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C. Sprinkler system design shall be approved by the authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications, densities, and head spacing shall be as indicated on the drawings.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

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

C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For qualified Installer and Professional Engineer.

E. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

F. Welding certificates.

G. 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."

H. Field quality-control reports.

I. Operation and maintenance data.

J. At closeout, Northwestern University Maintenance Requirement forms, refer to Division 01 for more information.

1.6 QUALITY ASSURANCE

A. Installer Qualifications:

1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test with corrections to the flow obtained per NFPA 291 Part 4.12 System Correction.

a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a properly qualified and licensed Professional Engineer.

B. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

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D. Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

E. Uncoated, Steel Couplings: ASTM A 865, threaded.

F. Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

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

H. Cast-Iron Flanges (must be approved by the University): ASME 16.1, Class 125.

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

J. Steel Welding Fittings: ASTM A 234/A

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

C. Bronze OS&Y Gate Valves:

1. Standard: UL 262.
2. Pressure Rating: 175 psig.
3. Body Material: Bronze.
4. End Connections: Threaded.

D. Iron OS&Y Gate Valves:

1. Standard: UL 262.
2. Pressure Rating: 250 psig minimum.
3. Body Material: Cast or ductile iron.
4. End Connections: Flanged or grooved.

E. Ball Valves 2” and smaller:

1. Standard UL 1091.
2. Pressure Rating: 175 psig minimum.
3. Body Material: Bronze.
4. End Connections: Threaded.

F. Indicating-Type Butterfly Valves:

1. Standard: UL 1091.
2. Pressure Rating: 175 psig minimum.
3. Valve Type: Butterfly.
4. Body Material: Cast or ductile iron.
5. End Connections: Flanged, grooved, or wafer.
6. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch indicating device.

2.6 TRIM AND DRAIN VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Minimum Pressure Rating: 175 psig.

2.7 SPECIALTY VALVES

5. End Connections: Flanged or grooved.

B. Riser Check Valves with Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Reliable Automatic Sprinkler Co., Inc.
b. Victaulic Company.
c. Viking Corporation.

2. Standard: UL 193.
3. Design: For vertical installation.
4. Trim Package: All necessary nipples and fittings, main drain valve, and gauges.

C. Automatic (Ball Drip) Drain Valves:

1. Standard: UL 1726.
2. Pressure Rating: 175 psig minimum.
3. Type: Automatic draining, ball check.
4. Size: NPS 3/4.
5. End Connections: Threaded.

2.8 FIRE-DEPARTMENT CONNECTIONS

A. Flush-Type, Fire-Department Connection:

1. Standard: UL 405.
2. Type: Flush, for wall mounting.
3. Pressure Rating: 175 psig minimum.
4. Body Material: Corrosion-resistant metal.
5. 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.
6. Caps: Brass, lugged type, with gasket and chain.
7. Escutcheon Plate: Rectangular, brass, wall type.
8. Outlet: With pipe threads.
9. Body Style: Horizontal.
10. Number of Inlets: Two.
11. Outlet Location: Back.
12.

3. Pressure Rating: 175 psig minimum.
4. FM approved.
5. Size: Same as connected piping, for sprinkler.

2.10 SPRINKLERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Globe Fire Sprinkler Corporation.
2. Reliable Automatic Sprinkler Co., Inc.
3. Viking Corporation.
4. Victaulic Company.

B. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
3. Sprinklers shall be used in accordance with their listed coverage limitations.
4. Sprinkler temperature classification shall be ordinary **[intermediate] [as indicated].**
5. Sprinklers in high heat areas including attic spaces or in close proximity to unit heaters shall have temperature classification in accordance with NFPA 13.

C. Sprinkler Types:

1. Concealed Sprinkler: Concealed sprinkler shall be chrome-plated quick-response type and shall have a nominal 1/2 inch or 17/32 inch orifice. Cover to be color selected by Architect.
2. Recessed Sprinkler: Recessed sprinkler shall be chrome-plated quick-response type and shall have a nominal 1/2 inch or 17/32 inch orifice.
3. Upright Sprinkler: Upright sprinkler shall be chrome-plated quick-response type and shall have a nominal 1/2 inch or 17/32 inch orifice.
4. Sidewall Sprinkler: Sidewall sprinkler shall have a nominal 1/2 inch orifice. Sidewall sprinkler shall have a polished chrome finish. Sidewall sprinkler shall be the quick-response type.
5. Intermediate Level Rack Sprinkler: Intermediate level rack sprinkler shall be of the upright or pendent type with nominal 13 mm 1/2 inch orifice and minimum "K" factor of 5.5. The sprinkler shall be equipped with a deflector plate to shield the fusible element from water discharged above it.

D. 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. Sidewall Mounting: Chrome-plated steel, one piece, flat.

E. Sprinkler Guards

1. Guards shall be a steel wire cage designed to encase the sprinkler and protect it from mechanical damage. Guards shall be provided on sprinklers in sports activity areas, and as otherwise noted on drawings.

2.11 ALARM DEVICES

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

B. Water-Flow Indicators:

1. Standard: UL 346.
2. Water-Flow Detector: Electrically supervised.
3. 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.
4. Type: Paddle operated.
5. Pressure Rating: 250 psig.
6. Design Installation: Horizontal or vertical.

C. Valve Supervisory Switches:

1. Standard: UL 346.
2. Type: Electrically supervised.
3. Components: Single-pole, double-throw switch with normally closed contacts.
4. Design: Signals that controlled valve is in other than fully open position. Also, external tamper switches or external wired tamper switches are required.

2.12 PRESSURE GAGES

A. Standard: UL 393.

B. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.

C. Pressure Gage Range: 0 to 300 psig (0 to 2070 kPa).

D. Water System Piping Gage: Include "WATER" label on dial face, as directed by the University/AHJ.

2.13 BACKFLOW PREVENTERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide a Conbraco RPDA reduced pressure detector assembly backflow preventer. The assembly shall consist of two independent tri-link check valves within a single housing, sleeve access port, four test cocks and two drip tight shut-off valves. Tri-link checks shall be removable and serviceable, without the use of special tools.

B. The bypass assembly shall consist of a meter, which registers in either gallon or cubic measurement, a double check backflow assembly and required test cocks

C. The housing shall be constructed of 304 Schedule 40 stainless steel pipe with grooved end connections. Tri-link checks shall have chloramine resistant silicone discs and in operation shall produce drip tight closure against reverse flow caused by backpressure or back-siphonage.

D. UL/FM grooved gear operated butterfly valves with tamper switches.

E. Refer to Division 22 for other requirements for when connection to domestic water mains or services. These required backflow preventers shall be furnished by the project plumbing contractor but installed by the Division 21 contractor. Refer to Section 22 2114.

2.14

3.4 VALVE AND SPECIALTIES INSTALLATION

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

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs

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a. Galvanized-steel-sheet sleeves for pipes NPS 6 (DN 150) and larger.

4. Sleeves for Piping Passing through Exterior Concrete Walls:

a. Galvanized-steel-pipe sleeves for pipes smaller than NPS 6.
b. Cast-iron wall-pipe sleeves for pipes NPS 6 and larger.
c. Install sleeves that are large enough to provide 1-inch annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.

5. Sleeves for Piping Passing through Interior (i)39-9.7(as)pe

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

D. Prepare test and inspection reports.

3.12

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