

**First Revision No. 634-NFPA 13-2016 [Global Input]**

See attached file for the reorganization of existing Chapter 6.

Supplemental Information

<u>File Name</u>	<u>Description</u>
13-Chapter_6.docx	

Submitter Information Verification

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Committee Statement

Committee Statement: Chapter 6 Formerly Chapter 10 in the 2016 edition. The entire chapter carried over and only renumbering occurred. The only exception is section 6.1.1.3.2 where the requirement for Dry Pipe Underground was relocated from Section 8.15.21.

Response Message:

Chapter 6 System Components and Hardware

6.1 General. [move to 7.1]

This chapter shall provide requirements for correct use of sprinkler system components and hardware.

6.1.1* Listing. [move to 7.1.1]

6.1.1.1 [move to 7.1.1.1]

Materials or devices not specifically designated by this standard shall be used in accordance with all conditions, requirements, and limitations of their special listing.

6.1.1.1.1 [move to 7.1.1.1.1]

All special listing requirements shall be included and identified in the product submittal literature and installation instructions.

6.1.1.2 [move to 7.1.1.2]

Unless the requirements of 6.1.1.3, 6.1.1.4, or 6.1.1.5 are met, all materials and devices essential to successful system operation shall be listed.

6.1.1.2.1 [move to 7.1.1.2.1]

Valve components (including valve trim, internal parts, gaskets, and the like) shall not be required to be individually listed.

6.1.1.3 [move to 7.1.1.3]

Equipment as permitted in Table 6.3.1.1 and Table 6.4.1 shall not be required to be listed.

6.1.1.3.1 [move to 7.1.1.3.1]

Nonmetallic pipe and fittings included in Table 6.3.1.1 and Table 6.4.1 shall be listed.

6.1.1.4 [move to 7.1.1.4]

Materials meeting the requirements of 9.1.1.2, 9.1.1.5.2, 9.1.1.5.3, and 9.1.1.6.4 shall not be required to be listed.

6.1.1.5 [move to 7.1.1.5]

Components that do not affect system performance such as drain piping, drain valves, and signs shall not be required to be listed.

6.1.1.6 [move to 16.1.2]

Materials and components shall be installed in accordance with material compatibility information that is available as a part of a listing or manufacturer's published information.

6.1.2 Reconditioned Components. [move to 16.1.3]

6.1.2.1 [move to 16.1.3.1]

The use of reconditioned valves and devices as replacement equipment in existing systems shall be permitted.

6.1.2.2 [move to 16.1.3.2]

Reconditioned sprinklers shall not be permitted to be utilized on any new or existing system.

6.1.3 Rated Pressure. [move to 7.1.2]

System components shall be rated for the maximum system working pressure to which they are exposed but shall not be rated at less than 175 psi (12 bar) for components installed above ground and 150 psi (10 bar) for components installed underground.

6.2 Sprinklers. [move to 7.2]

6.2.1 General. [move to 16.2.1]

Only new sprinklers shall be installed.

6.2.1.1* [move to 16.2.1.1]

When a sprinkler is removed from a fitting or welded outlet, it shall not be reinstalled except as permitted by 6.2.1.1.1.

6.2.1.1.1 [move to 16.2.1.1.1]

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

6.2.2* Sprinkler Identification. [move to 7.2.1]

All sprinklers shall be permanently marked with one or two English uppercase alphabetic characters to identify the manufacturer, immediately followed by three or four numbers, to uniquely identify a sprinkler as to K-factor (orifice size) or orifice shape, deflector characteristic, pressure rating, and thermal sensitivity.

6.2.3 Sprinkler Discharge Characteristics. [move to 7.2.2]

6.2.3.1* General. [move to 7.2.2.1]

Unless the requirements of 6.2.3.2, 6.2.3.3, or 6.2.3.4 are met, the K-factor, relative discharge, and marking identification for sprinklers having different K-factors shall be in accordance with Table 6.2.3.1.

Table 6.2.3.1 Sprinkler Discharge Characteristics Identification

Nominal K-Factor [gpm/(psi) ^{1/2}]	Nominal K-Factor [L/min/(bar) ^{1/2}]	K-Factor Range [gpm/(psi) ^{1/2}]	K-Factor Range [L/min/(bar) ^{1/2}]	Percent of Nominal K- 5.6 Discharge	Thread Type
1.4	20	1.3–1.5	19–22	25	1/2 in. (15 mm) NPT

Nominal K-Factor [gpm/(psi) ^{1/2}]	Nominal K-Factor [L/min/(bar) ^{1/2}]	K-Factor Range [gpm/(psi) ^{1/2}]	K-Factor Range [L/min/(bar) ^{1/2}]	Percent of Nominal K-5.6 Discharge	Thread Type
1.9	27	1.8–2.0	26–29	33.3	1/2 in. (15 mm) NPT
2.8	40	2.6–2.9	38–42	50	1/2 in. (15 mm) NPT
4.2	60	4.0–4.4	57–63	75	1/2 in. (15 mm) NPT
5.6	80	5.3–5.8	76–84	100	1/2 in. (15 mm) NPT
8.0	115	7.4–8.2	107–118	140	3/4 in. (20 mm) NPT or 1/2 in. (15 mm) NPT
11.2	160	10.7–11.7	159–166	200	1/2 in. (15 mm) NPT or 3/4 in. (20 mm) NPT
14.0	200	13.5–14.5	195–209	250	3/4 in. (20 mm) NPT
16.8	240	16.0–17.6	231–254	300	3/4 in. (20 mm) NPT
19.6	280	18.6–20.6	272–301	350	1 in. (25 mm) NPT
22.4	320	21.3–23.5	311–343	400	1 in. (25 mm) NPT
25.2	360	23.9–26.5	349–387	450	1 in. (25 mm) NPT
28.0	400	26.6–29.4	389–430	500	1 in. (25 mm) NPT

Note: The nominal K-factor for dry-type sprinklers are used for sprinkler selection. See 23.4.4.9.3 for use of adjusted dry-type sprinkler K-factors for hydraulic calculation purposes.

6.2.3.2 Pipe Threads. [move to 7.2.2.2]

Listed sprinklers having pipe threads different from those shown in Table 6.2.3.1 shall be permitted.

6.2.3.3 K-Factors Greater than K-28 (400). [move to 7.2.2.3]

Sprinklers listed with nominal K-factors greater than K-28 (400) shall increase the flow by 100 percent increments when compared with a nominal K-5.6 (80) sprinkler.

6.2.3.4 Residential Sprinklers. [move to 7.2.2.4]

Residential sprinklers shall be permitted with K-factors other than those specified in Table 6.2.3.1.

6.2.3.5 CMSA and ESFR K-Factors. [move to 7.2.2.5]

Control mode specific application (CMSA) and early suppression fast-response (ESFR) sprinklers shall have a minimum nominal K-factor of K-11.2 (160).

6.2.3.6 ESFR K-Factor. [move to 7.2.2.6]

ESFR sprinkler K-factor shall be selected as appropriate for the hazard. *(See Chapter 12.)*

6.2.4 Occupancy Limitations. [move to 7.2.3]

Unless the requirements of 6.2.4.1 or 6.2.4.2 are met, sprinklers shall not be listed for protection of a portion of an occupancy classification.

6.2.4.1 Residential Sprinklers. [move to 7.2.3.1]

Residential sprinklers shall be permitted to be listed for portions of residential occupancies as defined in 8.4.5.1.

6.2.4.2 Special Sprinklers. [move to 7.2.3.2]

Special sprinklers shall be permitted to be listed for protection of a specific construction feature in a portion of an occupancy classification. *(See 8.4.8.)*

6.2.5* Temperature Characteristics. [move to 7.2.4]

6.2.5.1 [move to 7.2.4.1]

Automatic sprinklers shall have their frame arms, deflector, coating material, or liquid bulb colored in accordance with the requirements of Table 6.2.5.1 or the requirements of 6.2.5.2, 6.2.5.3, 6.2.5.4, or 6.2.5.5.

Table 6.2.5.1 Temperature Ratings, Classifications, and Color Codings

Maximum Ceiling Temperature		Temperature Rating		Temperature Classification	Color Code	Glass Bulb Colors
°F	°C	°F	°C			
100	38	135–170	57–77	Ordinary	Uncolored or black	Orange or red
150	66	175–225	79–107	Intermediate	White	Yellow or green
225	107	250–300	121–149	High	Blue	Blue
300	149	325–375	163–191	Extra high	Red	Purple
375	191	400–475	204–246	Very extra high	Green	Black
475	246	500–575	260–302	Ultra high	Orange	Black
625	329	650	343	Ultra high	Orange	Black

6.2.5.2 [move to 7.2.4.2]

A dot on the top of the deflector, the color of the coating material, or colored frame arms shall be permitted for color identification of corrosion-resistant sprinklers.

6.2.5.3 [move to 7.2.4.3]

Color identification shall not be required for ornamental sprinklers such as factory-plated or factory-painted sprinklers or for recessed, flush, or concealed sprinklers.

6.2.5.4 [move to 7.2.4.4]

The frame arms of bulb-type sprinklers shall not be required to be color coded.

6.2.5.5 [move to 7.2.4.5]

The liquid in bulb-type sprinklers shall be color coded in accordance with Table 6.2.5.1.

6.2.6 Special Coatings. [move to 7.2.5]

6.2.6.1* Corrosion Resistant. [move to 7.2.5.1]

6.2.6.1.1 [move to 16.2.2.1]

Listed corrosion-resistant sprinklers shall be installed in locations where chemicals, moisture, or other corrosive vapors sufficient to cause corrosion of such devices exist.

6.2.6.1.2* [move to 16.2.2.1.1]

Unless the requirements of 6.2.6.1.3 are met, corrosion-resistant coatings shall be applied only by the manufacturer of the sprinkler and in accordance with the requirements of 6.2.6.1.3.

6.2.6.1.3 [move to 16.2.2.1.2]

Any damage to the protective coating occurring at the time of installation shall be repaired at once using only the coating of the manufacturer of the sprinkler in the approved manner so that no part of the sprinkler will be exposed after installation has been completed.

6.2.6.2* Painting. [move to 7.2.5.2]

6.2.6.2.1

Sprinklers shall only be painted by the sprinkler manufacturer.

6.2.6.2.2 [move to 16.2.3.1]

Where sprinklers have had paint applied by other than the sprinkler manufacturer, they shall be replaced with new listed sprinklers of the same characteristics, including K-factor, thermal response, and water distribution.

6.2.6.2.3 [move to 16.2.3.2]

Where cover plates on concealed sprinklers have been painted by other than the sprinkler manufacturer, the cover plate shall be replaced.

6.2.6.3 Ornamental Finishes. [move to 7.2.5.3]

6.2.6.3.1 [move to 7.2.5.3.1]

Ornamental finishes shall only be applied to sprinklers and, if applicable, their concealed cover plates, by the sprinkler manufacturer.

6.2.6.3.2 [move to 7.2.5.3.2]

Sprinklers with ornamental finishes where utilized shall be specifically listed.

6.2.6.4 Protective Coverings. [move to 16.2.4]

6.2.6.4.1 [move to 16.2.4.1]

Sprinklers protecting spray areas and mixing rooms in resin application areas shall be protected against overspray residue so that they will operate in the event of fire.

6.2.6.4.2* [move to 16.2.4.2]

Where protected in accordance with 6.2.6.4.1, cellophane bags having a thickness of 0.003 in. (0.08 mm) or less or thin paper bags shall be used.

6.2.6.4.3 [move to 16.2.4.3]

Sprinklers that have been painted or coated shall be replaced in accordance with the requirements of 6.2.6.2.2.

6.2.7 Escutcheons and Cover Plates. [move to 7.2.6]

6.2.7.1 [move to 7.2.6.1]

Plates, escutcheons, or other devices used to cover the annular space around a sprinkler shall be metallic or shall be listed for use around a sprinkler.

6.2.7.2* [move to 7.2.6.2]

Escutcheons used with recessed, flush-type, or concealed sprinklers shall be part of a listed sprinkler assembly.

6.2.7.3 [move to 7.2.6.3]

Cover plates used with concealed sprinklers shall be part of the listed sprinkler assembly.

6.2.7.4 [move to 16.2.5.4]

The use of caulking or glue to seal the penetration or to affix the components of a recessed escutcheon or concealed cover plate shall not be permitted.

6.2.8 Guards. [move to 16.2.6]

Sprinklers subject to mechanical injury shall be protected with listed guards.

6.2.9 Stock of Spare Sprinklers. [move to 16.2.7]

6.2.9.1* [move to 16.2.7.1]

A supply of at least six spare sprinklers shall be maintained on the premises so that any sprinklers that have operated or been damaged in any way can be promptly replaced.

6.2.9.2 [move to 16.2.7.2]

The sprinklers shall correspond to the types and temperature ratings of the sprinklers in the property.

6.2.9.3 [move to 16.2.7.3]

The sprinklers shall be kept in a cabinet located where the temperature to which they are subjected will at no time exceed the maximum ceiling temperatures specified in Table 6.2.5.1 for each of the sprinklers within the cabinet.

6.2.9.4 [move to 16.2.7.4]

Where dry sprinklers of different lengths are installed, spare dry sprinklers shall not be required, provided that a means of returning the system to service is furnished.

6.2.9.5 [move to 16.2.7.5]

The stock of spare sprinklers shall include all types and ratings installed and shall be as follows:

- (1) For protected facilities having under 300 sprinklers — no fewer than six sprinklers
- (2) For protected facilities having 300 to 1000 sprinklers — no fewer than 12 sprinklers
- (3) For protected facilities having over 1000 sprinklers — no fewer than 24 sprinklers

6.2.9.6* [move to 16.2.7.6]

One sprinkler wrench as specified by the sprinkler manufacturer shall be provided in the cabinet for each type of sprinkler installed to be used for the removal and installation of sprinklers in the system.

6.2.9.7 [move to 16.2.7.7]

A list of the sprinklers installed in the property shall be posted in the sprinkler cabinet.

6.2.9.7.1* [move to 16.2.7.7.1]

The list shall include the following:

- (1) Sprinkler Identification Number (SIN) if equipped; or the manufacturer, model, orifice, deflector type, thermal sensitivity, and pressure rating
- (2) General description
- (3) Quantity of each type to be contained in the cabinet
- (4) Issue or revision date of the list

6.3 Aboveground Pipe and Tube. [move to 7.3]

6.3.1 General. [move to 7.3.1]

6.3.1.1 [move to 7.3.1.1]

Pipe or tube shall meet or exceed one of the standards in Table 6.3.1.1 or be in accordance with 6.3.10.

Table 6.3.1.1 Pipe or Tube Materials and Dimensions

Materials and Dimensions	Standard
Ferrous Piping (Welded and Seamless)	
<i>Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use</i>	ASTM A795
<i>Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless</i>	ANSI/ASTM A53
<i>Wrought Steel Pipe</i>	ANSI/ASME B36.10M
<i>Specification for Electric-Resistance-Welded Steel Pipe</i>	ASTM A135
Copper Tube (Drawn, Seamless)	
<i>Specification for Seamless Copper Tube</i>	ASTM B75
<i>Specification for Seamless Copper Water Tube</i>	ASTM B88
<i>Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube</i>	ASTM B251
<i>Specification for Liquid and Paste Fluxes for Soldering Applications of Copper and Copper-Alloy Tube</i>	ASTM B813
<i>Brazing Filler Metal (Classification BCuP-3 or BCuP-4)</i>	AWS A5.8
<i>Solder Metal, Section 1: Solder Alloys Containing Less Than 0.2% Lead and Having Solidus Temperatures Greater than 400°F</i>	ASTM B32
<i>Alloy Materials</i>	ASTM B446
CPVC	
<i>Nonmetallic Piping Specification for Special Listed Chlorinated Polyvinyl chloride (CPVC) Pipe</i>	ASTM F442
Brass Pipe	
<i>Specification for Seamless Red Brass Pipe</i>	ASTM B43
Stainless Steel	
<i>Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes</i>	ASTM A312/312M

6.3.1.1.1* .—being deleted with an FR

Underground pipe shall be permitted to extend into the building through the slab or wall not more than 24 in. (600 mm).

6.3.1.2 [move to 16.3.1.1]

Steel pipe shall be in accordance with 6.3.2, 6.3.3, or 6.3.4.

6.3.1.3 [move to 16.3.1.2]

Copper tube shall be in accordance with 6.3.5.

6.3.1.4 [move to 16.3.1.3]

Nonmetallic pipe shall be in accordance with 6.3.9.

6.3.1.5 [move to 16.3.1.4]

Brass pipe shall be in accordance with 6.3.6.

6.3.1.6 [move to 16.3.1.5]

Stainless steel pipe shall be in accordance with 6.3.9.

6.3.2* Steel Pipe — Welded or Roll-Grooved. [move to 16.3.2]

When steel pipe referenced in Table 6.3.1.1 is used and joined by welding as referenced in 6.5.2 or by roll-grooved pipe and fittings as referenced in 6.5.3, the minimum nominal wall thickness for pressures up to 300 psi (21 bar) shall be in accordance with Schedule 10 for pipe sizes up to 5 in. (125 mm), 0.134 in. (3.4 mm) for 6 in. (150 mm) pipe, 0.188 in. (4.8 mm) for 8 in. and 10 in. (200 mm and 250 mm) pipe, and 0.330 in. (8.4 mm) for 12 in. (300 mm) pipe.

6.3.3 Steel Pipe — Threaded. [move to 16.3.3]

When steel pipe referenced in Table 6.3.1.1 is joined by threaded fittings referenced in 6.5.1 or by fittings used with pipe having cut grooves, the minimum wall thickness shall be in accordance with Schedule 30 pipe [in sizes 8 in. (200 mm) and larger] or Schedule 40 pipe [in sizes less than 8 in. (200 mm)] for pressures up to 300 psi (21 bar).

6.3.4 Specially Listed Steel Pipe. [move to 16.3.4]

Pressure limitations and wall thickness for steel pipe specially listed in accordance with 6.3.10 shall be permitted to be in accordance with the pipe listing requirements.

6.3.5* Copper Tube. [move to 16.3.5]

Copper tube as specified in the standards listed in Table 6.3.1.1 shall have a wall thickness of Type K, Type L, or Type M where used in sprinkler systems.

6.3.6 Brass Pipe. [move to 16.3.6]

Brass pipe specified in Table 6.3.1.1 shall be permitted in the standard weight in sizes up to 6 in. (150 mm) for pressures up to 175 psig (12 bar) and in the extra strong weight in sizes up to 8 in. (200 mm) for pressures up to 300 psig (21 bar).

6.3.7 Stainless Steel Pipe. [move to 16.3.7]

Stainless steel pipe as referenced in the standards listed in Table 6.3.1.1 shall be in accordance with Schedules 10S or 40S pipe.

6.3.8 Metallic Pipe and Tube Bending. [move to 16.3.8]**6.3.8.1 [move to 16.3.8.1]**

Bending of Schedule 10 steel pipe, or any steel pipe of wall thickness equal to or greater than Schedule 10 and Types K and L copper tube, shall be permitted when bends are made with no kinks, ripples, distortions, or reductions in diameter or any noticeable deviations from round.

6.3.8.2 [move to 16.3.8.2]

For Schedule 40 and copper tubing, the minimum radius of a bend shall be six pipe diameters for pipe sizes 2 in. (50 mm) and smaller and five pipe diameters for pipe sizes 2 1/2 in. (65 mm) and larger.

6.3.8.3 [move to 16.3.8.3]

For all other steel pipe, the minimum radius of a bend shall be 12 pipe diameters for all sizes.

6.3.8.4 [move to 16.3.8.4]

Bending of listed pipe and tubing shall be permitted as allowed by the listing.

6.3.9* Nonmetallic Pipe and Tubing. [move to 7.3.2]

6.3.9.1 [move to 7.3.2.1]

Nonmetallic pipe in accordance with Table 6.3.1.1 shall be investigated for suitability in automatic sprinkler installations and listed for this service.

6.3.9.1.1 [move to 7.3.2.1.1]

Other types of nonmetallic pipe or tube investigated for suitability in automatic sprinkler installations and listed for this service, including but not limited to CPVC, and differing from that provided in Table 6.3.1.1 shall be permitted where installed in accordance with their listing limitations.

6.3.9.1.2 [move to 16.3.9.1]

Listed nonmetallic pipe shall be installed in accordance with its listing limitations, including installation instructions.

6.3.9.1.3 [move to 7.3.2.1.2]

Manufacturer's installation instructions shall include its listing limitations.

6.3.9.2 [move to 16.3.9.2]

When nonmetallic pipe is used in systems utilizing steel piping internally coated with corrosion inhibitors, the steel pipe coating shall be listed for compatibility with the nonmetallic pipe materials.

6.3.9.3 [move to 16.3.9.3]

When nonmetallic pipe is used in systems utilizing steel pipe that is not internally coated with corrosion inhibitors, no additional evaluations shall be required.

6.3.9.4* [move to 16.3.9.4]

When nonmetallic pipe is used in systems utilizing steel pipe, cutting oils and lubricants used for fabrication of the steel piping shall be compatible with the nonmetallic pipe materials in accordance with 6.1.1.6.

6.3.9.5 [move to 16.3.9.5]

Fire-stopping materials intended for use on nonmetallic piping penetrations shall be compatible with the nonmetallic pipe materials in accordance with 6.1.1.6.

6.3.9.6 [move to 16.3.9.6]

Nonmetallic pipe listed for light hazard occupancies shall be permitted to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 ft² (37 m²).

6.3.9.6.1 [move to 16.3.9.6.1]

Nonmetallic pipe installed in accordance with 6.3.9.6 shall be permitted to be installed exposed, in accordance with the listing.

6.3.9.7 [move to 7.3.2.1.3]

Nonmetallic pipe shall not be listed for portions of an occupancy classification.

6.3.9.8 [move to 16.3.9.7]

Bending of listed nonmetallic pipe or tubing shall be permitted as allowed by the listing.

6.3.10* Listed Metallic Pipe and Tubing. [move to 7.3.3]

6.3.10.1 [move to 7.3.3.1]

Other types of pipe or tube investigated for suitability in automatic sprinkler installations and listed for this service, including steel, and differing from that provided in Table 6.3.1.1 shall be permitted where installed in accordance with their listing limitations, including installation instructions.

6.3.10.2 [move to 16.3.10.1]

Pipe or tube listed only for light hazard occupancies shall be permitted to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 ft² (37 m²).

6.3.10.2.1 [move to 16.3.10.1.1]

Pipe or tube installed in accordance with 6.3.10.2 shall be permitted to be installed exposed, in accordance with the listing.

6.3.10.3 [move to 7.3.3.2]

Pipe or tube shall not be listed for portions of an occupancy classification.

6.3.10.4 [move to 16.3.10.2]

Bending of listed pipe and tubing shall be permitted as allowed by the listing.

6.3.11 Pipe and Tube Identification. [move to 7.3.4]

6.3.11.1* [move to 7.3.4.1]

All pipe shall be marked along its length by the manufacturer in such a way as to properly identify the type of pipe.

6.3.11.2 [move to 7.3.4.2]

The marking shall be visible on every piece of pipe over 2 ft (600 mm) long.

6.3.11.3 [move to 7.3.4.3]

Pipe identification shall include the manufacturer's name, model designation, or schedule.

6.4 Fittings. [move to 7.4]**6.4.1* [move to 7.4.1]**

Fittings used in sprinkler systems shall meet or exceed the standards in Table 6.4.1 or be in accordance with 6.4.2 or 6.4.4.

Table 6.4.1 Fittings Materials and Dimensions

Materials and Dimensions	Standard
Cast Iron	
<i>Cast Iron Threaded Fittings, Class 125 and 250</i>	ASME B16.4
<i>Cast Iron Pipe Flanges and Flanged Fittings</i>	ASME B16.1
Malleable Iron	
<i>Malleable Iron Threaded Fittings, Class 150 and 300</i>	ASME B16.3
Steel	
<i>Factory-Made Wrought Steel Buttweld Fittings</i>	ASME B16.9
<i>Buttwelding Ends for Pipe, Valves, Flanges, and Fittings</i>	ASME B16.25
<i>Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures</i>	ASTM A234
<i>Steel Pipe Flanges and Flanged Fittings</i>	ASME B16.5
<i>Forged Steel Fittings, Socket Welded and Threaded</i>	ASME B16.11
Copper	
<i>Wrought Copper and Copper Alloy Solder Joint Pressure Fittings</i>	ASME B16.22
<i>Cast Copper Alloy Solder Joint Pressure Fittings</i>	ASME B16.18
CPVC	
<i>Chlorinated Polyvinyl Chloride (CPVC) Specification for Schedule 80 CPVC Threaded Fittings</i>	ASTM F437
<i>Specification for Schedule 40 CPVC Socket Type Fittings</i>	ASTM F438
<i>Specification for Schedule 80 CPVC Socket Type Fittings</i>	ASTM F439
Bronze Fittings	
<i>Cast Copper Alloy Threaded Fittings Classes 125 and 250</i>	ASTM B16.15
Stainless Steel	
<i>Specification for Wrought Austenitic Stainless Steel Pipe Fittings</i>	ASTM A403/A403M

6.4.2 [move to 7.4.2]

In addition to the standards in Table 6.4.1, nonmetallic fittings shall also be in accordance with 6.4.4.

6.4.3 Nonmetallic Fittings. [move to 7.4.3]

Nonmetallic fittings in accordance with Table 6.4.1 shall be investigated for suitability in automatic sprinkler installations and listed for this service. Listed nonmetallic fittings shall be installed in accordance with their listing limitations, including installation instructions.

6.4.3.1* [move to 16.8.2.1]

When nonmetallic fittings are used in systems utilizing internally coated steel piping, the steel pipe shall be listed for compatibility with the nonmetallic fittings.

6.4.3.2* [move to 16.8.2.2]

When nonmetallic fittings are used in systems utilizing steel pipe that is not internally coated with corrosion inhibitors, no additional evaluations are required.

6.4.3.3 [move to 16.8.2.3]

When nonmetallic fittings are used in systems utilizing steel pipe, cutting oils and lubricants used for fabrication of the steel piping shall be compatible with the nonmetallic fittings in accordance with 6.1.1.6.

6.4.3.4 [move to 16.8.2.4]

Fire-stopping materials intended for use on nonmetallic fitting penetrations shall be investigated for compatibility with the nonmetallic fitting materials in accordance with 6.1.1.6.

6.4.4* [move to 7.4.4]

Other types of fittings investigated for suitability in automatic sprinkler installations and listed for this service, including but not limited to CPVC and steel, and differing from that provided in Table 6.4.1 shall be permitted when installed in accordance with their listing limitations, including installation instructions.

6.4.5* Fitting Pressure Limits. [move to 16.8.3]

6.4.5.1 [move to 16.8.3.1]

Standard weight pattern cast-iron fittings 2 in. (50 mm) in size and smaller shall be permitted where pressures do not exceed 300 psi (21 bar).

6.4.5.2 [move to 16.8.3.2]

Standard weight pattern malleable iron fittings 6 in. (150 mm) in size and smaller shall be permitted where pressures do not exceed 300 psi (21 bar).

6.4.5.3 [move to 16.8.3.3]

Fittings not meeting the requirements of 6.4.5.1 and 6.4.5.2 shall be extra-heavy pattern where pressures exceed 175 psi (12 bar).

6.4.5.4 [move to 16.8.3.4]

Cast bronze threaded fittings in accordance with ASTM B16.15, *Cast Bronze Threaded Fittings*, shall be permitted where pressures do not exceed 200 psi (14 bar) for Class 125 fittings and 400 psi (28 bar) for Class 250 fittings.

6.4.5.5 [move to 16.8.3.5]

Listed fittings shall be permitted for system pressures up to the limits specified in their listings.

6.4.6* Couplings and Unions. [move to 16.8.4]

6.4.6.1 [move to 16.8.4.1]

Screwed unions shall not be used on pipe larger than 2 in. (50 mm).

6.4.6.2 [move to 16.8.4.2]

Couplings and unions of other than screwed-type shall be of types listed specifically for use in sprinkler systems.

6.4.7 Reducers and Bushings. [move to 16.8.5]

6.4.7.1 [move to 16.8.5.1]

Unless the requirements of 6.4.7.2 or 6.4.7.3 are met, a one-piece reducing fitting shall be used wherever a change is made in the size of the pipe.

6.4.7.2 [move to 16.8.5.2]

Hexagonal or face bushings shall be permitted in reducing the size of openings of fittings when standard fittings of the required size are not available.

6.4.7.3 [move to 16.8.5.3]

Hexagonal bushings as permitted in 8.15.20.2 shall be permitted to be used.

6.4.7.4 [move to 16.8.5.4]

The requirements of 6.4.7.1 and 6.4.7.2 shall not apply to CPVC fittings.

6.4.8 Extension Fitting. [move to 16.8.6]

6.4.8.1 [move to 16.8.6.1]

Extension fittings shall be permitted to be used with sprinklers K-8.0 or smaller.

6.4.8.2 [move to 16.8.6.2]

Extension fittings shall be permitted to be used with sprinklers in light hazard and ordinary hazard occupancies only.

6.4.8.3 [move to 16.8.6.3]

The internal diameter of extension fittings shall have the same nominal inlet diameter of the attached sprinkler.

6.4.8.4 [move to 16.8.6.4]

A single extension fitting up to a maximum of 2 in. (50 mm) in length shall be permitted to be installed with a sprinkler.

6.4.8.4.1 [move to 16.8.6.4.1]

Extension fittings longer than 2 in. (50 mm) shall not be permitted unless specifically listed.

6.4.8.5 [move to 16.8.6.5]

Extension fittings shall be included in the hydraulic calculations.

6.4.8.5.1 [move to 16.8.6.5.1]

Extension fittings 2 in. (50 mm) and less shall not be required to be included in the hydraulic calculations.

6.5 Joining of Pipe and Fittings. [move to 7.5]

6.5.1 Threaded Pipe and Fittings. [move to 7.5.1]

6.5.1.1 [move to 7.5.1.1]

All threaded pipe and fittings shall have threads cut to ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*.

6.5.1.2* [move to 7.5.1.2]

Steel pipe with wall thicknesses less than Schedule 30 [in sizes 8 in. (200 mm) and larger] or Schedule 40 [in sizes less than 8 in. (200 mm)] shall only be permitted to be joined by threaded fittings where the threaded assembly is investigated for suitability in automatic sprinkler installations and listed for this service.

6.5.1.3 .—being deleted with an FR

Joint compound or tape shall be applied only to male threads.

6.5.2 Welded Pipe and Fittings. [move to 7.5.2]

6.5.2.1 General. [move to 7.5.2.1]

6.5.2.1.1 [move to 7.5.2.1.1]

Welding shall be permitted as a means of joining sprinkler piping in accordance with 6.5.2.2 through 6.5.2.6.

6.5.2.2* Fabrication. [move to 7.5.2.2]

6.5.2.2.1 [move to 7.5.2.2.1]

When welding sprinkler pipe, the pipe shall be shop welded unless the requirements of 6.5.2.2 or 6.5.2.3 are met.

6.5.2.2.2 [move to 7.5.2.2.2]

Where the design specifications require any part of the piping system to be welded in place, welding of sprinkler piping shall be permitted where the welding process is performed in accordance with NFPA 51B and the mechanical fittings required by 8.15.22 and 8.16.3 are provided.

6.5.2.2.3 [move to 7.5.2.2.3]

Tabs for longitudinal earthquake bracing shall be permitted to be welded to in-place piping where the welding process is performed in accordance with NFPA 51B.

6.5.2.2.4 [move to 7.5.2.2.4]

Welding shall not be performed where there is impingement of rain, snow, sleet, or high wind on the weld area of the pipe product.

6.5.2.2.5 [move to 7.5.2.2.5]

Torch cutting and welding shall not be permitted as a means of modifying or repairing sprinkler systems.

6.5.2.3 Fittings. [move to 7.5.2.3]

6.5.2.3.1* [move to 7.5.2.3.1]

Welded fittings used to join pipe shall be listed fabricated fittings or manufactured in accordance with Table 6.4.1.

6.5.2.3.2 [move to 7.5.2.3.2]

Fittings referenced in 6.5.2.3.1 shall be joined in conformance with a qualified welding procedure as set forth in this section and shall be an acceptable product under this standard, provided that materials and wall thickness are compatible with other sections of this standard.

6.5.2.3.3 [move to 7.5.2.3.3]

Fittings shall not be required where pipe ends are butt welded in accordance with the requirements of 6.5.2.4.3.

6.5.2.3.4 [move to 7.5.2.3.4]

When the pipe size in a run of piping is reduced, a reducing fitting designed for that purpose shall be used in accordance with the requirements of 6.5.2.3.1.

6.5.2.4 Welding Requirements. [move to 7.5.2.4]

6.5.2.4.1* [move to 7.5.2.4.1]

Welds between pipe and welding outlet fittings shall be permitted to be attached by full penetration welds, partial penetration groove welds, or fillet welds.

6.5.2.4.2* [move to 7.5.2.4.2]

The minimum throat thickness shall be not less than the thickness of the pipe, the thickness of the welding fitting, or 3/16 in. (5 mm), whichever is least.

6.5.2.4.3* [move to 7.5.2.4.3]

Circumferential butt joints shall be cut, beveled, and fit so that full penetration is achievable.

6.5.2.4.4 [move to 7.5.2.4.4]

Full penetration welding shall not be required.

6.5.2.4.5 [move to 7.5.2.4.5]

Where slip-on flanges are welded to pipe with a single fillet weld, the weld shall be on the hub side of the flange and the minimum throat weld thickness shall not be less than 1.25 times the pipe wall thickness or the hub thickness, whichever is less.

6.5.2.4.6 [move to 7.5.2.4.6]

Face welds on the internal face of the flange shall be permitted as a water seal in addition to the hub weld required in 6.5.2.4.5.

6.5.2.4.7 [move to 7.5.2.4.7]

Tabs for longitudinal earthquake bracing shall have minimum throat weld thickness not less than 1.25 times the pipe wall thickness and welded on both sides of the longest dimension.

6.5.2.4.8 [move to 7.5.2.4.8]

When welding is performed, the following shall apply:

- (1) Holes in piping for outlets shall be cut to the full inside diameter of fittings prior to welding in place of the fittings.
- (2) Discs shall be retrieved.
- (3) Openings cut into piping shall be smooth bore, and all internal slag and welding residue shall be removed.
- (4) Fittings shall not penetrate the internal diameter of the piping.
- (5) Steel plates shall not be welded to the ends of piping or fittings.
- (6) Fittings shall not be modified.
- (7) Nuts, clips, eye rods, angle brackets, or other fasteners shall not be welded to pipe or fittings, except as permitted in 6.5.2.2.3 and 6.5.2.4.7.
- (8) Completed welds shall be free from cracks, incomplete fusion, surface porosity greater than 1/16 in. (1.6 mm) diameter, and undercut deeper than 25 percent of the wall thickness or 1/32 in. (0.8 mm), whichever is less.
- (9) Completed circumferential butt weld reinforcement shall not exceed 3/32 in. (2.4 mm).

6.5.2.5 Qualifications. [move to 7.5.2.5]

6.5.2.5.1 [move to 7.5.2.5.1]

A welding procedure shall be prepared and qualified by the contractor or fabricator before any welding is done.

6.5.2.5.2 [move to 7.5.2.5.2]

Qualification of the welding procedure to be used and the performance of all welders and welding operators shall be required and shall meet or exceed the requirements of AWS B2.1,

Specification for Welding Procedure and Performance Qualification; ASME Boiler and Pressure Vessel Code, Section IX, “Welding and Brazing Qualifications”; or other applicable qualification standard as required by the authority having jurisdiction, except as permitted by 6.5.2.5.3.

6.5.2.5.3 [move to 7.5.2.5.3]

Successful procedure qualification of complete joint penetration groove welds shall qualify partial joint penetration (groove/fillet) welds and fillet welds in accordance with the provisions of this standard.

6.5.2.5.4 [move to 7.5.2.5.4]

Welding procedures qualified under standards recognized by previous editions of this standard shall be permitted to be continued in use.

6.5.2.5.5 [move to 7.5.2.5.5]

Contractors or fabricators shall be responsible for all welding they produce.

6.5.2.5.6 [move to 7.5.2.5.6]

Each contractor or fabricator shall have available to the authority having jurisdiction an established written quality assurance procedure ensuring compliance with the requirements of 6.5.2.4.

6.5.2.6 Records. [move to 7.5.2.6]

6.5.2.6.1 [move to 7.5.2.6.1]

Welders or welding machine operators shall, upon completion of each welded pipe, place their identifiable mark or label onto each piece adjacent to a weld.

6.5.2.6.2 [move to 7.5.2.6.2]

Contractors or fabricators shall maintain certified records, which shall be available to the authority having jurisdiction, of the procedures used and the welders or welding machine operators employed by them, along with their welding identification.

6.5.2.6.3 [move to 7.5.2.6.3]

Records shall show the date and the results of procedure and performance qualifications.

6.5.3 Groove Joining Methods. [move to 7.5.3]

6.5.3.1* [move to 7.5.3.1]

Pipe, fittings, valves, and devices to be joined with grooved couplings shall contain cut, rolled, or cast grooves that are dimensionally compatible with the couplings.

6.5.3.1.1* [move to 7.5.3.1.1]

Pipe, fittings, valves, devices, and couplings that conform with or are listed in compliance with standardized groove specifications shall be considered compatible.

6.5.3.1.2 [move to 7.5.3.1.2]

Other groove dimensions and grooving methods shall be acceptable in accordance with 6.5.5.1.

6.5.3.2 [move to 7.5.3.2]

Grooved couplings, including gaskets used on dry pipe, preaction, and deluge systems, shall be listed for dry service.

6.5.4* Brazed and Soldered Joints. [move to 7.5.4]

6.5.4.1 [move to 7.5.4.1]

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*.

6.5.4.2 [move to 7.5.4.2]

Unless the requirements of 6.5.4.3 or 6.5.4.4 are met, joints for the connection of copper tube shall be brazed.

6.5.4.3 [move to 7.5.4.3]

Solder joints shall be permitted for exposed wet pipe systems in light hazard occupancies where the temperature classification of the installed sprinklers is of the ordinary- or intermediate-temperature classification.

6.5.4.4 [move to 7.5.4.4]

Solder joints shall be permitted for wet pipe systems in light hazard and ordinary hazard (Group 1) occupancies where the piping is concealed, irrespective of sprinkler temperature ratings.

6.5.4.5* [move to 7.5.4.5]

Soldering fluxes shall be in accordance with Table 6.3.1.1.

6.5.4.6 [move to 7.5.4.6]

Brazing fluxes, if used, shall not be of a highly corrosive type.

6.5.5 Other Joining Methods. [move to 7.5.5]

6.5.5.1 [move to 7.5.5.1]

Other joining methods investigated for suitability in automatic sprinkler installations and listed for this service shall be permitted where installed in accordance with their listing limitations, including installation instructions.

6.5.5.2 Outlet Fittings. [move to 7.5.5.2]

Rubber-gasketed outlet fittings that are used on sprinkler systems shall meet the following requirements:

- (1) Be installed in accordance with the listing and manufacturer's installation instructions
- (2) Have all disks retrieved
- (3) Have smooth bores cut into the pipe, with all cutting residue removed

(4) Not be modified

6.5.6 End Treatment. [move to 7.5.6]

6.5.6.1 [move to 7.5.6.1]

After cutting, pipe ends shall have burrs and fins removed.

6.5.6.2 [move to 7.5.6.2]

Pipe used with listed fittings and its end treatment shall be in accordance with the fitting manufacturer's installation instructions and the fitting's listing.

6.6 Valves. [move to 7.6]

6.6.1 General.

6.6.1.1 Valve Pressure Requirements. [move to 16.9.1.2]

When water pressures exceed 175 psi (12 bar), valves shall be used in accordance with their pressure ratings.

6.6.1.2 Valve Closure Time. [move to 7.6.1]

Listed indicating valves shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position.

6.6.1.3 Listed Indicating Valves. [move to 16.9.3.2]

Unless the requirements of 6.6.1.3.1, 6.6.1.3.2, or 6.6.1.3.3 are met, all valves controlling connections to water supplies and to supply pipes to sprinklers shall be listed indicating valves.

6.6.1.3.1 [move to 16.9.3.2.1]

A listed underground gate valve equipped with a listed indicator post shall be permitted.

6.6.1.3.2 [move to 16.9.3.2.2]

A listed water control valve assembly with a reliable position indication connected to a remote supervisory station shall be permitted.

6.6.1.3.3 [move to 16.9.3.2.3]

A nonindicating valve, such as an underground gate valve with approved roadway box, complete with T-wrench, and where accepted by the authority having jurisdiction, shall be permitted.

6.6.2 Wafer-Type Valves. [move to 16.9.2]

Wafer-type valves with components that extend beyond the valve body shall be installed in a manner that does not interfere with the operation of any system components.

6.6.3 Drain Valves and Test Valves. [move to 16.9.1.1]

Drain valves and test valves shall be approved.

6.6.4* Identification of Valves. [move to 16.9.11]

6.6.4.1 [move to 16.9.11.1]

All control, drain, venting, and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs.

6.6.4.2 [move to 16.9.11.2]

The identification sign shall be secured with corrosion-resistant wire, chain, or other approved means.

6.6.4.3 [move to 16.9.11.3]

The control valve sign shall identify the portion of the building served.

6.6.4.3.1* [move to 16.9.11.3.1]

Systems that have more than one control valve that must be closed to work on a system or space shall have a sign referring to existence and location of other valves.

6.7 Fire Department Connections. [move to 16.12.2]

6.7.1* [move to 16.12.2.1]

Unless the requirements of 6.7.1.1, 6.7.1.2, or 6.7.1.3 are met, the fire department connection(s) shall consist of two 2½ in. (65 mm) connections using NH internal threaded swivel fitting(s) with “2.5–7.5 NH standard thread,” as specified in NFPA 1963.

6.7.1.1 [move to 16.12.2.1.1]

Where local fire department connections do not conform to NFPA 1963, the authority having jurisdiction shall be permitted to designate the connection to be used.

6.7.1.2 [move to 16.12.2.1.2]

The use of threadless couplings shall be permitted where required by the authority having jurisdiction and where listed for such use.

6.7.1.3 [move to 16.12.2.1.3]

A single-outlet fire department connection shall be acceptable where piped to a 3 in. (80 mm) or smaller riser.

6.7.2 [move to 16.12.2.2]

Fire department connections shall be equipped with approved plugs or caps, properly secured and arranged for easy removal by fire departments.

6.7.3 [move to 16.12.2.3]

Fire department connections shall be of an approved type.

6.8 Waterflow Alarm Devices. [move to 7.7]

6.8.1 General. —being deleted with an FR

Waterflow alarm devices shall be listed for the service and so constructed and installed that any flow of water from a sprinkler system equal to or greater than that from a single automatic sprinkler of the smallest K-factor installed on the system will result in an audible alarm on the premises within 5 minutes after such flow begins and until such flow stops.

6.8.2 Waterflow Detection Devices. [move to 16.11.3]

6.8.2.1 Wet Pipe Systems. [move to 16.11.3.1]

The alarm apparatus for a wet pipe system shall consist of a listed alarm check valve or other listed waterflow detection alarm device with the necessary attachments required to give an alarm.

6.8.2.2 Dry Pipe Systems. [move to 16.11.3.2]

6.8.2.2.1 [move to 16.11.3.2.1]

The alarm apparatus for a dry pipe system shall consist of listed alarm attachments to the dry pipe valve.

6.8.2.2.2 [move to 16.11.3.2.2]

Where a dry pipe valve is located on the system side of an alarm valve, connection of the actuating device of the alarms for the dry pipe valve to the alarms on the wet pipe system shall be permitted.

6.8.2.3 Preaction and Deluge Systems. [move to 16.11.3.3]

The alarm apparatus for deluge and preaction systems shall consist of alarms actuated independently by the detection system and the flow of water.

6.8.2.3.1 [move to 16.11.3.3.1]

Deluge and preaction systems activated by pilot sprinklers shall not require an independent detection system alarm.

6.8.2.4* Paddle-Type Waterflow Devices. [move to 16.11.3.4]

Paddle-type waterflow alarm indicators shall be installed in wet systems only.

6.8.3 Attachments — General. [move to 16.11.1]

6.8.3.1* [move to 16.11.1.1]

An alarm unit shall include a listed mechanical alarm, horn, or siren or a listed electric gong, bell, speaker, horn, or siren.

6.8.3.2* [move to 16.11.1.2]

Outdoor water motor-operated or electrically operated bells shall be weatherproofed and guarded.

6.8.3.3 [move to 16.11.1.3]

All piping to water motor-operated devices shall be galvanized steel, brass, copper, or other approved metallic corrosion-resistant material of not less than 3/4 in. (20 mm) nominal pipe size.

6.8.3.4 [move to 16.11.1.4]

Piping between the sprinkler system and a pressure-actuated alarm-initiating device shall be galvanized steel, brass, copper, or other approved metallic corrosion-resistant material of not less than 3/8 in. (10 mm) nominal pipe size.

6.8.4* Attachments — Electrically Operated. [move to 16.11.7]**6.8.4.1 [move to 16.11.7.1]**

Electrically operated alarm attachments forming part of an auxiliary, central station, local protective, proprietary, or remote station signaling system shall be installed in accordance with *NFPA 72*.

6.8.4.2 [move to 16.11.7.2]

Sprinkler waterflow alarm systems that are not part of a required protective signaling system shall not be required to be supervised and shall be installed in accordance with *NFPA 70*, Article 760.

6.8.4.3 [move to 16.11.7.3]

Outdoor electric alarm devices shall be listed for outdoor use.

6.8.5 Alarm Device Drains. [move to 16.11.9]

Drains from alarm devices shall be arranged so that there will be no overflowing at the alarm apparatus, at domestic connections, or elsewhere with the sprinkler drains wide open and under system pressure. (*See 8.16.2.6.*)

**6.9* Signs. [move to 16.17]
(Reserved)**