Cleveland Clinic

Cleveland Clinic Master Specifications – Fire Protection

This document contains the Master Specifications for the design and construction of new and renovated facilities for all domestic Cleveland Clinic locations. It is be used by A/E firms in the preparation of Construction Documents for all facility types.

The general purpose of each Specification is to provide minimum criteria for construction materials at Cleveland Clinic facilities regarding Code and FM Global compliance, warranty, approved products, execution and uniformity.

The Specifications are used to prepare specific project Contract Specifications. They are intended to be used to address system design aspects of equipment that Cleveland Clinic desires to standardize among facilities, and identify prohibited materials and construction practices. Use of these Specifications will help A/E’s meet the Cleveland Clinic’s primary goal of providing a safe, reliable, and energy efficient installations and ultimately successful patient outcomes.

The use of these Specifications is mandatory for all design or maintenance projects. Deviations are discouraged. If project conditions arise which require a deviation, it should be thoroughly documented by the user and submitted for review and approval using the Design Standards Revision Request document. Additionally, all Cleveland Clinic staff, architects, engineers, and contractors are encouraged to participate in the ongoing development of these guidelines by communicating any suggestions by use of the Revision Request document.

*****
<table>
<thead>
<tr>
<th>SECTION #</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>211313</td>
<td>AUTOMATIC SPRINKLER AND STANDPIPE SYSTEMS</td>
</tr>
</tbody>
</table>

**End of List**
DESIGN STANDARD REVISION REQUEST DOCUMENT

From:

Department or Firm:

Phone:

E-mail:

Date:

Standard Type:
Specification___ Design Guideline___ Detail___

Specification, Guideline, or Detail Number:

DESCRIBE REASON FOR REVISION:

BRIEF DESCRIPTION OF REVISION:

SECTION, PAGE, PARAGRAPH NUMBER(S), DETAIL NUMBER:

HAS THIS PROPOSAL BEEN DISCUSSED WITH THE FACILITIES GROUP?

PROVIDE NAME OF PERSON AND DATE DISCUSSED:
PART 1 - GENERAL

[Designer Notes: Where text is bolded and italicized in brackets, designer must follow the instructions. Where text is in bolded in brackets, designer must make a choice or modification. Revise this Section by deleting and inserting text to meet Project specific requirements; delete portions of this specification that are not applicable as necessary. Where this specification references other specification sections, verify that these specifications are written and the titles of these specifications are accurate.]

1.1 DESCRIPTION OF WORK

A. This work includes the design and installation of a [new, complete] [modification to the existing] automatic sprinkler [and standpipe] system as described herein and on the contract drawings for [insert name of building or project]. [Include Narrative Description of Project.]

B. The system design and installation shall include all piping, valves, sprinklers, fittings, hangers, alarm devices, backflow preventers, inspector’s test connections, fire department connections, hose connections, and all accessories and miscellaneous items required for a complete operating system even if the item is not specifically described herein.

C. Project design drawings and specifications reflect the intent and scope of the project and general pipe routing. The Contractor is responsible for the design of the system. The Contractor shall provide a fire sprinkler [and standpipe] system that meets all of the requirements stated herein. [The Contractor may vary from the design drawings provided all of the requirements are satisfied.] The Contractor is expected to make allowances for all necessary adjustments for the actual system installation and to examine physical conditions which may affect the performance of their work, and coordinate the actual pipe routing as necessary to accommodate the conditions, obstructions and the work of others. No extra payments will be allowed for the Contractor on account of extra work made necessary by his failure to make such allowances. The cost associated with this task shall be included in the Contractor's base bid. Any case of error, omission, discrepancy or lack of clarity shall be promptly identified to the CCD for clarification prior to submission of base bid price.

D. The omission by the Engineer of any necessary system component, as required by the authorities having jurisdiction or applicable requirements, in the drawings and specifications shall not relieve the Contractor of the responsibility for verifying and providing such necessity, without additional cost to the CC.

E. The pipe sizing shown is the minimum size. The Contractor may reduce the pipe size for branchline piping, but shall not lessen the pipe size for mains and underground piping.

F. Extent of Work: The system shall be designed and installed in accordance with the drawings, specifications and referenced publications. Any conflicts between these documents shall be brought to the attention of the Design Professional Responsible for the Project prior to submitting a bid. No contract adjustments will be made for failure to address conflicts between drawings and specifications prior to bid.
G. Work shall not be considered complete until accepted by the CC.

H. Repair Service/Replacement Parts: Repair services and replacement parts for the system shall be furnished under this contract and be available for a period of 15 years after the date of final acceptance by the CC.

I. [Within thirty (30) days the start of construction, the Contractor shall evaluate the water supply for the existence of microorganisms and microbes that may contribute to Microbiologically Influenced Corrosion (MIC). The results of the test shall be submitted to the CC FCFPE and Engineer of Record within 15 days of completion of the test. If the results are found to contribute to MIC, the Contractor shall develop a treatment plan, submit to CC FCFPE and Engineer of Record and meet with these parties to review the treatment plan. See NFPA 13 for additional requirements.]

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All work shall be designed and installed in accordance with contract drawings, specifications, applicable codes, and Cleveland Clinic Fire Protection & Life Safety Design Standards.

1.3 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. [Hose connections.]
4. [Fire-department connections.]
5. [Backflow preventers.]
7. Alarm devices.
8. Pressure gages.

B. Related Sections:

1. [Division 10, Section 10 4413 “Fire Extinguisher Cabinets.”]
2. [Division 21, Section 21 0517 “Sleeves and Sleeve Seals for Fire-Suppression Piping”]
3. [Division 21, Section 21 0518 “Escutcheons for Fire Suppression Piping.”]
4. [Division 21, Section 21 1113 “Facility Water Distribution Piping”]
5. [Division 21, Section 21 3113 "Fire Pumps".]
6. [Division 22, specifications for Common Requirements for Mechanical Equipment.]
7. [Division 26, Section 26 0553 “Identification for Electrical Systems.”]
8. [Division 28, Section 28 3111 “Digital Addressable Fire Alarm System” for interconnection with fire alarm system.]
9. [Insert other Specification Sections as applicable.]
C. In any case where this specification conflicts with any other section, this specification shall supersede all other sections in regard to automatic sprinkler [and standpipe] systems.

1.4 REFERENCES

A. Provide an automatic sprinkler system conforming to the requirements of the listed editions of the following publications including all amendments to these publications:

[Edit the following to include all applicable design codes and their editions.]

1. Cleveland Clinic Fire Protection & Life Safety Design Standards
2. Factory Mutual (FM) Global
   a. The most recent edition of the following FM Global Loss Prevention Data Sheets:
      1) 2-0: Installation Guidelines for Automatic Sprinklers
      2) 3-0: Hydraulics of Fire Protection Systems
      3) 3-26: Fire Protection Water Demand for Nonstorage Sprinklered Properties
3. National Fire Protection Association (NFPA)
   b. [NFPA 14 – Standard for the Installation of Standpipe and Hose Systems, [Insert edition]]
   c. NFPA 24 – Standard for the Installation of Private Fire Service Mains, [Insert edition]
   e. NFPA 70 – National Electrical Code, [Insert edition]
4. [Ohio Building Code (OBC)] [Insert edition]
5. [Ohio Fire Code (OFC)] [Insert edition]
6. Underwriters Laboratories Inc. (UL)
   a. UL-FPED Fire Protection Equipment Directory

1.5 ABBREVIATIONS

A. AHJ: Authority Having Jurisdiction.
B. CC: Cleveland Clinic
C. DFC: Director of Facilities Compliance
D. FCFPE: Facilities Compliance Fire Protection Engineer
E. FLSM: Fire and Life Safety Manager
F. FM: FM Global
G. NFPA: National Fire Protection Association
H. NICET: National Institute for Certification in Engineering Technologies
I. UL: Underwriters Laboratories
1.6 DEFINITIONS

[Include high-pressure sprinkler piping and standpipe system definitions only where applicable to the project. Automatic standpipe systems shall only be used in high rise buildings, otherwise select a manual system if standpipes are required.]

A. [High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard 175 psig, but not higher than [250 psig] [300 psig].]

B. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

C. [Automatic Wet-Type, Class I Standpipe System: Includes NPS 2-1/2 hose connections. Has open water-supply valve with pressure maintained and is capable of supplying water demand.]

D. [Manual Wet-Type, Class I Standpipe System: Includes NPS 2-1/2 hose connections. Has small water supply to maintain water in standpipes. Piping is wet, but water must be pumped into standpipes through the fire department connection to satisfy demand.]

1.7 SYSTEM DESCRIPTIONS

[Delete the systems that are not applicable to this project.]

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

B. [Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.]

C. [Combination Sprinkler/Standpipe System: A system that supplies both standpipe hose connections and automatic sprinklers.]

1.8 PERFORMANCE REQUIREMENTS

[Delete high-pressure piping system components if they are not used. Include seismic performance requirements where seismic bracing is required by other standards. Select seismic standard based on local requirements.]

A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.

B. [High-Pressure Piping System Component: Listed for [250-psig minimum] [300-psig] working pressure.]

C. Sprinkler system design shall be approved by AHJ, CC FCFPE and the municipality.
1. Margin of Safety for Available Water Flow and Pressure: 15 percent or 10 psi, whichever is less, including losses through water-service piping, valves, and backflow preventers.

2. Sprinkler Occupancy Hazard Classifications: As shown on drawings and as defined by Cleveland Clinic Fire Protection & Life Safety Standards.

3. Maximum Protection Area per Sprinkler: Per UL listing and NFPA 13. Extended coverage sprinklers are not permitted.

D. [Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and [ASCE/SEI 7] [Insert requirement].]

1.9 SUBMITTALS

[Include LEED submittal requirements where the project is to be LEED certified.]

A. General Submittal Requirements: Refer to Cleveland Clinic Fire Protection & Life Safety Standards for submittal process.

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

C. [LEED Submittal:

1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content and chemical components.]

D. Shop Drawings: For all automatic sprinkler and standpipe systems. Include plans, elevations, sections, details, and attachments to other work. Shop drawings shall conform to “Working Plans” section of NFPA 13. Shop drawing submittal to Cleveland Clinic shall be accompanied by a completed Fire Suppression Review Checklist. Refer to Cleveland Clinic Fire Protection & Life Safety Standards Appendix.

1. Wiring Diagrams: For power, signal, and control wiring.

E. Qualification Data: For qualified Installer.

F. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by AHJ and the CC FCFPE, including hydraulic calculations if applicable.

G. Fire-hydrant flow test report.

H. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

I. Field quality-control reports.

J. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals. In addition to other items required, include the following:
1. Provide all records of inspection, testing, and maintenance reports to CC FLSM in accordance with NFPA 13 and 25.
2. Provide the CC FLSM with all literature and instructions provided by the manufacturer describing the operation and maintenance of equipment and devices installed. This shall include, but not be limited to, the following:
   a. Frequency of testing of installed components.
   b. Frequency of inspection of installed components.
   c. Requirements and recommendations related to results of maintenance.
   d. Manufacturer's user training manuals.
3. Manufacturer's required maintenance related to system warranty requirements.
4. As-built drawings.

1.10 QUALITY ASSURANCE

[Include local requirements for installer qualifications where NICET is not the commonly accepted certification.]

A. Provide design, materials, and devices for a wet pipe automatic sprinkler system, complete, conforming to NFPA 13. All components of the system shall be of current design and shall be in regular and recurrent production. All equipment supplied shall be first quality and the manufacturer’s best type and latest model capable of complying with all requirements of this specification and shall have been in continuous production for at least one year. Obsolete equipment shall not be used.

B. Approved Equipment: Provide materials, equipment, and devices that have been tested by a nationally recognized testing laboratory and listed or approved for fire protection service when so required by NFPA 13 or this specification. Equipment located outside the building envelope shall be listed for outdoor use.

C. Shop Drawings and Calculations: All sprinkler system design, including shop drawings, shall be by a NICET Level III or IV Sprinkler Technician or a Registered Fire Protection Engineer. Designer shall have an established office, which has been in existence for at least three (3) years. The person preparing these documents shall be responsible for compliance with applicable codes as cited in this specification as well as compliance with the contract.

D. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems, the preparation of hydraulic calculations, installation drawings, shop drawings, as built drawings, and providing professional engineering services needed to assume engineering responsibility. Base hydraulic calculations on results of fire-hydrant flow test.

2. Sprinkler system installation shall be supervised by a system technician who is certified by the NICET as an engineering technician with minimum Level III certification in Automatic Sprinkler Systems or a Fire Protection Engineer, as defined by the Cleveland Clinic Fire Protection & Life Safety Standards.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
F. Comply with Cleveland Clinic Fire Protection and Life Safety Design Standards.

G. Comply with FM Global requirements.

1.11 [PROJECT CONDITIONS

[Include this section for renovation projects in buildings with existing sprinkler systems.]

A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by CC or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:

1. Notify CC FLSM no fewer than [two] [Insert number] days in advance of proposed interruption of sprinkler service.
2. Do not proceed with interruption of sprinkler service without the CC FLSM’s written permission.]

1.12 COORDINATION

A. The Contractor shall coordinate this sprinkler system work with other trades to avoid conflicts, assure system completion and testing within the project schedule and to assure a quality, workmanlike finished product.

B. Coordinate layout and installation of sprinklers with other construction that penetrates or suspends from ceilings, including light fixtures, HVAC equipment, floating ceiling panels, and partition assemblies.

1.13 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

PART 2 - PRODUCTS

2.1 UNDERGROUND PIPING COMPONENTS

A. Pipe: Comply with NFPA 24. Minimum pipe size shall be 4 inches. Piping more than 5 feet outside the building walls shall comply with [Section 21 1113 Facility Water Distribution Piping] [Insert specification].
B. Buried Utility Warning and Identification Tape: Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. See [Section 21 1113 Facility Water Distribution Piping] [Insert specification] for requirements.

2.2 STEEL PIPE AND FITTINGS

[Include galvanized pipe only when the project includes dry pipe systems.]

A. Schedule 40, [Galvanized-] [and] Black-Steel Pipe: ASTM A 53/A 53M, [Type E] [Insert type], [Grade B] [Insert type]. Pipe ends may be factory or field formed to match joining method.

B. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in NPS 5 and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10, plain end.

[Nipples in first paragraph below are available in NPS 1/8 to NPS 12.]


[Couplings in first paragraph below are available in NPS 1/8 to NPS 20.]

D. [Galvanized] [and] [Uncoated], Steel Couplings: ASTM A 865, threaded.

[Fittings in first paragraph below are available in NPS 1/4 to NPS 12.]

E. [Galvanized] [and] [Uncoated], Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

[Unions in first paragraph below are available in NPS 1/4 to NPS 3, but NFPA limits them to NPS 2 and smaller.]

F. Malleable- or Ductile-Iron Unions: UL 860.

[Flanges in first paragraph below are available in NPS 1 to NPS 96.]


[Flanges and fittings in first paragraph below are available in NPS 1/2 to NPS 24.]

H. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.

[Fittings in first paragraph below are available in NPS 1/2 to NPS 48 (DN 15 to DN 1200).]

I. Grooved-Joint, Steel-Pipe Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
a. Anvil International, Inc.
b. Tyco Fire & Building Products LP.
c. Victaulic Company.

2. Pressure Rating: [175 psig] [250 psig] [300 psig] minimum.
3. [Galvanized] [and] [Uncoated], Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.

[AWWA C606 and UL 213 cover couplings in subparagraph below in NPS 3/4 to at least NPS 12.]
4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

[Fittings in paragraph below are available in NPS 3/4 to NPS 2.]

J. Steel Pressure-Seal Fittings: UL 213, FM-approved, 175-psig pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

2.3 COPPER TUBE AND FITTINGS

[All copper tubing in this article is suitable for 175-psig (1200-kPa) minimum working pressure.]

[Tube in first paragraph below is available in NPS 1/8 to NPS 12 (DN 6 to DN 300).]

A. Hard Copper Tube: ASTM B 88, Type L or ASTM B 88, Type M water tube, drawn temper.

[Fittings in first paragraph below are available in NPS 1/4 to NPS 12 (DN 8 to DN 300).]

B. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

[Fittings in first paragraph below are available in NPS 1/4 to NPS 8 (DN 8 to DN 200).]


[Flanges in first paragraph below are available in NPS 1/2 to NPS 12 (DN 15 to DN 300).]

D. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

[Unions in first paragraph below are available in NPS 1/4 to NPS 4 (DN 8 to DN 100), but NFPA limits them to NPS 2 (DN 50) and smaller.]

E. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

[Fittings in first paragraph below are available in NPS 1/2 to NPS 4 (DN 15 to DN 100).]

F. Grooved-Joint, Copper-Tube Appurtenances:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
a. Anvil International, Inc.
b. Shurjoint Piping Products.
c. Victaulic Company.

2. Grooved-End, Copper Fittings: ASTM B 75, copper tube or ASTM B 584, bronze castings.

[AWWA C606, in subparagraph below, does not cover couplings for grooved-end copper tubing. One manufacturer makes this type of coupling with dimensions for copper tube and fittings. Another manufacturer listed has a system for expanding the ends of copper tube and fittings so couplings for steel piping may be used.]

3. Grooved-End-Tube Couplings: To fit copper-tube dimensions, with design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gasket suitable for hot and cold water, and bolts and nuts.

[Extruded-tee connections in paragraph below can be used instead of tee fittings in copper tubing. Delete if not allowed by authorities having jurisdiction.]

G. Copper-Tube, Extruded-Tee Connections:

1. Description: Tee formed in copper tube according to ASTM F 2014.

2.4 [FLEXIBLE SPRINKLER HOSE]

[The installation of flexible sprinkler hose is restricted. The designer may permit its use within the following specifications.]

A. Manufacturers:

1. Flexhead Industries

B. Standard: UL 2443

C. Flexible Hose Assemblies and End Fittings

1. 100% Type 304 Stainless Steel
2. Rated Pressure: [175 psi] [300 psi]
3. Fully welded non-mechanical fittings, fully braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter.

D. Ceiling Bracket

1. Type G90 Galvanized
2. Type: Direct attachment type, having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws.

2.5 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free.
1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
2. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.6 LISTED FIRE-PROTECTION VALVES

A. General Requirements:
   1. Valves shall be UL listed or FM approved.
   3. Minimum Pressure Rating for High-Pressure Piping: [250 psig] [300 psig].

[Valves in first paragraph below are available in NPS 3 (DN 80) and smaller.]

B. Ball Valves:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Anvil International, Inc.
      b. Victaulic Company
   2. Standard: UL 1091 except with ball instead of disc.
   3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
   4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
   5. Valves NPS 3: Ductile-iron body with grooved ends.

[Valves in first paragraph below are available in NPS 2-1/2 (DN 65) and smaller.]

C. Bronze Butterfly Valves:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Fivalco Inc.
      b. Global Safety Products, Inc.
      c. Milwaukee Valve Company
   2. Standard: UL 1091.
   5. End Connections: Threaded.

[Valves in first paragraph below are available in NPS 2 (DN 50) and larger.]
D. Iron Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Milwaukee Valve Company
   b. Tyco Fire & Building Products LP.
   c. Victaulic Company

2. Standard: UL 1091.
4. Body Material: Cast or ductile iron.

[Retain one of two subparagraphs below.]
5. Style: Lug or wafer.

[Valves in first paragraph below are available in NPS 2 (DN 50) and larger.]

E. Check Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Tyco Fire & Building Products LP.
   b. Victaulic Company
   c. Viking Corporation

3. Pressure Rating: [250 psig minimum] [300 psig].
4. Type: Swing check.
5. Body Material: Cast iron.
6. End Connections: Flanged or grooved.

[Valves in first paragraph below are available in NPS 2 (DN 50) and smaller.]

F. Bronze OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Milwaukee Valve Company
   b. NIBCO Inc.
   c. United Brass Works, Inc.

5. End Connections: Threaded.

[Valves in first paragraph below are available in NPS 2 and larger.]
G. Iron OS&Y Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Milwaukee Valve Company
   b. NIBCO INC.
   c. Tyco Fire & Building Products LP

3. Pressure Rating: [250 psig minimum] [300 psig].
4. Body Material: Cast or ductile iron.
5. End Connections: Flanged or grooved.

[Valves in first paragraph below are available in NPS 2 and larger.]

H. Indicating-Type Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Milwaukee Valve Company
   b. Tyco Fire & Building Products LP
   c. Victaulic Company.

2. Standard: UL 1091.
4. Valves NPS 2 and Smaller:
   a. Valve Type: Ball or butterfly.
   b. Body Material: Bronze.
   c. End Connections: Threaded.
5. Valves NPS 2-1/2 and Larger:
   a. Valve Type: Butterfly.
   b. Body Material: Cast or ductile iron.
   c. End Connections: Flanged, grooved, or wafer.

[Retain first paragraph below with "Indicator Posts" Paragraph below. Valves are available in NPS 2 and larger.]

I. NRS Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Kennedy Valve; a division of McWane, Inc.
   b. NIBO INC.
Tyco Fire & Building Products LP

3. Pressure Rating: [250 psig minimum] [300 psig].
5. Stem: Nonrising.
6. End Connections: Flanged or grooved.

[Retain paragraph below with "NRS Gate Valves" Paragraph above.]

J. Indicator Posts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Kennedy Valve; a division of McWane, Inc.
   b. NIBCO INC.
   c. Tyco Fire & Building Products LP

3. Type: Horizontal for wall mounting.
4. Body Material: Cast iron with extension rod and locking device.
5. Operation: [Wrench] [Hand wheel].

2.7 TRIM AND DRAIN VALVES

[Trim and drain valves are UL listed, are typically used as part of specialty control valve trim and drain piping, and are NPS 2 (DN 50) and smaller. Most of these valves are ball type, but there are also a few angle, butterfly, gate, and globe types listed. No UL standard exists for these valves].

A. General Requirements:

2. Pressure Rating: 175 psig minimum.

2.8 SPECIALTY VALVES

[Alarm valves are generally not used. Include only where approved by the CC FCPF. Delete dry pipe valve paragraph if not needed.]

A. General Requirements:

2. Pressure Rating:
   a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
   b. High-Pressure Piping Specialty Valves: [250 psig minimum] [300 psig minimum]
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. [Alarm Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Tyco Fire & Building Products LP
   b. Victaulic Company
   c. Viking Corporation

2. Standard: UL 193
3. Design: For horizontal or vertical installation.

[Delete option in first subparagraph below if water-supply pressure is constant.]

4. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.

[Retain one of two subparagraphs below. Retain first subparagraph if retarding chamber is required. Retain second subparagraph if retarding chamber is not required.]

5. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
6. Drip Cup Assembly: Pipe drain with check valve to main drain piping.]

C. [Dry-Pipe Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

   a. Tyco Fire & Building Products LP
   b. Victaulic Company.
   c. Viking Corporation.

2. Standard: UL 260
4. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

[Retain first subparagraph below if system uses air-pressure maintenance devices. If retaining, delete "Air Compressor" Subparagraph below.]

5. Air-Pressure Maintenance Device:
   b. Type: Automatic device to maintain minimum air pressure in piping.
   c. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and [175-psig] [300-psig] outlet pressure.
6. Air Compressor:

[Motor characteristics such as NEMA designation, temperature rating, service factor, enclosure type, and efficiency are specified in Section 210513 "Common Motor Requirements for Fire Suppression Equipment." If different characteristics are required, insert subparagraphs below to suit Project.]
   c. Power: 120-V ac, 60 Hz, single phase.]

[Valves in first paragraph below are available in NPS 1-1/2 to NPS 8.]

D. Automatic (Ball Drip) Drain Valves:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. AFAC Inc.
      b. Reliable Automatic Sprinkler Co., Inc.
      c. Tyco Fire & Building Products LP
   4. Type: Automatic draining, ball check.

2.9 [HOSE CONNECTIONS]

[Include hose connection section only for combination sprinkler/standpipe systems.]

A. Nonadjustable-Valve Hose Connections:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Guardian Fire Equipment, Inc.
      b. Potter Roemer
      c. Tyco Fire & Building Products LP
   2. Standard: UL 668 hose valve for connecting fire hose.
   3. Pressure Rating: 300 psig minimum.
   4. Material: Brass or bronze.
   5. Size: NPS 2-1/2, as indicated.
   6. Inlet: Female pipe threads.
   7. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 1963 and matching local fire-department threads.
9. Finish: [Polished chrome plated] [Rough chrome plated].

B. Pressure-Reducing Valve Stations:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Guardian Fire Equipment, Inc.
   b. Potter Roemer
   c. Tyco Fire & Building Products LP

[Indicate valve size and inlet and outlet pressures on Drawings for each pressure-reducing valve.]

2. UL 668 hose valve, with integral UL 1468 reducing device.
3. Pressure Rating: 300 psig minimum.
4. Material: Brass or bronze.
5. Inlet: Female pipe threads.
6. Outlet: Threaded with or without adapter having male hose threads.
7. Pattern: [Angle] [or] [gate].
8. Finish: [Polished chrome plated] [Rough chrome plated].

2.10 FIRE-DEPARTMENT CONNECTIONS

[NOTE: Coordinate FDC requirements with Facility Water Distribution Specification. Delete this section if a freestanding FDC is used. Select exposed-type or flush wall-mounted FDC based on input from Architects.]

A. Exposed-Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Fire-End & Croker Corporation
   b. Guardian Fire Equipment, Inc.
   c. Tyco Fire & Building Products LP

3. Type: Exposed, projecting, for wall mounting.
6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
7. Caps: Brass, lugged type, with gasket and chain.
8. Escutcheon Plate: Round, brass, wall type.
10. Number of Inlets: [Two] [Three].
11. Escutcheon Plate Marking: Similar to "[AUTO SPKR & STANDPIPE] [AUTO SPKR] [AUTO STANDPIPE] [DRY STANDPIPE]."
12. Finish: [Polished chrome plated] [Rough brass or bronze] [Rough chrome plated].
13. Outlet Size: [NPS 4] [NPS 5] [NPS 6].

B. Flush-Type, Fire-Department Connection:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Elkhart Brass Mfg Company, Inc.
   b. Guardian Fire Equipment, Inc.
   c. Potter Roemer

3. Type: Flush, for wall mounting.
6. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
7. Caps: Brass, lugged type, with gasket and chain.
8. Escutcheon Plate: Rectangular, brass, wall type.
10. Body Style: [Horizontal] [Square] [Vertical].
11. Number of Inlets: [Two] [Three] [Four] [Six].
12. Outlet Location: [Back] [Bottom] [Left side] [Right side] [Top].
13. Escutcheon Plate Marking: Similar to "[AUTO SPKR & STANDPIPE] [AUTO SPKR] [AUTO STANDPIPE] [DRY STANDPIPE]."
14. Finish: [Polished chrome plated] [Rough brass or bronze] [Rough chrome plated].
15. Outlet Size: [NPS 4] [NPS 5] [NPS 6] [NPS 8].

2.11 [BACKFLOW PREVENTION ASSEMBLY

A. General:

1. Each check valve shall have a drain. Backflow prevention assemblies shall be FM approved. Include a permanently installed test assembly for full forward flow testing.

B. Reduced-Pressure-Principle Backflow Preventers:

[See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain one of first two subparagraphs and list of manufacturers below. See Section 016000 "Product Requirements."]

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
   b. Watts Water Technologies, Inc.
   c. Zurn Plumbing Products Group; Wilkins Water Control Products Division.
2. Standard: [ASSE 1013] [or] [AWWA C511].
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle one-third of flow range.
5. Size: [Insert NPS].
6. Design Flow Rate: [Insert gpm].
7. Selected Unit Flow Range Limits: [Insert gpm].
8. Pressure Loss at Design Flow Rate: [Insert psig].
9. Body Material: [Cast iron with interior lining complying with AWWA C550 or that is FDA approved] [Steel with interior lining complying with AWWA C550 or that is FDA approved] [Stainless steel].
11. Configuration: Designed for [horizontal, straight through] [vertical inlet, horizontal center section, and vertical outlet] [vertical] [Insert configuration] flow.
12. Accessories:
   a. OS&Y gate type with flanged ends on inlet and outlet.

C. Double-Check, Backflow-Prevention Assemblies:

[See Editing Instruction No. 1 in the Evaluations for cautions about naming manufacturers. Retain one of first two subparagraphs and list of manufacturers below. See Section 016000 "Product Requirements."]

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
   b. Watts Water Technologies, Inc.
   c. Zurn Plumbing Products Group; Wilkins Water Control Products Division.

2. Standard: [ASSE 1015] [or] [AWWA C510].
3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Pressure Loss: 5 psig maximum, through middle one-third of flow range.
5. Size: [Insert NPS].
6. Design Flow Rate: [Insert gpm].
7. Selected Unit Flow Range Limits: [Insert gpm].
8. Pressure Loss at Design Flow Rate: [Insert psig].
9. Body Material: [Cast iron with interior lining complying with AWWA C550 or that is FDA approved] [Steel with interior lining complying with AWWA C550 or that is FDA approved] [Stainless steel].
11. Configuration: Designed for horizontal, straight through.
12. Accessories: OS&Y gate valves with flanged ends on inlet and outlet.

[NOTE: Coordinate BFP requirements with Facility Water Distribution Piping Specification. Delete this section if the BFP is to be provided outside of the building in a vault. Select the double check assembly unless local regulations require use of a RPZ.]
2.12 SPRINKLER SPECIALTY PIPE FITTINGS

[Fittings in first paragraph below are available in at least NPS 2 to NPS 8 main sizes with NPS 1/2 to NPS 4 outlets or branches.]

[Assemblies in first paragraph below are available in NPS 3/4 to NPS 2.]

A. Zonecheck Flow Switch Tester:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Global Vision Inc.
   2. Operation: Closed system with pump that re-circulates water around the flow switch at a pressure equal to one sprinkler head discharging water. As water operates the flow-switch paddle, an electronic signal is sent back to the keyswitch to indicate that the flow switch has operated correctly.
   3. Size: Same as connected piping
   5. Pressure Rating: 175 psig minimum.

[Testers in first paragraph below are available in NPS sizes required for a single sprinkler.]

[Fittings in first paragraph below are available in NPS 3/4 to NPS 2.]

B. Adjustable Drop Nipples:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. CECA, LLC
      b. Corcoran Piping System Co.
      c. Merit Manufacturing; a division of Anvil International, Inc.
   3. Pressure Rating: [250 psig minimum] [300 psig].
   5. Size: Same as connected piping.
   7. Inlet and Outlet: Threaded.

2.13 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   1. Reliable Automatic Sprinkler Co., Inc.
   2. Tyco Fire & Building Products LP.
   3. Victaulic Company.
   4. Viking Corporation
B. General Requirements:
   3. Pressure Rating for High-Pressure Automatic Sprinklers: [250 psig minimum] [300 psig].

C. Automatic Sprinklers with Heat-Responsive Element:
   1. Nonresidential Applications: UL 199.

D. Sprinkler Finishes:
   1. Chrome plated.
   2. Bronze.
   3. Painted.

E. Special Coatings: Provide where required by NFPA 13 or as indicated on drawings.
   1. Wax.
   2. Lead.
   3. Corrosion-resistant paint.

F. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
   1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
   2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

G. Sprinkler Guards.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
      a. Reliable Automatic Sprinkler Co., Inc.
      b. Tyco Fire & Building Products LP.
      c. Victaulic Company.
      d. Viking Corporation
   2. Provide in accordance with NFPA 13 and as indicated on the drawings. Sprinkler guards shall be installed on sprinklers that are subject to mechanical damage or those installed less than 6 feet 8 inches above the finished floor, except in IT rooms where they shall be provided for sprinklers within 12 feet above the finished floor.
   4. Type: Wire cage with fastening device for attaching to sprinkler.
2.14 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Electrically Operated Alarm Bell:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Fire-Lite Alarms, Inc.; a Honeywell company.
   b. Notifier; a Honeywell company.
   c. Potter Electric Signal Company.

3. Type: Vibrating, metal alarm bell.
5. Finish: Red-enamel factory finish, suitable for outdoor use.

C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   b. System Sensor; a Honeywell Company
   c. Viking Corporation

4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
5. Type: Paddle operated.
7. Design Installation: Horizontal or vertical.

D. Pressure Switches:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   b. System Sensor; a Honeywell Company
   c. Viking Corporation

3. Type: Electrically supervised water-flow switch with retard feature.
5. Design Operation: Rising pressure signals water flow.

E. Valve Supervisory Switches:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
   a. Fire-Lite Alarms, Inc.; a Honeywell company.
   b. Potter Electric Signal Company.
   c. System Sensor; a Honeywell Company

3. Type: Electrically supervised.
5. Design: Signals that controlled valve is in other than fully open position.

2.15 PRESSURE GAGES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:

1. AMETEK; U.S. Gauge Division.
2. Ashcroft Inc.
4. WIKA Instrument Corporation.

B. Standard: UL 393.

C. Dial Size: 3-1/2- to 4-1/2-inch diameter.

D. Pressure Gage Range: [0 to 250 psig minimum] [0 to 300 psig].

E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

F. Air System Piping Gage: Include [retard feature and] "AIR" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

[Retain this article if fire-hydrant flow test is required or if CC has not provided flow information.]

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 WATER-SUPPLY CONNECTIONS

[Retain this article and delete "Service-Entrance Piping" Article if connection to building's water-distribution piping is required.]
A. Connect sprinkler piping to water-service piping for service entrance to building.

B. Install shutoff valve, [backflow preventer], pressure gage, drain, and other accessories indicated at connection to water-distribution piping.

3.3 WET-SYSTEM PIPING INSTALLATION

A. Installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with NFPA 13 and NFPA 25. Install sprinkler piping straight and true, to bear evenly on hangers and supports. Sprinkler piping shall be hung from structural elements capable of bearing the full designed load and in full compliance with referenced codes. No other load shall be suspended from sprinkler piping or sprinkler piping hangers/supports. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign material. Inspect piping before placing into position.

B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from AHJ. File written approval with CC FCFPE before deviating from approved working plans.

C. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.

[Retain first paragraph below if piping is required to withstand seismic design loads.]

D. [Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.]

E. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

F. Install unions adjacent to each valve in pipes NPS 2 and smaller.

G. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

H. Install Zonecheck flow switch testers in sprinkler system piping, in location approved by the CC FCFPE.

I. Install sprinkler piping with drains for complete system drainage. All drains shall terminate at a location acceptable to CC FCFPE. Drains that terminate to the exterior of the building shall have a 45 degree downturn no higher than 12 inches from the ground with a splashblock.

J. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

K. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
L. Install alarm devices in piping systems.

[See Editing Instruction No. 3 in the Evaluations for cautions about pipe hangers.]

M. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

N. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

O. Fill sprinkler system piping with water.

P. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified the Cleveland Clinic Firestopping and Fireproofing Performance Based Standard.

[Retain first paragraph below for piping that penetrates an exterior concrete wall or concrete slab.]

A. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified the Cleveland Clinic Firestopping and Fireproofing Performance Based Standard.

B. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified the Cleveland Clinic Firestopping and Fireproofing Performance Based Standard.

3.4 [DRY-PIPE SYSTEM PIPING INSTALLATION]

[Delete if dry pipe system is not in project.]

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

B. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.

[Retain first paragraph below if piping is required to withstand seismic design loads.]

C. [Install seismic restraints on piping. Comply with requirements in NFPA 13 for seismic-restraint device materials and installation.]

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 and smaller.
F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

G. Install piping sloped to facilitate complete system drainage in accordance with NFPA 13.

H. Install sprinkler piping with drains for complete system drainage. All drains shall terminate at a location acceptable to CC FPE. Drains that terminate to the exterior of the building shall have a 45 degree downturn no higher than 12 inches from the ground with a splashblock.

I. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

J. Install automatic (ball drip) drain valves to drain piping between fire-department connections and check valves. Drain to floor drain or to outside building.

K. Connect compressed-air supply to dry-pipe sprinkler piping.

L. Connect air compressor to the following piping and wiring:

1. Pressure gages and controls.
2. Electrical power system.
3. Fire-alarm devices, including low-pressure alarm.

M. Install alarm devices in piping systems and for compressor power failure.

N. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.

O. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 and with ball valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

P. Drain dry-pipe sprinkler piping.

Q. Pressurize and check dry-pipe sprinkler system piping and air-pressure maintenance devices.

R. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 21 0517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."

S. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 21 0517 "Sleeves and Sleeve Seals for Fire-Suppression Piping."
T. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 210518 "Escutcheons for Fire-Suppression Piping."

U. All dry system piping shall be sloped to drain.

V. Install pre-packaged preaction fire protection systems as indicated on drawings. Include isolation valve electrically supervised by the fire alarm system. Connect drain to floor drain, drain riser, or other location acceptable to Cleveland Clinic.

3.5 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: The use of threaded joints is restricted to wet pipe systems. Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

I. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.

J. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

K. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
L. **Brazed Joints:** Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.

M. **Copper-Tubing Grooved Joints:** Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.

N. **Copper-Tubing, Pressure-Sealed Joints:** Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.

O. **Extruded-Tee Connections:** Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

P. **Dissimilar-Material Piping Joints:** Make joints using adapters compatible with materials of both piping systems.

3.6 **VALVE AND SPECIALTIES INSTALLATION**

A. Install valves as shown on the drawings and as recommended by the manufacturer. Lubricate valves and exercise them after installation and prior to testing to assure proper operation, travel, and ease of use.

B. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

C. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs in accordance with Cleveland Clinic Fire Protection & Life Safety Standards.

D. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

E. **Specialty Valves:**

[Delete valve types that are not used.]

1. **General Requirements:** Install in vertical position for proper direction of flow, in main supply to system.

2. **Alarm Valves:** Include bypass check valve and retarding chamber drain-line connection.

3. **Dry-Pipe Valves:** Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.

[Retain first subparagraph below or retain second and third subparagraphs.]

a. Install air compressor and compressed-air supply piping.

b. **Air-Pressure Maintenance Device:** Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling;
pressure regulator or switch to maintain system pressure; strainer; pressure ratings with 14- to 60-psig adjustable range; and 175-psig maximum inlet pressure.

c. Install compressed-air supply piping from building's compressed-air piping system.

3.7 SPRINKLER INSTALLATION

[Delete dry-type sprinkler and flexible sprinkler hose paragraphs if they are not needed.]

A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Where flexible sprinkler hose is used, install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

3.8 [FIRE-DEPARTMENT CONNECTION INSTALLATION

[Coordinate this section with site/civil; delete if provided under separate specification.]

A. Install fire-department connection(s) as indicated on the drawings.

B. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

C. Install Knox covers.

3.9 [HOSE-CONNECTION INSTALLATION

[Include this section only for combination sprinkler/standpipe systems.]

[In the City of Cleveland, hose connections shall be on stair landings. Confirm location of hose connections in other jurisdictions with authority having jurisdiction.]

A. Install hose connections adjacent to standpipes. Hose connection shall be installed on floor landings. [intermediate floor landings].

B. Install freestanding hose connections for access and minimum passage restriction.

C. Install NPS 2-1/2 hose connections with quick-disconnect NPS 2-1/2 by NPS 1-1/2 reducer adapter and flow-restricting device.

D. Install wall-mounted-type hose connections in cabinets. Include pipe escutcheons, with finish matching valves, inside cabinet where water-supply piping penetrates cabinet. Install valves at angle required for connection of fire hose. Comply with requirements for cabinets in Section 10 4413 "Fire Extinguisher Cabinets."]
3.10 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and CCF Fire Protection & Life Safety Standard. All concealed valves shall be marked.

B. [Standpipes shall be painted red.]

C. Identify system components, wiring, cabling, and terminals. [Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

[Rretain first paragraph below to require Contractor to perform tests and inspections.]

A. Perform tests and inspections.

[Rretain first paragraph below to describe tests and inspections to be performed.]

B. Tests and Inspections:
   1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
   4. Energize circuits to electrical equipment and devices.
   5. Coordinate with fire-alarm tests. Operate as required.
   6. [Coordinate with fire-pump tests. Operate as required.]
   7. Verify that equipment hose threads are same as local fire-department equipment.

[See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.]

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Submit as-built drawings and testing certificates after the acceptance testing in accordance with Cleveland Clinic Fire Protection & Life Safety Standards.

3.12 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.
3.13 DEMONSTRATION

A. Engage a factory-authorized service representative to train CC's maintenance personnel to adjust, operate, and maintain specialty valves.

3.14 PIPING SCHEDULE

A. Typically, provide black steel, Schedule 10 pipe (or other listed schedule), roll-grooved for pipe 2-1/2” and larger. Provide black steel, Schedule 40 pipe, cut- or roll-grooved or threaded fittings for diameter 2” inches and smaller. Areas requiring nonferrous pipe shall be copper Type L with wrought copper solder joints. Galvanized Steel piping, where required, shall be Schedule 40 for all sizes.

3.15 SPRINKLER SCHEDULE

[Edit this section to include project-specific requirements for sprinkler types, with exceptions noted on the drawings.]

A. Use sprinkler types in subparagraphs below for the following applications unless otherwise noted on drawings:

1. Rooms without Ceilings: Upright sprinklers.
2. Rooms with Suspended Ceilings: Concealed sprinklers
4. Spaces Subject to Freezing: [Upright sprinklers] [Pendent, dry sprinklers] [Sidewall, dry sprinklers] [Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated] [Insert type].
5. [Behavioral Health and Holding Areas: Institution-style sprinklers.]
6. [Food Preparation Areas: Solder-type sprinklers.]

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with [chrome] [factory painted white] [or custom factory painted where indicated] flat cover plate.
2. Flush Sprinklers: Bright chrome, with painted white escutcheon.
3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
4. [Upright] [Pendent] [and] [Sidewall] Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 211313