



# NORTHWESTERN UNIVERSITY

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## DESIGN GUIDELINES AND TECHNICAL STANDARDS

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## **DIVISION 21 – FIRE SUPPRESSION**

### **SECTION 21 0000 – GENERAL FIRE SUPPRESSION REQUIREMENTS**

1. General:
  - a. This section outlines general requirements for fire suppression systems.
  - b. Section 28 3113 also contains design requirements for automatic sprinkler systems.
2. Design Criteria:
  - a. NFPA Standards 13 and 14 provide the basic design guidance for automatic sprinkler systems. Modifications and clarifications that follow must be incorporated into the design and specifications.
    - i. As a minimum, each floor of a building shall be a separate automatic sprinkler zone coordinated with the fire alarm system.
    - ii. Automatic sprinkler zones shall be coordinated with the smoke control systems. In no case shall parts of one automatic sprinkler zone be contained in more than one smoke control zone.
    - iii. When sprinklers are specified, provide a combined automatic sprinkler and standpipe system.
      1. On the Evanston campus pressure for hose stream requirements in "low rise" buildings is provided by the responding fire department. Fire pumps are to be provided where insufficient pressure is available for automatic sprinkler demands and "high rise" buildings. For buildings equipped with fire pumps, the pump shall provide both hose stream and automatic sprinkler demands.
    - iv. The automatic sprinkler design criterion applies to wet pipe systems. Increase the area of application in accordance with NFPA Standard 13 for dry systems.
    - v. Occupancy classification definitions shall follow NFPA Standard 13. The Room Design Method in NFPA Standard 13 shall not be used to reduce the area of application for each classification below. However, the use of the Special Design Methods is permitted and should be used where applicable.
    - vi. On the Chicago campus, the Chicago Building Code shall be consulted for deviations from NFPA standards.
  - b. The following occupancies shall be reviewed with the NU Project Manager and the University's Office of Risk Management to determine the sprinkler system design basis for the following areas and vaults:

- i. Multiple purpose areas that may be used for exhibits.
- ii. Storage areas over 12 feet high.
- iii. Storage for tires, rolled paper, Group A plastics, or unusual materials of any height.
- iv. Vaults for liquids, gases, or wastes.

END OF SECTION

## **DIVISION 21 – FIRE SUPPRESSION**

### **SECTION 21 1314 – AUTOMATIC FIRE SPRINKLER SYSTEMS**

1. General: This section outlines general requirements for automatic fire sprinkler systems.
2. Design Considerations:
  - a. Siamese connections shall be arranged to supply both the automatic sprinkler and standpipe systems.
  - b. Fire pumps shall include a valved bypass city loop and a valved connection to an outside test header. Valve arrangements shall be such that the fire pumps can be isolated during testing with the city loop remaining in service.
  - c. Dry pipe systems to be utilized:
    - i. Areas exposed to outdoor temperatures, eg pedestrian bridges between buildings, loading docks, etc.
    - ii. Areas sensitive to water, eg document storage, museums/art galleries, etc.
  - d. Dry pipe valves should be provided with a dedicated tank-type air compressor. In no case shall dry pipe valves be connected to an HVAC control air compressor. Dedicated air compressors must be connected to the emergency power system.
  - e. Drains from automatic sprinkler system equipment (dry pipe valves, flow test valves, RPZ backflow preventers) shall be piped to a floor drain capable of handling the expected maximum discharge for at least two minutes.
  - f. Quick response automatic sprinklers are required in offices, classrooms, hallways, assembly areas, atriums, sleeping rooms, dining rooms, and most laboratory areas. Ordinary response heads shall be used in storage areas, mechanical rooms, janitor closets, and areas where special coated sprinkler heads are required. Temperature ratings shall be the maximum expected ceiling temperature.
  - g. A water flow alarm shall be installed in each automatic sprinkler zone at the main water supply entrance, and at the supply connection to each vertical combined automatic sprinkler and standpipe riser.
  - h. Valve supervisory switches shall be provided for each point where the water supply to the system or parts of the system can be shutoff. Valves grouped at a common location can be combined into the same zone to a maximum of five. In no case shall control valves be concealed. External tamper switches or external wired tamper switches are required. Butterfly sectional and floor control valves are preferred.

- i. Architect/Engineer of record will be required to meet with the Authority Having Jurisdiction (AHJ) for either Chicago or Evanston Campus.
- j. Siamese connections shall be of the flush type having a polished chrome plated finish. Lettering shall indicate dual service.
  - i. On the Evanston campus, provide a weatherproof visual fire alarm signal device above the Siamese connection along with a weatherproof box for a future audible device.
- k. Sprinkler heads located in ceiling tiles should be centered in the tile unless the head can otherwise be aesthetically located.

END OF SECTION

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### **SECTION 21 2400 –CHEMICAL SUPPRESSION SYSTEMS**

1. General: This section outlines general requirements for chemical suppression systems.
2. Design Considerations:
  - a. Dry chemical suppression systems are preferred except in kitchens where wet chemical systems have typically replaced dry chemical systems. Review specific requirements with the NU Project Manager.
  - b. Clean agent fire extinguishing systems shall be Halon substitutes.
  - c. Fire extinguishing agents shall be a clean Halon substitute or carbon dioxide.
  - d. Trouble and alarm signals from fire extinguishing systems shall be connected to the building's fire alarm control panel. Where not possible, alarm and trouble signals shall be transmitted to Northwestern's central monitoring station.
3. Quality Assurance: The following quality assurance requirements should be reviewed with the NU Project Manager during the design phases of the project.
  - a. The system and agent supplier shall have provided equipment and agent for at least 50 systems of similar size.
  - b. The installation contractor shall have installed at least 12 of the supplier's systems and have sufficient agent on hand to recharge a system within 24 hours.

END OF SECTION

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### **SECTION 21 2500 – SMOKE CONTROL SYSTEMS**

1. General: This section outlines general requirements for smoke control systems.
2. Design Considerations:
  - a. Engineer of record will be required to meet with the Authority Having Jurisdiction (AHJ) for either Chicago or Evanston Campus for Specific requirements for smoke control requirements.
3. Definitions:
  - a. A dynamic smoke control system is a system that remains operational in the event of a fire (fans ON).
  - b. A static system is a system that automatically shuts down (fans OFF) when smoke is detected in the supply or return air of the HVAC system.
4. Design Guidelines:
  - a. To meet the Chicago and the City of Evanston codes a static system is required as a minimum.
  - b. To meet the Chicago and the City of Evanston Hi Rise codes a dynamic system is required as a minimum.
  - c. If a smoke control system is provided to meet code the guidelines herein must be followed.
  - d. For the Chicago campus high rise buildings, a stairwell pressurization system should be considered to enhance life safety.
  - e. To consider the use of a dynamic smoke control system the smoke control zone must be sprinkled and the sprinkler and smoke zones must be the same physical floor area.
5. System Descriptions:
  - a. General: All smoke control safety devices shall be hardwired into the fan safety circuit, with auxiliary relay contacts used for notification to BAS platform. Building Automation System (BAS) software control logic shall not be used for fire alarm shutdown.
  - b. Static Systems (Fans OFF). All smoke detectors and Fire Alarm Relay Panels (FARP) shall be furnished and installed by the fire alarm contractor. The fire alarm relay panel shall be within 10 ft of each Building Automation System (BAS) panel.

- i. The BMS contractor shall provide minimum 1/2 inch EMT conduit between the BAS control panel and the Fire Alarm Relay Panel (FARP). Confirm size of conduit with electrical requirements.
  - ii. Wiring from the smoke detectors to the Fire Alarm Control Panel (FACP) and from the FACP to the fire alarm relay panels shall typically be by the fire alarm contractor. Wiring between the BAS panels and fire alarm relay panels shall typically be by the BAS contractor. Confirm who is responsible for terminations in each panel and verify project specific requirements with NU Project Manager and indicate requirements in Construction Documents.
- c. Dynamic Systems (Fans ON). Smoke detectors and Fire Alarm Relay Panels (FARP) shall be furnished and installed by the fire alarm contractor. Fire Alarm Relay Panels shall be located within 10 feet of the BAS panels and one for each smoke zone. The location of the smoke zone FARPs shall be coordinated by the BAS and fire alarm contractors. Wiring from the smoke detectors to the FACP (Fire Alarm Control Panel) and from the FACP to the fire alarm relay panels shall be by the fire alarm contractor.
- d. The BAS contractor shall provide (1) the power source and controls for the smoke dampers or the combination fire/smoke dampers, and (2) 1/2 in. EMT conduit between the BAS control panels and the nearby FARP. Confirm size of conduit with electrical requirements. Wiring between the BAS panels and fire alarm relay panels shall be by the BAS contractor.

END OF SECTION