**SECTION 21 1316**

**DRY-PIPE SPRINKLER SYSTEMS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Includes But Not Limited To:
   1. Furnish and install complete fire sprinkler system as specified in Contract Documents.

B. Products Installed But Not Supplied Under This Section:
   1. Firestopping.

C. Related Sections
   1. Section 07 8400: Quality of Firestopping.
   2. Section 28 3123: Fire Alarm And Detection System including connection of tamper switches and pressure flow detectors to alarm system and furnishing and installing of low temperature switch.

**1.2 REFERENCES**

A. American Society For Testing And Materials:
   1. ASTM A 53-02, 'Standard Specification for Pipe, Steel and Hot-Dipped, Zinc-Coated, Welded and Seamless.'
   2. ASTM A 234-02, 'Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperature Service.'

B. American Society of Mechanical Engineers / American National Standards Institute:
   2. ASME / ANSI B 16.3-1998, 'Malleable-Iron Threaded Fittings.'
   3. ASME / ANSI B 16.4-1998, 'Gray Iron Threaded Fittings.'

C. National Fire Protection Association / American National Standards Institute:

**1.3 SUBMITTALS**

A. Shop Drawings:
   1. Size sprinkler system by one of following methods:
      b. Hydraulic calculation design method based on water supply evaluation performed at building site.
      c. 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.
2. Submittal Procedure:
   a. After award of Contract and before purchase of equipment, submit seven sets of shop drawings with specifications and hydraulic calculations, if pipe schedule method is not used, to Architect and two sets to local jurisdiction having authority for fire prevention for review.
   b. After integrating Architect's and local jurisdiction's comments into drawings, licensed certified fire protection engineer of record submitting fire sprinkler system design construction documents shall stamp, sign, and date each sheet of shop drawings and first page of specifications and calculations.
   c. Submit stamped documents to area office and local jurisdiction having authority for fire prevention for final approval.
   d. After final approval, submit four copies of approved stamped documents to Architect.
   e. Failure of system to meet requirements of authority having jurisdiction shall be corrected at no additional cost to Owner.

B. Closeout:
1. Operation And Maintenance Manual Data:
   a. Modify and add to requirements of Section 01 7000 as follows:
      1) Provide master index showing items included.
      2) Provide name, address, and phone number of Architect, Architect's Fire Sprinkler Consultant, General Contractor, and Fire Protection subcontractor.
      3) Provide operating instructions to include:
         a) General description of fire protection system.
         b) Step by step procedure to follow in putting system into operation.
      4) Maintenance instructions shall include:
         a) List of system components used indicating name and model of each item.
         b) Manufacturer's maintenance instructions for each component installed in Project. Instructions shall include installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance and lubrication instructions.
      5) Include copies of approved shop drawings and copies of required warranties.
   b. If system has both wet and dry segments, provide single Operations And Maintenance Manual for total Fire Suppression System.

2. Inspection Checklist:
   a. Provide Owner with checklist and brief explanation of following inspections:
      1) Weekly Inspection.
      2) Monthly Inspection.
      3) Quarterly Inspection.
      4) Semi-Annual Inspection.
      5) Annual Inspection.

1.4 QUALITY CONTROL

A. Qualifications:
   a. 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:
      1) Be responsible for overseeing preparation of shop drawings, hydraulic calculations where applicable, and system installation.
      2) Make complete inspection of installation.
      3) Provide corrected record drawings to Owner with letter of acceptance.
      4) Certify that installation is in accordance with Contract Documents.

2. Installer: Licensed by jurisdiction over installed fire protection systems for area of Project. Furnish verified list of similar projects installed during past five years minimum.

B. Requirements of Regulatory Agencies:
1. Unless noted otherwise, system shall conform to:
   b. ANSI / NFPA 24: 1992 'Service Mains and Their Appurtenances, Private.'
d. Requirements of local water department and local authority having jurisdiction for fire protection.
f. Comply with backflow prevention requirements and, if required, include device in hydraulic calculations.
g. Applicable rules, regulations, laws, and ordinances.

1.5 OWNER'S INSTRUCTIONS

A. Instruction Sessions:
   1. Instruct Owner's personnel in operation and maintenance of system utilizing Operation And Maintenance Manual when so doing. Minimum instruction period shall be four hours.
   2. Instruction sessions shall occur after Substantial Completion inspection when system is properly working and before final payment is made.

B. Posted System Diagram:
   1. Provide single, color-coded floor plan diagram showing total system. Color dry pipe system elements BLUE and wet pipe system elements RED. Indicate locations of dry pipe system drains and inspector test valve station.
   2. Include following information on diagram sheet:
      a. Explanation of principles behind operation of dry pipe system alarm valve.
      b. Step by step shut down procedure.
      c. Step by step start-up procedure.
   3. Laminate diagram with plastic and mat or frame suitable for hanging near riser.

1.6 MAINTENANCE

A. Extra Materials: Furnish six spare heads of each type and temperature rating used, stored in cabinet properly sized by Sprinkler Manufacturer, and sprinkler head wrench.

PART 2 - PRODUCTS

2.1 COMPONENTS

A. Pipe:
   1. Above Ground: Schedule 40 hot-dip galvanized welded steel meeting requirements of ASTM A 53.
      a. 2 Inches 50 mm And Smaller: Screwed, flanged, or roll grooved coupling system.
      b. 2-1/2 Inches 62 mm And Larger: Flanged or roll grooved coupling system.

B. Fittings
   1. Screwed: Cast iron meeting requirements of ANSI B 16.4 or ductile iron meeting requirements of ANSI B 16.3 and ASTM A 536, Grade 65-45-12.
   2. Flanged: Cast iron meeting requirements of ANSI B 16.1.
   3. Roll Grooved Pipe Coupling System:
      a. Ductile iron meeting requirements of ASTM A 395 and ASTM A 536, and UL listed and FM approved.
      b. Couplings:
         1) Rigid: Cast to provide rigidity for support and hanging in accordance with NFPA-13.
         2) Flexible: Use in locations where vibration attenuation and stress relief are required.
         3) Flange Adapters: Class 125 or 150.
      c. Grooved products used on Project shall be from same manufacturer. Grooving tools shall be as recommended by manufacturer of grooved products.
      d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
         1) Tyco grooved piping products.
2) Victaulic Coupling and FireLok fittings.

C. Valves:
   1. Butterfly Valves:
      a. UL / FM / CASA approved.
      b. Indicating type.
      c. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
         1) Kennedy: 93G1 or 93W1.
         2) Nibco:
            a) WD3510-4 Wafer type with valve tamper switch.
            b) GD4765-8N Grooved type with valve tamper switch.
      3) Pratt Valves: IBV.
      4) Victaulic: Series 705-W Grooved end type with internal supervisory switches.
   2. Gate Valves:
      a. UL / FM / CASA approved.
      b. Outside Screw and Yoke Type (O.S.&Y).
      c. Class 150 psi.
      d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
         1) Nibco: F-637-31 Flanged Ends.
   3. Ball Valves:
      a. UL / FM / CASA approved.
      b. Valve tamper switch.
      c. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
         1) Milwaukee: BBSC with threaded ends.
         2) Nibco: KT-505 with threaded ends.
         3) Nibco: KG-505 with grooved ends.
         4) Victaulic: Series 728 with grooved or threaded ends.
   4. Swing Check Valves:
      a. 1/2 to 3 inch 13 to 75 mm horizontal check.
         1) Regrinding type.
         2) Renewable disk.
         3) Bronze Class 125 with threaded ends.
         4) Category Four Approved Products. See Section 01 6000 for definitions of Categories.
            a) Nibco: KT-403-W.
            b) Stockham: B319C.
      b. 2-1/2 to 12 inch 63 to 300 mm Horizontal check:
         1) Bolted bonnet.
         2) Raised face flanges.
         3) Bronze mounted with ductile iron body.
         4) 125 lb Class A.
         5) Category Four Approved Products. See Section 01 6000 for definitions of Categories.
            b) Stockham: G939.
      c. Wafer Type Check Valves:
         a. 4 to 8 inch 100 to 300 mm cast iron body.
         b. 175 psi minimum working pressure.
         c. Rubber Seat.
         d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
            1) Nibco: KW-900-W.
   5. Grooved-End Check Valves:
      a. 2-1/2 to 12 inch 63 to 300 mm ductile iron body.
      b. 250 psi maximum working pressure.
      c. Disc And Seat:
         1) 2-1/2 And 3 Inch 63 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.
d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
   1) Victaulic Series 717.

7. Dry Pipe Alarm Valves:
   a. Category Four Approved Products:
      1) Reliable: D with gauges, drain, and trim.
      2) Tyco: DPV-1.
      3) Victaulic: Series 757P.
      4) Viking: F-1 with gauges, drain, and trim.

8. Air Maintenance Device:
   a. Maximum inlet air pressure 125 psi, minimum outlet air pressure 65 psi.
   b. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable: B-1.
      2) Tyco: ACC-1.
      3) Victaulic: 746.
      4) Viking: D-2.

9. Accelerator:
   a. Install with pressure gauge.
   b. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable: B-1.
      2) Tyco: ACC-1.
      3) Victaulic: 746.
      4) Viking: E-1.

10. Inspector's Test Valve:
    a. Ductile iron body with threaded ends.
    b. Combination sight glass/orifice.
    c. Bronze top works.
    d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
       1) Victaulic: Testmaster II Alarm Test Module Style 720.

D. Sprinkler Heads:
1. Dry Concealed Pendant:
   a. UL / FM / CASA approved.
   b. Coordinate concealed cover finish with Architect.
   c. Flush Ceiling profile.
   d. Adjustable cover.
   e. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable: F3 Dry Pendant Concealed.
      2) Victaulic: Model V36.

2. Upright Sprinklers:
   a. UL / FM / CASA approved.
   b. Include flush chrome escutcheon equal to Reliable C.
   c. Where guards are required, include chrome plated sprinkler guards that are listed, that are
      approved by Sprinkler Manufacturer for use with head, and that are supplied by Sprinkler
      Manufacturer.
   d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable: F1.
      2) Tyco: TY-B.
      3) Victaulic: Models V27 and V34, with recessed escutcheon.
      4) Viking: Micromatic.

3. Attic Sprinklers, Upright:
   a. UL / FM / CASA approved.
   b. Approved for use in roof structures, combustible and non-combustible, with ceiling below.
   c. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Tyco: BB, SD, or HIP.

4. Horizontal Sidewall Sprinkler:
   a. UL / FM / CASA approved.
   b. Recess adjustable.
   c. Where guards are required, include chrome-plated guard equal to Viking A-1.
   d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable: F-1 with recessed, two-piece escutcheon Model GF-1.
2) Viking: M HSW with recessed, two-piece escutcheon E-1.
3) Star: LD-2 with Nova Series recessed escutcheon.

E. Water Flow Alarm:
1. Mechanical Flow Alarm:
   a. UL / FM / CASA approved.
   b. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable: C.
      2) System Sensor: WFD.
      3) Tyco: WMA-1.
      4) Victaulic: Series 760.
      5) Viking: F-2.

F. Pressure Gauges:
1. Mechanical Water Pressure Gauges:
   a. UL / FM / CASA approved.
   b. 3-1/2 inch 88 mm diameter dial.
   c. 0 to 300 psi in 5 psi increments.
   d. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Reliable.
      2) Trerice: 500.

G. Pressure Detectors:
1. Electrical Water Pressure Switch:
   a. UL / FM / CASA approved.
   b. Switch activates on pressure rise between 4 and 8 psi.
   c. Two single pole double throw switches.
   d. Automatic reset.
   e. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
      1) Potter Electric Signal Co: PS10.
      2) System Sensor: EPS10.

H. Low Pressure Supervisory Switch:
1. UL / FM / CASA approved.
2. Adjustable pressure range 1 to 100 psi.
3. Automatic reset.
4. Factory adjusted to separate on pressure decrease of 30 psi.
5. Category Four Approved Products. See Section 01 6000 for definitions of Categories.

I. Tamper Switch:
1. Weather and tamper resistant switch.
2. UL / FM / CASA approved.
3. Two single pole double throw switches.
4. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
   a. Potter Electric Signal Co: PCVS.

J. Fire Department Connection:
1. Two-way Inlet with single clapper.
2. Polished Brass.
3. 3/4 inch 19 mm Straight Design Automatic Drain Device by Potter-Roemer Fig. 5982.
4. Round 'AUTO. SPKR.' Identification Plate, Polished Brass by Potter-Roemer Fig. 5962.
5. Category Four Approved Products. See Section 01 6000 for definitions of Categories.
   a. Croker: 6405PB.
   b. Potter-Roemer: Fig 5710.

K. Air Compressor:
1. Tank-mounted, 17 gallon 64 liter tank rated at 165 psi working pressure. Restrict speed of compressor to between 700 and 900 RPM.
2. Set tank-mounted air compressor on neoprene isolation pads located at each corner and sized 4 inches by 4 inches by 3/4 inches 100 mm by 100 mm by 19 mm high.
3. Wire air compressor to circuit breaker.
4. Furnish with air intake filter and silencer.
5. Overload protected 1750 RPM motor. One hp, single phase, 115V.
6. Industrial grade with totally enclosed steel belt guard.
7. Auto control group mounted and pre-wired. Auto group includes pressure switch, check valve, manifold, safety valve, and mounting.
8. Type One Acceptable Products:
   a. Emglo: K1S-17S.
   b. Equal as approved by Architect before bidding. See Section 01 6000.

### 2.2 MANUFACTURERS

A. Contact Information:
   15. TYCO Fire & Building Products, Oak Creek, WI  www.tyco-fire.com.
   16. Victualic Company of America, Easton, PA.

---

### PART 3 - EXECUTION

#### 3.1 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.
   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.

#### 3.2 INSTALLATION

A. Install system in accordance with NFPA 13.

B. Connect system to flange provided under Section 33 1119.
C. Install system to drain. Drain trapped piping in accordance with ANSI / NFPA 13, Paragraphs 8.15.2.5 and 8.16.4.1.
   1. Install main drain from riser.
   2. Install auxiliary drains in low points of piping system and inspector's test valve drain to mechanical pad located outside building, unless directed otherwise by Architect.

D. Install piping system so it will not fail due to freezing temperatures.

E. Do not use dropped, damaged, or used sprinkler heads.

F. Pendants:
   1. Do not use regular pendants.
   2. Install dry pendants with tees and not elbows. Do not adjust length with pipe nipples and couplings.
   3. Individually measure and order each dry pendant based on measured distance from ceiling to face of branch line tee.

G. Minimum slope of branch lines is 1/2 inch per 10 feet 12 mm in 3 meters. Minimum slope of main lines is 1/4 inch per 10 feet 6 mm in 3 meters.

H. Install sprinkler lines concealed.

I. Install tamper switches and pressure flow detectors where located by Architect.

J. Install automatic ball drip device in lowest point of piping to the fire department connection and drain to exterior of building.

K. Brace and support system to meet seismic zone requirements for building site.

3.3 FIELD QUALITY CONTROL

A. Site Tests:
   2. Tests shall be witnessed by Architect and by representative of local jurisdiction having authority for fire prevention.
   3. Test blanks shall have red painted lugs protruding beyond flange to clearly indicate their presence and be numbered to assure their removal when testing is completed.

END OF SECTION