

SECTION 210000 - FIRE-SUPPRESSION SYSTEM

PART ONE GENERAL

1.01 SUMMARY

- A. Work under this contract includes making required modifications to the wet pipe system, valves, and controls as required to provide the required coverage in areas where walls and ceilings have been removed or added, and all new building areas as shown on Drawings. This includes adjusting, relocating, replacing, adding, modifying, testing, and putting into service an approved fire suppression system.
- B. Provide fire-suppression system, equipment, accessories, and may include a dry-pipe second floor and attic branch with a wet-pipe first floor branch as indicated.
 - 1. Dry-Pipe Suppression System - System with automatic sprinklers attached to piping system containing compressed air from sprinkler system air compressor. Release of pressure (opening of sprinklers) permits water pressure to open dry-pipe valve. Water then flows into piping and discharges through open sprinklers.
 - a. Pressuring Gas - Compressed air, from sprinkler system air compressor.
 - 2. Wet-pipe sprinkler system with automatic sprinkler(s) attached to piping containing water and connected to water supply so that water discharges immediately from sprinkler(s) when they are opened by fire.

1.02 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Modify Bid Document Design as required and obtain approval from 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:
 - a. Mechanical Equipment Rooms and Kitchens: Ordinary Hazard, Group 1.
 - b. All Other Areas: Light Hazard.
 - 3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - 4. Maximum Protection Area per Sprinkler: According to NFPA 13 recommendations.
 - 5. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
 - b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.
 - 6. Components and Installation - Capable of producing piping system of 175 PSIG minimum working pressure, unless otherwise indicated.
- C. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Pipe and fitting materials and methods of joining for sprinkler piping.
 - 2. Pipe hangers and supports.
 - 3. Piping seismic restraints.
 - 4. Valves, including specialty valves, accessories, and devices.
 - 5. Alarm devices. Include electrical data.
 - 6. Air compressor. Include electrical data.
 - 7. Fire department connections. Include type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
 - 8. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
- B. Approved Sprinkler Piping Drawings - Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction. Include hydraulic calculations, if applicable.
- C. 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" and "Contractor's Material and Test Certificate for Underground Piping."
- D. Field Flow Test Report – The contractor is required to perform a Flow Test on/at the existing fire hydrant. The results shall be submitted to DMVA in Report form with the Testing Agency's Name appearing in the Letterhead and date of test.
- E. Maintenance Data for each type of fire protection specialty, to include in "Operating and Maintenance Manual".
- F. Operation and maintenance data.

1.04 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.
 - 2. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
- B. Engineering Responsibility - Preparation of working plans, calculations, and field test reports by a qualified professional engineer
- C. Professional Engineer Qualifications - A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.
- D. Manufacturer Qualifications - Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
- E. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."

2. NFPA 101, "Life Safety Code."

- F. Sprinkler Components - Listing/approval stamp, label or other marking by a testing agency acceptable to authorities having jurisdiction.
- G. Electrical Components, Devices, and Accessories - Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

PART TWO PRODUCTS

2.01 MANUFACTURERS - Subject to compliance with requirements, provide products by one of the following:

- A. Specialty Valves and Devices
 - 1. Badger Fire Protection, Inc
 - 2. Central Sprinkler Corp
 - 3. Firematic Sprinkler Devices, Inc.
 - 4. Globe Fire Sprinkler Corp.
 - 5. Grinnell Corp
 - 6. Reliable Automatic Sprinkler Co., Inc.
 - 7. Star Sprinkler Corp.
 - 8. Viking Corp

- B. Waterflow Indicators and Supervisory Switches
 - 1. Gamewell Co
 - 2. Grinnell Corp
 - 3. Pitway Corp.; System Sensor Div.
 - 4. Reliable Automatic Sprinkler Co., Inc.
 - 5. Viking Corp
 - 6. Watts Regulator Co.

- C. Sprinkler, Drain and Alarm Test Fittings
 - 1. Central Sprinkler Corp.
 - 2. Fire-End and Croker Corp.
 - 3. Grinnell Corp.
 - 4. Victaulic Co. of America

- D. Sprinkler, Branch-Line Test Fittings
 - 1. Elkhart Brass Mfg. Co., Inc.
 - 2. Fire-End and Croker Corp.
 - 3. Smith Industries, Inc.; Potter-Roemer Div

- E. Sprinkler, Inspector's Test Fittings
 - 1. Fire-End and Croker Corp.
 - 2. J Innovations, Inc.
 - 3. Triple R Specialty of Ajax, Inc.

- F. Fire Department Connections
 - 1. Badger Fire Protection, Inc.
 - 2. Elkhart Brass Mfg. Co., Inc.
 - 3. Fire-End and Croker Corp.
 - 4. Firematic Sprinkler Devices, Inc.
 - 5. Grinnell Corp.
 - 6. Guardian Fire Equipment, Inc.
 - 7. Reliable Automatic Sprinkler Co., Inc.

8. Smith Industries, Inc.; Potter-Roemer Div.

G. Sprinklers

1. Badger Fire Protection, Inc.
2. Central Sprinkler Corp.
3. Firematic Sprinkler Devices, Inc.
4. Globe Fire Sprinkler Corp.
5. Grinnell Corp.
6. Reliable Automatic Sprinkler Co., Inc.
7. Star Sprinkler Corp.
8. Viking Corp.

H. Indicator Valves

1. Central Sprink, Inc.
2. Grinnell Corp.
3. McWane, Inc.; Clow Valve Co. Div
4. Milwaukee Valve Co., Inc.
5. Nibco, Inc.
6. Victaulic Company of America

I. Fire Protection Service Valves

1. Central Sprink, Inc.
2. Central Sprinkler Corp.
3. Grinnell Corp.
4. McWane, Inc.; Kennedy Valve Div.
5. Nibco, Inc.
6. Stockham Valves and Fittings, Inc.
7. Victaulic Co. of America

2.02 STEEL PIPE AND FITTINGS

- A. Standard Weight, Galvanized- and Black-Steel Pipe: ASTM A 53, Pipe ends may be factory or field formed to match joining method.
- B. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53 standard-weight, seamless steel pipe with threaded ends.
- C. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.
- D. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- E. Malleable- or Ductile-Iron Unions NPS 2 and smaller: UL 860.
- F. Cast-Iron Flanges: ASME 16.1, Class 125.
- G. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- H. Grooved-Joint, Steel-Pipe Appurtenances:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.

- f. Victaulic Company.
2. Pressure Rating: 175 psig minimum.
3. Galvanized, 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.
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.

2.03 PIPE AND TUBE FITTINGS

- A. Malleable-Iron Threaded Fittings - ASME B16.3, Class 300, standard pattern, with threads according to ASME B1.20.1.
- B. Wrought Copper Fittings - ASME B16.22, streamlined pattern.

2.04 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 Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.05 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
 1. Valves shall be UL listed or FM approved.
 2. Minimum Pressure Rating: 175 psig.
- B. Check Valves:
 1. Standard: UL 312.
 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. Indicating-Type Butterfly Valves:
 1. Standard: UL 1091.
 2. Pressure Rating: 175 psig minimum.
 3. Valves NPS 2 and Smaller:
 - a. Valve Type: Ball or butterfly.
 - b. Body Material: Bronze.
 - c. End Connections: Threaded.

4. 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.
5. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch indicating device.

2.06 SPECIALTY 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 (1200 kPa).
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

B. Alarm Valves:

1. Standard: UL 193.
2. Design: For horizontal or vertical installation.
3. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
4. Drip Cup Assembly: Pipe drain with check valve to main drain piping.

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.

D. Dry-Pipe Valves - UL 260, differential type, 175 psig working pressure, with cast-iron flanged inlet and outlet, bronze seat with O-ring seals, and single-hinge pin and latch design. 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.

E. Air-Pressure Maintenance Devices for Dry-Pipe Systems - Automatic device to maintain correct air pressure in dry-pipe system. Include 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 14 psig to 60 psig adjustable range, and 175 psig maximum inlet pressure.

1. Air Compressor - Fractional horsepower, 120 volts a.c., 60 Hz, single phase.

F. Deluge Valve - UL 260, cast-iron body, 175 psig working pressure, hydraulically operated, differential-pressure-type valve. Valve shall have flanged inlet and outlet, and bronze seat with O-ring seals. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, drip cup assembly piped without valves separate from main drain line, fill line attachment with strainer, and push rod chamber supply connection.

1. Include Dry pilot line trim set include dry pilot actuator, air and water pressure gages, low air pressure warning switch, air relief valve, and actuation device. Dry pilot line actuator includes cast iron, 175 psig working pressure, air operated, diaphragm-type valve with resilient facing plate, resilient diaphragm, and replaceable bronze seat. Valve includes threaded water and air inlets and water outlet. Loss of air pressure on dry pilot line side allows pilot line actuator to open and causes deluge valve to open automatically.

2.07 SPRINKLER SPECIALTY PIPE FITTINGS

- A. Specialty Fittings - UL-listed and FM-approved, made of steel, ductile iron, or other materials compatible with system materials and applications where used.
 - 1. Dry-Pipe-System Fittings - UL-listed for dry-pipe service.
- B. Branch Outlet Fittings:
 - 1. Standard: UL 213.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 - 4. Type: Mechanical-T and -cross fittings.
 - 5. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 - 6. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 - 7. Branch Outlets: Grooved, plain-end pipe, or threaded.
- C. Flow Detection and Test Assemblies:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 - 4. Size: Same as connected piping.
 - 5. Inlet and Outlet: Threaded.
- D. Branch Line Testers:
 - 1. Standard: UL 199.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Body Material: Brass.
 - 4. Size: Same as connected piping.
 - 5. Inlet: Threaded.
 - 6. Drain Outlet: Threaded and capped.
 - 7. Branch Outlet: Threaded, for sprinkler.
- E. Sprinkler Inspector's Test Fittings:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating: 175 psig minimum.
 - 3. Body Material: Cast- or ductile-iron housing with sight glass.
 - 4. Size: Same as connected piping.
 - 5. Inlet and Outlet: Threaded.
- F. Adjustable Drop Nipples:
 - 1. Standard: UL 1474.
 - 2. Pressure Rating: 250 psig minimum.
 - 3. Body Material: Steel pipe with EPDM-rubber O-ring seals.
 - 4. Size: Same as connected piping.
 - 5. Length: Adjustable.
 - 6. Inlet and Outlet: Threaded.
- G. Flexible, Sprinkler Hose Fittings:
 - 1. Standard: UL 1474.
 - 2. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
 - 3. Pressure Rating: 175 psig minimum.

4. Size: Same as connected piping, for sprinkler.

2.08 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.09 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.10 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
 1. Characteristics: Nonshrink; recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

2.11 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

2.12 SPRINKLERS

- A. 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.
- B. Automatic Sprinklers with Heat-Responsive Element:
 1. Nonresidential Applications: UL 199.
 2. Residential Applications: UL 1626.
 3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- C. Sprinkler Types - features and options include:
 1. Flush ceiling sprinklers, including escutcheon.
 2. Pendent sprinklers.
 3. Pendent, dry type sprinklers.
 4. Quick-response sprinklers.
 5. Sidewall sprinklers.
 6. Sidewall, dry-type sprinklers
 7. Upright Sprinklers.
- D. Sprinkler Finishes -
 1. Finished Spaces - Chrome-plated.

2. Unfinished Spaces – bronze or painted.

2.13 ALARM DEVICES

- A. Alarm Devices - Types and sizes that will match piping and equipment connections.
- B. Water-Motor-Operated Alarms - UL 753, mechanical operation type, 10" diameter, cast-aluminum alarm gong, with red enamel factory finish. Include Pelton-wheel-type operator with nylon shaft bearings, and shaft length and sleeve to suit wall thickness and construction, 3/4" inlet and 1" drain.
- C. Waterflow Indicators - UL 346, electrical-supervision type, vane-type waterflow detector, rated to 250 psig, and designed for horizontal or vertical installation. Include 2 SPDT (single-pole, double-throw) circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125 volts a.c. and 0.25 ampere, 24 volts d.c.; complete with factory-set, field-adjustable retard element to prevent false signals and tamper-proof cover that sends a signal when cover is removed.
- D. Pressure Switches - UL 753, waterflow switch with retard, electrical-supervision type, SPDT, normally closed contacts, designed to operate on rising pressure and signal water flow.
- E. Supervisory Switches - UL 753, for valves, electrical-supervision type. SPDT, normally closed contacts, designed to signal controlled valve in other than full open position.
- F. Supervisory Switches - UL 753, for indicator posts, electrical-supervision type, SPDT, normally closed contacts, designed to signal controlled valve in other than full open position.

2.14 PRESSURE GAUGES

- A. UL 393, 3 1/2 to 4 1/2" diameter dial with dial range of 20-250 psig.
 - 1. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
 - 2. Air System Piping Gage: Include "AIR" or "AIR/WATER" label on dial face.

2.15 ALARM DEVICES

- A. Alarm Devices - Types and sizes that will match piping and equipment connections.
- B. Water-Motor-Operated Alarms - UL 753, mechanical operation type, 10" diameter, cast-aluminum alarm gong, with red enamel factory finish. Include Pelton-wheel-type operator with nylon shaft bearings, and shaft length and sleeve to suit wall thickness and construction, 3/4" inlet and 1" drain.
- C. Waterflow Indicators - UL 346, electrical-supervision type, vane-type waterflow detector, rated to 250 psig, and designed for horizontal or vertical installation. Include 2 SPDT (single-pole, double-throw) circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere, 125 volts a.c. and 0.25 ampere, 24 volts d.c.; complete with factory-set, field-adjustable retard element to prevent false signals and tamper-proof cover that sends a signal when cover is removed.
- D. Pressure Switches - UL 753, waterflow switch with retard, electrical-supervision type, SPDT, normally closed contacts, designed to operate on rising pressure and signal water flow.
- E. Supervisory Switches - UL 753, for valves, electrical-supervision type. SPDT, normally closed contacts, designed to signal controlled valve in other than full open position.
- F. Supervisory Switches - UL 753, for indicator posts, electrical-supervision type, SPDT, normally closed contacts, designed to signal controlled valve in other than full open position.

3.01 SPRINKLER SYSTEM PIPING APPLICATIONS

- A. Pipe Between Fire Department Connection and Backflow Preventer - Use galvanized-steel. Do not use welded joints.
- B. Sizes 2" and smaller - Schedule 40 steel pipe with threaded ends, malleable-iron fittings, and threaded joints.
- C. Sizes 2 1/2" to 6" - ASTM A 53, A 135, or A 795, Schedule 50 steel pipe with threaded ends, cast-iron or malleable-iron threaded fittings, and threaded joints.

3.02 PIPING INSTALLATION

- A. Locations and arrangements - Drawings indicated general location and arrangement of piping. Install as indicated, as far as practical. Deviations from approved "working plans" for sprinkler piping requires written permission from authority having jurisdiction. File written approval with DMVA prior to deviating from approved "working plans."
- B. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- C. Install unions - adjacent to each valve in pipes 2" and smaller. Unions are not required on flanged devices or in piping installations using grooved couplings.
- D. Install flanges or flange adapters on valves, apparatus, and equipment having 2 1/2" and larger connections.
- E. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve, sized and located according to NFPA 13.
- F. Install sprinkler piping with drains for complete system drainage.
- G. Install alarm devices in piping systems.
- H. Install pressure gages on riser or feed main, at each sprinkler test connection. Include pressure gages with connection not less than 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.
- I. Install sleeves for piping penetrations of walls, ceilings, and floors.
- J. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals.
- K. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.03 SPECIALTY SPRINKLER FITTING INSTALLATIONS - Install according to manufacturer's written instructions.

3.04 VALVE INSTALLATIONS

- A. Gate Valves - Install fire-protection service valves supervised-open, located to control sources of water supply except from fire department connections. Where there is more than 1 control valve, provide permanently marked identification signs indicating portions of system controlled by each valve.

- B. Alarm check valves - Install valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain line connection.
- C. Dry-Pipe Valve - Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill line attachment.
- D. Air Pressure Maintenance Devices for Dry-Pipe System - Install shut-off 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 14 psig to 60 psig adjustable range, and 175 psig maximum inlet pressure.
 - 1. Install air compressor and compressed air supply piping.
 - 2. Deluge Valves - Install in vertical position, in proper direction of flow, in main supply to deluge system.
- E. Detector Check Valve - Install for proper direction of flow, located to detect system leakage and unauthorized use of water and to prevent backflow into public water mains.

3.05 SPRINKLER INSTALLATION - Install in patterns indicated.

3.06 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
- B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS.

3.07 FIELD QUALITY CONTROL

- A. Perform tests and inspections in presence of DMVA Inspector, Notify DMVA 24 hours prior to testing..
 - 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. Verify that equipment hose threads are same as local fire-department equipment.
- B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.08 COMMISSIONING

- A. Verify that valves, fittings, and accessories have been installed correctly and operate correctly.
- B. Verify that tests on piping are complete.
- C. Check that potable water supplies have correct type backflow preventer.
- D. Fill wet-pipe sprinkler system(s) with water.

END OF SECTION 210000