

SECTION 28 31 00 FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Fire alarm and smoke detection system.

1.02 REFERENCES:

- A. NFPA 13: Standard for the Installation of Sprinkler Systems.
- B. NFPA 13A: Recommended Practice for the Inspection, Testing and Maintenance of Sprinkler Systems.
- C. NFPA 70: National Electrical Code
- D. NFPA 72: Installation, Maintenance, and Use of Local Protective Signaling System.
- E. NFPA 72E: Automatic Fire Detectors.
- F. NFPA 72G: Notification Appliances for Protective Signaling Systems.
- G. NFPA 72H: Guide for Testing Procedure for Local, Auxiliary, Remote Station and Proprietary Protective Signaling Systems.
- H. NFPA 90: Standard for the Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 101: Life Safety Code.

1.03 REGULATORY REQUIREMENTS:

- A. Systems: UL and FM listed.
- B. Conform to requirements of NFPA.
- C. Conform to requirements of Standard Building Code.
- D. Conform to requirements of American's with Disabilities Act - ADA.

1.04 SYSTEM REQUIREMENTS:

- A. The new devices, booster panel(s), etc. to match the existing campus system. All equipment and devices to be 100% compatible with the existing FACP. Where applicable, the system shall include, but not be limited to the following elements.
 - 1. Master system CPU including all fire detection.
 - 2. Circuit interface panels including all modules.
 - 3. Power supplies, batteries and battery chargers.
 - 4. Equipment enclosures.

5. Intelligent addressable manual pull stations, heat detectors, analog smoke detectors, alarm monitoring modules, and supervised control modules.
6. Annunciator panels, printers and video display terminals.
7. Audible and visual evacuation signals (equipped with voice evacuation technology).
8. Color graphic displays and historical archiving.
9. Software and firmware as required to provide a complete functioning system.
10. Wiring and raceway.
11. Installation, testing and certification and education labor.
12. Multipliex, system driven remote annunciator.

1.05 SYSTEM FUNCTION:

- A. The system shall be a complete, electrically supervised multiplex style fire detection and audio/visual evacuation system with intelligent analog alarm initiation, to be device addressable and annunciated as described and shown on the Drawings.
- B. The system shall support intelligent analog smoke detection, conventional smoke detection, manual station, water flow, supervisory, security, and status monitoring devices. The system shall also support audio/visual circuits.
- C. The panel shall be UL listed as a test instrument for the measurement of the sensitivity of connected intelligent analog ionization and photoelectric smoke detectors to comply with the testing requirements of NFPA 72E.
- D. The system shall annunciate a trouble condition when any smoke detector approaches 80% of its alarm threshold due to gradual contamination, signaling the need for service and eliminating unwanted alarms.
- E. Any intelligent analog smoke detector or conventional smoke detector zone shall include a selectable alarm verification capability. This feature shall provide automatic verification capability. This feature shall provide automatic verification of smoke detector alarms as described by NFPA 72E.
- F. The system shall recognize initiating of an alarm and indicate the alarm condition in a degrade mode of operation, in the event of processor failure or the loss of system communications to the circuit interface panels.
- G. The system shall provide a one person field test of either the complete system or a specified area, maintaining full function of areas not under test.
- H. The system shall be provided with eight levels of password protection with up to forty passwords.
- I. The system shall be programmed in the field via a laptop computer. All programmed information shall be stored in nonvolatile memory after downloading into the control panel. No special programming terminal or prom burning shall be required and the system shall continue in service during reprogramming. Systems requiring on line programming or not capable of mass uploading of software for offsite documentation or editing will not be considered acceptable.
- J. The system shall consist of central architecture using a single centrally located control unit. The system also shall be operable in a distributed multiplex architecture using a centrally located control unit with interconnection to remote circuit interface panels containing any combination of plug in intelligent analog signalling circuits, plug in conventional initiating device circuits and plug in relays.

- K. The system shall support a UL listed supervised printer.
- L. The system as installed shall be expandable to its predetermined maximum capacity of 3,000 initiation devices and/or 2,000 combined zones of audio/visual devices.

1.06 SYSTEM OPERATION:

- A. Activation of any fire alarm initiating device shall cause the following actions and indications:
 - 1. Display a custom message describing the device originating the alarm condition, at the fire alarm control panel LCD alpha numeric display. Remote LCD annunciators shall display the alarm condition via unique messages as required by the system Owner. LED type annunciator displays conventional and graphic style shall indicate alarm zoning as specified.
 - 2. Sound the audio/voice circuits, and activate the visual signals.
 - 3. Shut down all air handling units within the smoke zone of alarm origin.
 - 4. Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user, via a dialer provided under this Section. THIS OPTION REQUIRED IF EXISTING SYSTEM IS NOT EQUIPPED TO PROVIDE THIS OPTION.
 - 5. Close all smoke doors and smoke dampers (if any present in facility) shown on the Drawings to prevent the spread of smoke.
 - 6. Record within the non-volatile system historical memory the occurrence of the event, the time and date of occurrence and the device initiating the event.
- B. WHERE APPLICABLE... Activation of any smoke detector or two cross zoned smoke detectors in a single elevator lobby or an elevator equipment room shall, besides the actions described above, cause the recall of that bank of elevators to the eriminal floor and the lockout of controls. In the event of recall initiation by a detector in the first floor lobby, the recall shall be to the alternate floor.
- C. Activation of any detector in an elevator hoistway or machine room shall cause the capture of that bank of elevators per local requirements, upon completion of these actions, activate the sprinkler system pre-action release panel.
- D. Activation of any supervisory circuit, shall cause the following actions and indications:
 - 1. Display the origin of the supervisory condition report at the alarm control panel alphanumeric LCD display.
 - 2. Activate supervisory audible and visual signals as indicated on the Drawings.
 - 3. Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user.
 - 4. Record the occurrence of the event, the time of occurrence and the device initiating the event.
- E. Receipt of a trouble report (primary power loss, open or grounded initiating or signalling circuit wiring, open, grounded or shorted indication system wiring, device communication failure, battery disconnect) at the fire alarm control panel shall cause the following actions and indications:
 - 1. Display at the alarm control panel alphanumeric LCD display, the origin of the trouble condition report.
 - 2. Activate trouble audible and visual signals at the control panel and as indicated on the Drawings.

3. Furnish an alarm system closure for connection to an off site reporting device as contracted for by the system user, via a Dialer furnished under this Section.
4. Record the occurrence of the event, the time of occurrence and the device initiating the event.

1.07 SYSTEM ZONING:

- A. Each intelligent addressable device or conventional zone on the system shall be displayed at the fire alarm control panel by a unique alpha numeric label identifying its location.

1.08 QUALIFICATIONS:

- A. Manufacturer: Company specializing in smoke detection and fire alarm systems with five years experience and an office within 125 miles of job site.
- B. Installer: Company specializing in smoke detection and fire alarm system with three years experience.

1.09 SUBMITTALS:

- A. Submit shop Drawings and products data.
- B. Provide wiring diagrams, data sheets, and equipment ratings, layout, dimensions, and finishes. Include location of end-of-line devices.
- C. Submit manufacturer's installation instructions.

1.10 OPERATION AND MAINTENANCE DATA:

- A. Submit as-built Drawings indicating location of all devices, wiring, and end-of-line devices.
- B. Include operating instructions, and maintenance and repair procedures.
- C. Include manufacturer representative's letter stating that system is operational, and install in accordance with NFPA 72A, 72B, 72E, 72G and 101 and tested in accordance with NFPA 72H.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

- A. Where new fire alarm systems are required, acceptable manufacturers are: Pyrotronics, Simplex, EST, Gamewell, Notifier, and FCI (Fire Control Instruments)

2.02 FIRE ALARM CONTROL PANEL:

- A. The control panel shall be modular in construction and shall include, but not limited to; the hardware, software and firmware required to perform system functions.
- B. The control panel shall be housed within a code gage steel enclosure flush wall mounted.
- C. System power supplies shall be housed within the enclosure. Primary power supply shall be from the building distribution system. Secondary power shall be provided by internal sealed gelled electrolyte batteries with capability to operate the system for eight (8) hours.
- D. The panel shall provide a system for maintaining a historical event record.

2.03 FIRE ALARM INITIATING DEVICES:

- A. Smoke Detector, Intelligent Ionization: The detector shall be addressable, dual chamber, self compensating for ambient temperature and humidity. Detectors shall be suitable for two wire operation.
- B. Smoke Detector, Intelligent Photoelectric: The detector shall be addressable, self compensating for ambient temperature and humidity with integral self, restoring 135 degree heat detector. Detectors shall be suitable for two wire operation.
- C. Smoke Detector, Intelligent Duct Type: The detector shall be addressable, self compensating for ambient temperature and humidity, ionization or photoelectric type as application requires.
- D. Smoke Detector, Projected Beam: The detector shall consist of an infrared light beam transmitter and a light receiver. The detector shall be self compensating for ambient and temperature changes.
- E. Thermal Detector, Intelligent: The detectors shall be addressable, rate compensated rated at 135 degrees or 200 degrees Fahrenheit. Detectors shall be suitable for two wire operation.
- F. Manual Pull Station, Intelligent: The pull station shall be addressable single station type. Pull stations shall be flush wall mounted.

2.04 ZONE AND INTERFACE MODULES:

- A. Remote Conventional Zone Module: Provide, for integration of compatible 2 wire and shorting style contact devices into the analog signaling circuit.
- B. Intelligent System Interface Module: Furnish and install, for the monitoring of contact type initiation devices and for the control of electrical devices where required.
- C. Intelligent Supervised Control Module: Furnish and install for the control of supervised relays, contractors, audible signal circuits, visual signal circuits, distributed speaker circuits and two way fire fighters communication circuits.

2.05 EVACUATION/SIGNALLING DEVICES:

- A. Evacuation Horn(Speaker)/Strobe. Provide audible horns with strobe as indicated on the Drawings. Integral strobe shall be flashing, polarized type with polycarbonate lens producing 8000 peak candlepower at one flash per second.
- B. Evacuation Strobe: Provide visual evacuation strobes at locations indicated on the Drawings. Strobes shall be flush wall mounted, flashing, polarized type with polycarbonate lens producing 8000 peak candlepower at one flash per second.

2.06 FIRE ALARM WIRE AND CABLE:

- A. Fire Alarm Power Circuits: Building wire as specified in Section 16300. Minimum size conductors shall be 12 AWG.
- B. Fire Alarm Loop Circuits: Analog loop circuits shall be 18 AWG twisted pair.
- C. Fire Alarm Speaker Circuits: Speaker circuits shall be 18 AWG twisted pair.
- D. Fire Alarm Initiating and Strobe Circuits: Circuits shall be minimum 14 AWG building wire as specified in Section 16300.

- 2.07 DIALER: Provide dialer for off site notification where required locally. Verify if existing system is equipped with the local requirement.

PART 3 EXECUTION

3.01 INSTALLATION:

- A. Install system in accordance with manufacturer's instructions.
- B. Install manual station with operating handle 48 inches above floor. Install audible and visual devices 80 inches above floor or as indicated.
- C. Install cables and wiring in conduit.
- D. Mount end-of-line device in control panel or in box with last device or separate box adjacent to last device in circuit.
- E. Make conduit and wiring connections to sprinkler flow switches, sprinkler valve tamper switches, duct smoke detectors, HVAC shutdown equipment, and elevator control equipment.
- F. Automatic Detector Installation: NFPA 72E.
- G. Provide surge suppression for all wiring of the fire alarm system.

3.02 FIELD QUALITY CONTROL:

- A. Field inspection and testing will be performed.
- B. Test in accordance with NFPA 72H and local fire department requirements.

3.03 MANUFACTURER'S FIELD SERVICES:

- A. Provide manufacturer's field services as required for installation.
- B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.
- C. Instruct Owner in operation and function of the system.

END OF SECTION 283100