University of Rhode Island
Department of Public Safety

Design and Construction Standards
Division 21 – Fire Suppression

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21 10 00 – Fire Suppression (Sprinkler) Systems

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SECTION 21 10 00 – FIRE SUPPRESSION (SPRINKLER) SYSTEMS

The following shall serve as the minimum standard for installation of sprinkler systems in URI facilities. Where any part of this standard exceeds applicable fire codes, this standard shall be the minimum.

1. GENERAL

1.1. **Summary:** For all sprinkler system installations:

1.1.1. The system shall be hydraulically designed by a registered fire protection engineer or mechanical engineer (who must review and stamp all drawings and the hydraulic calculation cover sheets).

1.1.2. The designer is responsible for obtaining a satisfactory water supply test of the municipal water system.

1.1.3. The project scope of work shall include a complete description of the work required by all contractors. The scope of work shall include the final acceptance test parameters as required by the engineer of record.

1.2. **Submittals:** The contractor shall submit simultaneously to URI's Office of Alarm Services (URI Alarm Services) and the State Fire Marshal:

- Hydraulic calculations, seismic brace calculations, and all items set forth in NFPA 13.
- Product data and samples including a complete list of equipment and products, and a manufacturer's catalog sheet for each item to be included in the work.
- Shop drawings showing all sprinkler types, locations, pipe routing, pipe sizing, hanger details, riser details, pipe lengths, etc.
- Welding procedures that comply with the qualification requirements of NFPA 13, and that meet or exceed AWS B2.1 "Standard Welding Procedure and Performance Qualifications" and ASME Boiler and Pressure Vessel Code, Section IX.

1.2.1. Incomplete submittals will be returned without action, unless prior approval is requested and given by the University of Rhode Island for partial submittals.

1.2.2. Work shall not begin until approval is received from both the State Fire Marshal and URI Alarm Services.

1.2.3. For Substantial Completion, as-built CAD shop drawings, and O&M information, including final hydraulic calculations, manufacturer's product data catalog sheets, a completed Contractor's Test and Materials Certificate, and valve chart shall be submitted to URI Alarm Services and the AHJ.

1.2.4. Acceptance of the completed work will be granted jointly by the local AHJ and the University of Rhode Island. Approval by the local AHJ shall be evidenced in writing and forwarded to URI Alarm Services as a requirement for Substantial Completion.

1.3. **Approvals:** For the purposes of code compliance, the installation is to be compliant with requirements of the local AHJ. Where there are conflicts between the AHJ and the

referenced codes and standards, the more stringent standard shall apply. If there is a question of interpretation as to which is more stringent, URI Alarm Services shall decide.

1.3.1. The Contractor shall be responsible for obtaining all inspections including underground, rough, finish and final from all parties including URI Alarm Services.

2. EQUIPMENT

2.1. **Equipment Specifications:** To provide uniformity and compatibility across University properties, the following equipment shall be specified for all sprinkler system installations unless otherwise approved by URI Alarm Services.

2.1.1. All pipes shall be ferrous and meet the requirements of NFPA 13. Pipe shall be Schedule 40 for threaded and cut groove pipe and Schedule 10 for roll groove applications. All piping 2” or less shall be Schedule 40 threaded. CPVC is not allowed.

2.1.2. Underground pipe shall be as approved by the URI Facilities Operations’ Utilities office (hereafter referred to as URI Utilities). All piping upstream of the double backflow preventer shall be ductile iron Class 52 and cement-mortar lined whether inside or outside the building.

2.1.3. Backflow prevention assemblies shall be as approved by URI Utilities and the local water district.

2.1.4. Water flow switches shall be Potter VSR, or approved equivalent.

2.1.5. Valve supervisor switches shall be Potter OSYSU-A2 for OSY valves and Potter PCVS-2 for PIV valves, or approved equivalent(s).

2.1.6. Butterfly isolation valves shall be equipped with two internal, single-pole, double-throw monitoring switches.

2.1.7. Pressure-type water flow switch for dry systems shall be Potter PS10-2A, or approved equivalent.

2.1.8. High/low air pressure monitoring switches for dry systems shall be Potter PS40-2A, or approved equivalent.

2.1.9. Supervised valves 3.5 inches or smaller shall be butterfly valves.

2.2. **Signs and Markings:** All control, drain, and test valves shall be marked with signs identifying the type of valve and the area (floor or portion of the building) affected by the valve.

2.2.1. Signs shall be three-layer etched plastic with red letters on a white background. Letters shall be a minimum of 1/4 inch high.

2.2.2. The signs shall be hung by chain from the valve or attached to the building structure.

2.2.3. If the system is a hydraulically calculated system, a sign shall be provided in accordance with NFPA 13.

2.2.4. In addition to the code required signage, a separate sign shall be provided indicating the building name, area served, type of system (automatic sprinkler, standpipe, combination standpipe/sprinkler, etc.) for permanent attachment. The content, size and location shall be approved by URI Alarm Services. Lettering shall be a minimum 1 inch high.

2.2.5. All sign/marking text shall be submitted to URI Alarm Services for approval (ex., “CONTROL VALVE FOURTH FLOOR NORTH”).

2.3. **Spare Parts and Tools:** A UL-listed and/or approved spare sprinkler cabinet(s) shall be installed as required to contain the minimum quantity of sprinklers required by NFPA 13, for each type, finish, and temperature rating used.

2.3.1. Sprinkler wrenches and heads compatible with each type of sprinkler shall be provided in the cabinet(s) in accordance with NFPA 13.

2.3.2. The spare sprinkler cabinet(s) shall be painted “fire red” and be keyed to a Corbin CAT 30 lock.

2.3.3. The spare sprinkler cabinet(s) shall be labeled with a riveted or screw-on plastic laminate nameplate indicating “SPARE SPRINKLER CABINET” in 3/4-inch-high white letters on a red background.

2.3.4. The cabinet(s) shall be installed at a location specified by URI Alarm Services.

3. EXECUTION

3.1. **General:** All installation work shall be performed in accordance with the reference standards without exception, and as required by the AHJ.

3.1.1. All piping shall be installed straight, true and plumb.

3.1.2. Before making substantive deviations from the approved Shop Drawings, written approval shall be obtained from URI Alarm Services and the AHJ. Any deviations shall be carefully noted on the Project Record.

3.2. **Shutdown of Existing Systems:** When it is necessary to shut down existing fire sprinkler systems that leaves the building unprotected overnight, a continuous approved fire watch shall be provided in accordance with URI’s fire watch policy.

3.2.1. A Fire Protection Impairment Form shall be submitted to URI Alarm Services at least 48 hours in advance of any fire sprinkler impairment.

3.3. **Penetrations:** All penetrations shall be executed in accordance with the following provisions:

3.3.1. Piping that passes through fire rated assemblies, including fire rated GWB assemblies, shall be provided with clearance around the entire circumference of the pipe as required by NFPA 13. Penetrations of walls, floors or ceilings shall be made in a neat manner using properly sized hole-saw or masonry/concrete coring as necessary.

3.3.2. The annular space between the wall or pipe sleeve and the sprinkler pipe in fire rated assemblies shall be filled with UL-classified fire-stopping material in accordance with the manufacturer's instructions.

3.3.3. Where exposed pipes or hangers pass through a finished floor, wall or ceiling, split wall plates or escutcheons shall be installed, fitting securely and snugly, and covering the opening.

3.3.4. All floor penetrations shall be sealed watertight.

3.3.5. All penetrations in rooms with fuel burning appliances shall be fire stopped and sealed tightly, regardless of the code requirements.

3.3.6. Link seals shall be provided where underground pipes pass through exterior walls or slabs. Flexible couplings or push-on joints located within 1 foot of each side of the wall must be included in the link seal installation.

3.4. **Control Valves:** All control valves, supply valves, and test valves shall be installed in easily accessible locations with the valve handle or wheel no higher than seven (7) feet above the finished floor.

3.5. **Water Flow Switches:** All water flow switches shall be installed in easily accessible locations, such that the cover plate is unobstructed and facing forward.

3.6. **Fire Department Connection:** The Fire Department Connection shall be a 5" Storz connection with a 30-degree down angle mounted 24"-30" above finish grade or as approved by URI Alarm Services and local fire department.

3.6.1. The fire department connection shall be located per AHJ requirements, but in no case more than 100 feet from nearest fire hydrant. The location of fire hydrant shall be indicated on drawings.

3.7. **Standpipe Hose Valves:** Provide 2-1/2-inch polished brass hose valves with a cap and chain. Turn the outlet at an angle of 45 degrees from the wall. The cap is to have a 1/8-inch diameter hole drilled in the face to relieve any water pressure.

3.8. **Inspector's Test and Drains:** Test and drain systems shall be sized for the smallest head on the system.

3.8.1. Test valves shall be provided for each floor of each system.

3.8.1.1. For dry systems protecting exterior spaces such as canopies, the inspector's test assembly shall be piped to discharge outside the building and shall be located at the hydraulically most remote part of the system.

3.8.1.2. For buildings of two (2) stories or less, inspector's test assembly shall be piped to discharge outside the building, located at the hydraulically most remote part of the system. Where outside discharge cannot be achieved, discharge shall be a drain riser.

3.8.1.3. For buildings higher than two (2) stories, the inspector's test assembly shall be piped to discharge into a drain riser located adjacent to the system. The valve shall be readily accessible, at a location no higher than seven (7) feet above the finished floor.

3.8.1.4. All risers shall be sealed watertight regardless of fire rating requirements.

3.8.2. A 2” main drain shall discharge to the exterior of the building. Main drains shall be provided at all system floor control valves. All drains are to be installed in locations approved by URI Alarm Services.

3.8.3. Auxiliary drains shall be installed as approved by URI Alarm Services.

3.8.3.1. Auxiliary drains shall be in unfinished areas, without suspended ceiling, whenever possible.

3.8.3.2. When located in finished areas, with lathe and plaster or GWB, the hose bib shall be located within six (6) inches of an access panel, minimum 12” x 12”. When located in toilet rooms the panel shall be stainless steel.

3.8.4. Splash blocks shall be provided at the location of exterior drains to minimize damage to landscaping.

4. INSPECTIONS AND TESTING

4.1. Inspection of piping: All piping shall be inspected by URI Alarm Services and AHJ before installation of wall/ceiling material. Pipes, hangers, and sway bracing shall be considered satisfactorily installed when the installation is in conformance with the Contractor’s approved shop drawings and NFPA 13.

4.1.1. When in the opinion of the URI Alarm Services and AHJ, the installation deviates significantly from the approved shop drawings, revised Shop Drawings and hydraulic calculations may be required to verify the installation.

4.2. **Flushing of Underground Pipes:** Flushing shall be considered satisfactorily completed when no debris emanates from the piping or the piping has been flushed for a time period acceptable to the AHJ, URI Utilities, and URI Alarm Services.

4.3. **Final Functional Test:** The final functional test shall be considered satisfactorily completed when all valves and switches perform in accordance with the Contractor’s approved shop drawings and the following procedures:

4.3.1. Operate all control valves to verify proper operation of the valve and associated tamper switch.

4.3.2. Operate all test connections to verify water-flow switch operation.

4.3.3. Dry-pipe system air test: Pressurize all dry system piping to 40 psi of air pressure for 24 hours to verify leak-tight installation. The piping system shall not allow a loss of pressure greater than 1.5 psi in 24 hours. All leaks resulting in a loss greater than 1.5 psi shall be repaired and the system re-tested.

4.3.4. Dry-pipe valve operation: Operate the dry system inspector’s test connection. Record the following information on the Contractor’s Material and Test Certificate during the valve operation test: time for valve to operate, time to received water at inspector’s test connection, static supply water pressure, system air pressure and air pressure at valve release. The inspector’s test connection shall receive water within 60 seconds of its operation.

4.3.5. Pressure regulating valves: Flow-test pressure regulating valves (PRVs) to verify proper performance. Use a flow-metering device to properly record water flow rate. Record the following information for each valve and attach to the Contractor's Material and Test Certificate: inlet and outlet static pressures, inlet and outlet residual pressure and test water flow rate. Operate pressure regulating valves in accordance with the Contractor's approved shop drawings and the manufacturer's pressure/flow curves.

4.3.6. Final Acceptance Test: The final acceptance test shall not be scheduled until the Contractor has verified the Final Function Test. Should the results of any inspection or test not be satisfactory to URI Alarm Services or AHJ, a written list of corrective work items will be provided to the Contractor. The Contractor shall make the required corrections and request re-inspection as a requirement for Substantial Completion.