21 Fire Suppression

NOTE: This is a new section, which includes content from previous sections of the KU Design Standards, along with revisions and updates. Significant revisions or additions to the previous standards are highlighted in italics.

GENERAL

Designers shall verify that all applicable portions of these standards are incorporated into the project’s design, drawings, specifications and final construction. Requests for variances from these standards shall be submitted in writing to the DCM Project Manager, using the KU Standards Variance Request Form found in Appendix A1.1, for review and written approval or rejection as indicated on the form.

RELATED DOCUMENTS & REQUIREMENTS

Refer to the following for requirements that also apply to work of this section.

- **Division 1 - General Requirements**: refer to sections regarding construction testing and field quality control requirements.
- **Division 10 – Specialties**: Fire extinguisher and fire hose cabinets.
- **Division 22 - Plumbing**
- **Division 26 - Electrical**
- **Division 27 – Communications**
- **Division 28 - Electronic Safety and Security**: Includes requirements for KU-standard campus-wide fire alarm systems.
  - **Appendix A28.1 - Fire Alarm Standard of Practice**: Designers shall develop each project’s fire alarm system in accordance with these guidelines.
  - **Appendix A28.2 - Standard Fire Alarm Specification**: Designers are required to download and use this as the basis of each project specification, edited as required to reflect each project’s specific needs.
  - **Appendix A28.3 - Fire Alarm Standard Graphic Symbols**: Designers are required to download and use these KU-standard symbols as the basis of their construction document graphics and symbols.

FIRE SUPPRESSION SYSTEMS – GENERAL

**Responsibilities for Design**: In accordance with requirements of the State of Kansas, Office of Facilities and Property Management (OFPM) - Design, Construction & Compliance department (DCC), in its ‘Building Design and Construction Manual (BDCM)’, the Designer is responsible for all applicable items listed on the Construction Documents Checklist - Form 123 for fire suppression plans. Refer to OFPM-DCC / BDCM requirements at the following web site: [http://admin.ks.gov/offices/ofpm/dcc/](http://admin.ks.gov/offices/ofpm/dcc/)
Designer shall review, approve, and submit copy of approved shop drawings through the University Fire Marshal Authority (UFMA). Include the OFPM Request for Review - Form 120 with the submittal. The UFMA will submit to OFPM for review and approval.

The Designer shall prepare construction documents detailing all fire suppression system components as required by the referenced OFPM Manual and as required for a code-compliant system.

Other fire suppression systems that may be required on projects, but are not specifically mentioned in the BDCM guidelines, include fire pumps, storage tanks, chemical or gas extinguishing systems, etc. Designer shall incorporate these systems on projects where required.

System Performance Requirements: The University will provide the results of a hydrant flow test to the Designer during the programming phase of the building design.

The Designer shall identify the specific hydrants to be flow-tested for each project.

When a project requires sprinkler designs based on fire modeling, the sprinkler piping and heads shall be laid out by either a registered engineer proficient in fire protection design, or a NICET Level 4 Designer.

The Designer shall review any potential wet pipe suppression system freeze potential and adjust design accordingly or coordinate with other designers to mitigate.

Prohibited Piping Types and Systems: Due to the extended life span anticipated for University buildings, CPVC, PB and other plastic piping shall NOT be specified or approved for use on KU projects.

Exception: BlazeMaster UL listed and FM approved plastic piping or equivalent may be acceptable for specific applications if approved by the University Fire Marshal on a per-project basis.

Design Standards for Materials and Methods: The Designer shall edit pertinent specification sections to accommodate the following University requirements:

All equipment shall be UL listed and FM approved.

Flanged, threaded, welded or grooved piping connections are acceptable.

Flanged connections are required around fire pumps.

Threaded pipe shall be a minimum of Schedule 40 black iron.

Mechanical rolled grooved pipe may be Schedule 40 black iron.

Schedule 10 piping may be used on sprinkler pipes 2” diameter and larger, but only with roll-grooved joints. Schedule 10 piping is not permitted on pipes smaller than 2” diameter due to pinhole rust problems that KU has seen within 10 years of installation on past projects.

Use galvanized pipe for dry-pipe, deluge, and pre-action systems and the fire pump suction pipe.

Copper pipe may be used in areas susceptible to magnetic fields.

Firestopping shall be installed in accordance with Division 7 - Thermal and Moisture Protection.
Provide permanent signs to identify drains, test connections, control valves, risers supplying hydraulically designed sprinkler systems, and each alarm. Label valves normally open (NO) or normally closed (NC).

- **Signage shall be engraved, mechanically-fastened; not adhesive.**

Adequate drainage should be provided to drain and test the sprinkler system. Typical floor drains usually do not have capacity to handle full flow main drain tests. All main drains and express drains shall discharge to the exterior of the building.

- The Designer shall coordinate and confirm a location that is acceptable to the University Fire Marshal and Architect, which minimizes damage to landscaping or building from the main drain discharge.

**Fire Pumps:** The Designer should refer to the following supplemental guidelines and standards of practice for projects involving installation of a fire pump.

- **Applicability:** For all projects that involve the installation of new, or extension of existing, water-based fire suppression systems, the Designer shall determine the need for fire pump(s). The Designer shall determine when fire pumps are needed based on hydraulically calculated flow analysis using the highest system demand including standpipe demand. A fire hydrant flow test may be required to verify calculations.

- **Energy Source:** The University strongly prefers the use of electric-drive, rather than diesel-drive centrifugal fire pumps.

- Fire pumps shall be on the building’s emergency power system.

- **Design of Electrical Service:** To insure that the building electrical system may be de-energized without the loss of the fire pump service during a fire emergency, the electrical feeders to the pump controller shall originate at the building service transformer secondary terminations.

- The fire pump controller shall not be fed by any feeder that originates downstream of a building substation main disconnect.

- The Designer shall refer to NFPA 20 and applicable sections of the NEC for guidance regarding design of transformers, transfer switches, conductors, and overload protection in fire pump service.

- **Design of System Monitoring Service:** Provision should be made to interface the fire pump and controller to the campus-wide fire alarm system network. The fire alarm system shall monitor essential supervisory fire pump conditions, including: pump running, loss of power, phase reversal and controller troubles.

**Fire Department Connections:** 5” Storz connections, with the Knox locking cap shall be installed on all new construction or renovation projects, per Lawrence Fire Department (LFD)
standards (shown above).

- Verify FDC type with local fire department providing service, for KU facilities outside of Lawrence, KS.

- Clearly label FDC per code. On projects where existing fire suppression system is being updated, update FDC label to meet current code as required.

**Clean Agent Systems:** SAPPHIRE systems, as manufactured by ANSUL, where required to suppress fires in areas where an electrically non-conductive medium is required, where electronic systems cannot be shut down in an emergency, where cleanup of other agents poses a problem, and in normally occupied areas that demand a non-toxic agent.

**Fire Hydrants:** Designers shall specify one of the following fire hydrants, which are KU’s preferred standard components:

- Waterous Pacer 100 WB67
- Mueller Super Centurion A 423

**Post Indicator Valves (PIV):** Neither KU or the AHJ require electronic monitoring of PIVs. KU will provide PIV security lock.

**Contractor Qualifications and Responsibilities:**

- A complete sprinkler shop drawing shall include all necessary drawings, calculations, and product information compliant with NFPA 13 working drawings and shall be sealed by a licensed professional engineer.

- Contractor must submit shop drawings as soon as possible after Notice to Proceed for review and comment by Designer, and well in advance of fire suppression system construction work.

- The Fire Protection Subcontractor has responsibility for installation and testing of a fire suppression system that conforms to the design’s and shop drawing’s requirements.

**Post-Construction Testing:** The Designer shall specify that acceptance of the fire protection system will be based upon completion of the necessary testing by the Contractor as outlined in NFPA 25. All testing must be documented on certificate forms. The fire protection contractor is responsible for maintaining the equipment in service after the acceptance test, as well as minimizing impairments to the system for the remainder of the project.

- On projects involving installation of new hydrants, the Designer shall include specification requirements that the Contractor shall conduct a fire hydrant flow test of all new hydrants.
  - Tests shall be observed by the Designer. Representatives from the Owner, local fire department, and OFPM shall be invited to observe these tests.
  - The Contractor shall be required to submit the hydrant flow test information in the as-built drawings.