



# Division 211000

# Fire Suppression Systems

## DESIGN GUIDE

## 1 General

### 1.1 General

- A. The installation shall consist of hydraulically calculated fire sprinkler systems protecting the entire building.
  - 1. Exception: Minor revisions to existing systems, limited to tenant improvements, where occupancy hazard is not changing, and revisions may be installed while maintain the original hydraulically designed sizing or pipe schedule sizing per NFPA 13.
- B. The campus prefers wet sprinkler systems rather than dry systems to the extent that protected areas are not subject to freezing or program requirements might dictate otherwise.
  - 1. When possible, utilize dry pendant heads rather than dry systems. When dry/preaction systems are required, the campus does not allow pipe mounted (riser mounted) compressors and prefers stand-alone floor mounted air compressor.
- C. Standpipes, when required, shall be located in the stairwell floor landing. Provide 2 1/2-inch brass hose valves with a cap and chain. Rotate the outlet at an angle of 45 degrees from the wall.
  - 1. Calculations to be provided per NFPA 14.
- D. IT rooms: These shall have fire sprinklers or alternate fire suppressions systems approved by the AHJ KVFR (9/12/22).
- E. Electrical Rooms: The AHJ KVFR permits sprinklers to be omitted when provisions of 2016 NFPA 13-8.15.11.2 are met (9/12/22). NFPA requires that if sprinklers are omitted, the room be protected with a 2-



hour fire rated enclosure and no combustibles may be stored in the room. CWU is currently evaluating if they want sprinklers remoted from certain electrical rooms in buildings. CWU will update this standard when direction has been finalized.

- F. Early in design, the engineer-of-record shall verify hydrant fire flow and pressure and is advised that the campus, at some locations has lower available pressure than ideal but through planning, it is the campus's desire to avoid fire pumps when possible.
- G. In the construction documents, the engineer-of-record shall identify:
  - 1. Design densities for various building space types i.e.: light hazard, ordinary hazard group 1, etc.
  - 2. Static pressure, residual pressure with accompanying flow rates at the nearest hydrant(s). CWU's best practice requires a margin of 10% between all demand points and the water supply curve for hydraulic calculations.
  - 3. Sprinkler head types coordinated with ceiling systems. Areas where intermediate or high temperature sprinkler heads are required.
  - 4. Location and types of alternative fire suppression system types when required
  - 5. Location of standpipes
  - 6. Pipe main locations and main sizes
  - 7. Location of zone valves. These shall either be located in the fire riser room or at main standpipes in the stairwell. Each floor shall have its own zone control valve unless the area of the floor makes this not practical.
  - 8. Location of Fire Department Connections
  - 9. Location of Fire Riser Room. The AHJ requires fire riser room with outdoor access by fire service personnel (no exceptions). Coordinate room location and access with the AHJ in the design phase.



## 1.2 Codes and Standards

- A. This installation shall conform to each of the following codes in year of code adopted by the AHJ:
  - 1. NFPA 13, Edition, Installation of Sprinkler Systems,
  - 2. NFPA 14, Standard for the Installation of Standpipe and Hose Systems, including all appendices
  - 3. NFPA 24, Standard for the Installation of Private Fire Service Mains and their Appurtenances, including all appendices
  - 4. International Building Code, including any administrative rules and amendments
  - 5. International Fire Code, including any AHJ administrative rules and amendments
  - 6. International Mechanical Code, including any AHJ administrative rules and amendments
  - 7. Underwriters Laboratories Fire Protection Equipment Directory

## 1.3 Warranty

- A. The contractor shall guarantee all materials, equipment and workmanship in this installation for a period of one year from the date of completion. Any system failure during that time shall be repaired at the contractor's expense. Contractor shall respond on site to system problems within 24 hours.

## 1.4 Qualifications of Contractor

- A. All work shall be performed by a Contractor with a valid Washington State Contractor's license for the installation of fire sprinkler systems.
- B. The field installation shall be supervised at all times by a journeyman sprinkler fitter or person with equivalent experience.



## 1.5 Authority Having Jurisdiction

- A. For purposes of code compliance, the Authority Having Jurisdiction (AHJ) for this installation will be Kittitas Valley Fire and Rescue. Where there are conflicts between the AHJ and the referenced codes and standards, the more stringent shall apply.

## 1.6 Coordination

- A. The fire protection contractor is required to coordinate work with other trades prior to installation, to provide a complete and operable installation of highest quality workmanship.

## 1.7 Signage

- A. Signs are to be hung by corrosion resistant chain from the valve.
- B. Provide all control, drain and test valves with signs identifying the type of valve, the area (floor or portion of the building) affected by the valve. Signs shall be three-layer etched plastic with red letters on a white background
- C. General information sign: Provide general information sign at each system control riser, antifreeze loop and auxiliary system control valve. Include information required in NFPA including but not limited to name and location of facility protected, occupancy classification, commodity classification, presence of flammable/combustible liquids, presence of hazardous materials, flow test data, location of venting valve, location of auxiliary drawings and low point drains for dry pipe and preaction systems, name of contractor, original results of main drain flow test and the dry pipe and double interlock preaction valve tests.
- D. Hydraulically calculated Systems: If the system is a hydraulically calculated system, provide a sign in accordance with NFPA 13. Sign shall indicate the location of the design areas, discharge densities over the design areas, required flow and residual pressure demand at the base of the riser, occupancy and commodity classifications, hose stream allowance included sprinkler demand and name of installer.
- E. Submit text for approval (ex., "CONTROL VALVE FOURTH FLOOR NORTH")



- F. Spare Sprinkler Cabinet: The cabinet shall be painted "fire red" and be keyed to a Corbin cat. 30 lock. Label the cabinet with a riveted or screw-on plastic laminate nameplate indicating "SPARE SPRINKLER CABINET" white letters on a red background. List in the cabinet with the following information: Date the list was issued and revised, Sprinkler Identification Number (SIN) or the manufacturer/model/orifice/deflector type, thermal sensitivity/pressure rating of each sprinkler type installed, general description of each type of sprinkler contained in the cabinet.
- G. Fire Department Connection: Provide signage indicating "AUTO SPRINKLER" part of the FDC escutcheon. Provide a separate sign indicating Building Name, area served, type of system (automatic sprinkler.) for permanent attachment. Content, size and location to be approved by the Fire Department.
- H. Systems with Anti-Freeze: On the control valve, provide label with manufacturer, type and brand of antifreeze, concentration by volume of antifreeze used and volume of antifreeze.

## 1.8 Closeout Materials

- A. In addition to normally required closeout materials, furnish CAD files of sprinkler systems to the Owner.

# 2 Materials

## 2.1 Pipe

- A. Upstream of backflow preventer
  - 1. Ductile Iron Class 52 and cement-mortar lined when outside the building.
- B. Wet pipe-downstream of backflow preventer
  - 1. Ferrous, meeting all requirements of NFPA 13, Steel (ASTM A-135 or A-53)
  - 2. Schedule 40 threaded, black steel



3. Schedule 10 for roll groove applications
- C. Dry pipe systems, non-pressurized FDC and pipe in corrosive environment
  1. Schedule 40, ferrous, and galvanized
- D. Piping exposed to weather
  1. Stainless steel or hot dipped galvanized. Piping having only an external only galvanized finished is not acceptable.

## 2.2 Fittings

- A. Threaded shall be ductile or cast iron, Class 125
- B. Grooved fittings shall be malleable or ductile iron, Victaulic Firelock or equal conforming to ANSI B-16.1, with a rust inhibiting coating.

## 2.3 Flexible Drops

- A. UL listed flexible pipe drops may be used above ceilings to sprinkler heads provided that lengths do not exceed 6 feet and system is hydraulically designed. The drop shall attach to the ceiling with a UL listed bracket. Victaulic VicFlex Multiple-Use Flexible Stainless-Steel Sprinkler Drop System or approved equal.

## 2.4 Backflow Prevention

- A. Stainless steel (DCDA) double check detector assembly with integral butterfly or OSY isolation valves. Must have strainers installed directly upstream per City of Ellensburg requirements. Provide electronic supervisory flow at the DCDA.

## 2.5 Sprinklers

- A. Provide quick response type ordinary temperature sprinklers in light and ordinary hazard occupancies.
- B. For areas subject to higher temperature exceeding 110 degrees provide intermediate or high temperature sprinklers. For student



housing, utilize concealed heads only in all student areas including halls.

## 2.6 Sprinkler Guards

- A. Provide for any sprinkler lower than 7'0" including mechanical rooms. Guards shall be UL listed for installation on sprinkler head.

## 2.7 Clean Agent Systems

- A. For critical applications such as Data Centers, CWU has standardized on Inergen clean agent product and Simplex fire alarm panels for interface. Clean agent systems shall have a separate sub panel for Interface provided by Division 28.

## 2.8 Cooking Hoods (Type 1)

- A. Protected by Ansul fire suppression systems furnished with the cooking hood.

## 2.9 Spray Paint Booths

- A. Smaller booths are protected by Ansul fire suppressions systems. For very large booths, the engineer shall review options and make recommendations to CWU for the application.

## 2.10 Dust Collectors

- A. For wood working applications, the engineer shall, where practical, place spark detector in the warm side of the building so that sprinkler head in the ductwork does not get located outdoors or in a place that it is likely to freeze. Coordinate with Division 23.



## 3 Execution

### 3.1 SHUTDOWN OF EXISTING SYSTEMS

- A. Fire protection shutdown or functional impairment; When necessary to shut down an existing fire sprinkler system for a short period (less than 8 hours) that leaves the building unprotected, contractor shall notify campus maintenance and the Fire Department. A continuous, approved fire watch may be required.
- B. For longer term shutdown required for piping modifications, the contractor shall develop an approved impairment plan with campus maintenance and the Fire Department.

### 3.2 CONTROL VALVES

- A. Install all control valves, supply valves, and test valves in easily accessible locations with the valve handle, or wheel, no higher than seven (7) feet above the finished floor.

### 3.3 WATERFLOW/PRESSURE SWITCHES

- A. Install all water flow switches in easily accessible locations, such that the cover plate is unobstructed and facing forward.

### 3.4 INSPECTORS TEST AND DRAINS

- A. Provide inspector's test valves for each floor/zone.
  - 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.
  - 2. For buildings two (2) stories or less, pipe the inspector's test assembly to discharge outside the building.
  - 3. For buildings higher than two (2) stories, the inspector's test assembly shall be piped as noted in NFPA 13. Discharge into a drain riser located adjacent to the zone control. The valve shall be





readily accessible, at a location no higher than seven (7) feet above the finished floor with sight glass where required.

- B. Main drains: Provide main drains at all system floor control valves.
  - 1. The plumbing drain shall be capable of accepting the full flow of the sprinkler system main drain. The discharge shall be to a 6-inch minimum floor drain with a funnel. Do not pipe any sprinkler systems directly into a drain. There must be at least a 1/2-inch gap between the pipe and the funnel/drain.
  - 2. For single story buildings, drain risers and main drain shall discharge to a safe location outside the building. Provide splash blocks to limit damage to landscaping.
  - 3. Where outside discharge cannot be achieved, discharge shall be a drain riser.
  - 4. For multistory buildings, discharge shall be into drain risers.
- C. Auxiliary drains: Provide auxiliary drains at all low points of the system, where the trapped section of pipe exceeds 5 gallons.
  - 1. Provide an auxiliary drain for each floor of the building within a building stairwell hydraulically remote from the floor control assembly.
  - 2. The drain shall consist of, as a minimum, a valve, a 3/4-inch brass nipple with 3/4-inch male hose threads, and cap.
    - a. Locate auxiliary drains in unfinished areas, without suspended ceiling, whenever possible.
    - b. When located in finished areas, GWB locate the hose bib within six (6) inches of an access panel, minimum 12" x 12". When located in toilet rooms the panel shall be stainless steel.

### 3.5 GAUGES

- A. Provide gauges at the main system riser and at each floor control valve.
  - 1. Liquid filled gauges are required, dials shall be white with black numerals, 3-1/2-inch dial face. Normal reading shall be at midscale. Provide a three-way valve on each gauge connection.



### 3.6 LAY-IN SUSPENDED CEILINGS

- A. When not indicated otherwise, locate sprinkler heads centered in both directions of ceiling tile and carefully align them in a common area.
  - 1. Where additional sprinklers will be required in small rooms, exceptions can be allowed to center sprinklers in the narrow direction only.
- B. Provide 1 inch clearance with escutcheon around penetrations thru suspended ceilings per ASCE requirements.

### 3.7 INSPECTION AND HYDROSTATIC TESTS

- A. Hydrostatic testing of aboveground piping: Install aboveground piping in such a manner that there will be no visible leakage or drop in gauge pressure when the system is subjected to the hydrostatic pressure test. Test shall be in conformance with NFPA 13 (Revised piping in existing building to be tested at maximum working Static Pressure for 2 hours). The Contractor shall repair any leaks or drips immediately. Do not use additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals for testing systems or stopping leaks.
- B. Inspection of piping before installation of wall/ceiling material: Piping, 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. The Owner's Representative and the local AHJ shall approve any deviations from the approved Shop Drawings. When in the opinion of the Owner's Representative or the local AHJ representative, the installation deviates greatly from the approved Shop Drawings, revised Shop Drawings and hydraulic calculations may be required to verify the installation.
- C. Partial system test or sprinkler coverage inspections: Perform tests with the sprinklers installed in their final positions. Where it is critical to the continuance of the project, as a whole, to cover portions of the piping with ceilings or walls prior to the completion of the entire system, perform partial testing of the system after receiving written approval from the A/E. In this case "partial" indicates an entire zone of floor of one system. A satisfactory partial test does not relieve Contractor from performing all final testing procedures.



- D. Final piping inspection: Final sprinkler placement shall be considered satisfactorily complete when all sprinkler heads are installed in accordance with their listing or AHJ approval and the Contractor's approved Shop Drawings. The Contractor may be required to relocate or add additional sprinklers if proper coverage is not provided due to unforeseen or modified architectural conditions.
- E. Final functional test: The final functional test shall be considered satisfactorily complete when all valves and switches perform in accordance with the Contractor's approved Shop Drawings and the following procedures:
  - 1. Operate all control valves to verify proper operation of the valve and associated tamper switch.
  - 2. Operate all test connections to verify water-flow switch operation.
- F. Inspection and test results should be forwarded to the Owner's Representative. Should the results of any inspection or test not be satisfactory to the Owner 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.

## 4 Appendix

### 4.1 Reserved for future.

