

1.01 Scope of Standard

- A. The design guidelines contained herein include the requirements for systems, materials, fittings and valves utilized for fire protection systems at Sam Houston State University. It is the intention of this document to provide a minimum standard for fire protection materials, fittings, and valves at the University so as to provide the highest level of fire safety possible. This document is not intended to be a guide specification.

1.02 Scope of Work

- A. Reference Standards (Utilize latest editions available):
- B. Provide all design, materials and installation required to provide a complete fire protection system to protect the specified building in accordance with design requirements.
- C. A minimum 10-psi or 10% safety factor, whichever is greater, shall be provided.
- D. Provide a complete automatic sprinkler system as defined by the latest edition of NFPA 13. All fire sprinkler systems installed on campus are required to be wet pipe systems unless the area being protected cannot be maintained above 40 degrees F, as required per NFPA 13. These areas will require a dry pipe system to be installed. Antifreeze systems of any size are not permitted on campus. Rooms or areas where it is not desirable to have water filled piping within the room, such as special collections, computer rooms, etc. may utilize double interlock pre-action systems. Use of pre-action systems shall be approved by the University Fire Safety System Specialist prior to system design.

1.03 Related Work: References/Quality Assurance

- A. Sam Houston State, International Building Code, National Fire Codes as published by the National Fire Protection Association (NFPA), State Fire Marshal, and SHSU personnel's requirements contain fire protection criteria and requirements for the installation of all fire suppression systems. The contractor shall conform to the following:
 - 1. All materials and performance shall meet the appropriate ANSI, ASME and ASTM Codes.
 - 2. Welding Materials and Procedures shall conform to the ASME Code.
 - 3. Only welders certified in accordance with ANSI/ASME Section 9 shall be employed.
- B. Each item of equipment shall be new and listed by Underwriters Laboratories (UL) or approved by FM Global. Each major item of equipment shall bear the manufacturer's name or trademark; serial number, and/or UL/FM label.

1.04 Submittals

- A. SHSU Project Manager shall review and distribute all submittals for approval by the University insurer, the SHSU FSSS (Fire Safety System Specialist), the Owner's representative, and others as appropriate.
- B. Refer to provisions established in the Project Specifications and in related section of Division 01 – General Requirements. All product data shall be submitted under provisions of Division 01.
- C. Manufacturer's data sheets shall be provided for all materials and equipment for approval before purchase or installation. Data sheets shall describe the type of material, capacities, manufacturer, part numbers of equipment, and give information necessary for verifying equipment approval.
- D. The Contractor shall submit detailed and accurate shop drawings for approval of all equipment to be constructed and installed. Shop drawings shall identify all materials and list all equipment to be used. Shop drawings shall include ceiling grid or reflected ceiling layout and shall be coordinated with other trades prior to submittal. Shop drawings are to be submitted with a minimum 1/8" scale and all details at a minimum 1/4" scale.
- E. Not Used
- F. Not Used
- G. Prior to preparing shop drawings and hydraulic calculations, the design engineer is required to verify the adequacy of the water pressure and other pertinent water supply data from either the campus or the City of Huntsville water distribution system. Hydrant flow tests performed on the University distribution system shall incorporate erosion control requirements identified in this standard. See 2.10L Field Acceptance. The design engineer shall immediately notify the SHSU personnel and Project Manager of the need for testing the appropriate water supply or fire pump, or the need for any special considerations required. The engineer shall provide the record data at the point of the new utility connection as follows:
 - 1. Building Name and flange elevation (ft)
 - 2. Test hydrants (hydrant numbers and location) and hydrant elevations (ft)
 - 3. Flow rate (gpm), static pressure (psi), and residual pressure (psi)
 - 4. All turning of valves and operation of fire pump to be performed by FSSS. Actual test to be performed by Contractor or Engineer utilizing their own equipment.
- H. No work shall be performed until the University has approved the shop drawings, calculations, and data sheets. The contractor is solely liable for any work performed prior to this approval.
 - 1. Sam Houston State Project Manager shall review and distribute all submittals including drawings, calculations, and material data for approval by the SHSU, SHSU FSSS, the Owner representative, and others as appropriate. For Fire Sprinkler Equipment descriptors, reference Fire Alarm Standard 5.28.30.

2.01 Pipe

A. Aboveground Pipe

1. ERW Piping is not to be used in any SHSU facility
2. All wet sprinkler system piping shall be a minimum of schedule 40 black steel with threaded fittings for 1 inch piping , and black schedule 40 steel with grooved fittings for sizes 1 ¼ inch pipe and larger. All dry and pre-action system piping and fittings are required to be externally and internally galvanized.
3. Piping shall be concealed above suspended ceilings where installed, in a craftsman like manner, and shall not interfere in the complete function of other systems such as cable trays, access panels, or pedestrian passageways. Piping in all occupied areas and mechanical area passageways shall not be lower then 7'-6". Specific written approval may be granted for unavoidable projections, overhead piping shall be installed no lower then 6'-8" above the floor. Piping shall not reduce the required width of any means of egress, width of stairs, or clear width of a corridor or passageway, to less than 44 inches in width. Installation of all piping shall be in coordination with piping, ducts, light fixtures, and any other work that may obstruct sprinklers. The contractor shall coordinate with all trades having materials installed above the ceiling prior to commencement of any work.
4. Piping that is retrofit into an existing building with suspended ceilings shall be installed above the existing ceiling, unless exposed piping is approved by the University.
5. All exposed sprinkler and standpipe system pipe located in areas without suspended ceilings is required to be painted. Prepare galvanized pipe as necessary, such as priming, prior to painting pipe. All fire system piping shall be painted red.
6. All concealed pipe and exposed pipe that is not painted red is required to be marked "Fire Protection". Pipe Markers must be wrap around type with white letters at a minimum of 1 inch in height. All pipe markers must be visible from the floor. Spacing and location as follows:
 - a. Above Ceiling Corridors: Every 10' for mains. One (1) on each branch line.
 - b. Above Rooms with Ceilings: One (1) in every room on each branch line. Every 10' for mains (at least one (1) in each room).
 - c. Exposed Areas Non-painted Pipe: Every 10' for mains and branch lines (at least one (1) on each branch line) and in each room.
 - d. Exposed Areas Painted Pipe: Pipe markers not required (as long as pipe is painted red)

B. Underground Pipe:

1. Each underground pipe joint or connection shall include a compression-type joint restraint device (Mega Lug or equal). Any changes in direction of underground piping shall be provided with a thrust block or joint restraint as required. Changes in direction where entering buildings shall be provided with both thrust blocks and joint restraint.
2. Underground pipe shall be installed by either a fire sprinkler contractor or an underground contractor licensed by the State of Texas to install underground fire service mains.
3. All underground pipe connecting sprinkler and standpipe systems shall be rated for the maximum churn, or no flow pressure, of the largest fire pump in the zone plus the maximum static pressure at the suction side of the fire pump. Pipe shall be hydrostatically tested at the highest static pressure rating plus 50 psi, or 200 psi, whichever is greater per NFPA 24.
4. No underground pipe shall be covered until a joint inspection SHSU Plumbing and SHSU FSSS.

SEE JOCKEY PUMP DETAIL IN SECTION 5.21.40

2.02 Mechanical Grooved Couplings

- A. When grooved couplings are used, rolled-grooved joints are required with fittings and couplings designed for a working pressure of 300 psi. Malleable iron housing clamps: ASTM A47; UL labeled; engage and lock, designed to permit some angular deflection, contraction, and expansion (Firelock fittings not acceptable).
- B. Galvanized couplings are required for galvanized pipe.
- C. "C" shaped composition sealing gasket: ASTM D2000.
- D. Steel bolts, nuts and washers: ASTM A183 heat treated with a minimum tensile strength of 110,000 psi.
- E. Not Used

2.03 Valves

- A. Unless specified otherwise, all valves shall be UL listed and/or FM approved and be suitable for the maximum anticipated system pressure or a minimum of 175 psi working pressure, whichever is greater.
- B. All valves in the sprinkler system shall be UL listed and/or FM approved butterfly type indicating valves except for the following, which shall be O.S. & Y:
 1. All indicating valves on the suction side of a fire pump.
 2. Where indicated on the contract drawings.

- C. All butterfly valves shall have a built in tamper resistant switch for supervision of the open position. The switch shall be contained within a NEMA Type 1, general purpose indoor rated housing. Either unauthorized removal of the switch housing (when the valve is open) or closing the valve, shall cause the switch contacts to change position. The switch shall have four conductors to accommodate connections to Style 4 or Style 6 signaling line circuit devices.
1. Victaulic butterfly valves acceptable if manufactured in the year 2010 or later.
 2. Tyco TFP-101 Trim valves and TFP-202 Test Drain valves are not permitted to be used on campus.
- D. Where OS&Y indicating valves are installed, the following shall apply:
1. Valves 2-1/2 inches and larger shall be iron body with brass seats, discs, and stems. Include tamper switches listed for use with OS&Y valves.
 2. Valves 2 inches and smaller shall be brass body, stem, and seat. Include tamper switches listed for use with OS&Y valves.
- E. Check valves shall comply with the following:
1. Check valves 2-1/2 inches and larger shall be iron body swing check with cast brass hinge, rod, and brass faced discs.
 2. Check valves 2 inches and smaller shall be UL listed brass body and all brass fitted.
- F. Ball valves shall be constructed of forged brass with Teflon seats and shall be provided with a vinyl-covered handle.
- G. Post Indicator Valve
1. Gate valve on incoming water service shall be operable by a UL listed post indicator valve with tamper switch monitored by the associated building fire alarm panel.
- H. All valves controlling water supply for sprinklers shall be readily accessible for use by emergency and maintenance personnel.
- I. Except for underground water supply valves located in roadway boxes, all valves controlling water supply to sprinklers shall be chained and locked.
- J. A control valve shall be installed at the base of each riser. (Put into Section: Standpipe: 5.21.10; Locate standpipe isolation control valves within the stair enclosure and exposed for maintenance purposes.)

K. Pressure reducing valve:

1. Sprinkler systems are required to be provided with a pressure reducing valve. The discharge pressure setting of the pressure reducing valve shall not exceed 155 psi.

2.04 Piping Accessories

- A. All hanger components other than all thread shall be UL listed and/or FM approved. No sprinkler piping is to be supported from any mechanical or electrical devices and/or equipment (ducts, lights, etc.). Hanger assemblies installed outside, or otherwise exposed to weather, shall be externally galvanized.
- B. Provide sleeves where pipes penetrate beams, floors, or walls and install prior to construction of walls or pouring of concrete. Install sleeves flush with all surfaces.
- C. Sleeves for underground pipe shall have mechanical rubber seals and be watertight.
- D. Floor, wall and ceiling plates shall be pressed steel or cast iron split plates, chromium plated.
- E. Pressure gauges shall be UL listed or FM approved for fire service.

2.05 Identification Tags

- A. Identification signs shall be porcelain enameled 18 gauge and shall be affixed securely by brass chain to all valves. The signs shall be red in color.
- B. Provide an approved laminated valve chart in frame and plexi-glass cover showing location and use of each valve, including drain valves. The chart shall be secured in a visible location acceptable to the University.
- C. The main drain sign shall be labeled "MAIN DRAIN". Riser drains shall be labeled "RISER DRAIN" or "DRAIN".
- D. Auxiliary drain signs shall be labeled "AUXILIARY DRAIN".
- E. Inspector's test connection signs shall be labeled "INSPECTOR'S TEST".
- F. All water supply control valves shall have a standard sign identifying the portion of the system controlled, noting that the valve shall be kept open, and leaving a blank space for notification information.
- G. All isolation valves shall be marked on identification tag whether valve is to be "normally open" (NO) or "normally closed" (NC).

2.06 Drains and Test Piping

- A. All portions of the system shall be equipped with drains of the size specified in NFPA 13. Design sprinkler system that will drain to the riser. All main drains shall be piped to the exterior of

building. Auxiliary drains shall be piped to exterior of the building unless approved by SHSU FSS. All drain piping and threaded fittings to be galvanized (grooved couplings are not required to be galvanized).

- B. Every water flow switch shall have an inspector's test connection located downstream and piped to the sanitary sewer system designed to handle full flow from the drain.

2.07 Backflow Preventer

- A. A double check backflow prevention assembly shall be installed prior to any sprinkler or standpipe system connected to the water distribution system, including connection of pressure maintenance pumps to the building's domestic water line utilized to fill sprinkler system piping.

2.08 Express Drains:

- A. A remote express drain line is required for all buildings with floor control assemblies in addition to the main / inspectors test drain. This drain line shall be installed in the remote stairwell from the supply standpipe. The drain line shall be piped to a sanitary sewer.

2.09 Sprinklers

- A. Sprinklers shall be UL listed or FM approved and shall not include O-ring seals. Any sprinkler that incurs damage, is painted, or is sprayed with any obstructive material during construction shall be replaced at no cost to the University. Installation of sprinklers shall be coordinated with other work, including duct and electric fixture installation, to prevent sprinkler obstructions.
- B. Sprinklers located less than eight feet above finished floor or that may be subject to mechanical damage shall be provided with guards listed for use with the model of sprinkler installed.
- C. Quick-response sprinklers are required throughout all light-hazard occupancies, and may also be installed in ordinary-hazard occupancies for the quick response hydraulic design area reduction per NFPA 13 for utilizing quick response sprinklers. Extended coverage sprinklers may be utilized if proven in the hydraulic calculations.
- D. Unless specific aesthetic appearance is required for the project, white or chrome recessed pendent sprinklers with matching escutcheons shall be provided in areas with suspended ceilings, and brass upright sprinklers shall be provided in areas without suspended ceilings. Verify with the SHSU Project Manager & FSSS prior to specifying sprinkler type and finish.
- E. Where required by the project, sprinklers shall be centered in two directions in ceiling tiles. Pendent sprinklers required to be placed in the center of ceiling tiles, shall be supplied from a return bend that connects to an outlet at the top of the fire sprinkler branch line piping.

2.10 Dry Pipe System

- A. Dry Pipe systems shall only be installed where the area being protected cannot be maintained above 40 degrees F, as required per NFPA 13
- B. In areas subject to freezing that cannot be protected by dry type sprinklers on a wet sprinkler

system, a dry pipe system shall be installed. Antifreeze loops are not permitted.

- C. Pitch dry pipe system piping a minimum of ¼ inch per 10 feet for dry system mains and minimum of ½ inch per 10 feet for dry system branch lines.
- D. Provide full length dry pendent sprinklers that connect directly to the dry system branch line tee fittings in areas with suspended ceilings. Do not install dry pendent sprinklers on drops.
- E. Provide a non-riser mounted tank type air compressor listed for fire protection use and sized to refill the entire dry pipe system within 30 minutes as required per NFPA 13.
- F. Utilize the compressor manufacturer's listed air maintenance device and supervisory air pressure switch to maintain and monitor the dry pipe system air pressure.
- G. All dry pipe valves shall not be externally resettable
- H. Install permanent, typed, local labels at devices showing "HIGH AIR" setting, "LOW AIR" setting, "COMPRESSOR ON" setting, "COMPRESSOR OFF" setting, and "TRIP PRESSURE" setting.

2.11 Pre-action Sprinkler System

- A. Provide a double interlock pre-action system where the University prefers to eliminate water filled piping within the room, such as special collections, computer rooms, etc.
- B. Pitch pre-action system piping a minimum of ¼ inch per 10 feet for pre-action system mains and minimum of ½ inch per 10 feet for pre-action system branch lines.
- C. Provide full length dry pendent sprinklers that connect directly to the pre-action system branch line tee fittings in areas with suspended ceilings. Do not install dry pendent sprinklers on drops.
- D. Provide a tank or riser-mounted air compressor listed for fire protection use and sized to refill the entire pre-action system within 30 minutes as required per NFPA 13.
- E. Utilize the compressor manufacturer's listed air maintenance device and supervisory air pressure switch to maintain and monitor the pre-action system air pressure.
- F. Requirements for detection, pre-action system releasing, pre-action system monitoring, and the pre-action release control panel are noted in Section 5.28.30 of the SHSU Standards.
- G. All Pre-action valves shall not be externally resettable.
- H. Install permanent, typed, local labels at devices showing "HIGH AIR" setting, "LOW AIR" setting, "COMPRESSOR ON" setting, "COMPRESSOR OFF" setting, and "TRIP PRESSURE" setting.

PART 3 EXECUTION

3.01 Guarantee

- A. The Contractor shall guarantee and service all workmanship and materials to be as represented by him, and shall repair or replace, at no additional cost to the Owner, any part thereof, which may become defective within the period of one (1) year after the date of final acceptance by the Engineer, ordinary wear and tear excepted. Contractor shall be responsible for, and pay for, any damages caused by, or resulting from defects in his work.

3.02 Qualifications

- A. System design and installation shall be supervised by a licensed NICET Level III sprinkler system technician or fire protection engineer with not less than five (5) years of experience with sprinkler systems. Accurate As-Built drawings shall be required in the form of three hard copies and two copies on CD in the specified Auto CAD format. The signature of the RME or engineer constitutes an affidavit that the statements, representations, and information presented in the submittal constitute a complete operational system conforming to applicable state laws and recognized good engineering practices. All field installation work shall be supervised by a NICET Level II or III sprinkler system technician.

3.03 System Acceptance Testing and Commissioning

- A. Perform acceptance tests according to NFPA 25. All testing must be witnessed by SHSU Personnel. Provide copies of test reports to the SHSU personnel, SHSU FSSS, A&E Services, and other interested parties as tests are completed. Prior to acceptance, accurate red-lines must be submitted and required training for SHSU personnel completed. Provide a complete set including all test results to the Owner at the completion of the project and a copy in each O&M Manual. All Fire Sprinkler Systems to be tagged per State Fire Marshall's requirements.

3.04 Warranty

- A. Warranty must be good for one year.
- B. Contractor to respond to all warranty calls within 24 hours. If equipment cannot be repaired at this time, FSSS shall be updated daily with the progress and/or status.
- C. See Fire Alarm Warranty

3.05 Training

- A. Contractor shall provide services to instruct Owner's personnel in operation and maintenance of system for a minimum of two 4 hour sessions.

END OF STANDARD