

DIVISION 21: FIRE SUPPRESSION

21 1000 WATER-BASED FIRE SUPPRESSION SYSTEMS

21 1313 WET-PIPE SPRINKLER SYSTEMS

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SECTION 21 1313**WET-PIPE SPRINKLER SYSTEMS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Includes But Not Limited To:
 - 1. Furnish and install complete wet-pipe fire sprinkler system as specified in Contract Documents. Connect to existing system and extend into new addition.
 - 2. Furnish and install Firestop Penetration Systems for fire sprinkler system penetrations as described in Contract Documents.
- B. Related Requirements:
 - 1. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
 - 2. Section 28 3101: 'Fire Detection and Alarm System' for fire detection and alarm annunciation panels including connection of tamper switches and flow detectors to alarm system and furnishing and installing of low temperature switch.

1.2 REFERENCES

- A. Association Publications:
 - 1. Underwriters Laboratories, Inc.:
 - a. UL Directory B, 'Fire Protection Equipment, Directory B' (2011).
- B. Reference Standards:
 - 1. American Society of Mechanical Engineers:
 - a. ASME B1.20.1-2013 'Pipe Threads, General Purpose, Inch'.
 - b. ASME B16.1-2015, 'Grey Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250'.
 - c. ASME B16.3-2016, 'Malleable Iron Threaded Fittings:: Classes 150 and 300'.
 - d. ASME B16.4-2016, 'Gray Iron Threaded Fittings: Classes 125 and 250'.
 - e. ASME B16.5-2017, 'Pipe Flanges and Flanged Fittings'.
 - 2. American Water Works Association:
 - a. AWWA C606-15, 'Grooved and Shouldered Joints'.
 - 3. American Welding Society:
 - a. AWA B2.1/B2.1M-2014, 'Specification for Welding Procedure and Performance Qualification', (5th Edition).
 - 4. ASTM International:
 - a. ASTM A53/A53M-18, 'Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless'.
 - b. ASTM A135/A135M-09(2014), 'Standard Specification for Electric-Resistance-Welded Steel Pipe'.
 - c. ASTM A234/A234M-17, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service'.
 - d. ASTM A395/A395M-99(2018), 'Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures'.
 - e. ASTM A536-84(2014), 'Standard Specification for Ductile Iron Castings'.
 - f. ASTM A795/A795M-13, 'Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use'.
 - 5. National Fire Protection Association:
 - a. NFPA 13: 'Standard for the Installation of Sprinkler Systems' (2019 or most recent edition adopted by AHJ).

- b. NFPA 24 'Standard for the Installation of Private Fire Service Mains and Their Appurtenances' (2019 or most recent edition adopted by AHJ).
- c. NFPA 25, 'Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems' (2017 or most recent edition adopted by AHJ).
- d. NFPA 101: 'Life Safety Code' (2018 or most recent edition adopted by AHJ).

1.3 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

- a. Size sprinkler system using NFPA 13 hydraulic calculation design method based on water supply evaluation performed at building site:
 - 1) On submittals, refer to sprinkler heads by sprinkler identification or model number published in appropriate agency listing or approval. Trade names and other abbreviated designations are not acceptable.
- b. Submittal Procedure:
 - 1) After award of Contract and before purchase of equipment, submit seven sets of shop drawings with specifications and hydraulic calculations to Fire Sprinkler Consultant and two (2) sets to local jurisdiction having authority for fire prevention for review. If pipe schedule method is used, submit copies of schedules in NFPA 13 used in sizing pipe.
 - 2) After integrating Fire Sprinkler Consultant's and AHJ's comments into drawings, licensed certified fire protection engineer of record who designed fire protection system shall stamp, sign, and date each sheet of shop drawings and first page of specifications and calculations.
 - 3) Submit stamped documents to Owner and to AHJ for fire prevention for final approval.
 - 4) After final approval, submit four copies of approved stamped documents to Fire Sprinkler Consultant.
 - 5) Failure of system to meet requirements of authority having jurisdiction and/or approved stamped construction documents shall be corrected at no additional cost to Owner.

B. Informational Submittals:

1. Certificates:

- a. Provide one (1) copy of completed NFPA 13 'Contractor's Material and Test Certification for Aboveground Piping' as specified in 'Field Quality Control' in Part 3 of this specification:

2. Qualification Statement:

- a. Licensed fire protection engineer or fire protection system designer:
 - 1) Licensed for area of Project.
 - 2) Certified by NICET to level three minimum.
 - 3) Provide Qualification documentation if requested by Fire Sprinkler Consultant or Owner's Representative.
- b. Installer:
 - 1) Provide Qualification documentation if requested by Fire Sprinkler Consultant or Owner's Representative.

C. Closeout Submittals:

1. Include following in Operations And Maintenance Manual specified in Section 01 7800:

a. Operations and Maintenance Data:

- 1) Maintenance and instructions.
 - a) List of system components used indicating name and model of each item.
 - b) Manufacturer's maintenance instructions for each component installed in Project.
 - c) Instructions shall include installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.

b. Warranty Documentation:

- 1) Include copies of required warranties.

c. Record Documentation:

- 1) Include copies of approved shop drawings.
- 2) Provide master index showing items included.

- 3) Provide name, address, and phone number of Architect, Fire Sprinkler Consultant, General Contractor, and Fire Protection subcontractor.
 - 4) Provide operating instructions to include:
 - a) General description of fire protection system.
 - b) Step by step procedure to follow for shutting down system or putting system into operation.
 - 5) Provide signed copy of NFPA 13 'Contractor's Material and Test Certification for Aboveground Piping'.
2. Instruction of Owner (as specified in Part 3 of this specification):
- a. Provide Owner with latest version of NFPA 25.

D. Maintenance Material Submittals:

1. Extra Stock Materials:
 - a. Spare sprinkler heads in the quantity recommended by NFPA 13 selected in representative proportion to quantity used in Project and in accordance with NFPA 13 (Six (6) spare sprinkler heads minimum). Do not include dry barrel Pendent and dry barrel Sidewall sprinkler heads.
 - b. Provide spare heads in cabinet with sprinkler head wrench for each type of head used. After approval of cabinet and contents, mount cabinet in convenient location in Riser Room.

1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Unless noted otherwise, system shall conform to:
 - a. NFPA 13, 'Light & Ordinary Hazard Occupancies'.
 - b. NFPA 24, 'Service Mains and Their Appurtenances, Private'.
 - c. NFPA 25, 'Inspection, Testing, and Maintenance'.
 - d. NFPA 101, 'Life Safety Code'.
 - e. Requirements of local water department and local authority having jurisdiction for fire protection.
 - f. Underwriters Laboratories Publication, UL Directory B, 'Fire Protection Equipment Directory', current edition at time of Pre-Bid Meeting.
 - g. Comply with backflow prevention requirements and, if required, include device in hydraulic calculations.
 - h. Applicable rules, regulations, laws, and ordinances.

B. Requirements of Regulatory Agencies:

1. Unless noted otherwise, system shall conform to:
 - a. NFPA 13, 'Light & Ordinary Hazard Occupancies'.
 - b. NFPA 24, 'Service Mains and Their Appurtenances, Private'.
 - c. NFPA 25, 'Inspection, Testing, and Maintenance'.
 - d. NFPA 101, 'Life Safety Code'.
 - e. Requirements of local water department and local authority having jurisdiction for fire protection.
 - f. Applicable requirements as published by the Canadian Automatic Sprinkler Association (CASA).
 - g. Comply with backflow prevention requirements and, if required, include device in hydraulic calculations.
 - h. Applicable rules, regulations, laws, and ordinances.

C. Qualifications:

1. Licensed fire protection engineer or fire protection system designer certified by NICET to level three minimum and engaged in design of fire protection systems. Engineer / designer shall:
 - a. Licensed for area of Project.
 - b. Minimum five (5) years experience in fire protection system installations.
 - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.

- d. Be responsible for overseeing preparation of shop drawings, hydraulic calculations where applicable, and system installation.
 - e. Make complete inspection of installation.
 - f. Provide corrected record drawings to Owner with letter of acceptance.
 - g. Certify that installation is in accordance with Contract Documents.
 - h. Upon request, submit documentation.
2. Installer:
- a. Licensed for area of Project.
 - b. Minimum five (5) years experience in fire protection system installations.
 - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - d. Upon request, submit documentation.
- D. Qualifications:
1. Licensed fire protection engineer or fire protection system designer engaged in design of fire protection systems. Engineer / designer shall:
- a. Licensed for area of Project.
 - b. Minimum five (5) years experience in fire protection system installations.
 - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - d. Be responsible for overseeing preparation of shop drawings, hydraulic calculations where applicable, and system installation.
 - e. Make complete inspection of installation.
 - f. Provide corrected record drawings to Owner with letter of acceptance.
 - g. Certify that installation is in accordance with Contract Documents.
 - h. Upon request, submit documentation.
2. Installer:
- a. Licensed for area of Project.
 - b. Minimum five (5) years experience in fire protection system installations.
 - c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
 - d. Upon request, submit documentation.

PART 2 - PRODUCTS

2.1 SYSTEM

- A. Manufacturers:
1. Manufacturer Contact List:
- a. Croker Corp, Elmsford, NY www.croker.com.
 - b. Gruvlock by Anvil International, Portsmouth, NH www.anvilintl.com.
 - c. HO Trerice Company, Oak Park, MI www.hotco.com.
 - d. Kennedy Valve, Elmira, NY www.kennedyvalve.com.
 - e. Milwaukee Valve Co, New Berlin, WI www.milwaukeevalve.com.
 - f. Mueller Company, Decatur, IL www.muellerflo.com.
 - g. Nibco Inc, Elkhart, IN www.nibco.com.
 - h. Notifier by Honeywell, Northford, CT www.notifier.com.
 - i. Potter Electric Signal Company, St. Louis, MO www.pottersignal.com.
 - j. Potter-Roemer, Cerritos, CA www.potterroemer.com.
 - k. Reliable Automatic Sprinkler Co, Mount Vernon, NY www.reliablesprinkler.com.
 - l. System Sensor, St Charles, IL www.systemsensor.com.
 - m. TYCO Fire & Building Products, Lansdale, PA www.tyco-fire.com.
 - n. Victaulic Company of America, Easton, PA or Victaulic Company of Canada, Rexdale, ON www.victaulic.com.
 - o. Viking Corp, Hastings, MI www.vikingcorp.com.
- B. Description:

1. Automatic wet-pipe fire sprinkler system starting at flange in Fire Riser Room and extending throughout heated portions of building.
 2. Cold attic areas and roof overbuild areas over Entry Lobbies and Vestibules protected with auxiliary anti-freeze system(s).
 3. Sprinklers not required in areas with fire-retardant treated wood.
 4. Dry sprinkler heads preferred over and into Vestibules.
- C. Performance:
1. Design Criteria:
 - a. Area of Application and Corresponding Design Density:
 - 1) Serving Area and Mechanical, Electrical, and Janitorial Areas:
 - a) Ordinary Hazard Group 1.
 - b) Design density = 0.15 gpm per sq ft over **1,500 sq ft (140 sq m)**.
 - 2) Storage Areas:
 - a) Ordinary Hazard Group 2.
 - b) Design density = 0.20 gpm per sq ft over **1,500 sq ft (140 sq m)**.
 - 3) All Other Areas:
 - a) Light Hazard.
 - b) Design density = 0.10 gpm per sq ft over **1,500 sq ft (140 sq m)**.
 - 4) Increase remote areas by 30 percent where ceiling / roof is sloped more than **2 inches (50 mm)** per ft.
 - 5) Remote areas may be reduced within parameters indicated in NFPA 13 for use of quick response sprinklers throughout.
 - b. Maximum Coverage per Sprinkler Head:
 - 1) Ordinary Hazard Areas: **130 sq ft (12.1 sq meters)**.
 - 2) Attic Areas: **120 sq ft (11.2 sq meters)**.
 - 3) Light Hazard Areas: **225 sq ft (20.1 sq meters)**.
 - c. Design Area shall be hydraulically most remote area in accordance with NFPA 13.
 - 1) Provide a 10% safety allowance under adjusted water flow supply curve.
 - d. Maximum velocity of water flow within piping: **20 feet (6.1 m)** per sec.
- D. Components:
1. General: Use only domestically manufactured cast iron pipe fittings, valves, sprinkler heads, and other components.
 - a. Pipe of foreign manufacture that meets ASTM Standards is acceptable.
 - b. Ductile iron fittings of foreign manufacture are acceptable.
 2. Pipe:
 - a. Schedule 40 Welded Steel:
 - 1) Exterior, Above Ground: Schedule 40 hot-dip galvanized welded steel meeting requirements of ASTM A53/A53M, ASTM A135/A135M or ASTM A795/A795M.
 - 2) Interior, Above Ground: Schedule 40 black welded steel meeting requirements of ASTM A53/A53M, ASTM A135/A135M or ASTM A795/A795M.
 - 3) Connections:
 - a) **2 inches (50 mm)** And Smaller: Screwed, flanged, or roll grooved coupling system.
 - b) **2-1/2 inches (64 mm)** And Larger: Flanged or roll grooved coupling system.
 3. Fittings:
 - a. Usage:
 - 1) **2 inches (50 mm)** And Smaller: Welded, screwed, flanged, or roll grooved coupling system. For use with schedule 40 carbon steel pipe.
 - 2) **2-1/2 inches (64 mm)** And Larger: Welded, flanged, or roll grooved coupling system.
 - b. Types And Quality:
 - 1) Screwed:
 - a) Cast iron meeting requirements of ANSI B16.4 or ductile iron meeting requirements of ANSI B16.3 and ASTM A536, Grade 65-45-12.
 - b) Threaded fittings and pipe shall have threads cut to ANSI B1.20.1.
 - c) Do not extend pipe into fittings to reduce waterway.
 - d) Ream pipe after cutting to remove burrs and fins.
 - 2) Flanged: Steel meeting requirements of ANSI B16.5.
 - 3) Welded:
 - a) Carbon steel meeting requirements of ASTM A234/A234M.

- b) Weld pipe using methods complying with AWS B2.1, level AR-3. Welding procedures and performance of welders shall comply with AWS B2.1, level AR3.
- 4) Roll Grooved Pipe Coupling System:
 - a) Ductile iron meeting requirements of ASTM A395/A395M and ASTM A536, and UL listed.
 - b) Grooved products used on Project shall be from same manufacturer. Grooving tools shall be as recommended by manufacturer of grooved products.
 - c) Category Four Approved Products: See Section 01 6200 for definition of Categories:

	Gruvlok	Tyco (Grinnell)	Victaulic
Rigid Couplings	7401	772	Style 005
Flexible Couplings ¹	7000	705	Style 75
Flange Adaptors ²	7012	71	Style 744
Grooved Coupling Gaskets ³	'E' EPDM	Grade 'E' EPDM	'E' EPDM ⁴

¹ Use in locations where vibration attenuation, stress relief, thermal expansion, or seismic design is required / needed.

² Class 125 or 150.

³ Temperature rated 30 to 150 deg F (minus one to plus 65 deg C). NSF-61 certified.

⁴ Grade 'A'.

- c. Use of saddle or hole cut type mechanical tees is **NOT APPROVED**.
- 4. Valves:
 - a. Butterfly Valves:
 - 1) Design Criteria:
 - a) UL / CASA approved.
 - b) Indicating type.
 - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Milwaukee:
 - (1) Model BB-SCS02 threaded ends with tamper switch one inch (25 mm) to 2 inches (50 mm).
 - (2) Model BBVSCS02 Grooved ends with tamper switch 2 inches (50 mm) to 2-1/2 inch (64 mm).
 - b) Nibco:
 - (1) Model WD3510-8 Wafer type with valve tamper switch.
 - (2) Model GD4765-8N Grooved type with valve tamper switch, 2-1/2 inches (64 mm) to 8 inches (200 mm).
 - c) Tyco (Grinnell):
 - (1) Model BFV-N wafer.
 - (2) Model BFV-N grooved.
 - d) Victaulic: Series 705W Grooved end type with internal supv. switches.
 - e) Kennedy:
 - (1) Model 01W wafer.
 - (2) Model G300 grooved.
 - b. Gate Valves:
 - 1) Design Criteria:
 - a) UL / CASA approved.
 - b) Outside Screw and Yoke Type (O.S.&Y).
 - c) Class 150 psi.
 - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Nibco:
 - (1) T-104-0 with Threaded Ends 1/2 inch (12.7 mm) to 2 inches (50 mm).
 - (2) F-637-31 Flanged Ends.
 - b) Mueller: R-2360-6 Flanged Ends.
 - c) Victaulic: Series 771 Grooved Ends
 - c. Ball Valves:
 - 1) Design Criteria:
 - a) UL / CASA approved.

- b) Valve tamper switch.
- 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Milwaukee: BB-SCS02 with threaded ends.
 - b) Nibco: KT-505 with threaded ends.
 - c) Nibco: KG-505 with grooved ends.
 - d) Victaulic: Series 728 with grooved or threaded ends.
- d. Swing Check Valves:
 - 1) **1/2 to 3 inch (13 to 75 mm)** horizontal check.
 - a) Design Criteria:
 - (1) Regrinding type.
 - (2) Renewable disk.
 - (3) Bronze Class 125 with threaded ends.
 - b) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - (1) Nibco: KT-403-W.
 - (2) Victaulic: Series 712.
 - (3) Viking: G-1 Grooved ends.
 - 2) **2 to 4 inch (50 to 100 mm)** Horizontal check:
 - a) Design Criteria:
 - (1) Grooved ends.
 - (2) Ductile iron body.
 - (3) Rated **300 psi (2.07 MPa)**.
 - b) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - (1) Tyco (Grinnell): CV-1F Grooved ends.
 - (2) Victaulic: Series 712.
 - (3) Viking: G-1 Grooved ends.
 - 3) **3 to 12 inch (76 to 300 mm)** Horizontal check:
 - a) Design Criteria:
 - (1) Bolted bonnet.
 - (2) Raised face flanges.
 - (3) Bronze mounted with ductile iron body.
 - (4) **125 lb (56.7 kg)** Class A.
 - b) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - (1) Nibco: F-938-31.
 - (2) Mueller: A-2120-6.
 - (3) Viking: F-1 grooved and flanged.
- e. Wafer Type Check Valves:
 - 1) **Design Criteria:**
 - a) **4 to 8 inch (100 to 300 mm)** cast iron body.
 - b) **175 psi (1.21 MPa)** minimum working pressure.
 - c) Rubber Seat.
 - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Nibco: KW-900-W.
 - b) Mueller: A-2102.
 - c) Kennedy: Fig.706.
- f. Grooved-End Check Valves:
 - 1) Design Criteria:
 - a) UL / CASA listed and approved to **250 psi (1.72 MPa)** maximum operating pressure.
 - b) **2-1/2 to 12 inch (64 to 300 mm)** ductile iron body.
 - c) Disc And Seat:
 - (1) **2-1/2 And 3 Inch (64 to 75 mm):** Aluminum bronze disc with mounted elastomer seal and PPS (polyphenylene sulfide) coated seat.
 - (2) **4 Inch (100 mm)** And Larger: Elastomer encapsulated ductile iron disc with welded in nickel seat.
 - (3) Viking: Model VK462.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Nibco: KG-900-W grooved ends.

- b) Victaulic: Series 717.
 - c) Kennedy: Fig.426.
 - g. Alarm Check Valves:
 - 1) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Reliable: E with gauges and drain.
 - b) Tyco (Grinnell): Model AV-1-300.
 - c) Victaulic: Series 751 with gauges and drain.
 - h. Retard Chamber:
 - 1) Design Criteria:
 - a) Self-draining.
 - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Reliable: E-1.
 - b) Victaulic: Series 752.
 - c) Viking: C-1.
 - i. Inspector's Test Valve:
 - 1) Design Criteria:
 - a) Bronze body with threaded or grooved ends.
 - b) Combination sight glass / orifice.
 - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
 - a) Tyco (Grinnell): Model F350.
 - b) Victaulic: Testmaster Alarm Test Module Style 720.
- 5. Sprinkler Heads:
 - a. Concealed Pendant:
 - 1) Design Criteria:
 - a) Adjustable cover.
 - b) UL / CASA listed and approved.
 - c) Coordinate concealed cover finish with Fire Sprinkler Consultant.
 - 2) Type One Acceptable Products:
 - a) Wet Pendant, Flat Profile:
 - (1) Reliable: F4FR.
 - (2) Victaulic: Model 3802.
 - (3) Viking: Model VK462.
 - (4) Tyco (Grinnell): Model RF11.
 - (5) Equal as approved by Fire Sprinkler Consultant before bidding. See Section 01 6200.
 - b) Dry Pendant:
 - (1) Flat Profile:
 - (a) Tyco (Grinnell): DS-C.
 - (b) Victaulic: V3618.
 - (2) Equal as approved by Fire Sprinkler Consultant before bidding. See Section 01 6200.
 - b. Horizontal Sidewall Sprinkler:
 - 1) Design Criteria:
 - a) UL / CASA listed and approved.
 - b) Recess adjustable.
 - c) Where guards are required, use chrome plated sprinkler guards that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
 - 2) Type One Acceptable Products:
 - a) Wet System:
 - (1) Reliable: F1FR.
 - (2) Tyco (Grinnell): Model TY-FRB.
 - (3) Victaulic: Model V2710.
 - (4) Viking: VK305.
 - (5) Equal as approved by Fire Sprinkler Consultant before bidding. See Section 01 6200.
 - b) Dry System:
 - (1) Reliable: F3QR.
 - (2) Tyco (Grinnell): DS-1.
 - (3) Victaulic: Model V3610.

- (4) Viking: VK162.
- (5) Equal as approved by Fire Sprinkler Consultant before bidding. See Section 01 6200.
- c. Attic Sprinklers, Upright:
 - 1) Design Criteria:
 - a) UL / CASA listed and approved.
 - b) Approved for use in roof structures, combustible and non-combustible, with ceiling below.
 - 2) Category Four Approved Products: See Section 01 6200 for definitions of Categories:
 - a) Tyco: BB, SD, or HIP.
- d. Pendant Sprinklers:
 - 1) Design Criteria:
 - a) UL / CASA listed and approved.
 - b) Where guards or escutcheons are required, use chrome plated sprinkler guards and escutcheons that are listed, that are approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler Manufacturer.
 - 2) Type One Acceptable Products:
 - a) Reliable: F1FR.
 - b) Tyco: TY-FRB.
 - c) Victaulic: Model V2704.
 - d) Viking: VK302.
 - e) Equal as approved by Fire Sprinkler Consultant before bidding. See Section 01 6200.
- e. Upright Sprinklers:
 - 1) Design Criteria:
 - a) UL / CASA listed and approved.
 - 2) Type One Acceptable Products:
 - a) Reliable: F1FR.
 - b) Tyco: TY-FRB.
 - c) Victaulic: Models V2704.
 - d) Viking: VK300.
 - e) Equal as approved by Fire Sprinkler Consultant before bidding. See Section 01 6200.

2.2 ACCESSORIES

- A. Manufacturers:
 - 1. Manufacturer Contact List:
 - a. Anvil International, Portsmouth, NH www.anvilintl.com.
 - b. Eaton, Highland, IL www.cooperbline.com.
- B. Hangers, Rods, And Clamps:
 - 1. Design Criteria:
 - a. Galvanized, unless specified otherwise, and UL/CASA listed and labeled for service intended.
 - b. Hanger supports for sprinkler piping to conformance with NFPA 13.
 - 2. Class One Quality Standard:
 - a. Hangers and accessories shall be Anvil numbers specified or equals by B-Line by Eaton.
 - b. Pipe Ring Hangers: Equal to Anvil Fig 69.
 - c. Riser Clamps: Equal to Anvil Fig. 261.
- C. Posted System Diagram:
 - 1. Provide single floor plan diagram showing wet pipe system elements.
 - 2. Include following information on diagram sheet:
 - a. Step by step shut down procedure.
 - b. Step by step system drainage procedure.
 - c. Step by step start-up procedure.
 - d. Step by step procedure for protection of system from freezing.

- e. Step by step procedure to follow in deactivating system for maintenance.
3. Laminate diagram with plastic and mat or frame suitable for hanging near riser.

PART 3 - EXECUTION

3.1 INSTALLERS

- A. Acceptable Installers. See Section 01 4301:
 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

3.2 EXAMINATION

- A. Drawings:
 1. Fire Protection Drawings show general arrangement of piping. Follow as closely as actual building construction and work of other trades will permit. Install system so it drains.
 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These Drawings take precedence over Fire Protection Drawings.
 3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions and to enable system to drain.

3.3 INSTALLATION

- A. Connect system to flange provided under Section 33 1119: 'Fire Suppression Utility Water Distribution Piping'. After installation of riser, fill annular space between pipe and slab with flexible mastic.
- B. Install sprinkler systems in accordance with requirements of latest edition of NFPA 13 and as specified below:
 1. Provide maintenance access to equipment.
 2. Conceal sprinkler lines installed in occupied areas. In Mezzanine areas, route pipe to side or underneath Mezzanine walkway. Do not impede egress from Attic.
 3. Install to enable drainage of system.
 - a. Install main drain from riser according to NFPA 13.
 4. Install piping system, except for dry heads, so it will not be exposed to freezing temperatures.
 5. Do not use dropped, damaged, or used sprinkler heads.
 6. Install tamper switches and flow detectors where located by Fire Sprinkler Consultant.
 7. Except for Siamese connection, install automatic ball drip device in lowest point of piping to fire department connection and drain to floor drain or to exterior of building.
 8. Brace and support system to meet seismic zone requirements for building site.
- C. Flush system at full design flow rate for minimum five minutes. Route water to outside of building. Protect landscaping and other exterior elements from damage during flow tests.

3.4 FIELD QUALITY CONTROL

- A. Field Tests:
 1. Pressure Test:
 - a. Hydrostatically test system to **200 psi (1.38 MPa)** minimum for two (2) hours as required by 'Contractor's Material And Testing certificate for Aboveground Piping':
 - 1) NFPA 13 (2010), Figure 24.1.
 - 2) NFPA 13 (2013), Figure 25.1.
 - 3) NFPA 13 (2016), Figure 25.1.

2. Water Flow Test:
 - a. Test to determine static and residual pressures and corresponding flow rate at point of connection to utility water main.
 - b. Adjust water flow test data for seasonal fluctuations and future growth as recommended by Water Utility and AHJ.
 - c. At point of connection to utility water main, combine inside and outside hose stream allowances.
3. Check piping in relation to insulation envelope to be certain piping and auxiliary drains are properly enclosed inside building insulation envelope. Report unsatisfactory conditions to Fire Sprinkler Consultant.
4. Tests shall be witnessed by Fire Sprinkler Consultant and representative of local jurisdiction over fire prevention.

3.5 CLOSE-OUT ACTIVITIES

- A. Instruction of Owner:
 1. Instruction Sessions:
 - a. Instruct Owner's personnel in operation and maintenance of system utilizing 'Operation And Maintenance Manual' when so doing. Minimum instruction period shall be four (4) hours.
 - b. Instruction sessions shall occur after Substantial Completion inspection when system is properly working and before final payment is made.
 - c. Provide Owner with latest version of NFPA 25.
- B. Training:
 1. Installer required to provide FM Training from latest version of NFPA 25 with checklist and brief explanation of following inspections:
 - a. Weekly Inspection.
 - b. Monthly Inspection.
 - c. Quarterly Inspection.
 - d. Semi-Annual Inspection.
 - e. Annual Inspection.

END OF SECTION

END OF DIVISION 21