



MISSISSIPPI STATE
UNIVERSITY™

DESIGN AND CONSTRUCTION STANDARDS

**Div. 28 Electronic Safety
and Security**

Office of Planning Design and Construction Administration

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 31 00 FIRE ALARM AND DETECTION



DIVISION 28 ELECTRONIC SAFETY AND SECURITY

Professionals shall verify that all applicable portions of these standards are incorporated into the final construction documents and adhered to during the construction of the project. Variances from these standards by the professional and or contractor during the planning, design and construction of the project shall be submitted to the Office of Planning Design and Construction Administration for approval. All requests for variances shall be submitted on the Office of Planning Design and Construction Administration's standard Request for Variance form.



SECTION 28 31 00 FIRE DETECTION AND ALARM

General

New facilities and facilities to be substantially renovated must include a fire alarm system. Exceptions include small buildings and temporary facilities where little value is added by provision of an alarm system. Discuss exceptions with MSU.

The design and installation of this fire alarm system will be in accordance with current editions of the following codes, standards, and guidelines:

- *IFC International Fire Code*
- *IBC International Building Code*
- *NFPA 13 Standard for Installation of Sprinkler Systems*
- *NFPA 17 Standard for Dry Chemical Extinguishing Systems*
- *NFPA 17A Standard for Wet Chemical Extinguishing Systems*
- *NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection*
- *NFPA 45 Standard on Fire Protection for Laboratories using Chemicals*
- *NFPA 70 National Electrical Code*
- *NFPA 72 National Fire Alarm Code*
- *NFPA 90A Standard for Installation of Air Conditioning and Ventilation Systems*
- *NFPA 92B Guide for Smoke Management Systems in Malls, Atria and Large Areas*
- *NFPA 241 Safeguarding Construction, Alteration, and Demolition Operations*
- *ASME A17.1 Safety Code for Elevators and Escalators*
- *ADA Accessibility Guidelines (ADAAG)*
- *ANSI S3.2 Method for Measuring the Intelligibility of Speech over Communication Systems*
- *ANSI S3.41 American National Standard Audible Emergency Evacuation Signal*

Quality Assurance

The fire alarm system shall be the product of a single manufacturer who has engaged in the production of this type of equipment for at least 10 years. Each and all items of the fire alarm system shall be products of a SINGLE fire alarm system manufacturer under the appropriate category by UL and FM bearing their respective labels. Control equipment shall be listed by UL as a single control unit. Interconnecting equipment that has not been listed for interconnection, or the creation of components or system into a nonstandard unit that is not normally available from the manufacturer, is not acceptable.



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Further, the Engineer shall specify that:

- The authorized representative of the manufacturer of the fire alarm system equipment shall be responsible for satisfactory total system operation and its certification.
- The supplier shall employ factory trained and NICET certified personnel to terminate, program, test and commission the fire alarm system. These personnel must have been engaged in the installation of this type of equipment for a minimum of eight (8) years.
- The supplier shall have a fully equipped service organization within one hundred (125) miles of Mississippi State University.
- The supplier shall certify in writing to the Engineer with the Project submittals that the supplier has successfully completed projects of similar scope and nature, using the proposed product line, fire alarm and equipment, in other buildings over the past three years. The supplier shall also certify that they are an authorized State of Mississippi franchised representative and have a fully equipped service organization that will respond with parts and service as required within a 48-hour time period.

Acceptable Manufacturers

Honeywell (Firelite or Notifier),

Johnson Control (Autocall)

Edwards (Est) or approved by MSU

Submittals

Prior to bidding and project construction the design professional shall receive approval from the State Fire Marshal of all fire alarm plans. Prior to project construction, the professional shall ensure that a set of shop drawings have been submitted by the installing contractor and approved by the State Fire Marshal.

At project closeout, the contractor shall furnish PDCA one electronic and two (2) complete hard copies of “as-built” drawings. The contractor shall also provide two (2) flash drives containing software back up and CAD based drawings in latest version of AutoCAD of as-built drawings and schematics. The drawings shall include complete wiring diagrams showing connections between devices and equipment, both factory and field wired. Include a riser diagram and drawings showing the as-built location of devices and equipment. The drawings shall show the system as installed, including deviations from both the project drawings and the approved shop drawings.

The installing contractor shall provide MSU a complete smoke sensitivity report at system installation and a second smoke sensitivity report at the end of the 1-year warranty period.



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Appropriate manufacturer's software shall be provided to MSU. Software shall be provided to



upload/download programs and analog data results.

General Guidelines

At a minimum, the fire alarm system shall include a fire alarm control panel (FACP), remote annunciator, digital alarm communicator transmitter (DACT) and initiation and notification appliances as required by applicable Codes and proscribed in this Section. For most buildings, the fire alarm system should include voice system regardless of applicable Code requirements. This significantly improves maintenance as it allows FM personnel to announce tests. Consult with MSU before beginning design to verify requirements.

Fire alarm control and voice evacuation panels shall be located in communication or electrical rooms. A remote annunciator must be installed at the building entrance where the fire department is expected to enter the building in the event of a fire alarm or fire. Additionally, a remote annunciator shall be installed in the fire pump room when a fire pump is installed as part of the fire suppression system. Consult with MSU for exact location of annunciator.

MSU personnel must be able to perform comprehensive tests on the system with minimum disruption to occupants. Fire alarm system control must originate from the control panel and/or programmable field devices. Individual bypass switches located at the main control panel must provide system wide bypass for each type of output to accommodate testing with minimal disruption.

For building renovations, it is not acceptable to provide a new panel that serves a portion of a building unless the new panel is compatible with the existing system and listed to function as a single networked system. When older systems cannot be expanded to serve a renovated space, a new fire alarm panel should be provided for the entire building.

Where existing fire alarm systems are upgraded or replaced, the existing system shall remain in service until the new system is operational and satisfactorily tested by the University. Include procedures for identifying all devices, wires, and connection of old devices to new (as appropriate) and transfer of service between old system and new. If service is anticipated to be out beyond a single workday, an approved fire watch will be necessary. Consult with MSU for specifics regarding fire watch requirements.

System Requirements

Manual fire alarm initiation shall be provided using addressable, double action, manual pull stations at exits and other required locations. Automatic fire alarm initiation shall be provided using addressable and intelligent fire detection devices consisting of smoke and heat detectors, duct-mounted smoke



detectors, and sprinkler flow and tamper switch monitors.

Smoke detectors shall be installed in common areas, corridors, lobbies, libraries, communication rooms, storage rooms, custodial rooms and elevator lobbies. Smoke detectors shall be installed in each elevator lobby to provide selective elevator recall and protection. Heat detectors shall be installed in laboratories, hazardous locations and other normally unoccupied locations (electrical rooms, elevator rooms, mechanical rooms and facilities shops). Heat detectors shall be installed in each elevator equipment room as required by the elevator safety code. Duct-mounted smoke detectors shall be installed in each air-handling unit (AHU) and each make-up air-handling unit (MAHU).

As required by code, alarm notification shall be provided using a voice evacuation system (per MSU discretion) and visual alarm indicators. Notification speakers and visual signal appliances shall be installed in corridors, lobbies, auditoriums, large rooms (exceeding 1000 square feet), restrooms, and other common use areas.

Coordinate auxiliary controls for fans, smoke dampers, fire suppression systems, elevator and door control. Include all necessary components and relays to make an operational system.

Include interface with all necessary fire sprinkler components, water flow devices and valve supervision. Include connection to exterior control valve and exterior bell if provided. Provide fire alarm circuits to elevator controller. Provide four supervised relays in the elevator machine room. Coordinate door hold open requirements with the Architect.

Fire Alarm System Reporting

The University has a Digital Alarm Communication Receiver (DACR) located at the University Police Department capable of supervising fire, security, equipment or other system signals from any campus location. All fire, security, equipment signals shall transmit an alarm signal to this location by means of a digital communicator. Prior to system testing and interconnection, notify MSU FM to program the central receiver and perform a joint acceptance test to ensure proper system operation and reporting.

Spare Capacity

Design the entire fire alarm system so that the system can be expanded in the future without disruption or replacement of the existing control unit and secondary power supply. Fire alarm control panels shall be provided with 25% spare capacity installed on the following components:

- Audio & visual circuits
- Addressable detection points
- Auxiliary control circuits



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- Annunciator control switches and LEDs

Provide 25% spare capacity on all circuits, considering both circuit and panel limitations. This includes device count, circuit length and voltage drop.

Fire Alarm Control Panel

The fire alarm system shall utilize a fully addressable, microprocessor based, power limited fire alarm control panel (FACP). The FACP shall be programmed to provide control and monitoring functions as described in this Section. The fire alarm control panel shall support independent addressable circuits, originating from the fire alarm control panel mounted hardware, for each floor and zone. The FACP shall be equipped with a NIC for transmitting signals to MSU PD over the university network.

Each initiating device shall annunciate at the fire alarm control panel as a discrete point on an alphanumeric display. Provide descriptive alphanumeric program labels for each system device with the following format: Device Address, Device Type, Floor, Specific Location (i.e., N1-108, Thermal, First Floor, Mechanical Room 0108).

The FACP shall be provided with control point switches capable of providing the following functions:

- Audio Bypass with LED “on-off” indication
- Visual Bypass with LED “on-off” indication
- Elevator Bypass with LED “on-off” indication
- Door Release Bypass with LED “on-off” indication
- Air System Shutdown Bypass with LED “on-off” indication
- Fire Sprinkler System Water Flow Bypass with LED “on-off” indication

Digital Alarm Communication Transmitter

The FACP shall be provided with a digital alarm communication transmitter (DACT) that automatically transmits all fire alarm system alarm, trouble and supervisory signals to the University’s Police Department via Cell Dialer and if possible, Network as backup. DACT shall be integrated to the FACP or shall be equipped in a separate locking cabinet with battery back-up. A network interface (NIC) shall be provided for transmitting signals over the university network. Reporting format shall be CONTACT ID and shall be compatible with the University’s DACR system.

Wire the communicator to the nearest building telephone closet using a four-wire cable (2 pair, 22 gauge) in 3/4” conduit with ten feet (10’) of excess at the closet end, terminated in the communicator, and identified at both ends. The University shall connect to telephone lines.



Voice Evacuation System

Fire alarm audibility and visual notification is required throughout the building with speaker strobe devices positioned in corridors. Typically fire alarm speaker audibility can only be achieved through a single door. Therefore, an office inside a suite would require an audible device within the suite to ensure sufficient audibility in the office. Avoid speaker placement in individual offices.

Visual notification must be in compliance with NFPA 72, including minimum candela intensity throughout all public spaces including but not limited to corridors, classrooms, conference rooms, common areas and restrooms. Strobe design must include candela rating on the individual device and a template should be used to ensure sufficient intensity to provide coverage to all required areas. Synchronize visual notification devices when more than two devices are in the line of sight. The preferred method is to synchronize the circuit at the individual floor fire alarm terminal cabinet. All new systems shall be synchronized.

Voice evacuation system shall provide audible alarm notification by voice evacuation and tone signals on loudspeakers. System shall utilize a Digital Voice Module (DVM) and audio amplifiers. The voice evacuation system shall be capable of providing user defined automatic “voice evacuation”, “all-clear”, and “weather alert” messages. The voice evacuation system shall also be capable of public address at the FACP.

The voice alarm system shall be provided with control point switches capable of providing the following functions:

- “Weather Alert” voice message switch with LED “on-off” indication
- “All Clear” voice message switch with LED “on-off” indication
- “All Speaker Talk” voice message switch with LED “on-off” indication

The DVM shall be provided with four (4) prerecorded digitized evacuation and instructional messages, one each for “alarm”, “all clear”, “test” and “weather alert”. All messages shall be professionally recorded and approved by MSU. The DVM shall be configured to automatically output to the desired circuits following a programmed slow whoop alert tone. The DVM memory shall have a minimum 50% spare capacity after those messages identified in this section are recorded. All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.

Audio amplifiers shall be sized to provide a minimum of 50% spare capacity when attached to the speakers tapped at the wattage required to meet audio requirements. Voice evacuation panel shall



incorporate a spare automatic backup audio amplifier equal in size to the largest individual amplifier. Each amplifier shall be constantly supervised for any condition that could render the amplifier inoperable at its maximum output. Failure of any component shall cause automatic transfer to the backup amplifier, illumination of a visual "amplifier trouble" indicator on the control panel, appropriate logging of the condition on the system printer, and other actions for trouble conditions as specified.

Remote Annunciator

A remote annunciator shall be installed at the lobby entrance and in the fire pump room. Lobby entrance annunciator location shall be coordinated with the City of Starkville Fire Department and the AHJ. The fire pump room annunciator location shall be coordinated with MSU FM. Remote annunciator panels shall provide textual annunciation and LED status indicators of alarm by function (fire zones, manual alarms and water flow alarms) and control by function (AHU and MAHU shutdown, elevator recall and door release). Remote annunciator panels will also provide key-switch controlled remote command center functions (LCD display, alarm/trouble/supervisory trouble display, acknowledgement and reset) for maintenance personnel. Annunciator shall be a supervised, LCD display displaying a minimum of 80 characters for alarm annunciation in clear English text.

Power Supplies

The fire alarm system circuit shall be supplied from a dedicated branch circuit from the emergency power system. The dedicated branch circuit shall be arranged and protected with a disconnecting means, red in color, accessible only to authorized personnel, identified "FIRE ALARM CONTROL CIRCUIT", to prevent inadvertent disconnection.

The FACP and voice evacuation system will also have a secondary power supply consisting of rechargeable storage batteries. Batteries shall be housed in separate cabinets from fire alarm control panels. Each battery cabinet shall be separate locking cabinet listed for that purpose. Cabinet shall match fire alarm control panel in appearance and finish. Primary and secondary power supplies will be monitored by the FACP.

Surge Protection

All equipment connected to alternating current circuits shall be protected from surges. Fuses shall not be used for surge protection. Install UL-listed surge suppression devices on the incoming 120 VAC supply to each fire alarm control panel. Install surge suppression device in separate lockable metal enclosure located adjacent to fire alarm control panel. The enclosure shall match the fire alarm control panel in appearance and style. The surge protector/isolator shall be rated to protect the equipment. All SLC circuits shall have UL-listed surge protection provided at the fire alarm control panel. All



SLC, NAC or control circuit cables/conductors that exit the building shall have surge protection installed at each point where it exits or enters a building. Any communication (telephone) circuit cables/conductors shall have surge protection installed at the fire alarm control panel. The surge protector/isolator shall be rated to protect the equipment. All surge protectors shall be installed in a separate cabinet from the fire alarm cabinet.

Raceways, Terminal Cabinets & Fire Alarm Wiring

Fire alarm system wire and cable shall be located in metal conduit or wire mold regardless of Code exceptions. Raceways in finished areas shall be concealed in finished areas. Location and routing shall take advantage of areas easily accessed by University Operations personnel (hallways/corridors) and shall consider future modification and/or extension wherever practical. Raceway layout shall consist of a vertical riser of fire alarm terminal cabinets located on each floor. Larger buildings and buildings with two or more wings may require multiple risers and terminal cabinets per floor. Engineer is encouraged to show at least two lateral branch lines per floor originating from each terminal cabinet. Circuits shall be laid out to serve a specific geographical area (zone) per floor. Good access must be provided for testing and maintenance requirements.

Notification and initiating appliance circuits shall not be loaded greater than 75% of capacity. Style 4 (Class B) supervision of all initiation devices shall be required. Style Y (Class B) supervision of all notification appliances shall be required. All field wiring shall be continuous from fire alarm terminal cabinets to others fire alarm terminal cabinets, field devices and the fire alarm control panel. All field wiring and fire alarm control panel wiring shall terminate in fire alarm control panels, fire alarm terminal cabinets or field devices. “Pig tailing” and/or “Tee tapping” of initiating and notification device circuits is strictly prohibited. All device connections shall be made using device terminals or in terminal blocks in fire alarm terminal cabinets. Splicing or tapping in any other locations is not acceptable.

Do not use a single circuit for multiple floors or zones; however, multiple circuits may be required for a single zone. Visual notification appliances shall not be placed on the same circuit as audible notification appliances. No speaker or strobe circuit shall exceed 10% voltage loss measured at the end-of-line device. All end-of-line devices shall be located in the terminal cabinet or the end of the corridor for the zone served. Install end-of-line device in box with text labeled “End-of-Line” or “E.O.L.”.

All fire alarm wiring shall be manufactured by West Penn, Belden, or as accepted. Use solid color compound or solid color coating on all conductors. Identify with colored tape wire sizes for which colored insulation is not available. Outside jacket of all fire alarm wiring shall be RED. No other wiring (i.e., HVAC control wiring, elevator control wiring, etc.) shall have a RED outside jacket. Wire insulation shall indicate polarity of wire by the color of the conductor insulation (red – positive, black –



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negative). Shielded wiring shall be utilized where recommended by the manufacturer and installed in accordance with the manufacturer’s recommendations. Care shall be taken to properly make up, terminate and bond all shielded wire drain wires in accordance with the manufacturer’s recommendations.

Color-coding is required for circuits and shall be maintained throughout the circuit. Color coding

<u>Circuit Type</u>	<u>Color Code</u>	<u>Wire Size/Type</u>	<u>ID</u>
Water Flow Switch	Purple	#14 AWG THHN	W
Valve Tamper Switch	Purple	#14 AWG THHN	T
Addressable Circuit	Red / Black	#18 AWG TP/STP	N
Suppression Systems	Purple	#14 AWG THHN	S
Elevator Recall	Pink	#18 AWG THHN	E
Door Holders	Red / Black	#12 AWG THHN	D
AHU/VFD Shutdown	Pink	#12 AWG THHN	H
Audio Alarm (Speakers)	Red / Black	#14 AWG STP	A
Visual Alarm (Strobes)	Red / Black	#14 AWG TP	V
Ground/Bond	Green	#14 AWG THHN	--

follows:

STP – Shielded, twisted pair cable; TP – Twisted pair cable

Terminal cabinet enclosures shall be NEMA Type 1. Cabinet shall be sized to provide 40% spare capacity. Panels shall be flush mounted. All cabinets shall be hinged door type with latch and lock. Box and front shall be steel, finished to match adjacent surfaces as approved by the Architect. Terminal cabinets shall be Hoffman type ATC, or as accepted. Terminal cabinet shall be labeled with a riveted or screwed laminated plastic nameplate indicating “FIRE ALARM TERMINAL CABINET” in ¼” white letters on a red background. Provide backboard in each terminal cabinet. Backboard shall be constructed of fire retardant treated ¾” exterior grade plywood, painted white. Provide terminal blocks in all terminal cabinets. These blocks shall be sized to accommodate wire from 18 gauge to 10 gauge. Terminal blocks shall be General Electric Type EB-25, or as accepted.

Manual Pull Stations

Manual pull stations shall be installed at each floor’s stairway enclosure exit, all doors opening to the exterior of the building and exits from assembly occupancy areas. Additional manual pull stations shall be located so that the travel distance to any manual pull station from any part of the building does not exceed 200’. Manual pull stations shall be mounted not more than 5’ horizontally from the entrance to each exit. Manual pull stations will be installed 48” above floor level, and shall be readily accessible, unobstructed and visible.



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Activation of any manual pull station shall automatically operate an emergency voice communication system and visual alarm indicators, produce an alarm at the fire alarm control panel and remote annunciators and release magnetically held doors. All manual pull station alarm signals shall be automatically transmitted to the University Police Department as a “FIRE” signal.

All manual pull stations shall be addressable, double-action, break-glass type, red in color, non-coded, mounted in a listed manual back box. Manual pull stations shall be hinged and secured with a lockset. The manual pull station shall be able to communicate the pull station status (normal, alarm, trouble) to the FACP.

Smoke Detectors

Addressable, photoelectric type smoke detectors shall be installed in common areas, corridors, lobbies, libraries, communication rooms, storage rooms, custodial rooms, and elevator lobbies (note: open air elevator lobbies shall require a heat detector in place of a smoke detector). A smoke detector shall also be installed above the FACP. Smoke detectors shall be installed a minimum of 4’ from ceiling supply and return air diffusers.

Activation of any smoke detector shall automatically operate an emergency voice communication system and visual alarm indicators, produce an alarm at the fire alarm control panel and remote annunciators, release magnetically held doors and initiate air handler unit shutdown. All smoke detector alarm signals shall be automatically transmitted to the University Police Department as a “FIRE” signal.

Smoke detectors at elevator landings and in elevator machine rooms shall also recall the elevator to the designated floor or to the designated alternate floor as required by the elevator safety code. Smoke detectors shall be photoelectric type. Detectors shall be addressable, plug-in units that mount to a twist lock base. The detector base shall be able to communicate the detector status (normal, alarm, trouble) to the FACP. The detector base shall have base-mounted address dip-switches. Ionization detectors shall not be used unless specifically approved by MSU.

Heat Detectors

Heat detectors shall be installed in laboratories, hazardous locations and other normally unoccupied locations that are not suitable for smoke detectors (electrical rooms, elevator rooms, elevator pit, open-air elevator lobbies, mechanical rooms, facilities shops, etc.). Elevator pits require a fixed temperature and a rate-of-rise heat detector. All signals from the heat detectors in the elevator pit shall be automatically transmitted to the University Police Department as a “SUPERVISORY” signal.

Activation of any heat detector shall automatically operate an emergency voice communication system and visual alarm indicators, produce an alarm at the fire alarm control panel and remote annunciators and release magnetically held doors. All heat detector alarm signals shall be automatically transmitted to the University Police Department as a “FIRE” signal.



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Heat detectors installed in elevator equipment rooms shall be capable of operating the shunt trip breaker (future) for the elevator main line power in accordance with the elevator safety code.

All heat detectors shall be addressable, plug-in units that mount to a twist lock base. Heat detectors shall be a combination rate-of-rise and fixed temperature (135 or 200 F) type, automatically restorable. The detector base shall be able to communicate the detector status (normal, alarm, trouble) to the FACP. The detector base shall have base mounted address dip-switches.

Duct Smoke Detectors

Environmental fans requiring automatic shutdown (excess of 2000 CFM) shall include duct detectors and a fire alarm system relay within 3' of the MCC. For campus consistency the preferred method of fan control is from the FACP via relay at the fan's MCC. This method offers proven reliability, simplicity and is best suited for minimizing maintenance complications with FM personnel. The fire alarm control shall have priority control over fan's MCC "HOA" position. Consider practicality of installation, Code-required laminar flow and maintenance access. Provide multiple duct detectors if necessary. Duct detectors shall be installed in readily accessible locations in accordance with the manufacturer's specifications. Each duct detector shall be installed with a remote alarm lamp and keyed test switch located in a visible and accessible location.

Activation of a duct smoke detector shall initiate a supervisory alarm at the fire alarm control panel and remote annunciators. Duct smoke detector activation shall also initiate an air handler unit shutdown as required by NFPA 90A. All duct detector alarms shall be automatically transmitted to the University Police Department as a "SUPERVISORY" signal.



All duct-mounted smoke detectors will be addressable, photoelectric type housed installed in duct detector housings with sampling tubes. Duct-mounted smoke detectors will have photoelectric sensitivity that can be set to the proper obscuration for the site-specific area.

All retractable smoke curtains shall be manufactured and installed in a manner that does not hinder the egress of occupants.

CO Detectors -- Co detectors should be installed in new buildings where needed for gas water heaters or any other enclosed area with gas appliances.

Speakers & Strobes

Speakers shall conform to the applicable requirements of UL 1480. Speakers shall be connected into notification appliance circuits. Speakers shall have their sound output level selected or be sound damper attenuated as required to ensure sound level compliance with NFPA 72 *National Fire Alarm Code* and ANSI S3.2 *Method for Measuring the Intelligibility of Speech over Communication Systems* for audible notification appliances. Surface mounted speakers shall be painted white. Recessed speakers shall be installed with grill that is painted white.

Visual notification appliances (strobes) shall conform to the applicable requirements of UL 1971 and shall conform to the Americans with Disabilities Act. Appliances shall operate at 24 volts DC and shall have a selectable intensity of 15, 30, 75 or 110 candelas. Visual notification appliances shall have their strobe intensity selected to ensure compliance with NFPA 72 *National Fire Alarm Code* requirements for visual notification appliances. Strobes shall be synchronized on each floor and wing. Appliances shall be semi-flush mounted.

Water Flow Alarms

Water flow detectors shall be installed at each sprinkler or standpipe riser and at each sprinkler system zone to provide water flow alarms to the FACP upon water flow activation. Activation of a water flow alarm shall automatically operate an emergency voice communication system and visual alarm indicators, produce an alarm at the fire alarm control panel and remote annunciators and release magnetically held doors. All water flow alarm signals shall be automatically transmitted to the University Police Department as a "FIRE" signal. Water flow alarm switches shall be vane type and all water flow alarms shall be electrically supervised. Each water flow alarm shall connect to the fire alarm system using an addressable interface module. Each water flow alarm shall have a unique address point.

Valve Tamper Switches

Activation of a valve tamper switch on the fire sprinkler system shall initiate a supervisory alarm at the



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fire alarm control panel and remote annunciators. All valve tamper switch alarm signals shall be automatically transmitted to the University Police Department as a “SUPERVISORY” signal. Valve tamper switches shall be electrically supervised. Each tamper switch shall connect to the fire alarm system using an addressable monitor module. Each valve tamper switch shall have a unique address point.

Fire Pump Supervision

Individual supervisory signals shall be provided for the following conditions:

- Fire pump running
- Fire pump loss of power in any phase
- Fire pump phase reversal

Activation of a fire pump supervisory signal shall initiate a supervisory alarm at the fire alarm control panel and remote annunciators. All fire pump supervisory signals shall be transmitted to the University Police Department as a “SUPERVISORY” signal.

Automatic Fire Suppression Systems (Other than Water Flow)

Activation of an automatic fire suppression system shall automatically operate an emergency voice communication system and visual alarm indicators, produce an alarm at the fire alarm control panel and remote annunciators and release magnetically held doors. All automatic fire suppression system alarm signals shall be automatically transmitted to the University Police Department as a “FIRE” signal.

Any off-normal condition of an automatic fire suppression system shall initiate a supervisory alarm at the fire alarm control panel and remote annunciators. All automatic fire suppression system supervisory signals shall be transmitted to the University Police Department as a “SUPERVISORY” signal.

Magnetic Door Holders

Install magnetic door holders at fire rated doors. Coordinate installation with the Architect. Magnetic door holders shall be designed for semi-flush wall mounting. Magnetic door holders shall be designed operate at 24 VDC. Each magnetic door holder shall be connected to the new fire alarm system using an addressable control module. Each magnetic door holder shall have a unique address point. Ensure smoke detector placement is in accordance with code.

Elevator Recall

Provide elevator recall and elevator shunt tripping in accordance with NFPA 72 *National Fire Alarm*



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Code and ASME A17.1 *Safety Code for Elevators and Escalators*. Provide a minimum of four addressable control modules with 24-volt DC relays (with red LED when in alarm) for elevator primary recall, alternate recall, elevator threatened and elevator shunt trip.

Labeling

Label each device with its SLC (IDNET) circuit and device number (i.e., N5-145) with self-adhesive tape. Lettering shall be a minimum of 3/16" height black characters.

- Smoke and Thermal Sensors: Locate device identification on detector base on the side nearest a wall.
- Addressable Modules: Label device with its SLC (IDNET) circuit and device number and function (N1-154, Return Fan RE/1 Shutdown). Locate device identification label on the module body or the cover of the module box in ready view.
- Manual Pull Stations: Locate device identification on the top of the pull station.
- Duct Detectors: Locate device identification on detector base on the duct detector housing in ready view.

All fire alarm pull and junction boxes and associated covers that will be located in concealed spaces shall be painted red prior to their installation. All conduit and raceways that will be located in concealed spaces shall be color coded by a 3/4" red tape band at 10' intervals. Use Scotch Brand #35 tape or as accepted.

All circuits shall be labeled at each end and in fire alarm control panels, terminal cabinets, enclosures, and junction boxes using a typewritten shrink-wrap label to provide a unique and specific designation in the following format:

ID - Z - W - F - C

Circuit (ID) = per Wire Table (i.e., for V - visual, A - audio,

etc.) Zone (Z) = Software Zone (1, 2, 3, etc.)

Wing (W) = Building Wing (N-North, S-South, etc.)

Floor Level (F) = Floor Level (B, 1, 2, etc.)

Circuit No. (C) = Circuit No. (01, 02, 03, etc.)

Testing

Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.



Conduct preliminary tests to ensure that devices and circuits are functioning properly. Test the system in accordance with the procedures outlined in NFPA 72. After testing is complete, provide MSU a letter certifying that the installation is complete and fully operable. The letter shall state that the entire fire alarm system, including each initiating and indicating device and other auxiliary devices were tested in accordance with NFPA 72 *National Fire Alarm Code* and functioned properly. The letter shall include the names and titles of the witnesses to the tests.

Spare Components

Contractor shall supply spare components to MSU as listed below:

- Ten (10) smoke detectors or 5% of total installation, whichever is greater
- Five (5) heat detectors or 5% of total installation, whichever is greater
- Three (3) relays or 5% of total installation, whichever is greater
- Three of each type of A/V notification device or 5% of total installation, whichever is greater