

SECTION 5.21.10 - WATER-BASED FIRE-SUPPRESSION SYSTEMS
DESIGN AND CONSTRUCTION STANDARD

PART 1 GENERAL

1.01 Scope of Standard

- A. This standard provides general requirements of The University of Texas at Austin for combination automatic sprinkler/standpipe, automatic fire sprinkler, and standpipe systems. This document is not intended to serve as a guide specification.
- B. The design guidelines contained herein include the requirements for fire protection systems at The University of Texas at Austin. It is the intention of this document to provide a minimum standard for fire protection systems at the University so as to provide the highest level of fire safety possible.

1.02 Scope of Work

- A. Provide all design and materials required to provide a complete fire protection system to protect the specified building in accordance with design requirements. Antifreeze loops are not permitted. The preference of the University is to connect to the campus Fire Water Distribution System (FWDS) provide code compliant combination wet automatic fire sprinkler and, where possible, automatic standpipe systems, that do not contain alarm valves or local alarm devices, and a minimum 10-psi safety factor without requiring a building fire pump.

SEE JOCKEY PUMP DETAIL IN THE APPENDICES SECTION.

- B. 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 preaction systems. Use of preaction systems must be approved by the University prior to system design.
- C. Standpipe systems must be installed where required by NFPA 101 or the latest edition of the International Building Code. All standpipe systems shall be Class I in all cases, regardless of minimum code requirements, and designed per the latest edition of NFPA 14. 2-1/2" hose valves are required at the intermediate stair landings within the required stairwells per NFPA 14. This may require a standpipe riser in each intermediate landing of all stairs and a separate fire sprinkler riser located in one main stair landing. Provide standpipe isolation control valves with tamper switches for each standpipe as required per NFPA 14. Locate isolation control valves within the stair enclosure and exposed for maintenance purposes.

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- D.
- E. The work addressed in this section consists of a fire protection system, which may include coordination with one or more of the following:
 - 1. Fire Alarm Systems
 - 2. HVAC and smoke control systems and fire, smoke, and combination fire/smoke dampers.
 - 3. Emergency power systems.
 - 4. Elevator installation. See the Texas State Elevator Code ASME/ANSI A17.1 and ASME/ANSI A17.3.
 - 5. Central control and monitoring system.
- F. Reference Standards (Utilize latest editions available):
 - 1. NFPA 13-Installation of Sprinkler Systems.
 - 2. NFPA 14-Installation of Standpipe and Hose Systems.
 - 3. NFPA 24-Installation of Private Fire Service Mains and their Appurtenances.
 - 4. NFPA 25-Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.
 - 5. NFPA 101-Life Safety Code.
 - 6. IBC-International Building Code

1.03 Related Work: References/Quality Assurance

- A. The University, FM Global (FM), the International Building Code, National Fire Codes as published by the National Fire Protection Association (NFPA), State Fire Marshal, and The University of Texas Fire Marshal's requirements contain fire protection criteria and requirements for the design of all fire suppression systems. The project shall conform to the following:
- B. Conform to a minimum of the latest edition of NFPA 13 for sprinkler systems. Insurer may require design in excess of NFPA 13.
- C. Conform to a minimum of the latest edition of NFPA 14 for standpipe systems. Insurer may require design in excess of NFPA 14.

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1.04 Submittals

- A. The University of Texas Project Manager shall review and distribute all submittals for approval by the University insurer, the UT Fire Marshal, 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 prepared in accordance with NFPA 13, NFPA 14 (if applicable), and NFPA 24 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.
- E. Hydraulic calculations for sprinkler systems shall comply with NFPA 13 and shall include comprehensive hydraulic data sheets. Provide a 10 psi safety factor for all sprinkler system hydraulic calculations.
- F. Provide hydraulic calculations for automatic standpipes, where required per NFPA 14, to provide 100 psi when flowing 500 gpm at the most remote standpipe outlet and 250 gpm at each additional standpipe. Provide hydraulic calculations for manual standpipes to demonstrate the pressure available at the top of each standpipe while flowing the demand required per NFPA 14 utilizing both the available water supply and the nominal City of Austin fire truck pumper through the fire department connection.
- 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 Fire Water Distribution System (FWDS) or the City of Austin water distribution system, depending on which system will be utilized to supply the new sprinkler and/or standpipe 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 UT Fire Marshal 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)

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2. Test hydrants (hydrant numbers and location) and hydrant elevations (ft)
 3. Flow rate (gpm), static pressure (psi), and residual pressure (psi)
- 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.

PART 2 PRODUCTS

2.01 Piping and Fittings

- A. Refer to Section 5.21.00.

2.02 Valves

- A. Refer to Section 5.21 00.

2.03 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 UT Project Manager 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.
- F. Main electrical equipment rooms provide a pre-action or a dry sprinkler systems.

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2.04 Drains and Test Piping

- A. All trapped portions of the system shall be equipped with drains of the size specified in NFPA 13. Where possible, design a system that will completely drain to the system riser. Where any trapped water exists, provide an auxiliary drain per NFPA 13 and pipe to the sanitary sewer system.
- B. Every waterflow switch shall have an inspector's test connection located downstream of the water flow switch and piped to the sanitary sewer system.

2.05 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 tank or riser-mounted 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 an air maintenance device and supervisory air pressure switch to maintain and monitor the dry pipe system air pressure.

2.06 Preaction Sprinkler System

- A. Provide a double interlock preaction system where the University prefers to eliminate water filled piping within the room, such as special collections, computer rooms, etc.
- B. Pitch preaction system piping a minimum of ¼ inch per 10 feet for preaction system mains and minimum of ½ inch per 10 feet for preaction system branch lines.
- C. Provide full length dry pendent sprinklers that connect directly to the preaction system branch line tee fittings in areas with suspended ceilings. Do not install dry pendent sprinklers on drops.

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- D. Provide a tank or riser-mounted air compressor listed for fire protection use and sized to refill the entire preaction system within 30 minutes as required per NFPA 13.
- E. Utilize an air maintenance device and supervisory air pressure switch to maintain and monitor preaction system air pressure.
- F. Requirements for detection, preaction system releasing, preaction system monitoring, and the preaction release control panel are noted in Section 28 30 00.

2.07 Standpipe Systems

- A. Where a standpipe system is required to be installed, the standpipe shall be designed as Class I, manual-wet or automatic-wet standpipe as required by NFPA 14 and the IBC.
- B. Where a standpipe system is required in a building or area where the temperature cannot be maintained above 40 degrees F at all times, a dry standpipe is required to be installed. Dry standpipe systems installed on campus shall be Class I, manual-dry standpipes as defined by NFPA 14. Provide galvanized pipe, fittings, and hangers for all dry standpipe systems.
- C. Each standpipe shall be installed with a UL listed 2-1/2 inch NST fire department hose connection with caps and located in the intermediate stairwell landing with caps on each floor. Where the distance between the stairwells exceeds the criteria indicated in NFPA 14, provide additional hose valves on each floor to maintain the minimum required distance between valve locations. Locate the additional hose valves in UL listed recessed valve cabinets utilizing only 2-1/2" hose valves without the hose.
- D. Provide standpipe isolation control valves supervised by the fire alarm system as required per NFPA 14. Locate standpipe isolation valves within stairwells and exposed, unless an alternate location has been approved by the University.
- E. Each standpipe shall have a drain sized and located in accordance with NFPA 14. Each drain shall be discharged to sanitary sewer.
- F. All dry standpipe system piping shall be installed so that the entire system may be drained back to the system riser. Where building conditions do not allow complete system drainage, provide auxiliary drains for all trapped sections of pipe in accordance with NFPA 13. The number of auxiliary drains shall be kept to a minimum.
- G. Each dry standpipe shall be provided with an air and vacuum valve installed at the top of each riser. The air and vacuum valve shall be a 1 inch APCO Series 140 air and vacuum valve, manufactured by Valve and Primer Corporation or approved equal.

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- H. Where required, a conveniently accessible two-way hose connection shall be provided at the roof level. If the building layout and construction permits, penetrations for the roof level hose connection shall be through an exterior wall and not through the roof.
- I. Manual wet standpipe systems calculated utilizing the responding fire department pumper truck for the required pressure and flow per NFPA 14 shall be tested utilizing the pumper truck to prove the hydraulic calculations submitted during design.
- J. Where a combination sprinkler/standpipe is provided, the floor control assembly supplying the sprinkler system is required to have a check valve per NFPA 14.

2.08 Fire Department Connections

- A. Each fire department connection shall be flush wall-mounted type. Freestanding type fire department connections shall only be installed when approved by The University. Each fire department connection shall consist of a minimum of two 2-1/2-inch inlets compatible with equipment utilized by the City of Austin Fire Department and equipped with UL listed lockable caps keyed for the City of Austin Fire Department. The fire department connection shall be labeled to indicate the type of system served with raised letters at least one inch in size and cast on the escutcheon plate provided. The fire department connection shall not be less than two feet and not more than 3 feet 6 inches in elevation, measured from the ground level to the centerline of the inlets.

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 and UT. 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 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 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

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good engineering practices. All field installation work shall be continuously supervised by a NICET Level II or III sprinkler system technician.

3.03 Microbiological Influenced Corrosion (MIC)

- A. Provide testing on the City of Austin water supply or the campus FWDS, whichever will be supplying the new sprinkler and/or standpipe system, in accordance with the University for MIC testing procedures.
- B. Utilize methods and procedures for flushing sprinkler and standpipe piping as required by UT for MIC testing.

3.04 System Acceptance Testing and Commissioning

- A. Perform acceptance tests according to NFPA 13 and UT Third Party Testing Guidelines that apply to fire sprinkler system testing with a representative of UT Austin Fire Prevention Services and FSSS present. Provide copies of test reports to the UT Fire Marshal and Fire Prevention Services and FSSS , as tests are completed. Provide a complete set of all test results to the University at the completion of the project and a copy in each O&M Manual.

END OF STANDARD