**Chapter 5 System Components**

5.1 General

5.1.1\*

Only new sprinklers shall be installed in sprinkler systems.

5.1.1.1\*

Where a sprinkler is removed from a fitting or welded outlet, it shall not be reinstalled except as permitted by 5.1.1.1.1.

5.1.1.1.1

Dry sprinklers shall be permitted to be reinstalled when removed in accordance with the manufacturer's installation and maintenance instructions.

5.1.1.2

Spare sprinklers shall not be required to be provided.

5.1.2

Except as permitted by 5.1.2.1, devices and materials used in sprinkler systems shall be listed.

5.1.2.1

The following devices and components shall not be required to be listed:

Water supply pipe and fittings

Tanks

Expansion tanks

Connections up to 5 ft (1.5 m) long between a tank and a pump

Pumps

Valves

Gauges

Waterflow detection devices

Hangers

5.2 Aboveground Pipe and Equipment

5.2.1

Listed residential sprinklers installed in systems complying with 5.2.2.3, 5.2.2.4, 5.2.5.3, or 5.2.5.4 shall be permitted to have a minimum pressure rating of 130 psi (9 bar).

5.2.2\*

Pipe or tube used in sprinkler systems shall be of the materials specified in Table 5.2.2 or shall be in accordance with 5.2.3.

Table 5.2.2 Pipe or Tube Materials and Dimensions

Materials and Dimensions Standard

Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use

ASTM A795/ A795M

Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A53/ A53M

Welded and Seamless Wrought Steel Pipe ANSI B36.10M

Standard Specification for Electric-Resistance-Welded Steel Pipe ASTM A135/ A135M

Standard Specification for Seamless Copper Tube [Copper Tube (Drawn, Seamless)]

ASTM B75/ B75M

Standard Specification for Seamless Copper Water Tube ASTM B88

Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube

ASTM B251

Standard Specification for Liquid and Paste Fluxes for Soldering Applications of Copper and Copper-Alloy Tube

ASTM B813

Specification for Filler Metals for Brazing and Braze Welding (BCuP, copper-phosphorus, or copper-phosphorus-silver brazing filler metal)

AWS A5.8M/ A5.8

Standard Specification for Solder Metal [alloy grades containing less than 0.2 percent lead as identified in ASTM B32, Table 5, Section 1, and having a solidus temperature that exceeds 400°F (204°C)]

ASTM B32

Standard Specification for Seamless Red Brass Pipe ASTM B43

5.2.2.1

The chemical properties, physical properties, and dimensions of pipe materials shall be at least equivalent to the standards cited in Table 5.2.2.

5.2.2.2\*

Pipe used in sprinkler systems other than those addressed in 5.2.2.3 or 5.2.2.4 shall be designed to withstand a working pressure of not less than 175 psi (12.2 bar).

5.2.2.3

Nonmetallic pipe used in multipurpose piping systems and passive purge systems not equipped with a fire department connection shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C).

5.2.2.4

Nonmetallic pipe used in wet pipe sprinkler systems not equipped with a fire department connection and provided with a pressure-reducing valve set no higher than 80 psi (5.5 bar) shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82°C).

5.2.2.4.1

If the maximum static pressure from the water supply is less than or equal to 80 psi (5.5 bar), pipe designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82°C) shall be permitted to be used without a pressure-reducing valve.

5.2.2.4.2

If a pressure-reducing valve is used to comply with 5.2.2.4, an automatic means of pressure relief shall be installed on the sprinkler system side of the pressure-reducing valve.

5.2.3

Types of pipe other than those specified in Table 5.2.2 shall be permitted to be used where listed for sprinkler system use.

5.2.3.1

Pipe differing from those specified in Table 5.2.2 shall be installed in accordance with their listings and the manufacturers' installation instructions.

5.2.3.2\*

Chlorinated polyvinyl chloride (CPVC) pipe and crosslinked polyethylene (PEX) pipe shall comply with the portions of the American Society for Testing and Materials (ASTM) standards specified in Table 5.2.3.2 that apply to fire protection service.

Table 5.2.3.2 Specifically Listed Pipe or Tube Materials and Dimensions

Materials and Dimensions Standard

Nonmetallic Piping:

Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)

ASTM F442/ F442M

Standard Specification for Crosslinked Polyethylene (PEX) Tubing

ASTM F876

5.2.4

Schedule 10 steel pipe shall be permitted to be joined with mechanical groove couplings approved for service.

5.2.4.1

Where mechanical groove couplings are used to join pipe, grooves shall be rolled on the pipe by an approved groove-rolling machine.

5.2.5

Fittings used in sprinkler systems shall be of the materials listed in Table 5.2.5 or shall be in accordance with 5.2.9.

Table 5.2.5 Fitting Materials and Dimensions

Materials and Dimensions Standard

Cast Iron:

Gray Iron Threaded Fittings, Classes 125 and 250 ASME B16.4

Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125, and 250 ASME B16.1

Malleable Iron:

Malleable Iron Threaded Fittings, Classes 150 and 300 ASME B16.3

Steel:

Factory-Made Wrought Buttwelding Fittings ASME B16.9

Buttwelding Ends ASME B16.25

Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

ASTM A234/ A234M

Pipe Flanges and Flanged Fittings, NPS 1/2 through NPS 24 Metric/Inch Standard

ASME B16.5

Forged Fittings, Socket-Welding and Threaded ASME B16.11

Copper:

Wrought Copper and Copper Alloy Solder Joint Pressure Fittings ASME B16.22

Cast Copper Alloy Solder Joint Pressure Fittings ASME B16.18

Cast Copper Alloy Threaded Fittings: Classes 125 and 250 ANSI/ASME B16.15

5.2.5.1

The chemical properties, physical properties, and dimensions of fitting materials shall be at least equivalent to the standards cited in Table 5.2.5.

5.2.5.2

Fittings used in sprinkler systems other than those addressed in 5.2.5.3 or 5.2.5.4 shall be designed to withstand a working pressure of not less than 175 psi (12.1 bar).

5.2.5.3

Nonmetallic fittings used in multipurpose piping systems and passive purge systems not equipped with a fire department connection shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C).

5.2.5.4

Nonmetallic fittings used in wet pipe sprinkler systems not equipped with a fire department connection and provided with a pressure-reducing valve set no higher than 80 psi (5.5 bar) shall be designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82°C).

5.2.5.4.1

If the maximum static pressure from the water supply is less than or equal to 80 psi (5.5 bar), fittings designed to withstand a working pressure of not less than 130 psi (9 bar) at 120°F (49°C) and 100 psi (6.9 bar) at 180°F (82.2°C) shall be permitted to be used without a pressure-reducing valve.

5.2.5.4.2

If a pressure-reducing valve is used to comply with 5.2.5.4, an automatic means of pressure relief shall be installed on the sprinkler system side of the pressure-reducing valve.

5.2.6

Joints for the connection of copper tube shall be brazed on dry pipe and preaction systems.

5.2.7

Joints for the connection of copper tube for wet pipe systems and antifreeze systems shall be solder joints or be brazed.

5.2.8

Solder joints, where permitted, shall be fabricated in accordance with the methods and procedures listed in ASTM B828, Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

5.2.9

Types of fittings other than those specified in Table 5.2.5 shall be permitted to be used where listed for sprinkler system use.

5.2.9.1

Fittings differing from those specified in Table 5.2.5 shall be installed in accordance with their listings and the manufacturers' installation instructions.

5.2.9.2\*

CPVC fittings shall comply with the portions of the ASTM standards specified in Table 5.2.9.2 that apply to fire protection service.

Table 5.2.9.2 Specifically Listed Fittings Materials and Dimensions

Materials and Dimensions Standard

Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CVPC) Plastic Pipe Fittings, Schedule 80

ASTM F437

Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40

ASTM F438

Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

ASTM F439

5.2.10

Other joining methods investigated for suitability in automatic sprinkler installations and listed for this service shall be permitted.

5.3\* Water Supply Pipe and Fittings

Any type of pipe or tube acceptable under the applicable plumbing code for above-ground or underground supply pipe shall be acceptable as a supply for these portions of a fire sprinkler system when installed as follows and in accordance with manufacturer's recommendations:

Between the point of connection and the water supply source

Between a remote system riser and the dwelling or home

5.4 Pre-Engineered Systems

Where listed pre-engineered systems are installed, they shall be installed within the limitations that have been established by the testing laboratories.