

SECTION 16721
FIRE ALARM AND DETECTION SYSTEMS

The equipment requirements of this section apply to the IUB Campus. The IUPUI Campus has a preferred vendor agreement for fire alarm systems. Contact Pat Barry at (317) 274-5354 for details. IUB Engineering Services should be contacted regarding acceptable manufacturers on the other regional campuses, but basic requirements are as stated in this section.

A. Fire Alarm and Detection Systems

1. Fire alarm and detection systems shall be designed in compliance with applicable editions of NFPA 70 - "National Electrical Code", and NFPA 72 - "National Fire Alarm Code". Fire alarm and detection systems shall be UL listed and labeled, and FM approved.
2. Fire alarm and detection systems shall be an addressable system consisting of a microprocessor controlled fire alarm system control panel, manual fire alarm stations, automatic smoke and heat detectors, fire alarm signaling appliances, auxiliary fire alarm equipment, and raceways and conductors. The system shall report to the campus control center and IU police department where applicable via Owner provided automatic dialers. General alarm signals shall be sent to IU Police Department where applicable, all other signals shall be sent to Campus Control Center.
3. Initiating loops and signaling circuits shall not exceed 80 percent of capacity. Class B wiring shall be limited to a maximum of 60 devices per circuit. Layout of initiating loops shall follow the logical layout of the building (i.e. by floor or section); consult with Engineering Services.
4. All field devices shall be labeled with loop or circuit and device number. Devices shall be labeled in a manner acceptable to manufacturer and Owner. Record drawings shall indicate all devices and corresponding device numbers in both plan and riser. Plan drawings shall indicate actual conduit routing, pull/access points, and conduit fill. Riser diagrams or tabular charts shall depict entire system including spare addresses. Record drawings must also include tabular charts indicating circuit loading and capacity for each strobe, speaker, and horn circuit.
5. System service shall be available from manufacturer qualified technicians with a maximum response time of eight hours. Parts shall be available within twenty-four hours.
6. Training and manuals shall be provided by the manufacturer. Field training and installation and operation manuals shall be provided as base bid. Where directed by Engineering Services an alternate shall be provided for the cost of

factory certified training and technical manuals for the certification of an Indiana University technician. The technician shall be certified for the service of Indiana University systems only.

7. System design shall be coordinated with all disciplines. Particular attention shall be paid in coordination with the architectural design for doors and elevators, and the mechanical design for fire sprinkler piping and appliances, energy management system, and HVAC system equipment.
8. System design calculations shall be submitted to the Owner for review prior to release for bid.
9. System testing shall not commence until installer provides written certification that system is installed in compliance with plans and specifications. Within 14 days of completion of system testing the Contractor shall turn over to the Owner the "Record of Completion." This document shall include:
 - a. Completed and certified NFPA 72 Inspection and Testing Form.
 - b. Original copies of Owner's Manuals.
 - c. Original copies of installation instructions, and record drawings. Record drawings are to indicate device locations, settings and routing of conductors.
 - d. The "Record of Completion" shall be bound in 3-ring binders.

B. Fire Alarm System Control Panels

1. Fire alarm system control panels shall be addressable microprocessor controlled units.
2. Provide field programmability to Add / Delete / Reprogram point identified addressable devices.
3. Fire alarm system control panel shall have sensitivity testing of initiating devices and/or verification of device status. System shall employ digital sensitivity measurement techniques. Analog sensitivity measurements are not acceptable.
4. During normal operation, devices approaching sensitivity threshold limits shall initiate a "threshold warning" trouble status at the fire alarm system control panel. This trouble signal shall be reported at the campus control center.
5. Provide separate historical logging of alarm and trouble events by device, including time, date, and status in log entry. Log shall store 100 incidents minimum, scrollable display, and wrap back to beginning.
6. System shall employ internal software supervision with parity checking.
7. Provide Fire Alarm Control Panels with an RS-232 interface for system

printer.

8. Preferred Manufacturers
 - a. Simplex Grinnell
 - b. Siemens Building Technologies, Cerberus Division

C. Manual Fire Alarm Stations

1. Manual fire alarm stations shall be semi-flush mounted, single action station, and point addressable.
2. Glass-break rods shall not be used.

D. Automatic Smoke and Heat Detectors.

1. Automatic smoke and heat detectors shall be point identification addressable.
2. The system shall use ionization type smoke detectors, heat detectors (restorable, rate compensated type), and where specifically required photoelectric beam detectors. Variation from these devices shall be obtained from Engineering Services. Application of the detection systems shall be coordinated with fire sprinkler systems. The minimum coverage of detection devices shall include public corridors, storage rooms, electrical and telecommunications rooms. Heat detectors shall be installed in mechanical equipment spaces. See schedule at end of section.
3. Duct mounted smoke detector location is to be in strict accordance with NFPA standards and manufacturers recommendations. Specifically note distance from fan, duct sizing, duct velocities, and temperature range. Coordinate detector location with any humidification equipment. Maintain manufacturer's recommended clearance for proper operation of both systems.

E. Fire Alarm Notification Appliances

1. Fire alarm notification appliances and their location shall comply with the requirements NFPA 72, which exceeds the requirements of the Americans with Disabilities Act. Consider placing audible alarms in occupied areas where separated by two or more doors from nearest alarms.
2. Audible, visual, and audio/visual combination appliances shall be wired with audible portion of appliance on one set of wires and visual on a second. Visual and audible appliances shall be synchronized where applicable.
3. Remote annunciators are to be supervised, including audible and visual indication of fire alarm by zone address, English descriptor, and audible and visual indication of system trouble. Communication with fire alarm system control panel shall be accomplished using a multiplexed signal over a

shielded, twisted pair cable. Location of remote annunciator to be provided by Engineering Services who will interface with IU Fire and Safety Department and the local Fire Marshall.

4. Preferred Manufacturers
 - a. Simplex Grinnell
 - b. Siemens Building Technologies, Cerberus Division
 - c. Wheelock

F. Auxiliary Fire Alarm Equipment

1. Door release devices shall be a magnetic device with integral diodes to reduce buzzing. Zoning of door release devices shall be considered.
2. Point identification addressable auxiliary relays shall be used for the monitoring and control of chemical extinguishing systems, elevator recall, door holders, fire pumps, water flow, tamper, and pre-action sprinkler systems. Minimum contact rating 5 amperes at 24 volts, 5 amperes at 120 volts, and 3 amperes at 240 volts.
3. Transient surge protection modules shall be employed when an initiating circuit leaves a building shell. The devices shall provide for protection in the common and normal modes of the circuit. The device shall be listed and labeled to UL 497B.
4. Chemical extinguishing system release module and power supply shall be included where chemical extinguishing systems are installed.
5. Where directed by Engineering Services, provide portable, detachable printer, 132 column, like Okidata. Thermal printers are not acceptable.
6. Auxiliary power supply systems shall meet all NFPA 72 standards, including requirements for supervision, location, and accessibility. Battery system shall be sized to provide 24 hours of supervision and then provide 10 minutes operation of all signaling devices. System shall have common keyed locks with fire alarm system control panel.
7. Fire alarm and detection system shall remotely signal the campus control operations center and (IUPD) - Indiana University Police Department, through the energy management system or system designated by Engineering Services. Communication shall be accomplished using programmable output relays. Provide sufficient number of auxiliary relays to remotely signal fire alarm, trouble, and water flow conditions.

G. Fire Alarm System Wire and Cable

1. Raceways, branch circuit conductors, boxes and devices shall be in accordance with respective Electrical Design Standards.
2. Initiating loops and control/monitoring circuits shall be stranded, copper, shielded, twisted pair cable and sized in accordance with manufacturers written specifications, but shall not be smaller than 22 AWG. Signal circuits and 24 VDC power circuits shall be stranded, copper, twisted pair cable and sized in accordance with manufacturers written specifications, but not smaller than 18 AWG.
3. Terminations and splices shall be labeled with circuit and device number, must be made in appropriate junction boxes and indicated on record documents.
4. Junction boxes shall have red painted covers, labeled as "FIRE ALARM" and have visual label identifying circuiting.
5. Power limited circuit conductors and their installation shall meet all applicable requirements of NEC Article 76.
6. Preferred Manufacturers
 - a. Belden Wire & Cable
 - b. West Penn

H. Fire Alarm System Interface with HVAC Equipment

1. In general, do not use relay base type duct smoke detectors to shut down air handling unit supply and/or return fans.
2. The following sequence shall be followed, unless directed otherwise by IU Engineering Services.
 - a. Fan Shut Down Relay: Install separate fire alarm system relay near air handling unit supply and/or return fan motor controller. Connect to shut down fan upon receipt of signal from Main Fire Alarm Control Panel.
 - b. Temperature Control Panel Notification Relay: Install separate fire alarm system relay near building temperature control panel monitoring/controlling air handling unit. Connect to control panel as directed by IU Environmental Control Department. This relay is a notification relay only, and shall be activated by the Main Fire Alarm Control Panel.
 - c. The signal to activate Fan Shut Down Relay, and Temperature Control Panel Notification Relay shall be sent by main Fire Alarm Control Panel upon receipt of alarm status from duct smoke detector.

| SCHEDULE OF DETECTOR APPLICATIONS | | | | | | | | | |
|---|---------------|-----|-----|-----|------|------|------|------|-----|
| LOCATION OR APPLICATION | DETECTOR TYPE | | | | | | | | |
| | SI | SIH | SP | SB | H165 | H195 | H210 | HROR | |
| LOBBIES AND VESTIBULES | -1- | -1- | -1- | -1- | | | | | -1- |
| CORRIDORS (CLEAN) | -2- | | | | | | | | |
| CORRIDORS (DIRTY) | | | | | -2- | | | | -2- |
| STORAGE ROOMS | -3- | | | | -3- | | | | |
| ELECTRICAL ROOMS AND CLOSETS | | | | | -0- | | | | |
| TELECOMMUNICATIONS ROOMS AND CLOSETS | -0- | | | | | | | | |
| MECHANICAL ROOMS | | | | | -4- | -4- | -4- | -4- | |
| DUCT DETECTORS | | -0- | | | | | | | |
| GENERATOR ROOMS | | | | | | | -4- | | |

KEY:

- SI - SMOKE DETECTOR - IONIZATION
- SIH - SMOKE DETECTOR - IONIZATION, HIGH-VELOCITY
- SP - SMOKE DETECTOR - PHOTOELECTRIC
- SB - SMOKE DETECTOR - PHOTOELECTRIC, PROJECTED BEAM
- H165 - HEAT DETECTOR - 165 °F
- H195 - HEAT DETECTOR - 195 °F
- H210 - HEAT DETECTOR - 210 °F
- HROR - HEAT DETECTOR - RATE-OF-RISE

NOTES:

- 0 - ACCEPTABLE APPLICATION
- 1 - EVALUATE APPLICATION BASED ON AIR VELOCITY, AND AMBIENT TEMPERATURE RANGE
- 2 - EVALUATE APPLICATION BASED ON ARCHITECTURAL PROGRAM STATEMENT
- 3 - EVALUATE APPLICATION BASED ON TYPES OF MATERIALS, AND AMBIENT TEMPERATURE RANGE
- 4 - EVALUATE APPLICATION BASED ON AMBIENT TEMPERATURE RANGE