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BuildingName
The Description of the Project
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SPECIFICATION DIVISION 21

NUMBER SECTION DESCRIPTION

DIVISION 21 FIRE SUPPRESSION
SECTION 211313 - WET AND DRY PIPE SPRINKLER SYSTEMS

END OF CONTENTS TABLE

DIVISION 21 FIRE SUPPRESSION
SECTION 211313 – WET AND DRY PIPE SPRINKLER SYSTEMS

REVISIONS:

AUGUST 2018: INCORPORATED MICH MEDICINE SPECIFIC REQUIREMENTS (ANTI-LIGATURE HEADS, NO SCH. 10 SPRINKLER PIPE ALLOWED IN INPATIENT AREAS). REVISED B-FLY VALVE MODEL NUMBER TO 705 (708 NO LONGER AVAILABLE), ADD GIACOMINI AS APPROVED FOR FIRE PUMP TEST HEADERS. D. KARLE PER FP/PLMG MTT AND HOSPITAL FP&D.

APRIL 2018: REVISED TO LIST MFR.S FROM PML. R BENEDEK.

AUGUST 2016: REVISED TO ELIMINATE GALVANIZED PIPE AND FITTINGS FOR DRY PIPE SYSTEMS. D. KARLE PER FP/PLMG MTT.

AUGUST 2015: REVISE SPRINKLER HEAD MFR. FROM ANVIL TO TYCO TO REFLECT CORRECT MFR., PER B. BEGG/D. KING. D. KARLE.

APRIL 2015: REVISED TO SPECIFY FOR DRY PIPE SYSTEMS: MATERIAL TO BE SCH. 40 GALV. STEEL PIPE AND FITTINGS, INSTALL PIPE WITH WELD SEAM ABOVE HORIZONTAL CENTERLINE OF PIPE, DRAIN VALVES TO BE INSTALLED AT ALL LOW POINTS, ALL DRY PIPE PIPING TO BE PITCHED. ADDED SPEC FOR DRY PIPE VALVE. KARLE FOR FP/PLMG MTT.

SPEC EDITOR: IN ORDER FOR THE CONTRACTOR TO HYDRAULICALLY DESIGN SPRINKLER PIPING, BID DOCUMENTS MUST INCLUDE TEST DATA INCORPORATING THE LATEST FLOW TEST CONDUCTED BY FACTORY MUTUAL, FIRE PUMP LOCATION, LATEST FIRE PUMP TEST DATA, HYDRAULIC CALCULATIONS (IF AVAILABLE), AND AS-BUILT INFORMATION.

SPEC EDITOR: PRIOR TO ISSUING FIRE PROTECTION DRAWINGS FOR BID, THEY SHOULD BE SENT TO, REVIEWED AND APPROVED BY FACTORY MUTUAL.

SPEC EDITOR: FOR CLASSROOM BUILDINGS, PROJECT LEAD SHOULD SEND DRAWINGS TO STATE FIRE MARSHAL DURING SR. REVIEW, VIA DOUG KOEPSELL.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

B. Related Sections

1. Section 220500 - Common Work Results for Mechanical
2. Section 221113 – Piping Materials and Methods

1.2 SCOPE OF WORK:

A. Provide piping, fittings, valves and specialties for automatic wet and dry sprinkler systems.

SPEC EDITOR: STANDPIPE SYSTEMS ARE TYPICALLY ONLY INCLUDED FOR BUILDINGS OF FIVE OR MORE STORIES.

B. Provide piping, fittings, valves and specialties for standpipe systems.

C. All wiring related to 211313 is covered under Division 26.

1.3 DRAWINGS:

A. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the system, shall not be made without the written approval of the architect-engineer, and re-submitted to FM and the authority having jurisdiction for approval.

1.4 QUALITY ASSURANCE:

A. Materials, installation and testing shall comply with the following:

1. NFPA 13 - Installation of Sprinkler Systems.
2. FM - Factory Mutual Approval Guide.
3. NFPA 14 - Installation of Standpipe and Hose Systems.
4. UL - Fire protection Equipment Directory.
5. FM - Data Sheets.
6. City of Ann Arbor requirements.

B. Equipment and Components shall bear UL and FM label or marking and shall be FM approved for fire service.

1.5 SUBMITTALS:

A. Submit data, drawings, and hydraulic calculations, as specified in Division 01.

SPEC EDITOR: SELECT ONE OF THE FOLLOWING:

B. For Inpatient healthcare buildings, Ambulatory Surgery Centers or buildings containing classrooms: Submit shop drawings to Factory Mutual for approval first. Then, submit FM approved shop drawings to State of Michigan Bureau of Fire Services (BFS) for approval. Submit shop drawings bearing stamp of FM and OFS form 12A from State Office Of Fire Safety to the architect/ engineer for approval.

C. For Non Bureau of Fire Services (BFS) Buildings: Submit shop drawings to Factory Mutual for approval prior to submitting to the architect/ engineer. Submit shop drawings bearing stamp of FM to the architect/ engineer for approval.

1.6 HYDRAULIC DESIGN CRITERIA:

A. Locate mains and risers as indicated. Size piping per drawings, where indicated.

B. Hydraulic calculations shall be per NFPA and FM requirements.

C. Use latest FM water test to ascertain water supply parameters.

D. Density shall be as indicated (gallons/minute /square foot, gpm/sf). Size all piping to suit densities indicated below:

1. Offices: Density of 0.15 gpm/sf over the most remote 2000 sq. ft. area, 168 sq. ft. per head maximum.
2. Laboratories: Density of 0.18 gpm/sf over the most remote 2500 sq. ft., 130 sq. ft. per head maximum.
3. Mechanical rooms: Density of 0.18 gpm/sf over the most remote 2500 sq. ft., 130 sq. ft. per head maximum.

SPEC EDITOR: REVIEW STORAGE ROOMS WITH FM, AND CUSTOMIZE CRITERIA ACCORDINGLY. GENERALLY CRITERIA IS THE SAME AS FOR MECHANICAL ROOMS.

4. Storage Rooms:
5. Other rooms: Same as offices.

E. Include 250 gpm hose stream allowance at the floor of calculation.

F. Provide inspector's test connections per NFPA 13 and FM Data Sheets. Locate as indicated on the drawings.

G. Provide fire protection for soffit areas, void spaces, obstructions, top and bottom of ductwork above 4' wide, closets, and other spaces required by authority having jurisdiction, and at no additional cost to owner.

1.7 EXTRA MATERIALS:

A. For projects requiring more than 30 sprinkler heads, provide extra sprinkler heads with metal cabinet and head wrench, per NFPA 13 and FM Data Sheets.

1.8 IMPAIRING FIRE PROTECTION SYSTEM:

A. The University of Michigan Fire Alarm Shop shall impair existing fire protection system. Notify Fire Alarm Shop a minimum of 48 hours prior to required shutdown.

B. Plan and coordinate work to minimize period of time which the system is impaired.

C. In general, reactivate system at the end of each workday, under the supervision of the Fire Alarm Shop. System may be left impaired overnight only if explicitly authorized by the University and if contractor provides continuous fire watch in impaired areas.

PART 2 - PRODUCTS

2.1 GENERAL:

SPEC EDITOR: TOM TO CHECK ON FOLLOWING:

A. All hose threads shall be National Standard.

B. Pressure gauges: Liquid filled 6” dial, 0 to 150 psig range, 5 psig division, with gauge cock.
Manufacturers: Trerice Series 600, Weiss or Marsh

C. All piping materials of a given type shall be manufactured by a single source, and supplied by a single supplier.

2.2 ABOVE GROUND PIPING MATERIAL:

SPEC EDITOR: THIS SPEC IS FOR SYSTEMS WITH MAXIMUM REQUIRED OPERATING PRESSURE OF 175 PSIG. REVISE TO SUIT NEEDS FOR HIGH-RISE BUILDINGS.

SPEC EDITOR: SELECT 2.2.A (DELETE 2.2.B) FOR INPATIENT FACILITIES. SCH 10 SPRINKLER PIPING IS NOT ALLOWED IN INPATIENT FACILITIES. SELECT 2.2.B (DELETE 2.2.A) FOR ALL OTHER LOCATIONS.

A. Wet Pipe Systems in Inpatient Facilities: Schedule 40, ASTM A53, black steel pipe with screwed cast iron or malleable iron fittings (or match existing fittings in building) for sizes through 2″, and grooved couplings for sizes 2-1/2″ and larger.

B. Wet Pipe Systems in non-Inpatient Facilities: Schedule 40, ASTM A53, black steel pipe with screwed cast iron or malleable iron fittings (or match existing fittings in building) for sizes through 2″, and schedule 10, ASTM A135, black steel pipe with grooved couplings for sizes 2-1/2″ and larger.

C. Dry Pipe Systems: Schedule 40, ASTM A53, black steel pipe for all pipe sizes, with screwed cast or malleable iron fittings for sizes through 2″, and grooved couplings for sizes 2- 1/2″ and larger.

D. All piping, fittings and accessories shall be rated for a minimum working pressure of 175 psig.

E. Manufacturers: Victaulic Style 005 Rigid Firelock couplings with type "E" EPDM gasket, Tyco Grinnell.

F. Pipe Hangers: Pipe hangers shall comply with requirements of related sections, be FM approved, and be spaced in accordance with NFPA 13 and FM.

SPEC EDITOR: FOR SYSTEMS OVER 175 PSIG, RESOLVE SYSTEM APPROACH WITH FM AND CUSTOMIZE SPECIFICATION ACCORDINGLY.

G. For systems rated over 175 psig:

2.3 ABOVEGROUND ISOLATION VALVES:

A. General: Provide where shown on drawings, and as required, with valve monitor switch, and means of padlocking open.

B. Isolation valves 2-1/2" and larger: butterfly valve.
Manufacturers: Victaulic Series 705 (rated 300 PSI), Tyco Grinnell.

C. Isolation valves 2" and smaller: gate or ball valve, brass body.
Manufacturers: Victaulic Series 727, Tyco Grinnell

D. OS&Y type: Where specifically indicated on drawings, provide OS&Y type valves.
Manufacturers: Kennedy Figure 4068 (AWWA) or any other approved by the City of Ann Arbor Utilities Department Requirements, pages WM-1 & 2.

E. Valve monitor switch: Isolation valves shall be supervised open. Provide 115 volt, single pole, double throw roller type monitor switch to signal valve closing.
Manufacturers: Tyco Grinnell, Anvil, Notifier

2.4 SPRINKLER HEADS:

SPEC EDITOR: INDICATE TYPE OF HEAD ON PLANS. 286F LINKAGE MAY BE REQUIRED IN CERTAIN AREAS.

NOTE THAT FULLY CONCEALED HEADS SHOULD BE SPECIFIED FOR ALL CLINICAL CARE AREAS WITH DROPPED CEILINGS.

A. General: Provide brass sprinkler heads with wide angle spray, thermosensitive glass bulb with temperature rating of 155F to 165F, rated for 175 psig, standard response and orifice, except as otherwise specified, FM and UL approved. Install sprinkler head type as indicated on drawings.

B. Sprinkler head guards: Provide red, wire mesh guards where damage to sprinkler heads may occur, such as stairways, loading docks or aisles. Manufacturers: same as sprinkler manufacturer.

C. Semi-recessed pendant type: chrome plated brass, with chrome plated brass semi-recessed escutcheon.
Manufacturers: Reliable model G, Tyco, Viking model M., Victaulic

D. Concealed pendant type: brass finish with cover to match ceiling.
Manufacturers: Reliable model G4FR, Tyco, Viking, Victaulic

E. Upright type: brass finish.
Manufacturers: Reliable model G, Tyco, Viking, Victaulic

F. Sidewall type: chrome plated brass, with deflector and chrome plated brass escutcheon.
Manufacturers: Reliable HSW1, Tyco, Viking, Victaulic

G. Dry type (freezeproof): recessed with center strut, lever and solder capsule, unobstructed waterway.
Manufacturers: Tyco, Reliable Model G3, Viking, Victaulic

H. Behavioral Health (anti-ligature) type: concealed pendant or sidewall, tamper-resistant. Manufacturers: Tyco Raven 5.6K (quick response style), Tyco TFP PH2 (standard response style).

2.5 TEST CONNECTIONS:

A. Inspector's Test Connection: Provide per NFPA 13 4-7.4.2, and where indicated on drawings: minimum 1 inch piping and test valve, orifice equivalent to one sprinkler head, with chain and cap. Drain to sanitary waste or as indicated on drawings.
Manufacturers: Elkhart, Victaulic, Test Master

DESIGNER: DRAIN MUST BE ABLE TO HANDLE FULL FLOW OF INSPECTOR'S TEST. USE A 3" DRAIN OR EQUAL FOR 1" LINE. ROUTE TO A JANITORS CLOSET IF POSSIBLE.

B. Zone Test and Drain Connection: Provide per detail on drawings and NFPA 13 4-7.4.2. Integrated test and drain valve assembly is acceptable.
Manufacturer: AGF Model 1000

2.6 FIRE PUMP TEST CONNECTIONS (HEADER):

SPEC EDITOR: CUSTOMIZE DETAIL TO HAVE APPROPRIATE NUMBER OF CONNECTIONS SHOWN, DEPENDING ON FIRE PUMP CAPACITY.

A. Provide test connection per detail and NFPA 13 4-7.4.2. Cast brass body with end inlet, brass plate lettered PUMP TEST CONNECTION, with loose bonnets, 3-inch female NPT inlet x 2-1/2 inch male hose thread outlets to match local fire department connections. Provide cap and chain for each bonnet. Nipple connection between flush inlet body connection and snoot (exterior connections) shall be chrome-plated steel.
Manufacturers: Potter-Roemer Inc. 5800 series, Elkhart Brass Mfg. Co., W.D. Allen Mfg. Co, Giacomini.

2.7 FIRE DEPARTMENT CONNECTION (SIAMESE):

A. Cast brass or bronze, flush wall mounted escutcheon plate type with polished brass finish, two 2-1/2 inch fire department inlets to match local fire department connections, double clapper check valves, lug caps and chains and cast-in function lettering.
Manufacturers: Elkhart Brass Mfg. Co., No. 166, Potter-Roemer Inc., No. 5020 Series, Seco Mfg. Inc., No. 261, W.D. Allen Mfg. Co., No. 276

2.8 ROOF FIRE DEPARTMENT CONNECTION:

SPEC EDITOR: DELETE IN SHORT SPEC; TOM WILL RESEARCH FURTHER

A. Cast brass body with 4 inch NPT inlet and two (2), 2-1/2 inch NPT outlets to match local fire department connections. Provide 2-1/2 inch cast brass straight globe valve with red hand wheel. Valve shall have female NPT inlet x male hose thread outlet, rated for 300 psig. Provide cast-in function lettering.
Manufacturers: Elkhart Brass Mfg. Co., Potter-Roemer Inc., Model No. 5875 outlet with model 4115 valve, W.D. Allen Mfg. Co.

2.9 DETECTOR CHECK VALVE:

INCLUDE U-M STANDARD DETAIL "15300 001 – Fire Service System Detail", REVISED AS REQUIRED TO MAKE PROJECT SPECIFIC.

THIS IS USED TO MECHANICALLY DETECT SMALL VOLUMES OF WATER THAT PASS THROUGH THE FIRE PROTECTION MAIN. IT DOES NOT PROVIDE PROTECTION OF THE POTABLE WATER FROM POSSIBLE CONTAMINANTS IN THE FIRE PROTECTION SYSTEM. ASSEMBLY DOES NOT CONNECT TO THE FIRE ALARM SYSTEM.

A. Provide valve assembly, including flanged detector check valve and bypass line. Detector check valve shall have galvanized or epoxy coated cast iron body, bronze clapper with resilient seal. Bypass line shall include City of Ann Arbor meter, isolation valves and check valve.

B. Manufacturer: Ames 1000DCV or model 3000, Victaulic, Reliable, Viking, Hershey-Anvil

2.10 FIRE PROTECTION ZONE CONTROL VALVE

A. Manufacturers: Victualic, Milwaukee, Nibco, Stockham

2.11 FIRE DEPARTMENT HYDRANT VALVE:

SPEC EDITOR: DELETE IN SHORT SPEC

A. Cast brass back outlet body with 4 inch NPT inlet and two (2) 2-1/2 inch male NPT outlets to match local fire department connection. Provide caps and chains and cast brass round wall plate lettered HYDRANT.

B. Provide NRS gate valve with polished brass 7 inch plate lettered HYDRANT VALVE CONTROL with threaded 1-1/2 inch NPT lock nut, 30 inch long x 7/8 inch square steel extension rod with coupling for attachment to stem of gate valve.

C. Manufacturers: Potter-Roemer Inc., Model No. 5840, Elkhart Brass Mfg. Co., W.D. Allen Mfg. Co.

2.12 DRAIN VALVE:

A. Provide a brass ball valve, with hose thread outlet, and cap. Riser drains shall be 3/4" ball valve with hose thread outlet, and cap, unless otherwise noted on drawings.
Manufacturers: Victaulic Series 727, Tyco Grinnell, Anvil

DESIGNER: PIPE TO DRAIN CAPABLE OF TAKING FULL FLOW.

2.13 FIRE DEPARTMENT VALVE:

SPEC EDITOR: TYPICALLY USED IN STANDPIPE SYSTEMS

A. Provide 2-1/2" cast brass straight globe valve with red hand wheel, female NPT inlet and 2 1/2" male hose thread outlet with cap, rated for 300 psig. Fire department valve shall meet local fire department standards. Provide with pressure restricting valve as required. Identify with words "FIRE DEPARTMENT VALVE" per NFPA requirements and the authorities having jurisdiction.
Manufacturers: Potter-Roemer Inc., Model 4115, Elkhart Brass Mfg. Co., W.D. Allen Mfg. Co.

2.14 ISOLATION, DRAIN AND TEST VALVES SIGNS:

A. Provide permanent plastic or metal 6" x 6" signs for all isolation, drain and test valves describing purpose and location.
Manufacturer: Seton, Bramer

2.15 FLOW ALARM SWITCH:

A. Provide flow alarm switches where indicated and as detailed on the drawings.

SPEC EDITOR: CHECK CATALOG ON PSI RATING 300?

B. Each water flow switch shall be equipped with an adjustable recycling type retarding device designed to prevent false alarms due to pressure surges within the piping. The flow switch piping shall be suitable for 175 psig working pressures.

C. Each flow alarm shall be provided with a set of contacts rated for 115V for connection by Electrical Trades.

D. Manufacturer: Viking VSR-D, Reliable, Notifier, Victaulic, Anvil,

2.16 JOCKEY PUMP AND CONTROLLER:

A. Provide jockey pump and controller package as detailed on drawings, including 1/3 HP, 115V motor, 1.6 gpm, 100 psig pump.

SPEC TEAM: NEED TO CHECK FOR MANUFACTURER

B. Manufacturer/Supplier: Grundfos/Underwood Fire Equipment

2.17 PRESSURE RESTRICTING VALVE:

SPEC EDITOR: FIRE HOSES ARE NOT GENERALLY USED. BUT IF HOSES ARE USED, PRESSURE MUST BE LESS THAN 100 PSIG.

A. Provide pressure-restricting valve on bottom of rack nipple or on male side of fire department valve to restrict water pressure at hose line. Valve shall be 1 1/2" swivel inlet with pin lugs X male outlet, cast brass. A removable breakable link shall permit adjustment of restriction.
Manufacturer: Crocker Model 5370-5375, Powhattan 16-255.

2.18 FIRE PUMP PRESSURE RELIEF VALVE:

SPEC EDITOR: THIS PRESSURE RELIEF VALVE IS REQUIRED WHEN FIRE PUMP CAN DEVELOP SHUT-OFF HEAD MORE THAN SYSTEM IS RATED FOR - TYPICALLY 175 PSIG.

DESIGNER: PIPE TO DRAIN.

A. Provide UL and FM approved fire pump pressure relief valve: cast iron globe or angle valve body, bronze seat, Teflon coated stainless steel trim, hydraulically operated, cast bronze direct acting pilot control with stainless steel trim, adjustable spring loaded diaphragm. Relief pressure range factory set at 175 psig, adjustable 20 to 200 psig. Manufacturer: Claval 50B-4KG-1, size 6"

CAUTION: THE BELOW DRY PIPE SPECIFICATION WAS EXTRACTED FROM AIA MASTER SPEC, REQUIRES REVIEW AND EDIT AS REQUIRED TO MAKE PROJECT SPECIFIC. MAY NOT BE COMPLETE.

2.19 DRY PIPE VALVE AND ACCESSORIES:

A. Provide dry pipe valve and all required trim and accessories including air maintenance device, air compressor, and accelerator device. Provide all UL listed and FM approved components with a rated minimum pressure of 175 or 300 PSIG to match system pressure rating.

B. Valve: UL 260 differential-pressure type, cast or ductile iron, with flanged or grooved end connections. Include UL 1486, quick-opening device/accelerator, galvanized trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

C. Automatic device to maintain minimum air pressure in piping: shall include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, with adjustable range.

D. Air compressor: 120-V ac, 60 Hz, single phase.

E. Approved Manufacturers: Viking, Reliable, Tyco, Victaulic

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATION REQUIREMENTS:

A. Install piping in compliance with Section 221113, Article 3.1, with hanger spacing as dictated by NFPA and FM.

B. Flush per NFPA 13 and FM requirements.

C. Sleeve all piping passing through walls, floors and partitions per details and Section 220500.

3.2 DRY PIPE SYSTEMS

A. Install all piping with the longitudinal weld seam located above the horizontal centerline of the pipe.

B. Provide auxiliary drain valves terminated with a nipple and cap in all trapped sections of pipe, regardless of volume trapped. Drain valve size shall be per NFPA 13. Provide signage required by NFPA 13 at dry pipe or preaction valve indicating the number of low point drains and the location of each individual drain.

C. Mains and branch lines shall be pitched to drain at least $^{1}/_{2}$ in. per 10 ft in all locations, including non-refrigerated areas and areas not subject to freezing.

3.3 VALVE AND SPECIALTY INSTALLATION REQUIREMENTS:

A. Inspector's Test Connections: Install where indicated, and if not indicated, at end of most hydraulically remote point for each zone.

B. Isolation/ Control valves: Locate where readily accessible in emergency situations - in stairwells max 7' a.f.f.

C. Drain Valves: Provide downstream of each flow alarm to facilitate testing, at low points trapping more than 5 gallons of water, at base of each riser. Provide metal air gap fittings for connection to the underground drainage system. Drain must be capable of taking full flow.

D. Fire Department Connections: Locate with sufficient clearance from obstructions to allow full swing of fire department wrench handle.

E. Pressure Gauges: Provide, with petcock valve, at the top of each standpipe, in readily visible location.

3.4 SPRINKLER HEAD INSTALLATION REQUIRMENTS:

A. Locate heads per drawings, FM and NFPA 13, coordinated with lighting, building equipment layout, and other interferences. Aesthetically locate heads with respect to ceiling patterns, tile patterns, masonry bonds and similar constructions lines. Center heads in two directions in ceiling tile, with piping offsets as required.

B. Protect heads, covers and escutcheons prior to painting. Remove protection after painting.

3.5 FIELD QUALITY CONTROL AND TESTING:

A. Test equipment per the manufacturer's instructions, NFPA, and FM.

B. Test piping systems per NFPA 13 and the requirements of Factory Mutual.

END OF SECTION 211313