

SECTION 28 31 00 - ADDRESSABLE FIRE ALARM SYSTEMS

PART 1 - GENERAL

1.1 SCOPE

- A. Contractor shall furnish and install as directed on the plan drawings, and as herein specified, a complete system of fire alarm and detection equipment.
- B. System shall include all devices, wiring, equipment, raceways, etc. required for a complete and satisfactorily operating system, whether or not every such item is specifically shown or mentioned.
 - 1. Each building shall be provided with a stand-alone fire alarm system that is capable of fully monitoring the respective building.
 - 2. Each building system shall communicate with a headend panel/system located in the landlord/amenity office. Communication of all systems' alarm, trouble and supervisory conditions shall be transmitted by the headend system to the Owner's selected UL listed central station monitoring agency.
- C. System components, installation and operation shall be in strict accordance with the Fire Marshal's requirements for fire detection & alarm systems. System supplier shall be required to review the drawings carefully and shall include all devices required to attain Certificate of Occupancy and to notify the electrical contractor of any additional requirements not shown on the drawings so that all labor shall be included in the bid.
- D. All fire and smoke detection and alarm systems shall comply with latest applicable editions of NFPA 72 and ADA. They must also comply with State and Local Building Code, including NFPA 1 Fire Safety Code, NFPA 70 National Electrical Code, NFPA 90A Installation of Air Conditioning and Ventilating Systems, Fire Safety Code and NFPA 101 Life Safety Code.
- E. The system shall be multiplexed addressable, nominal 24 VDC, non-coded, and fully supervised (including control circuits). All equipment supplied must be listed for the purpose for which it is used, and installed in accordance with any instructions included in its listing. It must also be new, with a warranty (parts & labor) of at least one year from the date of final inspection and acceptable by the State.
- F. The system shall be electrically supervised for open or (+/-) ground fault conditions in the detection circuits, the alarm circuits, and the system alarm and trouble relay coils. Removal of any detection device, alarm appliance, system module, or standby battery connection shall also result in a trouble signal. Fire alarm signal shall override trouble signals, but any pre-alarm trouble signal shall reappear when the panel is reset.
- G. Within the apartment units, line voltage, single station type devices shall be provided.

1.2 SYSTEM FUNCTION

- A. Upon activation of any manual station, smoke detector, flow switch or other alarm initiating device, the following functions shall occur automatically:
 - 1. The alarm condition shall be annunciated visually and audibly at the fire alarm control panel. Alphanumeric display shall indicate device type and location of alarm.
 - 2. The alarm signaling system shall be activated. Upon activation, the alarm signaling shall sound an alarm signal throughout the building via the audible/visual system. This evacuation signal shall sound continuously until such time as the manual station or automatic detector is restored to normal and the fire command station reset.
 - 3. The alarm condition shall be transmitted to Owner selected, UL listed central monitoring station via dual line digital communicator.
- B. Special functions shall be activated as required.
 - 1. At any time (except as defined above) it shall be possible for the operator to transmit an alarm signal.

2. Activation of duct mounted smoke detectors shall cause HVAC shutdown. Coordinate interlock with the mechanical contractor.
 - a. Duct detectors shall transmit supervisory signal only and will not activate the evacuation signal system nor notify the fire response service.
 - b. Provide a toggle switch override of HVAC shutdown in the fire alarm panel with normal status indicated at the switch.
 3. Provide interconnection to elevator controllers as required.
 - a. Activation of the primary landing elevator lobby smoke detector shall signal the elevator controller to recall the elevator to the designated alternate level. If the elevator machine room access is directly adjacent to the primary landing elevator doors, machine room smoke detection shall also recall the elevator to the designated alternate level.
 - b. Activation of any other elevator lobby, machine room (not adjacent to the primary landing) or shaft smoke detector or heat detector shall signal the elevator controller to recall the elevator to the designated primary level.
 4. Activation of any alarm shall cause the release of any door hold open devices.
 5. Activation of any alarm shall cause the release of any door mag-lock access control devices.
 6. Coordinate with the sprinkler system subcontractor as required.
 - a. Verify exact location and quantity of all system flow switches and valves to be monitored by the fire alarm system.
 - b. Coordinate with sprinkler and elevator contractors for elevator shutdown (required when elevator shaft and/or machine room is sprinklered) as follows:
 1. Heat detectors shall be installed within 2'-0" of all sprinkler heads located in machine rooms and shafts.
 2. Upon receipt signal from the elevator controller that recall has been accomplished and activation of heat detection in the machine room or shaft, the FACP shall signal the shunt trip device of the elevator circuit breakers to disconnect power to the elevators.
- C. Within the apartment units, upon activation of any single smoke detector, all detectors within the given unit shall sound.

1.3 SYSTEM SUPERVISION

- A. All functions of system shall be fully electrically supervised. Upon any system fault or component failure, appropriate audible and visible signals shall be activated to indicate the nature of the trouble.
- B. Individual trouble messages shall be provided for each alarm and indicating circuit.
- C. Upon application of primary power failure, the system shall automatically be in a normal supervisory condition. Systems which require operator intervention to reset manual controls following a primary power restoration shall not be acceptable.
- D. Upon power outage, the system shall signal "AC Failure" and sound an audible trouble signal. The entire system shall be provided with 24 hours of standby power in the supervisory mode and 5 minutes in the alarm mode. Note maximum number of devices system can accommodate in shop drawing submittal.
- E. Within the apartment units, the single-station detectors shall be unsupervised.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. System components specified herein are those of Notifier and are intended to establish type and quality required. Similar equipment by Edwards System Technologies or Simplex are acceptable.

2.2 SYSTEM COMPONENTS

A. Fire Alarm Control Panel (FACP):

1. The Fire Alarm Control (FACP) Panel shall be fully solid state and of modular design, for ease of future system extension and/or modification. The front of the panel must have steady Power On indication and each alarm initiation device must have separate Alarm and Trouble indications.
2. The FACP power supply shall have a continuous rating adequate to power all devices and functions in full alarm continuously. Detection modules and alarm modules must be able to withstand prolonged short circuits in the field wiring, either line to line or line to ground, without damage.
4. The system must be equipped with the following protective devices to prevent damage or nuisance alarms by nearby lightning strikes, stray currents, or voltage transients:
 - a. On AC Input: GE 9L15ECA001, Leviton 51010-WM, or Square D Q02175SB, or equivalent.
5. The FAC panel must have an Alarm Silence switch with subsequent Alarm (alarm resound) feature.
6. All common modules, power supplies, amplifiers, control modules, relay and components as necessary to effect the fire alarm, detection, communication and control functions as herein specified and as indicated on the drawings shall be provided as required.
7. Surface mounted enclosure, with locked door.
8. System shall be provided with a separate and independent source of emergency power. Switching to emergency power during alarm shall not cause signal drop-out. Any batteries must meet the appropriate NFPA capacity requirements, with a 25% safety factor.
9. FACP shall be equivalent to the Notifier NFW-100 series.

B. Remote Annunciator:

1. Remote annunciator shall be LCD type with wide viewing angle to indicate all alarm, trouble and supervisory conditions.

C. Wiring:

1. Wiring shall be, installed in conduit, tight to structure (tie wrapped at intervals not to exceed 4'-0" on center).
2. Conductors shall be copper. Conductors shall be #14 AWG solid THWN or XHHW.
3. All junction boxes shall be accessible. All junction box covers shall be painted red.
4. Addressable communications fire alarm wiring shall be shielded type as required by the system manufacturer.
5. Within the apartment units, wiring shall be as required by detector manufacturer.

D. Manual Stations:

1. Manual pull stations shall be double action, push/pull type with integral address module, red in color, with "FIRE" or "FIRE ALARM" printed in white letters.
2. Stations shall be Notifier NOT-BG12LX Type for semi-flush mounting.

E. Detectors:

1. Detector bases shall be for ceiling mounting and operate from 24 VDC power from control panel. Detectors shall have environmental compensating and adjustable sensitivity, condition indicator to be flashing LED for normal, continuous LED for alarm. Trouble condition shall not interfere with the operation of other detectors in the circuit. Smoke detectors shall be photoelectric type unless otherwise noted.
 - a. Photoelectric Smoke Detectors: Detectors shall be provided with insect screens and means to minimize entry of dust and air turbulence. Units shall be Notifier NP-100 for typical use.
 - b. Ionization Smoke Detectors: Detectors shall be dual chamber ionization type designed to sense both visible and invisible products of combustion. Unit shall be Notifier NI-100 Type. Ionization detectors shall be used in Electrical Equipment Rooms.

- c. Heat Detectors: Detectors shall be combination rate of rise-fixed temperature type. Rate of rise shall be 15°F per minute with a fixed setting of 135°F. Unit shall be Notifier NH-100R Type.
 2. Within the apartment units, smoke detectors shall be 120V combination photoelectric type smoke sensing (2.5% sensitivity) and carbon monoxide sensing with insect screen, 90 dBA sound rated, interconnectable up to minimum of 6 detectors, 9VDC battery backup, ivory finish. Detectors shall be equivalent to Gentex #GN-503 or Kidde KN-COPE-I series. For handicapped spaces, provide remote 177 candella strobe equivalent to Gentex GXS or Kidde SL177I series.
- F. Duct Detectors:
1. Duct Detectors shall be ND-100 Type photoelectric type detectors in duct mount housing with 24 VDC power operated from control panel.
 - a. The Electrical Contractor shall verify with the Mechanical Contractor the tube lengths required and supply the complete units to the Mechanical Contractor for installation in the ducts. All wiring shall be by the Electrical Contractor.
 - b. HVAC shutdown shall be from the FACP in order to integrate shutdown override at the FACP. Coordinate with the mechanical contractor as required.
 - c. Provide remote test switch with reset and indicating light installed in an accessible location near its associated detector, Notifier RTS451KEY.
 - d. The connector head components shall be supervised so that their failure shall cause a trouble indication in the Fire Alarm Control Panel.
- G. Signaling Devices:
1. Combination horn and visual strobe light shall be equal to Notifier HS24 series. Synchronization shall be provided for strobe lights in all areas where two or more devices are visible.
 2. Mount combination horn/strobe or strobe only device 80" above finish floor to bottom of strobe lens or 6" below ceiling maximum when ceiling height is less than 7'-0".
 3. Mount horn only device aligned with top of door frame.
 4. Visual signals shall have side viewing lens, white in color with the words "FIRE" printed on each side.
 5. Visual signal shall be 24 VDC Xenon flasher with built-in reflector and shall be in accordance with ADA requirements.
 6. Coordinate signaling devices carefully with visual signal to provide a complete integral unit.
- H. Hold Open Devices:
1. Hold open devices shall be 24 vdc, Notifier FM series as required. Provide low profile type for wall mounting, floor mounted as required elsewhere.
- I. Battery Module:
1. Standby emergency power shall be provided to automatically power the system upon loss of 120 VAC input power.
 - a. Battery shall be sealed, maintenance free, lead calcium type.
 - b. After restoration of normal power, battery shall be automatically recharged and shall be continually float charged to maintain full power.
 - c. Module shall be fused to protect against over-current and accidental reversal of polarity.
 - d. Module shall be monitored to indicate low battery, battery disconnected or charge failure.
- J. Sprinkler, Flow and Tamper Switches:
1. Provide addressable module for each flow and tamper switch in the sprinkler system. Switches are to be provided by sprinkler contractor, modules and required wiring to be provided by this contractor.
- K. Spare Parts:
1. Provide two (2) fuses of each size used in the system.
 2. Provide 4 additional glass rods for the fire alarm pull stations.

3. Provide two photoelectric smoke detectors
4. Provide twelve combination horn/strobe units.
5. Provide twenty strobe only units.
6. Provide twelve single station combination smoke and carbon monoxide units.
7. Provide six 120V remote strobe units.

2.3 VERIFICATION OF SYSTEM PERFORMANCE

- A. Upon completion of the installation, and prior to final inspections, the CONTRACTOR AND THE MANUFACTURER'S AUTHORIZED REPRESENTATIVE together shall test every alarm initiating device for proper response and zone indication, every alarm signaling appliance for effectiveness, and all auxiliary functions such as capture of elevators and control of smoke doors/dampers and HVAC systems. This will often require a coordinated effort involving several trades and contractors, since some of the things to be tested may have been furnished and/or installed by someone other than the Electrical Contractor.
- B. The Owner and the Engineer will be given the opportunity to witness these tests. An itemized Test Report will be submitted to the Consulting Engineer and the Owner, detailing and certifying all results, including the measured sensitivity of each smoke detector. The data for each smoke detector will include the Manufacturer's serial number, plus specific location information adequate to quickly pinpoint the device.
- C. In the event of any system malfunctions or nuisance alarms, the Contractor will take appropriate corrective action. However, this may necessitate a repeat of the response test, if the Owner so desires. Continued improper performance during warranty shall be cause to require the Contractor to remove the system.
- D. System Documentation, Training, and Maintenance
 1. The contractor shall provide the Engineer with three (3) copies of the following, to be forwarded to the owner:
 - a. As-built wiring and conduit layout diagrams, incorporating wire color code and/or label numbers, and showing all inter-connections in the system.
 - b. Schematic wiring diagrams of all control panels, modules, communications panels, etc.
 - c. Technical literature on all major parts of the system, including detector heads, manual stations, signaling devices, alarm panels, and power supplies.
 2. The manufacturer's authorized representative must instruct the Owner's designated employees in proper operation of the system and all required periodic maintenance. This instruction will include two (2) copies of a written, bound summary, for future reference.
 3. Basic operating instructions shall be provided at the FACP. Programmed device descriptions shall note location per Owner designations. Contractor shall obtain from the architect a reduced scale drawing (11" x 17" or smaller) in order to note space designations.
 4. The contractor must have the manufacturer's authorized representative provide a quotation for regular preventative maintenance, in accordance with the recommendations of NFPA, 72H, "Guide for Testing Protective Signaling Systems." This will cover the first 12 months period after expiration of the standard warranty. This quotation will provide the owner with information on internal versus contract maintenance costs.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All fire alarm wiring shall be installed in conduit. Under no circumstances shall any fire alarm detection/initiating circuit be combined in the same conduit run with other building circuits. Within FAC panel, AC control circuits shall be isolated/insulated away from other circuits and the enclosure shall have an appropriate warning label alerting service personnel of the presence of high voltage.

- B. No splicing or "wire-nut" connection of fire alarm wiring is permitted. All required terminations shall be continuous from device terminal to device terminal. If an intermediate termination is required, utilize Square-'D' TC series terminal strips suitable for wiring being used. Only one wire per terminal.
- C. No annunciation circuit shall be more than 70% loaded prior to final inspections to allow addition of audible and strobe devices as may be required per local Fire Marshal.
- D. All wiring shall be checked for shorts, grounds, and opens prior to termination at cabinets or detector heads. The minimum resistance to ground or between any two conductors shall be ten megohms, verified in writing, with "megger" headings.
- E. Electrical contractor shall coordinate with mechanical contractor as required to extend HVAC shut-down interlock wiring to unit controller as required. Final connection at HVAC controller shall be by mechanical contractor/controls contractor.
- F. Coordinate with the elevator for elevator recall wiring. Electrical contractor to extend wiring to unit controllers. Final connection to controllers shall be by elevator contractor.
- G. Coordinate with the security/access control vendor for mag-lock interlock wiring. Electrical contractor to extend wiring to unit controllers. Final connection to controllers shall be by access control contractor.
- H. Within the apartment units, detectors shall be installed in accordance with manufacturer's written recommendations.

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