PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. The requirements of the General Conditions, Supplementary Conditions and the following Specification sections apply to all Work herein:
1. Section 21 00 10 - General Requirements
2. Section 21 00 20 - Fire Suppression Scope of Work
3. Section 21 05 07 - Design Conditions
4. Section 21 05 13 - Motor Requirements for Fire Suppression Equipment
5. Section 21 05 48 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment
6. Section 21 07 00 - Fire Suppression System Insulation
7. Section 21 05 93 - Testing
8. Section 21 11 00 - Connections to Utilities
9. Section 21 13 00 - Fire Suppression Sprinkler Systems
10. Section 21 30 00 - Fire Pumps and Controllers
11. [Section 21 41 00 - Fire Suppression Water Storage Tank]
12. Division 28 - Fire Detection, Alarm, and Communication System Specifications

1.2 SUMMARY

A. Furnish and install Fire Suppression wet and dry standpipe systems as specified herein and as indicated on the Drawings.

B. The Subcontractor shall provide fire-hydrant flow test as a basis for hydraulically calculated systems. Testing shall be conducted at a location representative of the actual future system(s) supply and be no more than 12 months old at date of submission. The flow test report shall have, as a minimum, the following:
1. Contractor's name and contact information.
2. Project name.
3. Date, time and location of flow test.
4. Static pressure (psi)
5. Residual pressure (psi)
6. Water flow measurement (gpm)
7. Elevation of hydrant(s) tested (feet above sea level).

C. Refer to Architectural drawings and specifications for portable fire extinguisher requirements and locations. The portable fire extinguishers in the building will be provided under the Architectural Section by the Contractor. Fire extinguishers in the garage will be provided by the Fire Suppression Subcontractor.

D. Under this Division, the Subcontractor shall furnish all labor, equipment, appliances and materials to perform all operations in connection with the installation of a wet or dry pipe standpipe system and hose systems as indicated on the Drawings; and as specified herein or as required by the local and state Building Code, Fire Marshall requirements and applicable NFPA Standards.

1.3 REFERENCE STANDARDS

A. All Fire Suppression system equipment and associated components shall be designed, manufactured and tested in accordance with the latest applicable standards or the particular edition specified by the authorities having jurisdiction including the following:
1. NFPA 14 - Installation of Standpipe and Hose Systems
2. NFPA 20 - Installation of Centrifugal Fire Pumps
3. NFPA 24 - Installation of Private Fire Mains
4. NFPA 25 - Inspection, Testing and Maintenance of Water Based Fire Suppression Systems
5. NFPA 70 - National Electrical Code (NEC)
6. NFPA 101
7. ASTM
8. ANSI - B16.3, B16.4, B16.5, B16.9, B31.1.0 ,and B36.10
9. AWS - American Welding Society

B. All equipment and material to be furnished and installed on this Project shall be UL listed, or FM approved, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

1.4 SUBMITTALS

A. The following submittal data shall be furnished according to the General Conditions and Section 21 00 10 and shall include, but not be limited to:
1. Schedule of Pipe and Fitting Materials* complete with typical mill reports.
2. List of pipe, hanger and support manufacturers.
3. Fire Suppression Standpipe System, materials, standpipe inlets, fire hose valves, hose manifolds, automatic pressure control valves, hose racks, double check valve assembly, cabinets, [extinguishers,] water flow switches, etc.
4. Subcontractor's Roll and Cut Groove Machine Certifications*.
5. Welder qualification test reports.
6. Fire-Hydrant flow test report.
7. Standpipe System Shop Drawings and Hydraulic Calculations. The Fire Suppression Subcontractor shall submit piping Shop Drawings and hydraulic calculations for review prior to fabrication of any of the systems. Shop Drawings shall indicate plan locations and elevations of piping and hangers, including bottom elevation of major piping and be coordinated with ductwork and other mechanical and electrical services. Complete Shop Drawings and hydraulic calculations shall be submitted to all local and state authorities having jurisdiction, Fire Department and the Owner's insurance carrier for approval. Shop Drawings submitted to the Engineer for review shall bear the approval stamp of all authorities having jurisdiction if those authorities normally review the Subcontractor's documentation. See Section 21 00 10 for requirements.
8. Fire pump flow test device complete with physical dimensions, materials, capacity data, water pressure drops, connection details, etc.
9. Fire Suppression test header complete with physical dimensions, materials, etc.
10. Fire Suppression water storage tank complete with physical dimensions, materials, construction details, capacity data, connection details, fill valves, level controllers, alarms, etc. Refer to Specification Section 21 41 00.
11. Proposed test procedures, recording forms, test equipment, and list of personnel and qualifications for all tests proposed. Refer to Section 21 05 93 titled "Testing" for additional requirements.
12. Field Test Schedule.
13. Field Test Reports.
    a. Hydrostatic Test Reports.
    b. Periodic Inspection Reports – NFPA "Report of Inspection"

B. All items or equipment listed above with asterisks (*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 21 00 10. See Section 21 00 10 for certification requirements.

1.5 WARRANTY

A. Comply with the requirements of the General Conditions and Section 21 00 10.

1.6 WORK INCLUDED

A. The Work includes but is not limited to the following:
1. Water supply pipe, water meter, valves and fittings to the interface point indicated on the Drawings] [5'-0" beyond foundation walls.
2. Standpipe risers and supply mains, valves and drains.
3. Standard pattern siamese connections.
4. Fire hose valves.
5. Flow switches and supervisory switches.
6. Fire pump, controllers and accessories. See Specification Section 21 30 00 titled "Fire Pumps and Controllers".
7. Jockey pump, controllers and accessories. See Specification Section 21 30 00 titled "Fire Pumps and Controllers".

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. All pipe material shall be as specified herein. The Subcontractor shall submit to the Engineer for review a list of the proposed manufacturers of pipe and fittings. See Section 21 00 10 for requirements.

B. If it complies with these Specifications and is UL listed, or FM approved, for 150 psig working pressure systems, one of the following pipe fitting manufacturers will be acceptable:
   1. Screwed piping fittings, Class 150, ANSI B16.3 screwed malleable iron Class 125, ANSI B16.4 cast iron, or Class 150 ductile iron:
      a. Central
      b. Grinnell
      c. Star Products, Inc.
      d. Ward
   2. Welding fittings ANSI B16.9 with wall thickness identical to pipe in which installed:
      a. Babcock & Wilcox
      b. Grinnell
      c. Ladish
      d. Taylor Forge
      e. Tube-Line
      f. Tube-Turn
      g. Weld Bend
   3. Flanges, Class 150, ANSI B16.5, raised face, forged steel, screwed or welding neck type where specified or required:
      a. Grinnell
      b. Ladish
      c. National Flange
      d. Taylor Forge
      e. Weld Bend

C. If it complies with these Specifications and is UL listed, or FM approved, for 300 psig working pressure systems, one of the following pipe fitting manufacturers will be acceptable:
   1. Screwed piping fittings, Class 300, ANSI B16.3 screwed malleable iron, Class 250, ANSI B16.4 cast iron, or Class 300 ductile iron:
      a. Central
      b. Grinnell
      c. Ward
   2. Welding fittings, ANSI B16.9 with wall thickness identical to pipe in which installed:
      a. Babcock & Wilcox
      b. Grinnell
      c. Ladish
      d. Taylor Forge
      e. Tube-Line
      f. Tube-Turn
      g. Weld Bend
   3. Flanges, Class 300, ANSI B16.5, raised face, forged steel, screwed or welding neck type where specified or required:
      a. Grinnell
      b. Ladish
      c. National Flange
      d. Taylor Forge
      e. Weld Bend

D. Weld fittings shall be UL listed, or FM approved, factory made and shall be full line size. If it complies with these Specifications, one of the following weld fitting manufacturers will be acceptable:
   1. Branch pipes more than one size smaller than the diameter of the main pipe:
      a. Bonney Forge “Weldolet” or “Threadolet” ANSI B16.9
      b. Grinnell Forged Steel Weldolet or Threadolet ANSI B 16.9

c. "Weldolet", "Threadolet" and Merit fittings and shaped nipples shall have a wall thickness as required by the ANSI B31.1.0 and ANSI 36.10 Code and shall be suitable for the working pressure and temperature of the pipe to which they connect.

2. For branch sizes 3" and smaller shaped nipple welding fittings with factory beveled ends :
   a. Allied Type T-1 and T-2
   b. Grinnell
   c. Tube Forgings
   d. Tube-Turn
   e. Wheeling
   f. No branch shall be made by burning a hole in the main and welding in the branch line.

E. If it complies with these Specifications and is UL listed, or FM approved, one of the following pipe hanger and support manufacturers will be acceptable:
1. B-Line
2. Grinnell
3. Hilti
4. Michigan Hanger
5. PHD
6. Tolco

F. At the Subcontractor's option and subject to the approval by the local authorities having jurisdiction, grooved style couplings and fittings may be used in lieu of welded or screwed joints specified hereinbefore as follows:
1. For Loop and Branch Piping: Victaulic Style 009H "FireLock EZ" or Gruvlok Figure 7400 "Rigidlite" UL listed, painted ductile iron couplings may be used subject to the special requirements in Paragraph 2.01F.4. hereinafter.
2. For Main Piping: Victaulic Style 107H "QuickVic", Victaulic Style 009H "FireLock EZ", Gruvlok Figure 7000 or Gruvlok Figure 7400 "Rigidlite" UL listed rigid couplings may be used for up to and including 300 psig working pressure. Victaulic Style HP70 or Gruvlok Figure 7001 couplings may be used for over 400 psig working pressure subject to the special requirements in Paragraph 2.01F.4. hereinafter.
3. For Fittings: UL listed, painted ductile iron Victaulic Standard, Victaulic "FireLock" or Gruvlok fittings and Victaulic Style 920 or Gruvlok Figure 7045 mechanical tees. All fittings shall be suitable for the design working pressures specified in Section 21 05 07 titled "Design Conditions" and may be used subject to the special requirements in Paragraph 2.01F.4. hereinafter.
4. Special Requirements: Victaulic or Gruvlok fittings and couplings shall be made of ASTM A 47 Grade 32510, malleable iron or ASTM A 536 Grade 65-45-12 ductile iron, with grooved ends. Grooved fitting manufacturer shall be ISO 9001 approved.
   a. Pipe grooves shall be made by a tool manufactured by the grooved coupling/fitting company. The manufacturer shall provide a certified letter with the Shop Drawing stating that the roll or cut grooving machine and fittings will provide a system complying with the pressure class and piping materials previously specified. A Victaulic or Gruvlok cut groove depth control tool shall be used for field and shop grooving of piping. A Victaulic or Gruvlok hole cutting tool shall be used in lieu of burning a hole in the piping. When using joining materials the piping shall be installed in accordance with the joint manufacturer's instructions. Gaskets shall be UL listed for the service and working pressure of the systems. Victaulic or Gruvlok flanges, reducing couplings and outlet couplings shall not be allowed. If they comply with these Specifications, UL listed couplings, full flow fittings and gaskets manufactured by Victaulic Company of America or Grinnell Corporation (Gruvlok) will be acceptable. Couplings and fittings installed throughout the project shall be the product of one manufacturer. Roll grooving shall not be acceptable for galvanized piping systems.

G. If it complies with these Specifications and is UL listed, or FM approved, one of the following pipe joint compound manufacturers will be acceptable:
1. LACO
2. Rector-Seal

H. If it complies with these Specifications and is UL listed, or FM approved, one of the following gasket manufacturers will be acceptable:
1. Crane
2. Dallas Gasket
3. Garlock

I. If it complies with these Specifications and is UL listed, or FM approved, one of the following underground pipe and joint manufacturers will be acceptable:
   1. Clow Corporation
   2. Griffin Pipe Products Company
   3. J-M "Blue-Brute"
   4. Tyler Pipe and Foundry Company
   5. U.S. Pipe and Foundry Company

J. If it complies with these Specifications and is UL listed, or FM approved, check valves manufactured by one of the following manufacturers will be acceptable:
   1. Crane
   2. Croker
   3. Grinnell
   4. Kennedy
   5. Mueller
   6. Nibco
   7. Reliable
   8. Viking

K. If it complies with these Specifications, double check valve assembly manufactured by one of the following manufacturers will be acceptable:
   1. Conbraco
   2. FEBCO
   3. Hersey
   4. Watts Regulator Company
   5. Zurn/Wilkins

L. If it complies with these Specifications and is UL listed, or FM approved, gate valves manufactured by one of the following manufacturers will be acceptable:
   1. Badger-Powhatan
   2. Crane
   3. Croker
   4. Fairbanks
   5. Grinnell
   6. Jenkins
   7. Kennedy
   8. Milwaukee
   9. Mueller
   10. Nibco
   11. Walworth

M. If it complies with these Specifications and is UL listed, or FM approved, butterfly valves manufactured by one of the following manufacturers will be acceptable:
   1. Grinnell
   2. Jenkins
   3. Kennedy
   4. Milwaukee
   5. Nibco
   6. Victaulic

N. If they comply with these Specifications and are UL listed, or FM approved, Venturi flow tubes manufactured by one of the following manufacturers will be acceptable:
   1. Aeroquip (Barco)
   2. Aurora
   3. Croker
   4. Gerand
   5. Preso
   6. Victaulic

O. If it complies with these Specifications and is UL listed, or FM approved, standpipe system equipment, Siamese, fire hose valves, firehose cabinets and racks, etc., manufactured by one of the following manufacturers will be acceptable:
1. Badger-Powhatan
2. Croker
3. Elkhart
4. Guardian
5. Potter-Roemer
6. Standard

P. If it complies with these Specifications and is UL listed, or FM approved, water flow switches manufactured by one of the following manufacturers will be acceptable:
1. Autocall
2. Croker
3. Potter Electric Signal Company
4. System Sensor

Q. If it complies with these Specifications and is UL listed, or FM approved, and is suitable for installation on the valves provided, supervisory switches manufactured by one of the following manufacturers will be acceptable:
1. Notifier
2. Potter Electric Signal Company
3. System Sensor

2.2 GENERAL

A. This building will utilize various pressure classes for wet standpipes and for the hose systems. Pipe, valves and fittings shall conform to requirements of the working pressures specified in Section 21 05 07 titled “Design Conditions” and as indicated by the Drawings.

B. Piping 4” and smaller shall be ASTM A 53, ASTM A 135 or ASTM A 795 black steel for all wet pipe systems as specified herein. Dry pipe systems shall be galvanized, Schedule 40, if required by local code, by the authorities having jurisdiction or the Owner’s insuring agency. Pipe shall be manufactured in the United States and be UL listed and FM approved for all piping except ASTM A53 pipe.

C. Piping 5” and larger shall be UL listed, or FM approved, ASTM A 53, ASTM A 135 or ASTM A 795, black steel Type “S” (seamless), Type “F” (furnace-butt welded) or Type “E” (electric resistance welded). Electric resistance welded pipe shall be fully normalized at the seams after welding. Pipe shall be manufactured in the United States and be UL listed and FM approved for all piping except ASTM A 53 pipe.

D. Pipe thickness shall be in accordance with ANSI B36.10, current edition and shall be as follows:
1. For 175 psig and 300 psig on all wet pipe systems:
   a. 4” : Schedule 40
   b. 6” : Schedule 10 or 40
   c. 8” and larger: Schedule 10 or 40
2. Above 300 psig on all wet pipe systems – Schedule 40.

E. orFire Suppression systems utilizing Schedule 40 pipe may be of threaded, butt welded or cut or roll groove construction.

F. Flanges shall be required for servicing or removal of equipment for repair, etc., for butt welded systems. Schedule 10 pipe shall be joined by roll grooved fittings only.

G. At each joint the flanges shall have matching flat faces or raised faces, and the flanges shall be identified in configuration and pressure rating. Steel flanges shall have a medium tool finish and shall have either flat or raised faces. When 150 lb. steel flanges are connected to 125 lb. cast iron or 300 lb. ductile iron flanges valves or fittings, the steel flanges shall be flat face medium finish. Grooved flanges shall be Victaulic 741 or Gruvlok Fig. 7012 using flange washers to join to the rubber faced serrated flanged components or raised faced flanges. Serrated flanges or raised face flanges shall use a full face red rubber gasket between the grooved flange washer and the flange to provide an acceptable sealing surface.

H. Screw joints shall be made up with approved pipe joint compound. Screw threads shall be in accordance with American Pipe Thread Standards.

I. Gasket material shall be as specified herein and shall be suitable for the service and pressure class intended.
   1. Gaskets shall be 1/16" thick for all pipe sizes 10" and smaller; and 1/8" thick for all pipe sizes 12" and larger. Gaskets shall be ring type between raised face flanges and full face type between flat face flanges with punched bolt holes and pipe opening.
   2. Gaskets shall be compressed non-asbestos with a nonstick clean surface and factory applied parting agent applied to both sides of the gasket.
   3. Gaskets shall contain no asbestos.

J. Flange bolting materials for flanges in service at 399°F or below shall be carbon steel ASTM A 307 Grade B hexagon head bolts and nuts. Cap screws utilized with flanged butterfly valves shall be ASTM A 307 Grade B cap screws with hexagon heads. Flange bolt thread lubricant shall be an antiseize compound. Thread lubricant designed for temperatures up to 1000°F, shall be Crane Antiseize Thread Compound or approved equal. Where the configuration or arrangement of flanges prevent the installation of machine bolts, stud bolts shall be used.

2.3 UNDERGROUND FIRE SUPPRESSION WATER SERVICE PIPING

A. All piping below ground shall be ductile iron bell and spigot push-on joint pressure water pipe designed and manufactured in accordance with the latest revisions of ANSI A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151) standards. 4" ductile iron pipe shall be thickness Class 51, 6" and larger ductile iron pipe shall be thickness Class 50.

B. Push on joints shall be of the "Tyton" or approved equal, type employing a molded rubber gasket retained in a ring recessed into the inside of the bell. Restraints and thrust blocking per NFPA 24 shall be provided at all changes in direction. Joints shall be in accordance with the requirements of the latest revision of ANSI Standard A21.11 (AWWA C111). Where indicated by the Drawings for working pressures not exceeding 150 psig, provide ductile iron restrained (internally locked) push-on type, "Tyton" or approved equal, joint pipe and fittings in lieu of thrust blocking or tie rods.

C. Fittings shall be gray iron or ductile iron conforming to all applicable requirements of the latest revision of ANSI Standard A21.10 (AWWA C110).

D. Coat pipe and fittings inside and outside with the manufacturer's standard asphaltic sealcoat and polyethylene wrap in accordance with the latest revision of ANSI Standard A21.4 (AWWA C104) suitable for domestic water service.

E. Unless otherwise noted on the Drawings, all ductile iron pipe, fittings, etc., shall be encased in eight (8) mils thick polyethylene tubing at thrust blocks in accordance with the latest revision of ANSI Standard A21.5 (AWWA C105).

F. Ductile iron piping, fittings and joints shall be suitable for the minimum working pressure and sizes indicated on the Drawings, in Type 4 laying conditions with two (2) to 15' of cover and as required for freeze protection, unless otherwise indicated on the Drawings.

G. Before backfilling, all underground piping, fittings, joints and valves shall be checked by the manufacturer's representative for location of possible tears and holes in the protective coating. Repair any breaks in the protective coating as recommended by the manufacturer.

H. At the Subcontractor's option, subject to the authorities having jurisdiction, PVC AWWA C900 Class 200 bell and spigot pipe may be used for underground fireline service. The joint gasket material shall be an ASTM F-477 compliant flexible elastomeric ring, which provides a tight water seal, and protects the piping from shock and vibration and provides for expansion and contraction. The pipe shall be installed in strict accordance with the pipe manufacturer's written instructions: J-M Publication TR-704B "Blue Brute PVC Class Water Pipe Installation Guide". AWWA C900 piping shall conform to the requirements of the working pressures as indicated in Section 21 05 07 titled "Design Conditions". If it complies with these specifications AWWA C900 pipe and joints shall be as manufactured by J-M "Blue Brute" or approved equal.

2.4 MISCELLANEOUS PIPING ACCESSORIES

A. Furnish and install all necessary miscellaneous piping accessories that are indicated on the Drawings or specified herein.

B. Check Valves:
1. Swing check valves located in Fire Suppression standpipe shall be as follows:
   a. For 175 psig Working Pressure System: 175 psig, UL listed swing check valve with iron body, bronze or stainless steel trim, stainless steel or ductile iron or bronze disc, bolted cover and screwed, flanged or grooved ends.
   b. For 300 psig Working Pressure System: 300 psig, UL listed swing check valve with iron body, bronze or stainless steel trim, stainless steel or ductile iron or bronze disc, bolted cover and screwed, flanged or grooved ends.
2. Swing check valves shall be installed in horizontal piping only.
3. Swing check valves shall be spring loaded clapper designed for non-slam closure.

C. Double Check Valve Assembly:
1. Double check valve assembly installed in the incoming water service line shall be approved by the local water authority and the Environmental Protection Agency as required for the application.
2. Double check valve assembly shall be suitable for a working pressure of 150 psig or 300 psig, as required. The pressure loss through the entire assembly shall not exceed 6 psig at the design flow rate. The size of the assembly shall not be less than the line in which it is installed.
3. Assembly shall be complete with inlet and outlet OS&Y shut off valves.
4. Double check valve assembly shall be UL listed, or FM approved, for the application in a Fire Suppression piping system.
5. Double check valve assembly will be provided by the Division 22 Plumbing Contractor.

D. Fire Pump Flowmeter: UL listed venturi flow tubes and fixed mounted indicating meters supplied by one manufacturer shall be furnished and installed where indicated on the Drawings. Flow tubes shall be rated for the system working pressure indicated on the Drawings. Flow tubes shall be venturi type (butt-welded, grooved or full flanged) with steel body, complete with valve manifold for connection to flow tube meter and quick disconnect valves for calibration purposes. Venturi's shall be selected to accurately measure flow throughout the range of fifty to two hundred (50 - 200%) percent of the rated capacity of the fire pump for which the meter will be used. Provide a permanent minimum 4-1/2" diameter dial type GPM indicating meter for each venturi flow tube showing the entire flow range of zero to two hundred (0 - 200%) percent of the fire pump rating. The gauge shall be fixed mounted on the venturi. The accuracy of the meter shall be no less than 0.5% of full scale. GPM meters shall be equipped with shutoff and vent valves and shall be suitable for the operating pressure of the systems. Attach a metal identification tag on chain to each individual venturi flow tube indicating manufacturer, model number, size, flow rating in GPM, meter range, maximum working pressure, date of manufacture and UL listing. Operating instructions shall be secured to unit.

2.5 GATE VALVES

A. A. Furnish and install all gate valves, indicating type, that are indicated on the Drawings or specified herein. Valve packing and gaskets shall contain no asbestos.

B. Gate, Ball and Butterfly Valves:
1. 175 psig Working Pressure:
   a. Gate valves up to and including 2" Kennedy Figure 66, 175 psig cold water, UL listed, bronze body, bronze trim, single disc, outside screw and yoke, screwed bonnet valves with seats of bronze, screwed ends.
   b. Gate valves 2-1/2" through 12" Kennedy model KS-FW, 175 psig cold water, UL listed, AWWA Standard C509 approved, cast iron body, outside screw and yoke, bolted bonnet valves with double or single disc, Class 125 ANSI B16.1 flanged ends, bronze trim, and cast iron wedge fully encapsulated with resilient material.
   c. Butterfly valves 2-1/2" through 8" Victaulic Series 705, Gruvlok AN7722-3A, Kennedy G300/01G or Nibco GD-4765-8N, UL listed, ductile iron body and disc with EPDM disc coating, grooved ends, flanged or full lug body.
   d. Ball valves up to and including 2" shall be red brass or cast bronze UL listed with brass, bronze or stainless steel ball, full port type, 400 psig non-shock WOG at 200°F.

2. 300 psig Working Pressure:
   a. Gate valves up to and including 2" Crane No. 634E, Milwaukee 1184 or Nibco T-174-SS, 400 psig cold water, UL listed bronze body, wedge disc, rising bronze stem, union bonnet, bronze disc with bronze or stainless steel body seat rings and screwed ends.
   b. Ball valves up to and including 2" shall be red brass or cast bronze UL listed with brass, bronze or stainless steel ball, full port type, 400 psig non-shock WOG at 200°F.
   c. Gate valves 2-1/2" through 12", Crane No. 7-1/2E, Milwaukee F2894A or Nibco F-667-0, 500 psig cold water, iron body, brass stem, bolted bonnet, outside screw and yoke valves with wedge disc, bronze seats and Class 250 ANSI B16.1 flanged ends.
   d. Butterfly valves 2-1/2" through 8" Victaulic Series 705, Gruvlok 7722-3 FD or Nibco, UL listed, ductile iron body and disc with EPDM disc coating, grooved ends, flanged or full lug body.
3. Furnish and install supervised valve tamper switches as shown on the Drawings or as required by NFPA standard and local codes. Coordinate all requirements with Division 28 FDAC System Specifications.

2.6 CONSTRUCTION STANDPIPE AND FIRE SUPPRESSION SYSTEM

A. During construction it will be necessary to provide Fire Suppression to the building in accordance with the local codes and regulations, Fire Marshal's requirements and NFPA requirements. The Subcontractor shall provide and maintain this construction standpipe. The permanent standpipes may be utilized subject to the Owner's approval.

2.7 STANDPIPE SYSTEM EQUIPMENT

A. Roof Manifolds: Roof manifolds shall be Potter-Roemer No. 5880 rough brass, three way manifold 6" x 2-1/2" x 2-1/2" x 2-1/2" with three Potter-Roemer No. 4065 2-1/2" x 2-1/2", 300 psig rough brass hose gate valves, with cap and chain and cast iron handwheel.

B. Fire Department Connections (Siamese):
1. Freestanding Siamese: Potter-Roemer No. 5760 series, two (2) way, No. 5770 series, three (3) way, No. 5780 series, four (4) way or approved equal, chrome plated, freestanding, clapper type siamese with caps and chains. The words "Auto Sprinkler Standpipe High Zone" or "Auto Sprinkler Standpipe Low Zone" shall be cast in the unit as required. The siamese shall be complete with concrete anchors, chain attached removable caps, polished chrome trim, etc. Siamese shall be UL listed or FM approved for the required working pressures. If not UL listed or FM approved for the working pressures shown, the manufacturer shall certify in writing that the siamese is suitable for the working pressures specified or shown on the Drawings. See Section 21 00 10 for certification requirements.
2. Flush Mounted Siamese: Potter-Roemer No. No. 5020 series, two (2) way, No. 5030 series, three (3) way, No. 5200 series, four (4) way or approved equal, chrome plated, flush, clapper type siamese with caps and chains. Each siamese shall have the words "Auto Sprinkler Standpipe High Zone" or "Auto Sprinkler Standpipe Low Zone" shall be cast in the unit as required. Each siamese shall be complete with chain attached removable caps, polished chrome trim, etc. Siamese shall be UL listed or FM approved for the working pressures specified or shown on the Drawings. If not UL listed for the working pressures shown, the manufacturer shall certify in writing that the siamese is suitable for the working pressures specified or shown on the Drawings. See Section 21 00 10 for certification requirements.

C. Fire Pump Test (Siamese):
1. Freestanding Siamese: Potter-Roemer No. 5760 series, two (2) way, No. 5770 series, three (3) way, No. 5780 series four (4) way or approved equal polished chrome plated body and trim without clappers. The words "Fire Pump Test" shall be cast in the unit as required. The siamese shall be complete with concrete anchors, chain attached removable caps, polished chrome trim, etc. Siamese shall be UL listed or FM approved for the required working pressures. If not UL listed or FM approved for the working pressures shown, the manufacturer shall certify in writing that the siamese is suitable for the working pressures specified or shown on the Drawings. See Section 21 00 10 for certification requirements.
2. Flush Mounted Siamese: Potter-Roemer No. 5020 series, two (2) way, No. 5030 series, three (3) way, No. 5200 series, four (4) way or approved equal, chrome plated, body and trim without clappers. The words "Fire Pump Test" shall be cast in the unit as required. Each siamese shall be complete with chain attached removable caps, polished chrome trim, etc. Siamese shall be UL listed or FM approved for the working pressures specified or shown on the Drawings. If not UL listed for the working

pressures shown, the manufacturer shall certify in writing that the siamese is suitable for the working pressures specified or shown on the Drawings. See Section 21 00 10 for certification requirements.

D. Fire Hose Racks and Cabinets: Where indicated on the Drawings, furnish and install fire hose racks and cabinets. These cabinets shall consist of the following:
   1. 1-1/2" Fire Hose Cabinets (FHC):
      a. UL listed labeled semiautomatic, nipple mounted, rough finished painted hose rack, Potter-Roemer Series #2500 Model 2510.
      b. In locations where pressure at the cabinet is 100 psig or less under full flow conditions, furnish 1-1/2" UL listed rough brass body, red brass angle valve, 300 psig, Potter-Roemer No. 4070.
      c. In locations where pressure at the cabinet is greater than 100 psig under full flow conditions, furnish 1-1/2" automatic pressure regulating control valve. UL listed angle type rough brass finish, combination shutoff pressure reducing and pressure regulating feature suitable for 300 psig working pressure, Potter-Roemer No. 4010. Set so that the nozzle pressure does not exceed the outlet pressure required by the local Fire Department under full flow conditions.
      d. Provide 100'-0" of 1-1/2" UL label lined poly-flex hose, complete with UL hose clamp, couplings and Potter-Roemer No. 2960 Lexan combination Fog and Straight Stream Nozzle.
      e. Cabinet shall accommodate the hose rack and fire extinguisher. Fire extinguisher shall be Potter-Roemer No. 3020, 20 lb. ABC multipurpose dry chemical. Cabinet shall be constructed of furniture steel and shall be recessed. Cabinet shall be finished with baked white enamel inside. Potter-Roemer No., 1304 recessed, 1334 semi-recessed, 1354 surface mounted.

E. 2-1/2" Fire Hose Valve (FHV):
   1. In locations where the pressure does not exceed 100 psig, furnish 2-1/2" UL listed rough brass angle valve, 300 psig, Potter-Roemer No. 4065, or approved equal. Refer to the detail on the Drawings for installation details. Furnish with cap and chain.
   2. Where approved by the authorities having jurisdiction, in locations where pressure is greater than 175 psig at full flow conditions, provide 2-1/2" automatic pressure regulating control valve with handwheel, cap and chain, Potter-Roemer No. 4033, UL listed angle type rough brass finish, combination shut off pressure reducing and pressure regulating feature under flow and no flow conditions are suitable for 400 psig working pressure. Refer to the detail on the Drawings for installation details.
   3. Cabinet shall accommodate the fire hose rack. Cabinet shall be Potter-Roemer No., 1810-F recessed, 1812-F semi-recessed, 1815 surface mounted.

F. Thread Test: A test shall be made of the thread on the 2-1/2" valves and Siamese connections using a coupling from the local Fire Department hose. The test shall be made in the presence of the Owner or the Owner's representative.

G. Underwriters' Rules: All piping, valves and other materials shall be installed according to the applicable NFPA 14. See Reference Standards specified hereinbefore. An inspection certificate shall be furnished to the Owner by the Subcontractor. All fittings, hose, valves, etc., shall be UL listed or FM approved.

2.8 FIRE AND JOCKEY PUMPS

A. See Section 21 30 00 titled "Fire Pumps and Controllers".

2.9 FIRE PUMP WATER FLOW ALARM SWITCHES

A. UL listed, and FM approved, water flow alarm switches shall be furnished and installed in the discharge piping of each fire pump. Water flow switches similar to Autocall WF-5 shall be suitable for the working pressure of the system and shall be equipped with an adjustable retard feature to prevent false alarms. Coordinate all requirements with Division 28 FDAC System specifications.

PART 3 EXECUTION

3.1 INSTALLATION

A. The complete Fire Suppression standpipe system and hose installation shall be in accordance with the manufacturer's recommendations and as indicated on the Drawings.

B. All Fire Suppression piping shall be made and installed in accordance with the applicable NFPA Standards, as indicated on the Drawings, and as specified herein.

C. Exposed piping shall be installed as nearly as possible parallel to or at right angles to the column lines of the building. Run all pipe straight and true. Springing or forcing piping into place will not be permitted. Install piping in such a manner as to prevent strain on the equipment.

D. Piping in finished portions of the building, except in mechanical equipment rooms, stairwells or where otherwise indicated on the Drawings shall be concealed.

E. All piping shall be carefully graded so as to eliminate traps and pockets. Where water traps cannot be avoided, provide drains.

F. Make all joints smooth and unobstructed inside. Ream all cut pipe ends to remove burrs. Remove all obstructions prior to fabrication.

G. Install a union or flanges at equipment connections and elsewhere as indicated.

H. Make welded joints on pipe runs with continuous welds, without backing rings, and with pipe ends beveled before fabrication. Gas cuts shall be true and free from burned metal. Before welding, surfaces shall be thoroughly cleaned. The piping shall be carefully aligned and no metal shall project within the pipe.

I. All welded elbows shall be long radius types.

J. The Subcontractor shall furnish and install all sleeves and fire safing required for the lines and risers required for the standpipe and sprinkler systems. See Section 21 00 10 for requirements.

K. All piping shall be of the sizes required by applicable codes but not less than the sizes indicated on the Drawings. The maximum water flow velocity shall be limited to five (5) feet per second in the suction line supplying the fire pumps. Main and loop piping shall be routed as indicated on the Drawings.

L. All welders shall be certified by ANSI B31.1.0-1967 - “Standard Qualification Welding Procedures, Welders and Welding Operators”. Furnish welder performance qualification test certificates for positions 2G and 5G made in strict compliance with the above codes. Welders shall be certified for the type of pipe materials specified herein. All costs incident to procedures and welder’s qualification tests shall be assumed by the Subcontractor. Two (2) copies of the qualification test report and certification with welder’s identification number, letter, etc., shall be delivered to the Engineer for his file before any welding commences. Each weld shall bear the welder’s identification mark permanently indented in the weld. Welding procedures shall also be in accordance with the requirements of the American Welding Society, current edition where applicable.

M. The Subcontractor shall coordinate the installation of pipes, hangers, valves and all other items of the fire suppression system with the work of all other trades so that all components will be installed to avoid conflicts, maintain the tenant flexibility zone at least 8” above the ceiling, and provide for proper servicing and maintenance of mechanical and electrical equipment in ceiling plenums. Components improperly installed shall be removed or relocated as directed by the Architect or Engineer at no additional cost to the Owner. Refer to Section 21 00 10 Paragraph 1.12 titled “Coordination Drawings” for additional requirements. If any departures from the Drawings are necessary to comply with any NFPA requirements or the authorities having jurisdiction, such revisions or departures shall be detailed and submitted for approval. Departures shall not be made without prior written approval by the Architect or Engineer. The Drawings are schematic and do not indicate inferred details. This installation shall also meet the approval of the local Fire Marshal.

N. All pipes throughout the building shall be thoroughly and substantially supported with UL listed, or FM approved, hangers and support devices. Furnish and install any special hangers or supports that may be required due to any peculiarities of construction. The design, selection spacing and application of horizontal pipe hangers, supports, restraints, anchors and guides shall be in accordance with the applicable NFPA 13 and 14.

O. All vertical pipes 8" in diameter and smaller shall be supported at least every other floor with Grinnell Figure 261 or approved equal riser clamps.

P. Hanger rods, inserts, etc., shall be sized and installed as recommended by the manufacturer for the service intended. Hanger rods shall be galvanized.

Q. The Subcontractor shall submit pipe hanger, insert and support details for concrete floor construction to the base building Structural Engineer for review and approval prior to submission to the Engineer.

R. The Subcontractor utilizing a grooved piping system shall provide a letter of certification to the Engineer and Architect stating that a Project Site training session of at least two (2) hours duration was conducted for this Project by the grooved fitting manufacturer for the Subcontractor's supervisory and installing personnel.

S. Qualifications: Only Subcontractors and workmen experienced and regularly engaged in the installation of Fire Suppression systems for the past five (5) years and licensed as required by the authorities having jurisdiction shall be permitted to install the system.

3.2 FACTORY TESTING

A. All standard factory tests shall be performed in accordance with the latest applicable version of NFPA and UL Standards.

3.3 FIELD TESTING

A. Inspections and Tests: All inspections, examinations and tests required by the authorities or agencies specified hereinbefore shall be arranged and paid for by the Subcontractor, as necessary to obtain complete and final acceptance of the system as installed. The certificates of inspection shall be in quadruplicate and shall be furnished as Submittal Data.

NOTE: All hydrostatic tests shall be performed as required by the reference standards cited hereinbefore and the authorities having jurisdiction, except the testing period shall be not less than eight (8) hours.

B. Periodic Inspection Service: After completion of the Fire Suppression standpipe and hose system and at the beginning of the warranty period the Subcontractor shall perform, without charge to the Owner, one (1) inspection of the standpipe and hose systems during the warranty period. Inspection shall be as per the applicable NFPA No. 25, "Inspection, Testing and Maintenance of Water Based Fire Suppression Systems" plus the following maintenance to be performed during the course of the inspection:
1. Operation of all control valves.
2. Lubrication of operating stems of all interior valves.
3. Operation of water gong, electric alarms, supervisory panels, air compressors, alarm trip switches, flow switches, etc.
4. Cleaning of alarm valves.
5. Lubrication of Fire Department hose connection inlet and fire hose valve threads.
6. The Standard Form of the National Fire Sprinkler Association, Inc., "Report of Inspection" (Sheets 1 and 2), shall be filled out in triplicate after each inspection and the copies furnished as Submittal Data.

C. The Subcontractor shall notify the Engineer and Owner in writing at least two (2) weeks prior to the day of the field test. The Engineer and Owner may witness the field test if they so desire.

D. Refer to Section 21 05 93 for additional testing requirements for fire suppression systems.

END OF SECTION