

SECTION 13900
FIRE SUPPRESSION

PART 1 GENERAL

1.1 SCOPE

- A. The work under this section of the specifications consists of furnishing all materials, equipment, labor, testing, appurtenances, engineering and performing all operations in conjunction with all fire protection work indicated on drawings and specified herein.
- B. This is a performance base specification with the Sprinkler Contractor providing professional design services of an Engineer. The information in this Section of the DMS is intended solely to set forth the minimum engineering, material and installation requirements to be used as basic prerequisites applied to the work in this Section.

1.2 RELATED DOCUMENTS

- A. The other Contract Documents complement the requirements of this Section. The General Requirements apply to the work of this Section.

1.3 CODES AND REGULATIONS

- A. Sprinkler system design, equipment, materials, devices and installation shall conform to NFPA Codes and Requirements of Governmental Bodies and Bureaus as listed below.
 - 1. NFPA-13, 14, 20, and 24
 - 2. The City of Melbourne Code Compliance Division Melbourne Fire Department.
 - 3. Underwriters Laboratory
 - 4. Factory Mutual
 - 5. Department of Professional Regulation, State of Florida, Law and Rules, Chapter 471, Florida Statutes and Rules Chapter 61G15, Florida Administrative Code.
 - 6. FBC Florida Building Code

1.4 SUBMITTALS

- A. Prior to commencing the work, the Sprinkler Contractor shall submit a complete set of detailed signed and sealed working drawings prepared by an Engineer in accordance with NFPA-13, showing equipment, underground fire service lines, risers, piping and heads. These drawings shall be coordinated with structural steel, mechanical ductwork and piping shop drawings prior to submission. Drawings shall indicate cut length of piping, elevation of lines, location of piping from columns and/or other fixed building elements. If using grooved couplings, show joint coupling and fittings on drawings and product submittals, specially identified with the applicable manufacturer' style number.
- B. The Engineer shall prepare and submit a complete set of signed and sealed hydraulic calculations for each riser. Where risers serve areas with different hazard classifications, provide a separate calculation for each hazard. Provide graph sheets with plotted water supply curve, sprinkler system demand curve and hose demand.
- C. Sprinkler drawings shall be coordinated with the mechanical and electrical, and the Project Consultant's reflective ceiling plans. Because the drops for sprinkler heads are installed prior to the lighting, ductwork and air outlets, the Sprinkler Contractor shall locate the heads to avoid interference with such items. Locations for mechanical and electrical items shall have priority

over sprinkler piping and head locations. Where sprinkler heads are to be installed on modular ceiling panels, locate in symmetrical pattern acceptable to the Architect. The Contractor shall include in his base bid the cost of providing such material and labor as required coordinating his work with that of the other trades and providing same at no additional cost to the Owner.

- D. Identify sprinklers on drawings, submittals, and other documentation, by the sprinkler identification or Model number as specifically published in the appropriate agency listing approval. Do not use trade names or other abbreviated designations.
- E. Submit material and equipment data sheets, test certificates, instructions and similar information to demonstrate compliance with the specification.

1.5 TESTS AND CERTIFICATION

- A. Sprinkler Contractor shall test system in accordance with NFPA-13, NFPA-14 and 24. Tests shall be conducted in the presence of the authority having jurisdiction and the Owners' representative. The Contractor shall have available at the site, a copy of the prescribed test. Contractor shall give ample notice as to time for conducting tests.
- B. Should any component of the system fail the prescribed test, Contractor shall replace such component of increased strength as required to withstand test.
- C. Upon completion of installation and test, Contractor shall prepare "Contractor's Material and Test Certificate for Aboveground Piping", as prescribed in NFPA-13, and "Contractor's Material and Test Certificate for Private Fire Service Mains" as prescribed in NFPA-24. Certificate shall be signed by Contractor's and Owners' representative. Contractor shall furnish copies of the signed Certificate to the Owner, and Project Consultant.
- D. Where a fire pump is required, fire pump/controller test shall be performed in accordance with Chapter 11 of NFPA-20. Test shall be conducted in the automatic mode of operation on normal and emergency power sources. A Pump Acceptance Test Data form shall be provided, similar to the example in the Appendix of NFPA-20.

1.6 WIRING

- A. The Contractor shall coordinate power wiring and connection to the fire alarm system for signal and alarm devices furnished under this section of the specifications.
- B. Furnish motors, controllers, contactors, and disconnects with their respective pieces of equipment. Controllers and contactors shall have a maximum of 120V control circuits, and auxiliary contacts for use with the controls furnished. When motors and equipment furnished are larger than sizes indicated, the cost of providing additional electrical service and related work shall be included under this section.

1.7 INSTRUCTION

- A. Furnish typed instructions relative to sprinkler controls, alarm device operations and emergency procedures.
- B. Instructions shall be encased in a metal frame with glass or lucite cover and shall be permanently secured by chain to the sprinkler riser at each controlling alarm valve of the hydraulically designed automatic sprinkler system.
- C. The following information shall be included on each placard where applicable:
 - 1. Area of water application _____ sq.ft.
 - 2. Minimum rate of water application (density) _____ gpm/sq.ft.
 - 3. Area per sprinkler _____ sq.ft.
 - 4. Allowance for inside hose and outside hydrants _____ gpm.

1.8 SCOPE

- A. The entire facility shall be fully sprinklered with head spacing and locations in accordance with NFPA-13 including equipment rooms, closets, and similar locations.

1.9 DESIGN CRITERIA

- A. The sprinkler system shall be hydraulically designed.
- B. If the project is to be constructed in phases, the sprinkler system shall be sized to serve completed and future phases.
- C. The general sprinkler system design parameters are as follows:
 - 1. Administrative and Classrooms: Light hazard occupancy, minimum application density of 0.10 gpm/sq.ft. over 1500 square feet.
 - 2. Kitchen/Food Service Area: Ordinary Hazard, Group I, minimum application density of 0.15 gpm/sq.ft. over 1500 square feet.
 - 3. Stage Area: Ordinary Hazard, Group II, minimum application density of 0.20 gpm/sq.ft. over 1500 square feet. In addition to the sprinkler system, a Class III standpipe system shall be provided at the stage where required by NFPA-101.
- D. Hose: 100 gpm for light hazard, 250 gpm for ordinary hazard.
- E. Coverage: maximum 225 square feet per head for light hazard areas, maximum 130 square feet per head for ordinary hazard areas.
- F. The flow information is as follows:
 - 1. Static Pressure: _____ psi.
 - 2. Residual Pressure _____ psi.
 - 3. Flow at Residual Pressure _____ GPM.
 - 4. Date of Test: _____.
 - 5. Taken by: City of Melbourne Fire Department.

PART 2 PRODUCTS

2.1 PIPE MATERIAL

- A. All pipe materials and fittings shall be of domestic manufacture.
- B. Underground Piping: As shown and specified on civil drawings.
- C. Interior Piping:
 - 1. Branch piping up to 2" in size shall be Schedule 40 black steel ASTM A-135, ASTM A-53, or ASTM A-795 with screwed, welded or cut grooved ends.
 - 2. Main piping 2½" and larger shall be Schedule 10, ASTM A-135, ASTM A-53, or ASTM A-795, with welded or roll grooved ends.
- D. Screwed Fittings: Cast iron, Class 125 ANSI B16.4, or malleable iron conforming to ANSI B16.3, 150 pound.
- E. Flanged Fittings: Cast iron, 175-psi cold water pressure, ANSI B16.1, butt weld fittings ANSI B16.9.
- F. Grooved Fittings: Shall be cast of ductile iron (ASTM A-395 and A-536) forged steel (ASTM A-234), or fabricated from carbon steel pipe (ASTM A-53) approved for use by the coupling manufacturer with flow characteristics equal to or better than standard fittings equal to Grinnell, Starr or Victaulic.

- G. Mechanical Couplings: UL listed and FM Global approved for fire protection service, ductile or iron housing, rust inhibiting no-lead painted coating, zinc electroplated heat treated bolts and heavy hex carbon steel nuts meeting ASTM A-449 equal to Grinnell, Starr or Victaulic.
 - 1. Rigid Type: To provide system rigidity, use coupling housings cast with offsetting, angle-pattern bolt pads, support and hang in accordance with NFPA 13, Victaulic 005 or 07.
 - 2. Flexible Type: Use in locations where vibration attenuation and stress relief are required. May use flexible couplings in lieu of flexible connectors at equipment connections. Place three couplings in close proximity to the vibration source, Victaulic Style 75 or 77.
 - 3. Flange Adapters: Flat face, for direct connection to ANSI Class 125 or 150 flanged components. Victaulic Style 744.
- H. Locking Lug Fittings: UL listed and FM Global approved for fire protection service, ductile iron housings with self-contained synthetic rubber gaskets, internal pipe stop, plated ¼-turn positive locking lugs with externally visible locked position indicator.
- I. Hangers shall be UL listed and FM approved, plated or galvanized finish equal to Grinnell, B-Line or Michigan Hanger.
- J. Non-grooved products such as “Pressfit”, “Snap-Let” outlets and/or “Fit” plain end products shall not be used.
- K. Bolted branch outlets (Victaulic style 920/920N and similar) when approved by the Engineer and the District.
- L. Adjustable nipples using an o-ring design shall not be used. Head outlets shall be preformed tee pipefittings, welded, thread-o-lets or grooved couplings, similar or equal to Victaulic Style 073.
- M. Reducing bushings/couplings shall not be used.
- N. CPVC Fire Sprinkler Pipe and Fittings meeting ASTM F442, ASTM F437 and ASTM F439 may be used in certain applications. Prior approval by Florida Tech Facilities Management Department is required.

2.2 EQUIPMENT

- A. All equipment listed herein shall be Grinnell, Central, Star, Reliable, or Viking, System Sensor, or Victaulic. All components shall be UL listed and FM Global approved.
- B. Vane type Flow switch waterflow detector with two SPDT switches and adjustable time delay similar or equal to Grinnell Model VSR-F (wet pipe system) or System Sensor Model WFD.
- C. Siamese Fire Department connection with two 2½” polished brass inlet hose connections, 4” outlet pipe, with red enamel finish, cast iron wall plate labeled "Automatic Sprinkler Fire Department Connection", cast iron ease-off caps and automatic brass ball drip connection, equal to Star. Provide wall or freestanding yard mounting as appropriate to the installation.
 - 1. Where applicable, install a 90° elbow with drain connection at each Siamese Fire Department connection equal to Victaulic 10-DR.
- D. 3½” Diameter Pressure Gauges with ¼” gauge cocks on both sides of the riser check valve, at pumps and where otherwise required or indicated.
- E. 2” angle valve drain connection, bronze body, 175 lb. working pressure, screw bonnet, integral seat, renewable disc, Nibco Model T-301-W or equal.
- F. Riser shut-off valves, OS&Y pattern gate valve or butterfly, with tamper. OS&Y valves shall be iron body, rising stem, solid wedge, 175 lb. working pressure, similar to Nibco Model F-607-OTS. Butterfly valves shall be ductile iron body, gear operator with indicator, resilient liner, similar to Nibco Model #LD3510-2 or GD 1765-4, or Victaulic Series 705W.
- G. Riser and siamese swing check valves shall be swing type, ductile iron body, brass seat, rubber-faced clapper, and class 150 with a maximum working pressure of 250 psi. Provide Viking Model D-1, G-1, F520 or “easy riser swing check valve” or Engineer approved equal. Spring-assisted check valves shall consist of ductile iron body, aluminum bronze or elastomer

- encapsulated ductile iron disc, stainless steel spring and shaft, grooved ends. Provide automatic drip valve where required for drainage.
- H. Gong alarm bell, 24 volt operation, 10 inch diameter weatherproof cast aluminum housing with steel gong, painted red with identification sign.
- I. Fire Pump (where required)
1. Pump shall be UL listed/FM approved, single-stage, centrifugal type with split cast iron casing, electric motor drive. Maximum pump and motor speed shall not exceed 3600 RPM.
 2. The impeller shall be double suction type, made of cast bronze, balanced hydraulically and dynamically, keyed to the shaft and securely retained in an axial position by positive mechanical means. Pump shall be mounted on a steel or cast iron base. Pump shall include a motor coupling with guard.
 3. Suction and discharge connections shall be located to allow removal of the rotating element without disturbing the system piping connections.
 4. Provide the following accessories:
 5. Suction eccentric reducer, with the flat side on top, at the pump inlet; reducer shall be cast iron or wrought steel with flanged connections.
 6. Automatic air release valve with threaded inlet and discharge connections, to vent air from the pump casing.
 7. Casing relief valve, non-adjustable bronze-type, set above the design pressure anticipated but below the combined suction pressure and shut-off head pressure, to discharge water from the system to avoid pump overheating, conforming to NFPA-20.
 8. Pump discharge test header, number of valves in accordance with NFPA-20.
 9. The fire pump manufacturer, of the electrical characteristics indicated, shall provide electric motor drive. Motor shall be open drip proof (ODP), 1.15-service factor and be sized such that the pump motor is not operating in the service factor by more than 5 percent at the design conditions, and/or as required for UL listing/FM approval. Number of motor leads shall be coordinated with the fire pump controller.
- J. Pressure Maintenance Jockey Pump (where required)
1. The jockey pump shall be of the centrifugal type, rated to 230 psi, having a drain and gauge tapings. Pump impeller shall be hydraulically balanced, non-vapor-binding type, mechanically keyed to the shaft. Pump shall have replaceable bronze impeller (casing) wear rings, threaded connections, mechanical seal, non-regreasable cast iron cartridge roller ball bearings, close-coupled to an open-drip proof motor. Pump shall be arranged to draw water from the suction supply side of the gate valve of the fire pump(s) and shall discharge into the system on the downstream side of the pump discharge gate valve.
 2. Jockey Pump Controller: controller shall be completely assembled, wired, and tested at the factory. The unit shall be complete with across-the-line magnetic starter equipped with overload protection, 3-pole fusible disconnect switch, H-O-A selector switch, 10-300 psi bourdon tube pressure regulator with independent high and low setpoints, pump running light, and NEMA 1 enclosure with lockable handle, automatic stop function, minimum run time timer, and contacts for remote restart. Provide an adjustable relay (0-60 minute) with a Form "C" NO/NC alarm contact such that if the jockey pump cycles off and then is restarted before the expiration of the relay timer, the alarm contact will be energized and send an excessive cycling alarm to the fire alarm panel. Start/stop pressure settings shall exceed those of the main fire pump(s). Also include a run timer to ensure the jockey pump runs for the minimum time as recommended by the manufacturer of the jockey pump motor.
- K. Electric Fire Pump Controller/Automatic Transfer Switch

1. The fire pump controller shall meet NFPA 20 and NFPA 70 requirements for fire pump service and are UL listed.
2. The fire pump controller/automatic transfer switch shall be of the combined automatic and manual reduced voltage, soft-start, solid-state, full wave controlled open loop type.
3. The fire pump controller shall have a single handle for operating both the isolating switch and then the solid-state microprocessor-type circuit breaker in sequence. Provide a reduced voltage, soft-start, solid-state NEMA rated starter sized for the motor load. Controls to be furnished shall include a built-in 10-300 psi bourdon tube-type pressure switch with independent high and low setpoints piped to the cabinet exterior, automatic and manual start and manual soft stop and emergency stop pushbuttons, an adjustable minimum run timer, power available light, and power monitoring sensing all phases for loss of any phase, under voltage, or phase reversal. Fire pump controller shall provide three (3) signals to the facility fire alarm control panel per NFPA 20 and NFPA 72. Provide dry contacts for signaling loss of input power; phase reversal; pump running; and provide contacts for remote start. Provide voltage surge arresters between each line terminal of the controller isolating switch and ground, to suppress voltage surges above rated motor voltage tolerance. The reduced voltage acceleration ramp shall be adjustable between 0.5 and 10 seconds, with a bypass contactor to energize at full speed or upon overheating of the solid-state starter. Stop sequence shall also be initiated through the solid-state starter and include an adjustable deceleration ramp. All indicated controls and a dry-type control transformer shall be housed in steel NEMA 2 enclosure with lockable handle, and shall be factory assembled and tested prior to shipment.
4. The automatic transfer switch shall withstand current rating of at least 22,000 RMS symmetrical Amps and be capable of manual mechanical operation by means of a readily accessible handle. It shall provide for transfer of the soft/start controller to an emergency power source upon failure of the normal power source and return to the normal power when power is restored. The transfer switch shall be electrically operated and mechanically held, and listed by U.L. for fire pump service.
5. The controller assembly shall be rated to withstand the maximum available fault current of the normal and emergency isolating switches. Voltage and horsepower rating shall be as scheduled.
6. An audible alarm shall be provided.
7. A safety mechanical link shall be provided between the emergency isolating switch and the normal isolating switch to mechanically open the emergency isolating switch when the normal isolating switch is opened. It shall also have a safety interlock to prevent the isolating switch from being either opened or closed when the circuit breaker is closed. Visual indication of the switch position shall be provided.
8. Controller shall be service entrance labeled by U.L.
9. Provide remote alarm panel for 120 volt input with power on light, pump run light, pump power failure light, remote fire pump start switch, press-to-test switches, audible alarm with alarm silence.

2.3 SPRINKLER HEADS

- A. Sprinkler heads shall be UL listed, FM Global approved, and from a single manufacturer, equal to Grinnell, Star, Viking, Reliable Central or Victaulic of the following types:
 1. Sprinkler heads shall be of the ordinary temperature range, 155°F, except where subject to high temperatures caused by unit heaters, hot pipes, radiant ceiling, or other heat source, heads shall be of high temperature type, 250°F.

2. For areas with finished ceilings: heads shall be of semi-recessed pedant type, chrome finish with escutcheon, fusible metal alloy link, or glass bulb tube. Body shall be die cast brass, with hex-shaped wrench boss cast into the body to facilitate installation and reduce the risk of damage during installation.
3. For areas without ceilings: heads shall be of upright style, brass finish, fusible metal alloy link, or glass bulb tube.
4. In gymnasiums, dry storage rooms, walk-in freezers, and other spaces where heads are subject to damage provide wire guards.
5. For areas subject to freezing (walk-in freezers and coolers): dry type semi-recessed pendant style, chrome finish, with escutcheon and fusible metal alloy link or glass bulb type.
6. Heads shall be nominal ½" orifice type unless otherwise required by hydraulic calculations.
7. Provide escutcheons and guards listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer.
8. In residential areas within reach of students, faculty and staff, tamper-resistant heads with 135°F covers such as Reliable Model F1 Res 49 & 58 CCP Pendent and F1 Res 44 SWC (or equal) shall be used.

2.4 SPRINKLER HEAD CABINET

- A. For each building provide a wall-mounted sprinkler head cabinet with a minimum of 6 heads of each type used or as required by NFPA-13, together with required wrenches for replacing heads.

2.5 ALARM SYSTEM

- A. Install in riser a water flow indicator of the vane type with two sets of contacts, automatic reset and instant recycling retard and circuit closer, for connection to the fire alarm system and gong alarm under Division 16.
- B. Install on riser O.S.&Y. (or butterfly) shut-off valve, a tamper switch to indicate whether the valve is open or closed for connection to the fire alarm under Division 16.

2.6 WALL PENETRATION

- A. Penetration of fire rated walls shall be made using a UL listed fire rated wall penetration assembly. Rating shall be equal to or greater than the wall rating.
- B. Penetration of floor slabs shall be made using a Schedule 40 pipe sleeve, with the space between the pipe and sleeve sealed with mastic.

2.7 HOSE RACK ASSEMBLY

- A. Class III Hose Rack Assembly red enamel rack, rough brass 2-1/2 inch valve with polished brass trim and separate 1-1/2 inch hose valve with 100 feet of 1-1/2 inch lined 500 pound polyflex hose, and adjustable spray nozzle.
- B. Surface mounting steel cabinet, white color with see-through glass panel in door.

PART 3 EXECUTION

3.1 DESIGN

- A. Provide services of the Licensed Professional Engineer in the State of Florida to design a complete wet pipe sprinkler system in accordance with NFPA-13, NFPA-24 and other applicable code requirements.
- B. Engineer shall provide signed and sealed engineering documents suitable for fabrication including cut lengths of pipe.
- C. Engineer shall provide signed and sealed hydraulic calculations for each riser and for each hazard classification.

3.2 INSTALLATION

- A. Install new fire service line and sprinkler system generally as indicated and coordinate with work of other trades. Exact requirements and installation shall be in accordance with working shop drawings.
- B. Hydrostatically pressure test above ground piping for two hours at pressure as required by NFPA-13 and 14, with no observable leakage allowed. Pressure test below ground piping in accordance with NFPA-24, with leakage not to exceed that allowed by NFPA-24.
- C. Label drain piping, inspectors test stations, main drain, electric gong and similar system components. Locate inspectors test station in a non-student occupied space. Inspectors test station and main drain piping shall discharge outdoors onto a splash block.
- D. Test system in presence of Owner in accordance with NFPA-13 and 24 requirements. Provide a fire pump acceptance test in accordance with NFPA-20 requirements to include both automatic and manual modes of operation on regular and emergency power sources.
- E. Paint exposed piping red. Provide red head guards for heads subject to damage.
- F. Provide rigid couplings at connection to valves in riser, use flexible couplings at building expansion joints and similar locations subject to movement.
- G. Provide auxiliary drains for trapped sections of piping.
- H. Install hangers at branch and main line locations as required by NFPA-13. Hangers shall be securely fastened to the structure utilizing offset or center loading beam clamps, or "C" clamps with retainer clip. Provide miscellaneous support steel where required to span across structural members. Attachment to concrete structures shall be made using drilled-in concrete inserts or self-tapping studs. Power driven studs shall only be used with the permission of the project structural engineer, and if approved, a minimum of four studs shall be tested at four times the applied piping load. Should any of the studs fail the load test, power driven studs shall not be used.
- I. Provide heads above ceilings where combustible construction is present.
- J. Label exposed piping with snap-on type plastic labels at no less than 20 feet on-center, but at least one label on each exposed section of piping.
- K. Post operating instructions for the fire pump to include system operation, resetting trouble conditions and cautionary warnings.
- L. Provide training for the Owners staff as to proper operation and maintenance of the fire pump system.
- M. Grooved Joints:
 - 1. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer, and the grooving tools shall be of the same manufacturer.
 - 2. Use gaskets molded and produced by the groove-coupling manufacturer.
 - 3. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove.
 - 4. Grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of groove, and installation of grooved piping products.

5. Factory trained representative shall periodically inspect the product installation.
 6. Contractor shall remove and replace any improperly installed products.
 7. Pipe shall be certified for use with the manufacturer's system.
- N. Locking Lug Joints:
1. Pipe ends shall be square cut and thoroughly clean on the outside edge for 1" from the pipe end to remove pipe coatings, mill scale, rust and raised weld beads.
 2. Remove all burrs and sharp edges on the pipe inside and outside edge.
 3. Pipe shall be marked 1 ½" from the end and pipe end configuration shall be in conformance with manufacturer's specifications.

END OF SECTION