must be on the job site at the time of test if there was a stipulation for rough-in approval.
4. Verify manufacturers head tolerance with the escutcheon in place and check for paint, obstructions, plasters, etc.

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4.10.3 RE-INSPECTIONS FEES *ADDED*

A re-inspection fee may be assessed for each inspection or re-inspection, not-limited to the following:

1. When installation is not complete.
2. When corrections from previous inspection are not complete.
3. When two or more appointments have been cancelled at the same address.
4. Late notice of cancellation (less than 2 hours prior).

4.11 CPVC CERTIFICATION *ADDED*

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

CHAPTER 6 – WATER SUPPLY

6.2.2.1 PUMP SYSTEM CRITERIA FROM CITY WATER SUPPLY *ADDED*

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

6.2.2.2 PUMP SYSTEM CRITERIA FROM WELL AND/OR STORED WATER SUPPLY *ADDED*

1. A combination pump system supplying both the domestic and fire sprinkler system shall be required.
2. A low water alarm shall be actuated when the water level drops to the minimum quantity specified for the fire sprinkler system. The low water alarm shall be audible and installed in a central location of the 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 the electric bell, accessible to the Fire Department. (National Standard Hose thread with an 1-1/2" snoot)
4. Submit manufacturer's specifications for the pump, including the pump curve.
5. See Appendix "D" for an example of a pump system from well water supply.

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6.3 MULTIPURPOSE PIPING SYSTEM *AMENDED*

1. In common water supply connections, 5 GPM per dwelling unit shall be added to the sprinkler system demand to determine the size of common piping and the size of the total water supply requirements where no provision is made to prevent flow into the domestic water system upon operation of a sprinkler.

3. Piping connected to the system that supplies only plumbing fixtures shall comply with local plumbing and health authority requirements and shall be listed.

5. **Warning sign**. A sign shall be affixed adjacent to the main shutoff valve that states in minimum ¼ in. (6.4 mm) letters, "Warning, the water system for this home supplies fire sprinklers that require certain flows and pressures to fight a fire. Devices that restrict the flow or decrease the pressure or automatically shut off the water to the fire sprinkler system, such as water softeners, filtration systems, and automatic shutoff valves, shall not be added to this system without a review of the fire sprinkler system by a fire protection specialist. Do not remove this sign."

6. Where water treatment and filtration are installed, one of the following conditions shall be met:

   a) The flow restriction and pressure loss through the water treatment equipment shall be taken into account in the hydraulic calculations.
   b) An automatic listed bypass valve shall be installed around the water treatment equipment that directs all water directly to the system.

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CHAPTER 7 – INSTALLATION

7.1.4 FIRE RISER COMPONENTS *ADDED*

The components of a riser assembly include the following:

1. Aboveground horizontal or vertical pipe between the water supply, the cross mains or feed mains.

2. A combination control valve installed prior to the fire sprinkler and domestic supply tee (See Appendix "A" for Residential Riser Detail)
3. Rubber faced check valve
4. Pressure gauge
5. Main drain with a pressure relief valve
6. Supervisory capable electric flow switch

7.1.4.1 FIRE RISER ASSEMBLY LOCATION AND ACCESS *ADDED*

1. The riser shall be constructed within a garage or other secured location as approved by the 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. Plastic systems shall be protected from damage up to 7 feet from floor level.

7.2.1 DRAIN *AMENDED*

1. Each sprinkler system shall have a drain on the system side of the control valve.
2. The main drain shall be ½ inch or larger. Located above the check valve and flow switch.
3. There shall be a fixed non-adjustable pressure relief valve branched off of 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 CONNECTION *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 the same size as the piping to the most remote sprinkler head.
3. Underground sprinkler supply pipe servicing detached structures, shall be provided with an inspector's test. This may be used as the only inspector's test if it is a remote location.

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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 sprinkler head.
2. The test valve shall be constructed 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.

7.3.2.1 PRESSURE GAUGE ***ADDED***

The gauge shall be installed on the system side of any system.

7.5.5.3 (4), (5) USE OF INTERMEDIATE TEMPERATURE RATINGS ***ADDED***

(4) Intermediate temperature rated residential sprinkler heads (175^{o}F) shall be installed in mechanical rooms, garages and small laundry closets without a/c

(5) 200^{o} commercial quick response small (7/16") orifice heads may be used in mechanical and/or storage rooms that are isolated and accessible on the exterior face of the structure.

7.5.8.1 SOLVENT CEMENT ***ADDED***

The head adaptor/drop nipple assembly shall be pre-fabricated prior to installation to ensure the sprinkler orifice remains free of obstructions.

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7.6 ALARMS ***AMENDED***

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

1. A 110 volt AC 6 inch minimum size electric 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 the front.
4. The bell must be at a height to view easily from the street or drive and no higher than the plane made by the bottom of the eaves.
5. The alarm shall receive its signal from a UL listed local water flow switch.
6. Color: Red.

7.7.1 THERMAL PROTECTION ***ADDED***

CPVC may be installed the vertical and/or horizontal position to protect mechanical units in open attic spaces, however, it shall be protected with a noncombustible insulation molded to fit the pipe diameter. The insulation shall be compatible with CPVC pipe.

Surface burning characteristics shall be in accordance with the following specifications:

Shall not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88.

Note: Copper pipe may be installed in the same manner as CPVC in open attic spaces. Insulation products used for either copper of CPVC shall be rated to protect from freezing down to minimum temperatures of 0^{o}F.

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7.8 UNSUPERVISED PIPE ***ADDED***

Unsupervised sprinkler pipe in residential structures:

1. Residential sprinkler systems shall not have unsupervised pipe more than four (4) feet in length within a wall adjacent to livable space and/or no more than ten (10) feet in length in a wall that does not have a livable space on either side.
2. The pipe will be measure from the point of entry; both horizontally and vertically, up to the center of the flow switch on the riser.

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CHAPTER 8 – SYSTEM DESIGN

8.1.5 SPECIAL DESIGN APPROACHES ***ADDED***

8.1.5.1 CEILINGS WITH EXPOSED BEAMS ***ADDED***

Ceilings w/exposed beams – Follow manufacturers listing requirements for "beamed ceilings sprinklers"

1. **Design challenge #1 when drilling beams:**
   a) Sloped ceilings (4:12 max.) w/beams using a listed head for beams – Calculate the next higher GPM listed for the sprinkler head selected or an additional head may be calculated. Following the specific coverage criteria is permitted. The designer will select which option is being utilized and state that option on the plan.
2. **Design challenge #2 when drilling beams:**
   b) Sloped ceilings (Over 4:12 – 8:12 max.) w/beams using a listed head for beams – An additional head shall be calculated. Following the specific coverage criteria is permitted. The designer shall state the requirement on the plan.
3. **Design challenge #3 when installing heads between beams:**
   c) Calculate 3 heads with the listed coverage criteria when unable to maintain 8' minimum between sprinklers. The designer shall state the requirement on the plan.
4. **Design challenge #4 when beam length and/or spacing parameters exceed testing approvals:**
   d) Calculate the next higher GPM listed for the sprinkler head selected or an additional head may be calculated.

Note: Until further testing has been conducted for residential fire sprinkler systems, design challenges that require sprinkler heads to be installed in non-listed applications, the City of Buckeye Fire Marshal will be requiring that the 2007 Edition of NFPA 13-D section A.8.1.2 be considered when designing systems.

These guidelines are for some of the most common design challenges. The designer/engineer will address other design challenges on a case-by-case basis.

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8.1.5.2 COFFERED CEILINGS/SOFFITS *ADDED*

1. A.8.1.2 provides guidance for design scenarios when NFPA 13-D Standards & specific head listings do not accommodate a particular design feature. NFPA 13 may be referenced for determining maximum ceiling pocket depth of 36" before requiring a head to be placed at the high point of the ceiling.
2. When faced with a design challenge of installing heads on other than smooth-flat ceilings, i.e. installing heads in coffered ceilings, Annex A, sec. A.8.1.2 may be applied by choosing the next higher GPM listed for the sprinkler head selected or an additional head may be calculated. The designer will select which option is being utilized and state that option on the plan.
3. Residential sprinkler heads with a specific listing for beamed ceiling may be installed in lowest architectural soffit feature of a coffer with a maximum depth of 14"in. from the high point of the ceiling. Following the specific coverage criteria is permitted.

NOTE: NFPA 13-D section 8.6.7 may be used in lieu of the above requirement.

8.1.6 RESIDENTIAL BARNS *ADDED*

1. 1501-5000 square foot barns may be piped from the domestic service. Calculate a minimum of two commercial QR heads using the area/density method per NFPA 13. Install in accordance with NFPA 13 Standards.
2. 5001 square foot barns and above shall require a separate fire line service connected to a city water main. Install in accordance with the City of Buckeye Interpretations and Applications and NFPA 13. Calculate 4 heads.

8.1.7 DETACHED STRUCTURES *ADDED*

Detached garages, guest houses, and similar structures exceeding 1500 square feet, shall require a separate water supply, fire sprinkler riser, inspector's test and electric bell.

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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 the existing piping system.
2. Connect a new supply line at top of the existing fire sprinkler riser and run the pipe overhead or underground to the point of connection.
3. Other proposals will be considered on a case by case basis.

Note: See sections 4.10, 4.10.1 & 4.11 for submittal requirements.

8.4.2.1 FLOW SWITCH LOSS *ADDED*

Pipe sizes 2" or less shall include 3 PSI fixed loss for the flow switch, or per manufacturer specifications.

A.8.4.3.3 NETWORK SYSTEMS *AMENDED*

11. In common water supply connections, 5 GPM per dwelling unit shall be added to the sprinkler system demand to determine the size of common piping.
12. Piping runs shall be installed per manufacturer's color coding for ease of inspection.
13. Where water treatment filtration are installed, one of the following conditions shall be met:
    a) The flow restriction and pressure loss through the water treatment equipment shall be taken into account into the hydraulic calculations.
    b) An automatic listed bypass valve shall be installed around the water treatment equipment that directs all water directly to the system.

8.4.4 (6) PRESSURE LOSS FROM CITY MAIN TO INSIDE CONTROL VALVE *AMENDED*

6. A minimum of 5 feet shall be calculated from the city main to the meter. Pressure losses from the city main to the inside control valve shall be deducted by multiplying the factor from Table 8.4.4(a) or Table 8.4.4(b) by the total length(s) of pipe in feet (meters). [The total length includes equivalent length of fittings as determined by applying Table 8.4.4(c), Table 8.4.4(d), Table 8.4.4(e), or Table 8.4.4(f).]

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8.4.4(12) PRESSURE SAFETY MARGIN ***ADDED***

12. Calculations shall maintain a 10% pressure safety margin from the field water pressure tests. The pressure used for hydraulic calculations shall not exceed 72 psi. The purpose for this practice is to account for water pressure fluctuations. When additional fittings have been installed in a sprinkler system not accounted for in the design, revised drawings may be required with new calculations.

8.4.4(13) COMMON WATER SUPPLY CONNECTIONS ***ADDED***

13. In common water supply connections, 5 gpm per dwelling unit shall be added to the sprinkler system demand to determining the size of common piping and the size of the total water supply requirements.

8.4.4(14) DOMESTIC WATER SUPPLY ***ADDED***

14. Domestic water supplies shall be 1” minimum size in new construction.

8.4.4(15) PRESSURE REDUCING VALVE ***ADDED***

15. Pressure reducing valve installations shall be installed on the domestic side of the tee.

SECTIONS: 8.6.2, 8.6.4 ***DELETED***

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8.6.1 LOCATIONS OF SPRINKLERS *AMENDED*

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

1. Garages
2. Attached carports
3. Bathrooms
4. Entrance foyers
5. Water heater closets
6. Utility and mechanical closets
7. Washer-dryer closets
8. All 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 the patio (Entire patio)
12. In close proximity to mechanical units (any heat producing unit) located in attic spaces. Coverage shall include two sides of each mechanical unit if the head cannot be installed above the unit. Use 200^{o} QR 7f/16 orifice commercial heads. Install 1-12 inches from deck.
13. Where an attached built in barbeque with open attic space is constructed, a 200^{o} QR 7/16 orifice commercial head shall be provided in an approved location in close proximity to where the flue passes through the roof structure.

8.6.3 LOCATION OF SPRINKLERS *AMENDED*

Sprinklers are not required in clothes closets, linen closets, pantries, dumbwaiters, laundry chutes and storage rooms that do not contain electrical or mechanical equipment that meet the following conditions:

1. The area of space does not exceed $24ft^2$.
2. The least dimension does not exceed 3ft.
3. The walls and ceilings are surfaced with noncombustible or limited-combustible materials as defined in NFPA 220, *Standard on Types of Building Construction*.

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8.6.5 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.

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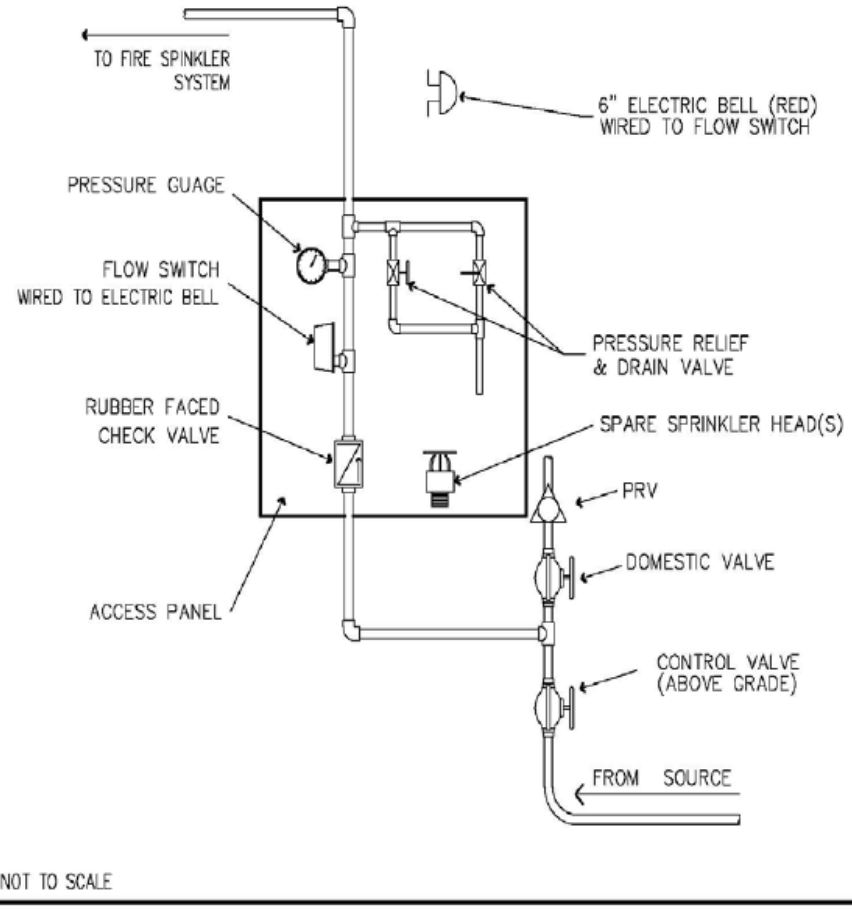
RISER DIAGRAM



NOT TO SCALE

APPENDIX "A"