

SECTION 211313 – FIRE PROTECTION SPRINKLER & STANDPIPE SYSTEMS

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(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all “Underlines”.)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 21.

1.2 SUMMARY

- A. This section includes requirements for furnishing, a complete fire protection system and/or modifying an existing system, including the following: **<Edit for Project>**
 - 1. Pipe, fittings, joints, and backflow preventors.
 - 2. Valves and inspector’s test assemblies.
 - 3. Supervisory switches, flow detectors and pressure switches.
 - 4. Cabinets.
 - 5. Pressure gauges.
 - 6. Hangers.
 - 7. Sprinklers.
 - 8. Air Vents.
 - 9. Exterior fire department connections.
 - 10. Fire department hose valves.
 - 11. Wet pipe systems.
 - 12. Dry pipe systems.
 - 13. Pre-action pipe systems.
 - 14. Nitrogen generator.

1.3 ACTION SUBMITTALS

- A. Product Data: For each specified product, include manufacturers cut sheets, dimensional data, performance data, installation instructions, wirings diagrams, power requirements, specified options, and warranty information.
 - 1. Do not include manufacturers maintenance information in the action submittal. Include this information in the O & M Manual.
- B. Fire Protection Shop Drawings (working plans): For each fire protection system, include a complete fire protection system layout indicating the location, elevation, and sizes of the distribution piping, standpipes, floor zone valves, hangers, and sprinklers and include all required dimensional data. Also include the location of the water service entrance to the

building, the fire pump, and electrical components if needed. The system layout must be coordinated with the work of all other trades.

1. Fire protection shop drawings (working plans) must be developed by computer software. Fire protection shop drawings (working plans) submitted for review that are hand drawn or have handwritten notes will be rejected.
2. Sprinkler type shall be identified on the drawings by the manufacturer's model number.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Product Data: Include a copy of the approved submittal for each product and material along with applicable maintenance data in the project operation and maintenance manual.
- B. Final As-Built Construction Record Documents: Include a electronic copy of the final as-built construction record documents and hydraulic calculations for each type of fire protection system. See Specification Section "210000 Basic Fire Protection Requirements" for additional requirements.
- C. File Format: See Specification Section "Basic Fire Protection Requirements" for file formats.

1.6 PROJECT REQUIREMENTS

- A. Except as modified herein, the system shall be designed in accordance with [NFPA 13] [NFPA14] and the UMB Design Standards Manual. Pipes sizes shall be determined by [hydraulic calculations] [utilizing the existing building pipe schedule]. <Coordinate with the UMB Fire Marshal and edit for the project>
- B. Contractor shall comply with NFPA 241 Safeguarding Construction, Alteration, and Demolition Operations while construction is underway to provide reasonable safety to life and property from fire. Contractor is responsible for ensuring the applicable sections are reviewed and enacted.
- C. A minimum of 10% or 10 psi safety margin, whichever is greater, above the system pressure demand shall be provided in the hydraulic calculations of all fire protection systems.

- D. Provide a standpipe calculation demonstrating that the NFPA 14 required flow rates at a minimum residual pressure of 100 psi can be obtained at the most remote hose valve with a flat supply pressure of 150 psi at the fire department connection.
- E. New Construction Projects: Comply with the following:
 - 1. Floor Zones: Each floor shall be separate a zone.
 - 2. Standpipes: Provide a standpipe riser for each stairwell with a fire hose connection on each level.
- F. Renovation Projects: Where portions of existing buildings are renovated, the existing sprinkler floor zone assembly shall be reused unless otherwise directed by the UMB Fire Marshal.

1.7 QUALITY ASSURANCE

- A. During the two (2) year guarantee period, the contractor shall be responsible for the proper adjustment of all systems, equipment, and apparatus, installed by them and perform all the work necessary to ensure safe, efficient, and proper functioning of the systems and equipment at no cost to the University.

1.8 WARRANTY/GUARANTEE

- A. See Division 21 Specification Section “Basic Fire Protection Requirements” for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 LISTED MANUFACTURERS

- A. The manufacturers indicated in Part 2 represent the basis for design and identify the minimum level of quality for materials and equipment, specified in this section, that are acceptable to UMB. Unless otherwise indicated in this Section, contractors may submit material and equipment by non listed manufacturers provided said submittals meet the requirements of these specifications. All submitted materials and equipment are subject to approval by the A/E and UMB.

2.2 SPRINKLER SYSTEM PIPE, FITTINGS, JOINTS AND BACKFLOW PREVENTERS

- A. General: All pipe, fillings, joints, and couplings used for standpipe and sprinkler systems shall be as follows:
 - 1. Piping: All piping shall be the product of one (1) manufacturer. Piping one (1) inch through eight (8) inches shall be provided with antimicrobial coating to limit

corrosion from microbes on the interior of the pipe. Acceptable manufacturer for sprinkler piping is Wheatland Tube Company or approved domestic equal.

2. Fittings, Couplings and Gaskets: All grooved fittings, couplings and gaskets shall be the product of one (1) manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. Acceptable manufacturers for grooved fittings, couplings and gaskets are Victaulic or Gruvlok with Victaulic products as the basis of design.
 3. The Contractor shall be responsible for replacing all products and material that were installed and was not included in the approved submittal.
- B. Exterior Service Pipe Material: Fire protection service piping above grade within the building including the backflow preventer and exterior the piping below grade to a point five (5) feet outside the building shall be as provided and installed by the plumbing contractor. The pipe and fittings shall be ductile iron pipe and fittings.
- C. Interior Pipe Material: All interior piping above grade within the building from the backflow preventer to the pump and the building shall be Grade A or Grade B, Schedule 40 black steel pipe manufactured in the United States as follows:
1. Piping one and one half (1-1/2) inch and smaller shall conform to Type 'F' Grade 'A' Schedule 40 black steel pipe per ASTM A53 with threaded ends. Threads shall be per ANSI B.1.20.1.
 2. All two (2) inch piping shall conform to Type 'E' Grade 'B' Schedule 40 black steel pipe per ASTM A53. Two (2) inch piping shall be either thread end type per paragraph 1 above or rolled grooved end type per paragraph 3 below. (Contractor Option)
 3. Piping two and one half (2-1/2) inches and larger shall conform to Type 'E' Grade 'B' Schedule 40 black steel pipe per ASTM A53 with rolled grooved ends.
- D. Fitting Material: Comply with the following:
1. Fittings for piping one and one half (1-1/2) inch and smaller shall be threaded Class 125 cast iron fittings.
 2. Fittings for two (2) inch piping shall be either threaded Class 125 cast iron per paragraph 1 above or ductile iron grooved end fittings per paragraph 3 below. (Contractor Option)
 3. Fittings for piping two and one half (2-1/2) inches and larger shall be ductile iron grooved end fittings. Fittings shall be short pattern, with flow equal to standard pattern fittings.

E. Joints, Couplings, Mechanical T's and Gaskets: Comply with the following:

1. Joints:
 - a. Joints for piping one and one half (1-1/2) inch and smaller shall be Threaded Joints conforming to American Standard for Pipe Threads ANSI B2.1.
 - b. Joints for two (2) inch piping shall either be Threaded Joints per paragraph 'a' above or Rolled Groove Joints with Couplings per paragraph 'c' below. (Contractor Option)
 - c. Joints for piping two and one half (2-1/2) inch and larger shall be Rolled Groove Joints with Couplings.
2. Couplings:
 - a. Couplings for rolled grooved piping shall be Victaulic Style 009N two (2) Bolt Installation Ready Coupling with offset angled bolt pads to accomplish rigidity and provide support in accordance with NFPA 13. Couplings shall be fully installed at visual pad to pad offset contact. Couplings that require gapping of bolt pads or specific torque ratings for proper installation are not permitted.
 - b. Where seismic design requirements are applicable, provide Victaulic Quick Vic Flexible Coupling Style 177N.
3. Mechanical-Ts:
 - a. For piping smaller than 2", provide Victaulic FireLock Outlet-T Style 922.
 - b. For piping larger than 2", provide Victaulic Mechanical-T Bolded Branch Outlet Style 920.
 - c. For 2" piping, either the Victaulic FireLock Outlet-T Style 922 or Victaulic Mechanical-T Bolded Branch Outlet Style 920 is acceptable.
4. Gaskets: Gasket Material shall be as follows:
 - a. Wet Systems: Grade 'EHP' EPDM.
 - b. Dry Systems: Grade 'E' Type 'A' EPDM.
5. Backflow Preventors: When required by code, backflow preventors shall be included in the Fire Protection System. The backflow preventor shall be provided,

installed, and certified by a licensed plumber. Coordinate with Division 22, Specification Section 22110 “Domestic and Laboratory Water Piping Systems and Specialties” for requirements. <Delete if not Required>

2.3 VALVES AND TEST CONNECTION

- A. General: Valves shall be approved types and as specified in NFPA 13 and the UL. All valves controlling fire protection water supplies shall be supervised. Butterfly Valves and or Ball Valves designed for fire protection service only and with integral tamper switches unless otherwise noted. In systems requiring a fire pump provide Outside Stem and Yoke (OS&Y) valves in the suction piping of the system.
- B. Ball Valves with Integral Tamper Switches: For piping systems one (1) inch through two (2) inch, requiring supervised valves, provide Victaulic Series 728 FireLock full port, ball valve that is UL/FM rated for 365psi/25 BAR service in all sizes (LPCB and VdS listed for 20 BAR services). Available with grooved or threaded ends (NPT), the valve body is brass. The ball is chrome plated brass with a stainless steel stem. Reinforced seats aid ease of operation and provide a durable, corrosion-free seat. Flow characteristics exceed UL Specification 1091 and FM Approval Standard 1112. The valve is approved for indoor and outdoor use. Valve supervisory switches shall include two (2) single pole, double throw, pre-wired switches. Switches shall supervise the valve in the open position.

<Delete if not Required>

- C. Butterfly Valves with Integral Tamper Switches: For piping systems two (2) inch through twelve (12) inch, requiring supervised valves, provide Victaulic Series 705 FireLock Butterfly Valves, pressure rated up to 300 psi with ductile iron body (ASTM A-536, Grade 65-45-12), ductile iron disk with electroless nickel coating (ASTM B-733), Grade E EPDM pressure responsive seat, teflon impregnated fiberglass with stainless steel backing stem bearings, EPDM O ring, carbon steel plated tap plug, bracket, groove to groove end connections, and weatherproof actuator or approved equal by Grinnell, Viking, Stockham, Muller, or Nibco. The valve stem shall be offset from the disc centerline to provide complete 360 degree circumferential seating. The valve is approved for indoor and outdoor use. Valve supervisory switches shall include two (2) single pole, double throw, pre-wired switches. Switches shall supervise the valve in the open position.

OS&Y Valves: OS&Y valves shall be by Victaulic Series 771H Groove by Groove or Series 771F Groove by Flange pressure rated up to 200 PSI, with ductile iron body (ASTM – 536), EPDM body gaskets, steel nuts and bolts, and cast iron hand wheel (ASTM 126 – B) or approved equal by Grinnell, Viking Stockham, Muller, or Nibco. See Article 2.4 below for supervisory switch requirements. <Delete if not Required>

- D. Trim and Drain Valves: Trim and drain. valves include ball valves, globe valves and plug valves. Trim and drain valves installed as part of an automatic sprinkler system or fire protection standpipe shall have a minimum pressure rating of 175 psi and be listed for use as part of a fire protection system by UL’s “Fire Protection Equipment Directory” or FM

Global's "Approval Guide." Automatic (ball drip) drain valves shall comply with UL 1726. Ball drip valves shall be minimum NPS three-quarters (3/4) inch with threaded connections.

E. Check Valves: Provide check valves where required as follows:

1. Alarm Check Valve: An approved alarm check valve (variable pressure type) with all appropriate trimmings shall be installed on the system side of the water supply control valve. Alarm check valve shall be by Victaulic Series 751, with a high strength ductile iron body (ASTM A-536 Grade 65-45-12), aluminum bronze clapper, stainless steel shaft – 17-4, EPDM clapper seal (ASTM D2000), nitrile seat O rings, stainless steel springs, and all necessary trim for a complete assembly, pressure rated up to 300 psi or approved equal. The valves internal components shall be replaceable with the valve in the installed position. The top of the retard device or alarm line shall be fitted with an approved pressure switch Reliable Model 'G', Type 1, or equivalent. Conductors shall be provided under the electrical section to provide fire alarm and annunciation. Activation of the sprinkler system by one sprinkler or equivalent test shall cause the fire alarm system to activate and the appropriate lamp(s) to activate on the annunciator as "Main Water Flow".
2. Swing Check Valves: Swing-type check valves shall comply with UL 312 rated up to 300 psi with cast iron body. Subject to compliance with requirements, provide check valves manufactured by Grinnell, Viking, Stockham, Muller, or Nibco.

F. Indicating Post/Wall Valves and Indicators: Provide indicating post wall valves and indicators where required as follows for the project:

1. The valve shall be an iron body unit approved by UL and designed for use with wall or post indicators. The valves shall be non-rising stem. The valves shall be designed for either vertical or horizontal indicators.
2. The valves shall be Victaulic Series 773 wall post indicator and/or Victaulic Series 774 upright post indicator or approved equal by Grinnell, Viking Stockham, or Nibco.
3. The post indicator shall be supplied by the same manufacturer as the non-rising stem valve. The indicator shall have a handle for turning the valve on or off plus arranged to lock to the indicator body. The indicator shall be painted red.
4. The wall indicator shall be supplied by the same manufacturer as the non-rising stem valve.

G. Inspectors Test Connection: The inspector's test device shall be Victaulic's Test Master II Alarm Test Module, Style 720, with screw threads.

2.4 SUPERVISORY SWITCHES, WATERFLOW DETECTORS AND PRESSURE SWITCHES

- A. Valve Supervisory Switches: The valve supervisory switch shall be System Sensor or Potter Model OSYSU-1, Outside Screw and Yoke Valve Supervisory Switch. Valve supervisory switches shall be electrically supervised and comply with UL 346. Components shall be single-pole, double-throw switch with normally closed contacts. Valve supervisory switches shall send a signal to building fire alarm system when the controlled valve is in other than a fully open position
- B. Indicator-Post Supervisory Switches: Indicator-post supervisory switches shall be electrically supervised and comply with UL 346. Components shall be single-pole, double-throw switch with normally closed contacts. Post indicator supervisory switches shall send a signal to building fire alarm system when the controlled valve is in other than a fully open position.
- C. Water Flow Detectors: Water flow detectors shall be System Sensor Model WFD Series or Model VSR-F by Potter Electric Co. or equivalent and shall be installed where specified by design requirements. Electrical conductors shall be provided under the Electrical Division to provide fire alarm and annunciation. Activation of the sprinkler system by one (1) sprinkler or equivalent test shall initiate an alarm sequence at the Fire Alarm Control Panel and activate the appropriate lamp(s) to activate on the Annunciator Panel. Water flow detectors shall be set to activate at sixty (60) seconds of water flow.
- D. Pressure Switches: Alarm pressure switches shall be System Sensor Series EPS10 or Potter PS Series or approved equal. Electrical conductors shall be provided under the Electrical Division to provide fire alarm notification and annunciation.

2.5 CABINETS

- A. Fire Protection Valve Cabinet: Provide and install where indicated on drawing Potter-Roemer Fig. No. 1810 recessed fire department valve cabinet with 20 gauge tubular steel door, and 18 gauge frame.
- B. Sprinkler Cabinet: Provide a Metal Sprinkler Cabinet equipped with a supply of spare sprinklers. The spare sprinklers shall correspond with each type of sprinkler and temperature rating that was installed in the project. The cabinet shall be a red baked enamel steel box by Potter Roemer Figure 6162, Victaulic or equal.

2.6 PRESSURE GAUGE

- A. Pressure gauges shall comply with UL 393. Dials shall be three and one half (3-1/2) inches to four and one half (4-1/2) inches in diameter. Pressure gauge shall range from 0 to 300 PSI. Water system piping gauges shall include “WATER” or “AIR/WATER” label on dial face. Air system piping gauge shall include retard feature and “AIR” or “AIR/WATER” label on dial face.

2.7 HANGERS

- A. All pipe hangers and hanger spacing shall be in strict accordance with NFPA 13.

2.8 SPRINKLERS <Edit for Project: A/E to select type of sprinkler>

- A. General: Sprinklers shall be listed by UL and only new sprinklers shall be installed. Sprinklers shall be located and installed in accordance with NFPA 13, and properly coordinated with all other work.
- B. Damage to Sprinklers: Any sprinkler that incurs damage, is painted, sprayed, caulked, or covered with any material before the system is accepted by the University shall be replaced by the contractor at no cost to the Owner. Protective sprinkler caps cannot be removed until after the ceiling is in place or sprinklers will be subject to replacement.
- C. Basis of Design: The basis of design shall be sprinklers manufactured by Viking or others as permitted below.
- D. Temperature Ratings: The correct temperature rating of every sprinkler shall be in accordance with NFPA 13 and based upon the maximum anticipated ceiling temperature.
- E. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler. Guards shall be specifically listed for the sprinkler on which they are being installed. Guards shall be installed wherever sprinklers are potentially subject to damage. Guards shall be installed on all upright sprinklers located at the base of stairwells, on all sprinklers under ductwork, and on all sprinklers installed less than six (6) feet – eight (8) inches above the finished floor
- F. Spare Sprinklers: The spare sprinklers shall correspond with each type of sprinkler and temperature rating that was installed in the project. Provide the necessary wrench(s) for each of the type sprinkler installed. Provide spare quantities as follows:

Type of Sprinklers Installed:	Minimum Spare Sprinklers:
1-10	1
11-50	2
51-100	3
101-500	4
501+	6

In no case shall the total number of spare sprinklers provided be less than the number required by NFPA 13.

- G. Coverage: Except for high hazard areas, all sprinklers shall be quick response standard coverage type sprinklers with a 'K' Factor of 5.6, unless prohibited by Code or otherwise directed by the UMB Fire Marshal. Only the listed sprinklers below may be installed, unless specific project requirements dictate a different type of sprinkler:

1. Pendent Sprinklers: Where pendant sprinklers are required, provide Viking VK3021 - Horizon Quick Response Flush Pendent Sprinkler and push on escutcheon with a white polyester finish to match ceiling.
2. Side Wall Sprinklers: Where sidewall sprinklers are required, provide Viking VK305 - Microfast Quick Response Horizontal Sidewall Sprinkler and escutcheon with a white polyester finish to match walls.
3. Upright Sprinklers: Where upright sprinklers are required, provide Viking VK3001 - Microfast Quick Response Upright Sprinkler with a chrome finish.
4. Corrosive Areas: Where sprinklers installed in corrosive areas provide Viking VK130 (Upright) or VK132 (Pendent) - Micromatic Stainless Steel Sprinkler.
5. Cold Rooms: In each new cold room provide Viking 200°F dry pendent Model VK176 Adjustable Sprinkler with a chrome finish
6. Concealed Sprinklers: Where concealed sprinklers are required, provide Viking VK4621 Quick Response Concealed Pendent Sprinkler and push on escutcheon with a white finish to match ceiling.
7. If existing to remain sprinklers are present in the same compartment as new sprinklers, the existing sprinklers are not one of the models specified above, the new sprinklers shall match the type and style of the existing sprinklers.

2.9 AIR VENTS

- A. Provide air vents at the high points of the sprinkler system as required by NFPA as follows:
 1. Automatic Air Venting Valve: Provide an Automatic Air Venting Valve Assembly Model 7900AAV as manufactured by AGF Manufacturing or approved equal by the AHJ. Assembly shall include:
 - a. All metal parts shall be forged brass except the strainer material and handles for the ball valve and the purge valve.
 - b. Air release valve shall include a recessed venting valve, single float on a rigid shaft that only allows vertical movement and a bubble breaker which aids in the passage of air to the vent.
 - c. One (1) inch isolation ball valve with thread end connections a chrome plated ball and stem and a galvanized steel handle.
 - d. Strainer with 20 mesh stainless steel strainer material.
 - e. Adjustable purge valve with a three quarter (3/4) inch hose connection, cap and lanyard.

2. Manual Air Venting Valve: Provide a Manual Air Venting Valve Model 7910MAV as manufactured by AGF Manufacturing or approved equal by the AHJ. Assembly shall include:
 - a. Brass or bronze ball valve, one half (1/2) inch with ball float and strainer screen and a galvanized valve handle and thread end connections.

2.10 EXTERIOR FIRE DEPARTMENT CONNECTION <Edit for Project>

- A. Provide and install the required exterior fire department connection(s) and piping to the system. Each exterior fire department connection(s) shall be the Siamese type and equipped with a ball drip. Piping shall be of the required size, but in no case shall be less than four (4) inches.
- B. The exterior fire department connection(s) shall be chrome or brass finish flush type in a straightaway pattern and the required number of two and one half (2-1/2) inch inlets with threads conforming to the NFPA 1963 Standard for Fire Hose Connections.
- C. Provide lockable caps for each exterior fire department standpipe connection (s) at the [Building Name]. The lockable cap shall be a two and one half (2-1/2) inch male locking FDC cap, Model #3043, as manufactured by the Knox Company. The contractor must coordinate the installation of these caps with the UMB Fire Marshal who has a Knox key wrench.
- D. Low Point Drain: At the low point near each fire department connection, provide a 90 degree elbow with a drain connection to allow for localized system drainage to prevent freezing. Provide Victaulic FireLock Model 10-DR or approves equal.

2.11 FIRE DEPARTMENT STANDPIPE AND HOSE SYSTEM

- A. Fire Department Hose Connections: Fire department hose connections shall be for Class I service only. Additional requirements shall be as follows for the project:
 1. Hose valves shall be designed and located as required by NFPA 14.
 2. Fire department hose valves shall be two (2) inch to two and one half (2-1/2) inch with threads conforming to the National (American) Standard Fire Hose Coupling Screw Threads Standard, equipped with screw caps and pin lugs. Hose valves shall be Potter Roemer Figure 4065, two and one half (2-1/2) inch cast brass valve with a red handle, female NPT inlet by male hose thread outlet, polished brass finish, three hundred (300) pound rated or approved equal. Provide two and one half (2-1/2) inch to one and one half (1-1/2) inch reducers on each valve.
 3. Approved two (2) way roof manifolds shall be provided where required by the appropriate code or standard. Roof manifolds will be minimum four (4) inch with two and one half (2-1/2) inch gated outlets with the interior control valve operable

from the roof location. Suitable and accessible manual drains and automatic drip shall be provided.

2.12 DRY PIPE SPRINKLER SYSTEMS <Delete if not applicable to project>

- A. General: All system pipe, fittings, joints, valves, sprinklers and accessories shall be as specified in this specification section. For Nitrogen Generator Corrosion-Mitigation with Purge/Vent requirements see article 2.14.

Provide a Tyco Model DPV-1 dry pipe valve assembly or approved equal.

- B. Dry Pipe Valve Assembly Shall Include:

1. Body: Ductile iron conforming to ASTM A536, grade 65-45-12.
2. Clapper: Aluminum bronze UNS-C95500
3. Latch: Aluminum bronze UNS-C95500 Shafts: Stainless 17-4
4. Clapper Seal: Peroxide cured EPDM, ASTM D2000
5. Bushings/Seat O-rings: Nitrile
6. Springs: Stainless Steel (300 Series)
7. Diaphragm: Peroxide cured EPDM with fabric reinforcement
8. Pressure Class: Up to 300 psi/2068 kPa/21Bar
9. Air Pressure Requirements:
 - a. Minimum is 13 psi/90 kPa/0.9 Bar,
 - b. Maximum is 18 psi/124 kPa/1.2 Bar
10. Alarm Pressure Switch: Alarm Pressure Switches are designed to activate electrical alarms and control panels when a sustained flow of water occurs (such as with an open sprinkler).
11. Air Supervisory Pressure Switch: Air Pressure Supervisory Switches are used to monitor low and high system air pressure and are factory pre-set.
12. Provide additional trim and accessories as required for a complete system.

2.13 PRE-ACTION SYSTEMS: SUPERVISED SINGLE INTERLOCK TYPE WITH ELECTRIC ACTUATION <Delete if not applicable to project>

- A. General: All system pipe, fittings, joints, valves, sprinklers and accessories shall be as specified in this specification section. For Nitrogen Generator Corrosion-Mitigation with Purge/Vent requirements see article 2.14.
- B. Provide all the components required by NFPA for a complete pre-action sprinkler system. The equipment shall include a deluge style automatic control valve with trim and all equipment required for electric release. All components must be UL listed and FM and approved and be approved by NFPA for use in a pre-action system.
- C. The automatic control valve shall be a right angle style that is able to be reset without opening the valve. The release line shall be equipped with a hydraulic device preventing the valve from resetting until the system is manually reset. The automatic valve shall be as manufactured by Victaulic, NXT Series 769 or approved equal. Include the following:

1. Pre-action valve clappers shall incorporate a latching mechanism that will not be affected by pressure changes in the water system.
 2. In addition to automatic operation, arrange each valve for manual release at the valve.
 3. Provide pressure gages and other appurtenances at the pre-action valves.
 4. Provide a test detection device for each actuation circuit adjacent to each valve which the device controls as required by NFPA 13.
- D. The detection system shall be compatible with the release control panel and listed for use in pre-action systems. The panel shall be programmable for crossed zoned detection from dip switch settings on the front of the mother board. The panel shall include supervised contacts for detection zones and signaling requirements per NFPA. Extra supervisory contacts shall be provided by a factory installed module with three alarm, two supervisory, and one trouble contact. The release control panel shall be a Model B-1, PDRD 2001, as manufactured by Victaulic or approved equal.
1. Battery & Charger System: Include the following:
 - a. Self contained batteries mounted within main control panel.
 - b. Rated for twenty four (24) hours of non-alarm monitoring plus five (5) minutes of alarm conditions.
 - c. Sized for 120% of Amp-Hour requirement per calculations.
 - d. Sealed lead acid type, maintenance free.
 - e. Minimum projected life of five (5) years.
 - f. Automatic operation upon loss of primary power.
 - g. Solid state automatic transfer switch to switch to battery power if the normal AC input voltage falls below 15% of nominal. The audible system trouble tone shall sound upon loss of AC input, and "LOSS OF AC POWER" message shall be displayed.
 - h. Automatic, variable rate battery charger: Include the following:
 - 1) Capacity for 150% of the connected system load while maintaining batteries fully charged.
 - 2) Capable of recharging batteries from fully discharged to fully charged in four (4) hours.
 - 3) Fully supervised charger output.
- E. The pre-action system shall be single interlocked. The operation of the detection system is required in order to open the valve; precharging the sprinkler pipe before a sprinkler operates. Air supervisory pressure shall monitor the integrity of the piping system. Loss of supervisory pressure shall indicate an alarm but the system control valve shall not open.
- F. Pressure Switch: Provide switch with circuit opener or closer for the automatic transmittal of an alarm over the facility fire alarm system. Connect into the building fire alarm system.

Alarm actuating device shall have mechanical diaphragm controlled retard device adjustable from ten (10) to sixty (60) seconds and shall instantly recycle.

- G. Automatic Air Maintenance Device: Automatic air maintenance device shall be Victaulic Series 757 Air Maintenance Trim Assembly with regulator, or approved equal, for each dry valve assembly.
- H. Supervision: Pre-action sprinkler piping and pneumatic detection system and pre-action valve electric releases shall be supervised. A break in the piping or tubing systems resulting in loss of pneumatic pressure shall activate trouble alarm. Provide a silencing switch which transfers trouble signals to an indicating lamp; arrange so that correction of the trouble condition will automatically transfer the trouble signal from the indicating lamp back to the trouble alarm until the switch is restored to normal position.
- I. Initiating Devices: Initiating devices shall comply with the requirements in Division 28 Specification Section “Digital Address Fire Alarm System.”

2.14 NITROGEN GENERATOR CORROSION-MITIGATION WITH PURGE/VENT

<Delete if not Required>

- A. General: Provide a Nitrogen Generator Corrosion-Mitigation with Purge/Vent to serve dry pipe and/or pre-action sprinkler systems zones for piping corrosion mitigation, including system venting.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Engineered Corrosion Solutions; Nitrogen Generator or comparable product by one (1) of the following:
 - a. Reliable Automatic Sprinkler Co., Inc.
 - b. Tyco by Johnson Controls Company.
 - c. General Air Products
 - d. Potter Electric Signal Company
 - 2. Description: Nitrogen generator system for pre-action sprinkler system providing required supervisory pressure within sprinkler zone. System is to include either an integrated, oil-less air compressor located within the nitrogen generator system package, or a separate vibration-isolation mounted air compressor, also provided by nitrogen generator manufacturer.
 - 3. Standards:
 - a. FM Approvals 1035.
 - b. UL 508A listed.
 - 4. Nitrogen Generator: <Edit for Project>

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- a. [Wall-mounted] [Skid-mounted] [Stand-alone] nitrogen generator to provide minimum nitrogen purity of 98% to the designated sprinkler systems.
 - b. Power: 120 V ac.
 - c. Bypass mode and nitrogen generating mode.
 - d. Minimum Capacity: As recommended by manufacturer.
 5. Air Compressor:
 - a. Standard: UL's "Fire Protection Equipment Directory" or FM Approvals' "Approval Guide."
 - b. Motor Horsepower: Fractional.
 - 1) Power: 120 V ac, 60 Hz, single phase.
 - c. Sized for application and capable of achieving system supervisory pressure within thirty (30) minutes in accordance with requirements of NFPA 13. Provide ASME air receiver tank as required to meet requirements on larger systems.
 - d. Include filters, relief valves, coolers, automatic drains, and gauges.
 - e. Minimum Capacity: Match capacity of nitrogen generator.
 6. Automatic Purge Vent/Valve:
 - a. Vents oxygen during system nitrogen fill.
 - b. Automatically closes when 98% minimum nitrogen has been reached.
 - c. Sized to allow correct purge rate per manufacturer's written instructions and within a [fourteen (14) day] period.
<Verify time period, revise if necessary>
 - d. Provide one (1) venting device for each dry/pre-action sprinkler system zone.
 - e. Include a connection port for a portable nitrogen purity sensor or a nitrogen purity manifold.
 7. Supervisory Gas Monitoring - Nitrogen Purity Sensing Device:
 - a. Portable Handheld Nitrogen Purity Sensing Device: Portable sensing device to connect to the outlet of automatic purge/vent valve during periodic inspections to obtain a nitrogen purity reading within each zone.
 - b. Permanently Mounted Nitrogen Purity Monitoring Device or Manifold: Permanent monitoring device to continuously monitor system's nitrogen purity.
 8. BAS Alarm Integration: <Coordinate with UMB for project requirements>
<Delete if not required>

- a. Provide nitrogen generation system with integrated leak detection and bypass alarms. Program alarms into controller and connect to BAS.
 - 1) Leak detection system is to alarm if leaks develop within fire-suppression system piping.
 - 2) Air bypass alarm is to alarm if nitrogen generation system is bypassed by air compressor.
 - 3) Provide a set of contacts for connection to the BAS.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Install all pipe, fittings, valves, controls, and hangers as required in accordance with NFPA 13.
- B. The work under this contract shall be coordinated with that of all trades so that all work may be installed in the most direct and workmanlike manner and so that interference between piping, ducts, equipment, architectural and structural features will be avoided.
- C. The sprinkler contractor shall install water flow alarms, valve supervisory devices, and any other sprinkler system equipment designed to be electrically interconnected into a fire alarm system but shall not connect to the fire alarm system.
- D. All electrical devices incorporating electrical apparatus installed by the sprinkler contractor as part of the sprinkler system shall be interconnected electrically under another section of these specifications.
- E. Connection(s) shall be made to an approved water supply capable of delivering the necessary volume. The connection between the system piping and underground piping shall be made with a cast iron flanged piece, properly fastened.

3.2 PIPING

- A. All Piping shall be run concealed in areas with suspended ceilings. Piping shall be installed and arranged to protect it from freezing and corrosion and shall be pitched for drainage.
- B. All sprinkler piping shall be substantially supported from the building structure which must support the added load of water filled pipe plus a minimum of two hundred fifty (250) pounds applied at the point of hanging in accordance with NFPA 13.
- C. Install all vertical sprinkler piping systems level and parallel to the building walls, ceilings, and partitions.
- D. Sprinkler Main and Branch Piping: All new sprinkler main and branch piping shall comply with the following:

1. All new sprinkler main and branch piping shall be installed level and parallel to walls, matching work by other trades.
 2. Where horizontal sprinkler piping offsets to clear obstructions such as ductwork, structural members and work installed by other trades provide low point drain valves in locations where they can be accessed.
- E. Pipe and Connections for Sprinklers: Sprinkler Pipe and connections for Sprinklers shall comply with the following requirements:
1. When reusing existing sprinkler branch piping, the sprinkler pipe runout connections located on the bottom of the existing branch piping are permitted to be reused when relocating sprinklers. Return bends are not required for new sprinkler runout piping.
 2. Mechanical T-s in new piping and/or added to existing sprinkler piping must be made with the outlet on the top or side of the piping.
 3. All new sprinkler branch piping must be connected to the top or side of the existing or new sprinkler main.
 4. All new sprinkler runout pipe connections serving individual sprinklers must be made off the top or side of the sprinkler branch piping unless otherwise noted above.
 5. Sprinkler Runout Piping – Existing Branch Piping: New sprinkler runout pipes connecting to existing branch piping can be installed diagonally to or perpendicular to the existing branch piping.
 6. Sprinkler Runout Piping – New Branch Piping: New sprinkler runout pipes connecting to new branch piping shall be installed perpendicular to the new branch piping.
- F. Drains: All risers, including the alarm check valve, shall be equipped with drains sized as specified in NFPA 13. The alarm check valve drain (main drain) shall be piped to the outside of the building or to a Storm Water Sump with Pumps approved for the purpose by the Engineer and the UMB Fire Marshall. A supplementary drain of equal size shall then be provided for test purposes with free discharge, located at or above grade. An extra valve shall be installed in the line to the sump in order to close the line during tests

3.3 PIPE JOINTS

- A. Grooved Joints: Install in accordance with the manufacturer's latest published installation instructions. Pipe ends shall be clean and free from indentations, projections and roll marks in the area from pipe end to (and including) groove. Gasket shall be manufactured by the coupling manufacturer and verified as suitable for the intended service. A factory trained representative (direct employee) of the coupling manufacturer shall provide on-site training for contractor's field personnel in the use of grooving tools, application of groove, and product installation. The representative shall periodically visit the job site and review

installation to ensure best practices in grooved joint installation are being followed. Contractor shall remove and replace any improperly installed products.

3.4 DRAINS AND TEST PIPING

- A. Drains and test piping shall be furnished and installed so that all parts of the fire protection system may be drained and tested properly. Piping shall not be exposed to freezing (except approved dry pipe systems).
- B. All interior sectional control valves, including riser control valves, shall be provided with auxiliary drainage so located as to drain that portion of the system controlled by the sectional control valve. These sectional auxiliary drains shall be piped as indicated in paragraph 3.4.D.
- C. Auxiliary drains shall be provided to properly drain all low points of the system when a change in direction prevents drainage through the main system.
- D. All Sprinkler System drain piping, including main drain, each riser drain, all sectional auxiliary drains shall be piped individually or combined into one (1) or more common drain pipes which are piped to the Lower Level Mechanical Equipment Room and discharged into the sump pit. Where the drain piping cannot be piped to a Lower Level Mechanical Equipment Room the drain piping shall be combined into one or more sectional drains and piped to hose bibs located on the exterior of the building. The location of these hose bibs and signs must be coordinated with the UMB Design and Construction Staff and the UMB Fire Marshal.

3.5 SPRINKLERS

- A. Center sprinklers in ceiling tiles and coordinate location with all other trades, including but not limited to ceilings, lights, diffusers, grilles etc.
- B. In finished ceilings where more than two (2) sprinklers are installed, the deflectors of all sprinklers shall be installed at the same elevation from the finished floor.
- C. New Sprinklers shall be installed using new rigid pipe for the sprinkler runout piping. See paragraph 3.2.F for piping requirements.

3.6 AIR VENTS

- A. Install air vents at the high points of the sprinkler system as follows:
 - 1. Automatic Air Venting Valve assembly in the main sprinkler pipe or high point serving each zone. In multi-story buildings each floor with a zone valve is a separate zone per NFPA.

- a. Each assembly shall be installed horizontally with the air release valve in the vertical position in an accessible location.
- 2. Manual Air Venting Valve:
 - a. Install manual air venting valve at the top of each sprinkler riser in the vertical position.

3.7 SPRINKLER CABINET

- A. The reserve sprinkler cabinet shall be surface mounted and installed on a wall adjacent to the main sprinkler controls for the fire pump, if provided. In buildings where there is no fire pump coordinate the location the new sprinkler cabinet with the UMB Fire Marshal.
- B. Provide a sign for the new sprinkler cabinet that reads “NEW SPRINKLER HEAD CABINET - DATE INSTALLED - MO- DAY-YR”.

3.8 INSPECTORS TEST CONNECTION

- A. An inspector’s test device shall be provided for testing each alarm device that leads to an approved drain discharge system.

3.9 VALVES

- A. Provide one (1) approved valve in each source of water supply except the fire department connection(s).
- B. Provide approved indicating valves at the base of each major riser, unless there is only one (1) riser.
- C. Provide approved indicating valve on the supply side of the alarm check valve.
- D. Drain and test valves shall be of approved types and in accordance with NFPA 13.
- E. Drain and auxiliary valves shall be of an approved type and in accordance with NFPA 13 edition. Drain and auxiliary drain valves shall be either globe or angle valves as required and readily accessible for maintenance personnel.
- F. Zone control valves installed in stairwells shall be installed so that the lowest portion of the control valve is seven (7) foot - six (6) inches above the finished floor.

3.10 EXTERIOR FIRE DEPARTMENT CONNECTIONS

- A. Each exterior fire department standpipe connection(s) shall be arranged to provide water to all parts of the system(s). On wet pipe systems with a single riser, the connection shall be made on the system side of the alarm check valve (on dry pipe systems, between the

water supply control and dry pipe valve). On systems with two (2) or more risers, the connection shall be made on the system side of the alarm check valve, but on the supply side of all riser shutoff valves.

- B. The connection shall be located on a street side of the building, preferably on the front, not more than one hundred (100) feet from the nearest fire hydrant.
- C. The connection shall be not less than two (2) feet and not more than three (3) feet six (6) inches in elevation, measured from the ground level to the center of the inlets.

3.11 ALARM CHECK VALVE

- A. All equipment shall be located and installed so that it is accessible for inspection, removal, and repair and shall be substantially supported.
- B. The main drain from the alarm check valve shall be installed as specified.
- C. The alarm check valve shall be provided with two (2) standard gauges, one (1) above the alarm check valve for system pressure, and one (1) below for supply pressure. On vertical installations, the system pressure gauge shall be mounted at a higher elevation than the supply main gauge.

3.12 FIRE DEPARTMENT HOSE VALVES

- A. Where the Fire Department Hose Valves are installed in a Hose Cabinet the valve(s) shall be positioned in the cabinet at an angle (30° to 45°) with the cap positioned downward toward the floor.
- B. Hose valves shall be located within building stairway enclosures, with additional corridor locations as required. The hose valves shall be installed at such an angle so that the fire hose is not obstructed or kinked when in use.

3.13 HOLE SAW DISCS

- A. If the contractor is required to make openings in the piping by means of a hole saw, the contractor shall remove the resultant discs (slug) and hang the discs adjacent to the hole cut. Failure by the contractor to do this will result in the contractor completely disassembling the sprinkler system to satisfy the Engineer and the UMB Fire Marshal that the discs is not in the system piping.

3.14 DUST, SOIL, DEBRIS

- A. The contractor shall take such steps as necessary to protect the surface and contents of rooms in which work is in operation, from damage from his/her operation. The room contents shall be either moved out of the way or covered with waterproof coverings while

work is in progress. The contractor shall remove and replace ceilings and protect them against dirt and damage.

- B. Particular care shall be exercised to prevent staining damage from cutting oils used in the cutting and threading of pipe.
- C. Suitable non-permeable drop cloths shall be used under all cutting and threading machines.
- D. The contractor will be held responsible and accountable for any damage resulting from his/her operation.

3.15 CONNECTIONS AND ALTERATIONS TO EXISTING WORK

<Delete if not applicable to project>

- A. When the new work under this project requires connection to existing piping, rearranges existing piping, etc., the contractor shall perform all necessary cutting, fittings, etc., to the existing work as may be necessary or required to make satisfactory connections between the new work, as to leave the entire completed work finished in a workmanlike manner to the entire satisfaction of the Engineer and the UMB Fire Marshal.
- B. The contractor shall make the necessary arrangements with the engineer for all outages of utilities or fire protection systems. Such outages shall be made at least five (5) business days in advance of the anticipated outage requirement.

3.16 CUTTING AND PATCHING

- A. The cutting of walls and floors for passage and accommodation of new piping, the closing of openings and removal of all debris caused by the work under this contract shall be performed by and at the expense of the contractor.
- B. Patching shall be uniform in appearance and shall match the surrounding surfaces. New openings in existing concrete floors shall be drilled with diamond core drills.
- C. Building surfaces cut, damaged or removed in the performance of work under this contract shall be repaired as close as possible to their original condition.

3.17 INSTALLATION, TESTS, AND ACCEPTANCE <Edit for Project>

- A. Installation, testing, and final acceptance shall be in accordance with all applicable codes, and the UMB Fire Marshal.
- B. For pressure test requirements see Division 21 Specification Section “Leak Test Fire Protection Piping Systems”.

3.18 DOCUMENTATION

- A. Prior to the scheduled date of the final acceptance test, the contractor shall submit a hard copy red line drawings reflecting the actual installed conditions to the nearest one half (1/2) foot.
- B. The following documentation shall be furnished to the University by the contractor at the conclusion of the final acceptance test:
 - 1. Updated as-built drawings in both full size hard copy and electronic (pdf and dwg) files.
 - 2. Operating and maintenance instructions of controllers, alarm valves, etc. as required by NFPA 13.
 - 3. The spare sprinklers hereinbefore specified and wrench(s).
 - 4. A copy of NFPA 25 Standard for the Inspection, Testing, and maintenance of Water-Based Fire protection Systems (latest edition).

3.19 DEMONSTRATION OF SPRINKLER AND STANDPIPE SYSTEMS

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
- B. Schedule demonstration with all interested parties at least seven (7) business days advance notice.

3.20 DRY PIPE SYSTEMS <Delete if not required>

- A. The installation for dry pipe sprinkler systems shall comply with the foregoing specifications, except where specifically modified in NFPA 13 for dry pipe sprinkler systems.
- B. Auxiliary drains shall consist of a one half (1/2) inch valve with nipple and cap for under five (5) gallons capacity of trapped and two (2), one (1) inch valves with two (2) inch by twelve (12) inch nipple or equivalent for over five (5) gallons. Tie in drains shall be minimum one (1) inch.
- C. The required continuous air compressor and heater (s) shall be connected to an emergency electrical power source.
- D. Sufficient OS&Y valves and check valves shall be provided so that either pump can be isolated for inspection and service.
- E. An approved dry pipe valve with all the trimmings shall be installed on the system side of the main water valve. All equipment shall be located and installed so that it is accessible for inspection, removal and repair and shall be substantially supported.

3.21 PRE-ACTION SYSTEM – FIELD WIRING <Delete if not required>

- A. Field wiring the Pre-Action System components and panel shall be provided by the electrical contractor as required in Division 28 Specification Section “Digital Address Fire Alarm System.”

3.22 NITROGEN-GENERATION, CORROSION-MITIGATION SYSTEM

- A. Install in accordance with manufacturer's written installation instructions.
Locate purge vent/valve in accordance with manufacturer's written installation instructions.
- B. Route alarm signals in code-approved electrical conduit from nitrogen generator system control panel to the supervisory circuit of BAS. <Coordinate with UMB for project requirements > <Delete if not required>

END OF SECTION 211313