

## SECTION 28 31 00

### FIRE ALARM SYSTEM

#### PART 1 - GENERAL

##### 1.1 SCOPE

Work described in this Section includes providing all labor, materials, and equipment indicated, specified, and necessary for complete and operating systems in accordance with SECTION 26 00 00 - ELECTRICAL GENERAL PROVISIONS.

##### 1.2 APPLICABLE PARAGRAPHS

Applicable paragraphs of SECTION 26 0500 - ELECTRICAL BASIC MATERIALS AND METHODS, shall apply to this Section as though repeated herein.

##### 1.3 FIRE ALARM SYSTEM SUBMITTALS

A. Contractor shall have a certified fire alarm installer prepare equipment brochures, plan view and one line schematic shop drawings for the work of this contract.

B. Equipment brochures shall consist of items specified hereinafter and items that are pertinent to the work. The brochures shall include a sequence of operation, battery calculations, and statement identifying "type of system". These brochures shall be submitted for review per paragraph 26 0000. Where remote station monitoring is required, brochures shall provide the name of the monitoring company (which must be Fire Marshal approved).

C. Shop drawings shall indicate sizes, quantities, and types of conductors, cables and raceways and details necessary to install the work, to include strobe candela ratings.

D. Contractor shall submit the following to the Architect for Fire Marshal review:

1. Six sets of the reviewed equipment brochures.
2. Six sets of shop drawings and one set of reproduces.
3. Completed Louisiana State Fire Marshal's plan review form.
4. Check for review fee, if applicable.

E. If additional clarifying details and/or components are required by the Fire Marshal, Contractor shall prepare the details, provide components, and secure approval at no additional cost to the Owner. Installation shall not begin until the Fire Marshal's review is complete.

F. Operating instructions provided to the Owner shall include submittal brochure, shop drawings, and booklet including device addresses to match shop drawings, and control commands for doors, HVAC, etc.

## PART 2 - PRODUCTS

### 2.1 FIRE ALARM SYSTEM

A. Contractor shall furnish and install smoke detectors, air-stream smoke detectors, heat detectors, manual stations, beam detectors, signals, door hold-open devices, monitor modules, control modules with relays, control panel, DACT, remote annunciator, wiring and raceways, and all other equipment, whether specifically indicated or not, to provide a complete and operating addressable analog, voice notification, non-coded, supervised fire alarm system to meet the requirements of NFPA 72 and all other applicable Life Safety Codes.

B. Contractor shall provide wiring as recommended by the manufacturer and it shall be indicated in the point-to-point interconnection drawings that shall be included with the submittals. The completed installation is to conform to applicable sections of NFPA 72, local and state code requirements and the National Electrical Code. Entire system shall have battery backup to meet NFPA and local codes plus 20% spare capacity.

C. Manual stations shall be addressable, double action type, metal or Lexan housing with red finish on flush outlet box. Where surface mounting is allowed, a full size backbox made specifically for manual stations shall be used.

D. Smoke detectors shall be photoelectric, low profile, addressable, analog type with base mounted on flush outlet box. Smoke detectors shall communicate actual smoke chamber values to the system control panel. Sensors shall be listed to UL 268. Sensors shall be listed as compatible with the control equipment and shall, in combination with this control equipment, be able to generate sensitivity reports acceptable to the Authority Having Jurisdiction as automatically meeting NFPA sensitivity testing requirements. Sensors shall be fully field programmable for sensitivity levels and indicate when maintenance is required. Each sensor base shall contain an LED that will flash each time the detector is scanned. LED shall also indicate when the sensor is in alarm. Where surface mounting is allowed, a round backbox that is slightly larger in diameter than the detector base shall be used.

E. Air-stream smoke detectors shall be addressable analog detectors. Performance shall be as described for smoke detectors. A remote test station (with indicator light and keyed test switch on a single-gang plate to be engraved with associated air unit designation) shall be provided for each air-stream smoke detector. Each shall be in a flush outlet box at a location as directed (generally) in corridor wall near the detector or at a readily accessible place in the associated mechanical room, unless a location is indicated on the drawings. Provide wiring in raceways from detector(s) to remote test station (test station shall not be addressable device with a different address than the detector). Provide an addressable control module with relay at the air handling system associated with each air-stream smoke detector and program the control module for fan/damper shutdown control resulting from activation of that detector associated with that air handling system. The control module shall be located within 2' of the starter or control panel. Where not part of Division 23 work, provide wiring and raceways from control module relays so that each air-stream smoke detector will provide fan shutdown and, where applicable, closure of smoke damper for only the associated HVAC system (i.e., other HVAC systems shall not be controlled by this air-stream smoke detector

or by the fire alarm control panel unless indicated otherwise). Air-stream smoke detectors shall be as follows:

1. Where air-stream to be sensed passes through a duct, the air-stream smoke detector shall be a duct type smoke detector with housing and air sampling tubes. These shall be located in accordance with NFPA 72 requirements with exact location to be coordinated with the Division 15 contractor. Multiple duct smoke detectors shall be provided at each location where ducts split into multiple ducts that cannot be monitored by a single detector.

2. Where air-stream to be sensed does not pass through a duct, the air-stream smoke detector(s) shall be located in accordance with NFPA 72 paragraphs 5.14.4.2.2 and A.5.14.4.2.2 and shall be of the type (and quantity) suitable and UL listed for the application (including air velocity).

F. Heat detectors shall be used where indicated and in lieu of smoke detectors where moisture will cause the smoke detectors to malfunction. Each shall be addressable and shall be rate-of-rise or fixed temperature type as appropriate. Where used in association with elevator sprinkler heads, they shall be fixed temperature type with temperature lower than sprinkler head temperature and one shall be located within two feet of each head. Where surface mounting is allowed, a round backbox that is slightly larger in diameter than the detector base shall be used.

G. Beam detectors (transmitters and receivers) shall be photoelectric type with minimum of three sensitivity settings, normal and alarm LED's, 24VDC, with 180 degree horizontal adjustability and 20 degree vertical adjustability. Provide detectors with the appropriate beam pattern for each location. Provide power supplies, monitor modules, etc., as needed.

H. Bases for addressable smoke detectors shall be identical to bases for addressable heat detectors so that smoke detectors can be changed by simply unplugging the smoke head and plugging in a heat head. The system shall automatically recognize the new device and operate on a default program designed for the new device. The Fire Alarm Control Panel shall automatically be notified of any device changes and the exact location of these changes.

I. Provide a small permanent label on each addressable device to indicate the address.

J. Audiovisual signal units shall be wall mounted speakers with strobe lights with off-white plate/housing. Strobe lights shall be xenon flasher, with the word "FIRE" and shall be ADA compatible and listed to UL 1971. Units shall be mounted on flush outlet boxes. Where surface mounting is allowed, an off-white full size backbox made specifically for these signal units shall be used. Mounting height to the bottom of the device lense shall be 80" above the highest floor level within the space. Strobe intensity at each location shall be selected to meet ADA and NFPA 72. Where there are more than two units in a space, units shall flash in synchronization. Audio unit shall be selected to provide adequate volume at each location. Speakers shall be rated 88.8 db at 10' for 2-watt setting; lower wattage settings may be used as long as sound levels are sufficient for all occupants to clearly hear the voice messages (generally 15 db above ambient).

K. Visual signal units shall be xenon flasher on an off-white plate/housing with the word "FIRE", shall be ADA compatible, and shall be wall mounted on flush outlet boxes. Where surface mounting is allowed, an off-white full size backbox made specifically for these signal units shall be used. Mounting height shall be the same as audiovisual signal units. Strobe intensity at each location shall be selected to meet ADA and NFPA 72. Where more than two in a space, units shall flash in synchronization.

L. Provide addressable monitor modules for each sprinkler flow switch, sprinkler valve supervisory switch, sprinkler pressure switch, fire suppression panel (two for trouble, two for alarm), fire pump controllers (one for pump running alarm, one for phase reversal-trouble, one for loss of phase-trouble), and for other equipment as shown. Provide wiring in raceways from monitor modules to the equipment to be monitored. Modules shall communicate any change in status to the fire alarm control panel (alarm for flow switches, fire suppression panels, fire pump controllers and trouble for valve supervisory switches, pressure switches, fire suppression panels, fire pump controllers).

M. Provide addressable control modules at air handling systems (as hereinbefore indicated), at door control panels (quantity as required), and for other equipment as indicated on the drawings. Provide wiring in raceways from control modules to the equipment to be controlled; observe distance limitations required in NFPA 72. Provide custom programming as required.

N. Provide connection to door hold-open devices furnished under other Divisions. Provide wall mounted magnetic door hold-open devices in flush outlet boxes. Provide control modules or, if permitted by code, door control from fire alarm control panel.

O. Fire alarm control panel shall be Notifier NFS-2-640 series, or Edwards System Technology EST-3 series, flush mounted with battery backup (including charger, transfer switch, and batteries, with 24-hour capacity in standby mode and 5-minute capacity in alarm mode (15 minute capacity in voice alarm mode) microprocessor based monitoring and control, 80 character LCD display, 400 event historical logging, point selectable alarm verification feature (alarm verification shall not be programmed at this time), dedicated supervisory service indicator, acknowledge trouble silence reminder (time interval and signal type to be programmable to suit Owner), interface addressable devices (equipped with hardware for 159 analog points and 159 monitor/control points. Fire alarm control panel shall include a voice communication center (in the control panel cabinet) with audio control board, audio amplifiers (sized for all speakers simultaneously plus 50 percent, minimum), voice zone selector switches (one for each floor of the building, and all-call), a microphone, and a recorded message programmed per Fire Marshal and Owner's requirements. Voice messages shall be preceded by chime tones per NFPA 72. There shall be one N.O. and one N.C. dry contact that shall change state during any alarm condition. There shall be an RS-232 port for on-site maintenance, another RS-232 port programmed for plug-in of a future printer, and an internal modem with interface assembly for off-site viewing of system status for maintenance. There shall be a signal silence switch with ring-back that does not cancel the strobe lights. Strobe lights shall flash until all devices are restored to normal and system is reset. Custom labeling and programming shall be provided for proper use of system. Power supplies and batteries shall be sized for 150% capacity for future additions. Where amplifiers, power supplies, and batteries will not fit in fire alarm control panel, they shall be provided in cabinets to be located in closets with locations to be approved. Provide dedicated 120 volt circuits as necessary and identify the circuit disconnecting means at the control panel.

P. Remote annunciators shall be flush mounted and compatible with control panel. It shall have 80 character LCD display with key operated door, reset button, silence button, alarm and trouble lights with audible signals.

Q. A digital alarm communicator transmitter (DACT) shall be provided in fire alarm control panel. It shall be used to transmit system status (for each device in alarm and trouble, simultaneously, for as many as 89 devices) to a remote station receiver via public telephone network. Two telephone lines in raceway shall be installed to the nearest telephone backboard/cabinet for the DACT in addition to a telephone

line for the modem. Contractor shall provide programming, make all connections, and provide one year of remote monitoring service of the DACT.

R. Programming shall be provided as required and shall include programming for off-site maintenance through the modem.

S. System shall operate in such a way that activation of any pull station, smoke detector, heat detector, air-stream smoke detector, beam detector, sprinkler system flow switch, fire suppression panel (pre-alarm and alarm), or fire pump controller shall cause all audio and visual signals to operate, zone annunciator in the fire alarm control panel and remote annunciators to operate, sonalert to sound until acknowledged by the operator, signal to be transmitted to the remote monitoring system and door hold-open devices to be released. Acknowledgment shall silence message and this operation shall be logged in memory. Operation of the signal silence button shall silence all audible signals and this operation shall be logged in memory. Audio visual signals shall remain on until the system is reset. A break in an initiating loop, signal loop, monitor or control circuit, wiring to a control circuit, loss of power, activation of valve supervisory switch to off normal position, trouble activations of a fire suppression panel or fire pump controller, failure of any amplifier or oscillator circuit shall cause a system trouble condition to occur, the system trouble lamps to flash, and the sonalert to sound. Acknowledging the trouble condition shall cause the sonalert to be silenced and the trouble LED's to come on steady, and shall be archived in memory. All alarm and trouble conditions shall be archived in the memory by time and date of occurrence. Alarm conditions shall also provide other control functions such as selected HVAC functions and the following:

1. In addition, signals shall be sent to control modules for door control so that doors will be unlocked. Provide programming as required to meet door security system requirements. Contractor shall arrange with and pay all costs for a door security technician to connect from the control modules to door security system junction boxes and provide security system programming as necessary.

2. Any alarm condition shall cause a control module at the sound systems to turn off the sound systems.

## PART 3 - EXECUTION

### 3.1 FIRE ALARM SYSTEM INSTALLATION

A. Wiring shall be provided as necessary for proper system operation and shall be of the type as recommended by system manufacturer. Wiring shall be contained in concealed raceways unless noted otherwise. There shall be minimum of 40% spare analog capacity and 40% spare binary capacity in each data line. Audio circuits shall have 50% spare capacity for future additions. Wiring between control panels, power supply panels, and remote annunciators shall be U.L. System 22 cables (Tyco or equal) in EMT or rigid galvanized steel conduit.

B. System shall be installed by a qualified fire alarm technician licensed by the State of Louisiana. Devices shall be individually tested. A final operational test shall be conducted on the entire system. After wiring and construction is completed, system shall be certified by equipment supplier in writing as being complete and properly operating. The certification letter shall include NFPA 72 forms.

- C. Contractor shall adjust volume tap on each audible signal unit for proper volume at each location.
- D. Contractor shall meet with the Owner to establish name for each device address.
- E. Contractor shall meet with the Owner (or security contractor) to properly program as required.
- F. Provide 5 spare smoke detectors, 5 spare audiovisual signal units, 5 spare visual signal units, 2 spare heat detectors, and 3 spare air-stream (duct type) smoke detectors to the Owner.
- G. Install 3 additional monitor modules and 3 additional control modules with relays at locations as directed. Connect them to the system and to monitored and controlled devices. At end of construction, any of these modules not used shall be turned over to the Owner.
- H. Contractor shall demonstrate proper operation of system to the Engineer (using smoke cans). After system is acceptable to Engineer, Contractor shall contact Fire Marshal and demonstrate system to him, as many times as required.
- I. Contractor shall, at the completion of the project, arrange with equipment supplier to train designated Owner personnel in the proper operation, programming and minor maintenance of the system. This shall include training on programming to make changes in device addressing, to make other specified programming changes (to include changes to smoke detector sensitivity settings), and to generate system reports. Training shall be minimum of 2 hours.
- J. The completed systems shall be guaranteed free from electrical, mechanical, software, and/or operational defects for a period of one year.

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