

**SAM HOUSTON STATE UNIVERSITY  
DESIGN AND CONSTRUCTION STANDARDS**

**DIVISION 21 00 00  
FIRE SUPPRESSION**

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## **21 12 00 FIRE SUPPRESSION STANDPIPE SYSTEM**

### **A. General**

1. Standpipe hose connections shall be provided at intermediate landings and at all other locations required by NFPA 14. Where multiple intermediate floor landings are provided between two levels, the standpipe hose connection shall be provided at the highest intermediate floor landing.
2. Storage of Materials, Equipment, and Fixtures – During construction, all standpipe system piping, fittings, and equipment shall not be stored directly on the ground and shall be protected from weather and damage. All pipe ends and outlets shall be covered until installation to prevent contamination on pipe interior.
3. All standpipe systems shall be provided with a hard piped main drain located at the lowest point of each standpipe riser. The main drain shall meet all the requirements of NFPA 14. A main drain shall be provided for each standpipe riser on the system side of the system control valve. The lowest hose connection is not permitted to be used as the main drain. The main drain shall be sized in accordance with NFPA 14. Standpipe drains shall be routed to discharge at either a floor drain or the building exterior. Where standpipe drains are routed to the building exterior, the drain location shall be coordinated so that it does not discharge to sidewalks, porches, walkways, or other areas where the discharge would interrupt daily operations. Drain discharge locations shall also be coordinated so that the drain discharge does not damage sensitive vegetation or other landscape features.

### **B. Piping**

1. All standpipe system piping shall be a minimum of Schedule 40 black steel seamless piping. Where a nitrogen inerting system is provided for all standpipe system piping, a minimum of Schedule 10 black steel seamless piping is permitted. The use of galvanized steel piping is not permitted. The use of Electric-Resistance Welded (ERW) piping is not permitted unless otherwise approved by SHSU Facility Services.
2. All standpipe system piping shall be painted red. In occupied areas where the standpipe system piping is exposed, the system piping shall be permitted to be painted a color other than red given it is approved by SHSU Facility Services and pipe markers are provided as indicated below.
  - a. Pipe markers shall be marked “Fire Protection” and indicate direction of flow. Where direction of flow can be in both directions, the pipe marker shall indicate as such.
  - b. Pipe markers shall be either wrap-around type or stick-on vinyl type with red background and white lettering a minimum of 1 inch in height.
  - c. Pipe markers shall be visible from the floor.
  - d. Pipe markers shall be provided on all standpipe feed mains, risers, and branch lines at intervals not exceeding 20 feet.

### **C. System Acceptance**

1. Prior to final system acceptance testing, the contractor shall perform all necessary pretesting of the standpipe system in accordance with NFPA 14. This may include, but is not limited to, flushing of pipe, hydrostatic testing, flow testing, and testing of pressure reducing valves.
2. After completion of all necessary pretesting, the contractor shall perform final acceptance testing in accordance with NFPA 14 and SHSU Third Party Testing Guidelines with a representative of SHSU Fire Prevention Services and/or FSSS (Fire Safety System Specialist) present. Prior to SHSU arriving for final acceptance testing, the documents and training listed below shall be

submitted/provided to SHSU Facility Services at least five business days prior to the scheduled final acceptance testing.

- a. All documentation and reports from pre-testing performed by the contractor.
  - b. All as-built drawings, test reports, and manuals required by NFPA 14.
  - c. Standpipe system training performed by the contractor to SHSU Fire Prevention Services and FSSS staff. Training shall indicate, at a minimum, location of all system control valves, location of all auxiliary drain and main drain valves, and all inspection, testing, and maintenance requirements of NFPA 25.
3. After successful acceptance testing and approval from SHSU Fire Prevention Services and/or FSSS, the contractor shall provide all required closeout documentation required by NFPA 14 and the contract design documents.

**D. Warranty**

1. The installing contractor shall warranty all materials and workmanship for a period of two years beginning with the date of final written acceptance by SHSU. The contractor shall be responsible during the design, installation, testing, and warranty periods for any damage caused by their (or their subcontractors') work, materials, or equipment.

**21 13 00 FIRE SUPPRESSION SPRINKLER SYSTEM**

**A. General**

1. Sprinkler piping and sprinkler heads shall not pass-through or be installed in Electrical rooms or closets. Electrical rooms and closets shall comply with the requirements of NFPA 13 to permit the omission of sprinkler protection. These requirements include:
  - a. The room/closet is dedicated to electrical equipment only.
  - b. Only dry-type electrical equipment is used
  - c. Equipment is installed in a 2-hour fire-rated enclosure including protection for penetrations.
  - d. No combustible storage is present in the room/closet.
2. Sprinkler piping shall not pass-through Data rooms/closets. Data rooms/closets shall be provided with sprinkler protection in accordance with NFPA 13.
3. Storage of Materials, Equipment, and Fixtures – During construction, all sprinkler system piping, fittings, and equipment shall not be stored directly on the ground and shall be protected from weather and damage. All pipe ends and outlets shall be covered until installation to prevent contamination on pipe interior.
4. All devices within the automatic sprinkler system (including fire pump, jockey pump, control valves, spare head box, gauges, inspector test valves) are to be barcoded and uploaded via Building Reports-no exceptions. Once added to the system, the contractor shall add a bar code sticker obtained from BuildingReports.com for identification.

**B. Aboveground Piping**

1. All sprinkler system piping shall be a minimum of Schedule 40 black steel seamless piping. Where a nitrogen inerting system is provided for all sprinkler system piping, a minimum of Schedule 10 black steel seamless piping is permitted. The use of galvanized steel piping is not permitted. The use of Electric-Resistance Welded (ERW) piping is not permitted unless otherwise approved by SHSU Facility Services.

2. CPVC piping shall be permitted to be used in Residential occupancies only. CPVC piping shall be Spears Blazemaster or “approved equal”. “Approved equal” shall be approved by SHSU Facility Services.
3. All sprinkler system piping shall be painted red. In occupied areas where the sprinkler system piping is exposed, the system piping shall be permitted to be painted a color other than red given it is approved by SHSU Facility Services and pipe markers are provided as indicated below.
  - a. Pipe markers shall be marked “Fire Protection” and indicate direction of flow. Where direction of flow can be in both directions, the pipe marker shall indicate as such.
  - b. Pipe markers shall be either wrap-around type or stick-on vinyl type with red background and white lettering a minimum of 1 inch in height.
  - c. Pipe markers shall be visible from the floor.
  - d. Pipe markers shall be provided on all standpipe feed mains, risers, and branchlines at intervals not exceeding 20 feet.

**C. Underground Piping**

1. Underground piping shall meet Civil requirements for proper installation.
2. Tracer wire shall be installed with all underground piping.
3. Underground piping shall not be covered until a joint inspection from SHSU Plumbing and SHSU FSSS (Fire Safety System Specialist) is performed and the installation is approved by both parties.
4. Sleeves for underground pipe shall have mechanical rubber seals and be watertight.

**D. Flexible Sprinkler Assemblies**

1. Flexible sprinkler head assemblies are permitted and shall be installed and mounted in accordance with manufacturer requirements. Where the friction loss through a flexible sprinkler head assembly is based on the number of bends in the hose (in lieu of an equivalent length), the hydraulic calculations for the flexible head assembly shall be based on the maximum permitted number of bends. Where flexible sprinkler head assemblies are used, the flexible hose length shall be long enough to accommodate future renovation and/or relocation of the sprinkler head.

**E. Couplings and Fittings**

1. Where grooved couplings are used, rolled-grooved joints are required with fittings and couplings designed for a working pressure of 300 psi. Cut grooved piping is not permitted. Malleable iron housing clamps: ASTM A47; UL labeled; engage and lock, designed to permit some angular deflection, contraction, and expansion.
2. Slip couplings are not permitted. All grooved couplings shall have a bolted connection.
3. Mechanical tee fittings are not permitted on new construction. Mechanical tee fittings shall only be permitted to be used where necessary on renovation projects.
4. All threaded fittings shall be Schedule 80.

**F. Valves**

1. All valves in the sprinkler system shall be UL listed and FM approved butterfly type indicating valves except for all indicating valves on the suction side of a fire pump, which shall be O.S. & Y.
2. All butterfly valves shall have a built-in tamper resistant switch for supervision of the open position (or closed position if applicable). 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 signaling line circuit devices.

3. Where OS&Y indicating valves are installed, the following shall apply:
    - a. 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.
    - b. Valves 2 inches and smaller shall be brass body, stem, and seat. Include tamper switches listed for use with OS&Y valves.
  4. Check valves shall comply with the following:
    - a. Check valves 2-1/2 inches and larger shall be iron body swing check with cast brass hinge, rod, and brass faced discs.
    - b. Check valves 2 inches and smaller shall be UL listed brass body and all brass fitted.
  5. Ball valves shall be full port. Ball valves shall be constructed of forged brass with Teflon seats and shall be provided with a vinyl-covered handle. Ball valves shall be lockable if accessible to the public.
  6. Post Indicator Valve
    - a. Gate valve on incoming water service shall be operable by a UL listed post indicator valve secured in the open position by a chain and lock (provided by SHSU).
  7. All valves controlling water supply for sprinklers shall be readily accessible for use by emergency and maintenance personnel.
- G. Except for underground water supply valves located in roadway boxes and exterior post indicator valves, all valves controlling water supply to sprinklers shall be electronically supervised and locked in its normal position (either normally open or normally closed) via a chain and lock (chain and lock provided by SHSU). Where sprinkler control valves are located in a locked room that is only accessible to SHSU personnel (i.e., locked mechanical room), the chain and lock are not required.
- Floor Control Assemblies
1. Multi-story buildings (including those with NFPA 13R sprinkler systems) shall be configured so that each story has its own system with a floor control assembly for each story. The floor control valve assembly shall meet the requirements of NFPA 13. A remote express drain and inspectors test shall also be provided.
- H. Drains and Test Piping
1. All sprinkler system drains that discharge to the building exterior shall be coordinated so that they do not discharge to sidewalks, porches, walkways, or other areas where the discharge would interrupt daily operations. Drain discharge locations shall also be coordinated so that the drain discharge does not damage sensitive vegetation or other landscape features.
  2. An auxiliary drain shall be provided at the furthest point from the supply and piped from the highest elevation of the system.
  3. Every water flow switch shall have an inspector's test connection located downstream and piped to the outside of the building designed to handle full flow from the drain.
  4. 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 the outside of the building.
- I. Dry Pipe System
1. 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.

2. Provide a non-riser mounted tank type air compressor. Compressor shall be sized to meet the requirements of NFPA 13.
3. All dry pipe valves shall not be externally resettable.
4. Install permanent, typed, local labels at each dry pipe valve indicating the “HIGH AIR” setting, “LOW AIR” setting, “COMPRESSOR ON” setting, “COMPRESSOR OFF” setting, and “TRIP PRESSURE” setting.
5. Where dry pendent sprinklers are provided, install dry pendent sprinklers directly to the dry system branch line piping. Do not install dry pendent sprinklers on drops.

**J. Pre-action Sprinkler System**

1. Provide a double interlock pre-action system where the SHSU prefers to eliminate water filled piping within the room, such as special collections, computer rooms, etc. Rooms/spaces requiring pre-action sprinkler system protection shall be coordinated with SHSU during the project design phase.
2. Where dry pendent sprinklers are provided, install dry pendent sprinklers directly to the pre-action system branch line piping. Do not install dry pendent sprinklers on drops.
3. Provide a non-riser mounted tank type air compressor. Compressor shall be sized to meet the requirements of NFPA 13.
4. Utilize the compressor manufacturer’s listed air maintenance device and supervisory air pressure switch to maintain and monitor the pre-action system air pressure.
5. All Pre-action valves shall not be externally resettable.
6. Install permanent, typed, local labels at each pre-action system valve indicating the “HIGH AIR” setting, “LOW AIR” setting, “COMPRESSOR ON” setting, “COMPRESSOR OFF” setting, and “TRIP PRESSURE” setting.

**K. Nitrogen Inerting Systems**

1. Where a nitrogen inerting system is provided (for either a wet-pipe or dry-pipe sprinkler system), the nitrogen inerting system shall comply with the requirements of this section and all manufacturer requirements.
2. Manufacturer of the nitrogen inerting equipment shall be Potter or approved equal.
3. Contractor Responsibility
  - a. After final written acceptance from SHSU, the contractor shall be responsible for 24/7 support to include emergency response on site or via telephone technical support within 2 hours from the call time for two years from the completion date.
  - b. After final written acceptance from SHSU, the contractor shall be required to include all preventative maintenance as outlined by the manufacturer for 2 years.
4. Nitrogen Inerting System for Wet-Pipe Sprinkler Systems
  - a. Nitrogen inerting vents shall be provided in accordance with manufacturer requirements. Nitrogen inerting vents shall be easily accessible for testing and maintenance.
  - b. All nitrogen gas cylinders necessary to complete the nitrogen inerting process shall be provided by the Contractor. Quantity of nitrogen necessary shall be determined by the contractor and manufacturer based on system size.
  - c. Spare nitrogen gas cylinders shall be provided on site to be used as needed in the future. Quantity of nitrogen gas cylinders shall be determined by contractor and manufacturer and approved by SHSU.
5. Nitrogen Inerting System for Dry-Pipe and Pre-Action Sprinkler Systems

- a. Nitrogen inerting equipment shall not be located in a unsecure location (area accessible to the public).
- b. The nitrogen generator, air compressor, and equipment shall be selected by the contractor and meet all manufacturer requirements.
- c. Where nitrogen inerting vents are provided at remote locations of the sprinkler system (i.e., any location not at the system riser), the nitrogen inerting vents shall be accessible for testing and maintenance.
- d. Air compressor shall be sized based on manufacturer and NFPA 13 requirements. One backup air compressor of equal size shall be provided to serve as a backup to the primary air compressor in case of malfunction or maintenance needs.  
Nitrogen generator shall have the ability to be monitored via the buildings BMS system, fire alarm system, or manufacturer's software.

**L. Renovations and Servicing**

1. Where renovations or servicing to existing sprinkler systems occur, the renovation/work area shall be isolated so that all portions outside of the renovation/work area remain in service while the contractor is not actively working on the project. The contractor is responsible for achieving the required system isolation, including but not limited to, addition of isolation control valves, draining of system within work area, and bypass of necessary fire alarm equipment.

**M. System Acceptance**

1. Prior to final system acceptance testing, the contractor shall perform all necessary pretesting of each sprinkler system in accordance with NFPA 13/13R. This may include, but is not limited to, flushing of pipe, hydrostatic testing, and trip testing.
2. After completion of all necessary pretesting, the contractor shall perform final acceptance testing in accordance with NFPA 13/13R and SHSU Third Party Testing Guidelines with a representative of SHSU Fire Prevention Services and/or FSSS (Fire Safety System Specialist) present. Prior to SHSU arriving for final acceptance testing, the documents and training listed below shall be submitted/provided to SHSU Facility Services at least five business days prior to the scheduled final acceptance testing.
  - a. All documentation and reports from pre-testing performed by the contractor.
  - b. All as-built drawings, test reports, and manuals required by NFPA 13/13R.
  - c. Sprinkler system training performed by the contractor to SHSU Fire Prevention Services and FSSS staff. Training shall indicate, at a minimum, location of all system control valves, location of all auxiliary drain and main drain valves, and all inspection, testing, and maintenance requirements of NFPA 25.
3. After successful acceptance testing and approval from SHSU Fire Prevention Services and/or FSSS, the contractor shall provide all required closeout documentation required by NFPA 13/13R and the contract design documents.

**N. Warranty**

1. The installing contractor shall warranty all materials and workmanship for a period of two years beginning with the date of final written acceptance by SHSU. The contractor shall be responsible during the design, installation, testing, and warranty periods for any damage caused by their (or their subcontractors') work, materials, or equipment.



**21 31 00 FIRE PUMPS**

**A. Fire Pump, Motor, and Controller**

1. Fire pump and controller shall be connected to emergency power.
2. The pump furnished for fire protection service shall be supplied with a driver, controller and pump accessory items specified by the pump manufacturer.
3. The fire pump controller shall be manufactured by either Metron, Firetron, or other approved domestic manufacturer.
4. The fire pump shall be a single stage, centrifugal horizontal split-case pump specifically labeled for fire service.

**B. Jockey Pump and Motor Controller**

1. Jockey Pump Controller:
  - a. All jockey pumps shall be served by emergency power circuits.

**C. System Acceptance**

1. Prior to final system acceptance testing, the contractor shall perform all necessary pretesting of each fire pump in accordance with NFPA 20 and NFPA 13. This may include, but is not limited to, flushing of piping, hydrostatic testing, and fire pump flow testing.
2. After completion of all necessary pretesting, the contractor shall perform final acceptance testing in accordance with NFPA 20 and SHSU Third Party Testing Guidelines with a representative of SHSU Fire Prevention Services and/or FSSS (Fire Safety System Specialist) present. Prior to SHSU arriving for final acceptance testing, the documents and training listed below shall be submitted/provided to SHSU Facility Services at least five business days prior to the scheduled final acceptance testing.
  - a. All documentation and reports from pre-testing performed by the contractor.
  - b. All as-built drawings, test reports, and manuals required by NFPA 20.
  - c. Sprinkler system training performed by the contractor to SHSU Fire Prevention Services and FSSS staff. Training shall indicate, at a minimum, operation of fire pump and fire pump controller, and all inspection, testing, and maintenance requirements of NFPA 25.
3. After successful acceptance testing and approval from SHSU Fire Prevention Services and/or FSSS, the contractor shall provide all required closeout documentation required by NFPA 20 and the contract design documents.

**D. Warranty**

1. The installing contractor shall warranty all materials and workmanship for a period of two years beginning with the date of final written acceptance by SHSU. The contractor shall be responsible during the design, installation, testing, and warranty periods for any damage caused by their (or their subcontractors') work, materials, or equipment.