

SECTION 13850  
FIRE ALARM SYSTEMS

1 GENERAL

1.1 SECTION INCLUDES

- A. Fire alarm control panels.
- B. Manual fire alarm stations.
- C. Automatic smoke and heat detectors.
- D. Fire alarm signaling appliances.
- E. Auxiliary fire alarm equipment.

1.2 RELATED SECTIONS

- A. Section 08710 - Door Hardware.
- B. Section 08360 - Sectional Overhead Doors.
- C. Section 13930 - Wet-Pipe Fire Suppression Sprinklers.
- D. Section 13935 - Dry-Pipe Fire Suppression Sprinklers.
- E. Section 13940 - Pre-Action Fire Suppression Sprinklers.
- F. Section 13945 - Combination Dry-Pipe and Pre-Action Fire Suppression Sprinklers.
- G. Section 13950 - Deluge Fire Suppression Sprinklers.
- H. Section 13960 - Carbon Dioxide Fire Extinguishing Systems.
- I. Section 13965 - Alternative Fire Extinguishing Systems.
- J. Section 15910 - Ductwork Accessories: Smoke Dampers.
- K. Section 16123 - Building Wire and Cable.

1.3 REFERENCES

- A. Underwriters Laboratories Standard Number 864.
- B. NFPA 70 - National Electrical Code.
- C. NFPA 72 - National Fire Alarm Code.
- D. NFPA 101 - Life Safety Code.
- E. American National Standards Institute Number 3.4.1.

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1.4 SYSTEM DESCRIPTION

- A. The fire alarm system shall be a micro-processor based control system suitable for use as a local fire alarm system, remote station service, proprietary service, and central station service using automatic and manual initiating devices.
- B. The system shall provide an 80-character backlit LCD display to indicate all information associated with the Fire Alarm condition, including type of alarm and location within the protected premise.
- C. The system shall provide a non-volatile history buffer to log the time and date of each occurrence. The history buffer shall contain at least 600 events to log all potential alarms without losing any alarm initiations.
- D. The system shall activate all control functions within six seconds after receipt of alarm condition.
- E. All components shall be U.L. Listed for the intended application, certified by the manufacturer as compatible with the system, and supplied by the same manufacturer..
- F. All components furnished shall be guaranteed against defect in design, material and workmanship for a period no less than three years (36 months) from system registration with the manufacturer.

1.5 SUBMITTALS

- A. General
  - (1) Submit under the provisions of Section 01300.
  - (2) All references to manufacturer's model numbers and other pertinent information herein are intended to establish minimum standards of performance, function and quality. Equivalent equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
  - (3) For equipment other than specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance and quality of the specified equipment.

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B. Manufacturer's Product Data Sheets.

(1) Material and equipment information shall include manufacturer's catalog data sheets and any pertinent technical data for each component or device used on the system. This shall include the following:

- (a) Control panel
- (b) Analog addressable smoke and heat sensors
- (c) Addressable contact monitoring devices
- (d) Addressable relays
- (e) Addressable supervised output modules
- (e) LCD, LED, and/or Graphic Annunciators

C Shop Drawings

- (1) Sufficient information, clearly presented, shall be included to determine compliance
- (2) Include manufacturer's name, model numbers, ratings, power requirements, equipment layout, device arrangement, complete point-to-point wiring diagrams and conduit layout.
- (3) Complete sequence of operation for all control functions provided by the fire alarm control panel.

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(4) Show annunciator layout, configuration and terminations.

D. Manufacturer's Installation Instructions

(1) Submit simultaneously with shop drawings, complete operating and maintenance manual.

(2) Indicate application conditions and limitations of use stipulated by product testing agency

#### 1.6 PROJECT RECORD DOCUMENTS

A. Submit under the provisions of Section 01700.

B. Record actual locations of all initiating devices, signaling appliance, end-of-line devices.

C. Record actual wiring terminations.

#### 1.7 OPERATION AND MAINTENANCE DATA

A. Submit under the provisions of Section 01700.

B. Operating instructions shall be provided.

C. Maintenance procedures shall be provided.

#### 1.8 QUALIFICATIONS

A. Manufacturer:

(1) Company specializing in manufacturing the products specified in this section for at least five years.

(2) The name of the manufacturer, part numbers and serial number shall appear on all major components.

(3) All devices, components and equipment shall be obtained from a single manufacturer.

(4) All devices, components and equipment shall be new and standard products of the manufacturer's latest design, suitable to perform the functions intended.

B. Installation Firm:

(1) The system shall be installed by an experienced firm regularly engaged in the installation of systems similar to those specified in this section. The firm or principles shall have a minimum of five (5) years experience in design, installation, testing and service of fire detection and signaling systems.

(2) The installer shall be trained and certified by the manufacturer to design, install, test and service the fire detection and signaling system provided under this section.

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- (3) The installation firm shall employ a NICET certified fire alarm system designer, level 2 or above, who will be responsible for this project.
- (4) The installation firm shall show evidence of a minimum \$2,000,000 liability and completed operations insurance policy. These limits shall supersede limits required elsewhere in this specification.
- (5) The installation firm shall provide proof of emergency service available 24 hours a day, seven days a week.
- (6) The installation firm shall provide proof of having obtained any and all licenses and permits required by the jurisdiction where the system is to be installed.

#### 1.9 REGULATORY REQUIREMENTS

- A. System shall conform to the requirements of NFPA 70, NFPA 72 and NFPA 101.
- B. Furnish products listed and classified by Underwriter's Laboratory Inc. as suitable for the purpose specified and indicated.
- C. System shall conform to the requirement acceptable to the authority having jurisdiction.

#### 1.10 MAINTENANCE SERVICE

- A. Offer a service and maintenance agreement on of the fire detection and signaling system for a period of five years from the Date of Substantial Completion.
- B. All labor and material required to maintain the system shall be included in this contract. Any perishable item supplied, such as batteries shall be exempt from this requirement if indicated in the submittal documents.

## 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. SafeTech International, Inc., Lenexa, Kansas, USA.

### 2.2 CONDUIT AND WIRE

- A. Conduit, if required
  - (1) Conduit shall be installed in accordance with the National Electric Code, NFPA 70.
  - (2) All wiring shall be installed in a conduit or raceway. Conduit fill shall not exceed 40 percent of the interior cross sectional area where three or more cables are included within a single conduit.
  - (3) Cables must be separated from any open conductors of Class 1 circuits and shall not be placed in any conduit, junction box or raceway containing Class 1 cables.
  - (4) Wiring for low voltage control, alarm notification, emergency communication and similar

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power-limited auxiliary functions may be installed in the same conduit as initiating and signaling line circuits. The system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

(5) Conduits shall not enter the control panel or any other component provided except where entry is specified by the manufacturer.

(6) Conduit shall be ¾-inch minimum.

#### B. Wire

(1) All fire alarm system wiring shall be new.

(2) Wiring shall comply with local, state and national codes and as recommended by the manufacturer. Number and size of conductors shall be as recommended by the manufacturer, but shall be not less than 18 AWG for initiating device and signaling line circuits, and 14 AWG for notification appliance circuits.

(3) All wiring and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

(4) All field wiring shall be supervised for open circuits, short circuits and grounded conditions.

C. The control panel shall be connected to a separate dedicated branch circuit with a separate dedicated disconnect switch. This circuit shall be labeled FIRE ALARM.

### 2.3 MAIN FIRE ALARM CONTROL PANEL (FACP)

A. The FACP shall be a Series 3000 fire alarm and signaling system manufactured by SafeTech International, Inc., Lenexa, Kansas, USA. The FACP shall be a micro-processor based system capable of communicating with the following types of peripherals and accessories: analog smoke sensors, analog thermal sensors, addressable contact monitoring modules, addressable supervised output modules, addressable relay modules, conventional initiating zone modules, ADA power boosters, and remote annunciators. The system shall include a built-in RS-485 network bus with no requirement to add hardware or software upgrades.

#### B. System Capacity and General Operation

(1) The system shall be capable of communicating and controlling up to 1512 addressable analog sensors and addressable modules; and up to 120 conventional initiation zones. The system shall support up to 199 output groups for configuring initiating devices to output functions.

(2) The system shall respond to an alarm-initiating device, including analog smoke sensors within 6 seconds for a fully loaded system (1512 devices). Response times shall be measured from the activation of the initiating device to the activation of the associated notification appliance circuit.

(4) The system shall provide an Alarm and Trouble Form-C Relay contact rated at a minimum of 5.0 amps @ 28VDC.

(5) The system shall allow addition of up to 20 individually mappable system relays in the

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main FACP enclosure, or remotely on the RS-485 communications loop.

(4) The system shall provide four configurable output circuits. Each output shall be configurable as a coded reverse-polarity notification appliance circuit or a 24 VDC auxiliary power output. Each circuit shall be rated for 2.75 amps @ 24 VDC. Each NAC shall be capable of Style Y or Z wiring.

(5) The FACP shall include a full-featured operator interface control and annunciation panel that shall include an 80 character LCD display; individual color-coded system status LED's and an alpha numeric keypad for field programming of the fire alarm system.

(6) All programming or editing of the existing configuration program in the system shall not require use of special equipment, such as a laptop personal computer. Access to the configuration program shall be limited by use of a password security system. Two levels of access shall be used to isolate user and maintenance/configuration operating portions of the system, and a factory level security code is available to allow certain high-end functionality.

(7) The FACP shall provide the following features:

- (a) Drift compensation for analog sensors.
- (b) Sensitivity test in accordance with NFPA 72 requirements.
- (c) Maintenance alerts for sensors with excessive accumulations of dust or dirt.
- (d) Service alerts for sensors outside the drift compensation range.
- (d) Alarm verification by point on SLC's.
- (e) At least 4 distinct Day/Night automatic smoke sensor sensitivity adjustments.
- (f) One man walk test with optional notification appliance testing.
- (g) 600-event history buffer.

#### C. Distributed Processing - Central Microprocessor

(1) The system should employ a system of distributed processing, to increase system reliability. Each subassembly mounted remotely from the main control system shall include a microprocessor and be supervised by the central microprocessor. The central microprocessor shall monitor, communicate to, and control and monitor all external devices. All custom operating parameters for the system shall be stored in non-volatile memory to prevent loss during power outages. A real time clock shall be provided to denote actual time of occurrence of system events for the display, history buffers and external reporting devices.

(2) It shall be possible to remotely mount SLC modules, conventional initiating inputs, remote annunciators, reverse polarity/city box tie modules, relays, all communicating via the built-in RS-485 communications bus standard on the main FACP.

(3) The system shall allow monitoring of up to 24 conventional 20-zone control systems over RS-485 communications loop. Each conventional zone of the remotely located panels

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will be monitored as one of the 1512 points, providing capacity for mapping to output groups on the main FACP and 40-character customer labels for each zone. The remote panels monitored by the host FACP will operate independently in the event of a communication error.

#### D. DISPLAY

- (1) An 80-character backlit LCD display shall annunciate system conditions and program system operating parameters.
- (2) Nine status LED's; AC Power, Fire Alarm, Pre-Alarm Warning, Supervisory, Trouble, Alarm Silence, Supervisory Silence, Trouble Silence, Offline, and Test Mode shall be provided.
- (3) The display unit shall provide a 16 keypad with tactile feel membrane switches that provide operational feedback. Keys shall be dedicated to System Reset, Alarm Silence, Drill, Program Mode, System Status, System Test, and Print Mode. The keypad shall be used to provide all control and programming functions for the system. Programmable Function Keys shall allow control of up to 5 output groups from the panel front.

#### E. Signaling Line Circuits (SLC)

- (1) Each SLC shall provide power and communication with up to 126 analog or addressable devices. The basic system shall consist of two (2) SLCs (252 devices total) with expansion to twelve (12) SLCs (1512 devices total). Each SLC shall be capable of meeting the wiring requirements of NFPA 72, Style 4, 6 or 7. The panel shall provide the ability to remotely mount the SLC loops up to 6,000 feet from the main control system in a UL 864 listed enclosure.
- (2) Each SLC shall communicate to resident devices using a completely digital communication method to provide a more reliable, noise immune communication system. All communication between an addressable device or sensor shall use a validation method, such as providing parity checking for each message, to validate the integrity of each message. Systems that use a hybrid analog and digital communication scheme will not meet the requirements of this section.
- (3) Each SLC shall be capable of communication over standard wire (no twisted pair required).
- (4) The system shall meet the requirements of NFPA 72 as a calibrated smoke sensitivity fixture.

#### F. Enclosures

- (1) The system shall be housed in a small footprint enclosure with dimensions not to exceed 25.5" X 14.5" X 4.0".
- (2) The enclosure shall be capable of surface or semi-flush mounting without requiring additional hardware.
- (3) The enclosure shall be painted red with a corrosion protective, harden finish.

#### G. Power Supplies

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- (1) The power supply shall operate upon either 120 VAC or 240 VAC, 50/60 Hertz and shall provide all power necessary to operate the control system.
- (2) The power supply shall provide at least 5.75 amps of power for use on notification appliance circuits or auxiliary power circuits.
- (3) Each power supply shall provide battery charger capacity to sufficiently recharge a depleted set of up to 60 AH batteries in a remote enclosure within 48 hours.
- (4) Additional power will be available from a UL listed 24VDC-power supply, the IPB-3.

#### H. Field Programming

- (1) The system shall be programmable from the control panel without requiring use of personal computer.
- (2) All programming shall be accomplished via the standard 16 keypad or a Windows 95 or later compatible version of programming software.
- (3) Two levels of password access shall be provided to prevent unauthorized modifications to the system operating configuration. Within each access level, up to 16 unique users can be assigned. The history buffer will record the user for each action taken requiring a password.
- (6) An Auto-Program shall be provided to identify changes in the installed system with the system configuration. The Auto-Program shall also provide a means to program groups of devices with the same operating characteristics to minimize configuration times and errors.
- (7) A validation program shall prevent any input point from being unassociated with an output group and any output group from being linked

#### I. Configuration Software

#### J. Configurable System Operations

### 2.4 SYSTEM COMPONENTS

#### A. Analog Photo Sensors

- (1) Each sensor shall have the sensor address stored in a coding card located in the sensor base that is read by the switches in the sensor head.
- (2) Each sensor shall have an alarm LED for viewing. The alarm LED shall be programmed to flash or remain off when communicating with the control panel. The alarm LED will illuminate steady during alarm conditions.
- (3) Each sensor shall be capable of compensating for dust and dirt accumulation within the sensing chamber.

#### B. Analog Ionization Sensors

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- (1) Each sensor shall have the sensor address stored in a coding card located in the sensor base that is read by the switches in the sensor head.
- (2) Each sensor shall have an alarm LED for viewing. The alarm LED shall be programmed to flash or remain off when communicating with the control panel. The alarm LED will illuminate steady during alarm conditions.
- (3) Each sensor shall be capable of compensating for dust and dirt accumulation within the sensing chamber.

#### C. Analog Thermal Sensors

- (1) Each sensor shall store the sensor address and operating characteristics in non-volatile memory at the sensor. The sensor shall use a threshold received from the control unit to determine when an alarm condition exists.
- (2) Each sensor shall have an alarm LED for viewing. The alarm LED shall be programmed to flash or remain off when communicating with the control panel. The alarm LED will illuminate steady during alarm conditions.
- (3) Sensitivity settings for thermal sensors shall be set and displayed on the LCD in degrees Celsius. The set point for the thermal sensor shall be adjustable between 40°C and 90°C (104°F and 190°F). The thermal sensor shall operate on a fixed temperature principle, or be established as a rate of rise sensor.

#### D. Priority Response Contact Monitor Module

- (1) Contact modules shall provide monitoring of dry contacts as initiating devices.
- (2) The Priority Response contact module shall initiate communication on a priority-interrupt basis to the control to report an alarm independent of polling from the main control.
- (3) Each module shall store the module address at the module.
- (4) The module shall be mounted to a standard junction box and provide visual indication of status via a status LED. Optional mounting shall be available to allowing mounting the module in a junction box with a monitored contact.

#### E. Sounder Control Module

- (1) Each Sounder Control Module shall be rated to operate listed notification appliances or audio outputs (speakers).
- (2) Each module shall store the module address at the module.
- (3) Each module shall be individually selectable for silencing and walktest. A module programmed to operate during walktest will initiate the programmed pattern for 2 seconds when the appropriate initiating conditions are satisfied.

#### G. Switch Monitor Input/Output Module

- (1) This multiple-purpose module may provide one independently operating and configurable

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relay or an input module with associated relay that

- (2) Each relay shall be rated for 1.0 amps @ 24 VDC.
- (3) Each module shall store the device address at the module.
- (4) The module shall operate the relay without requiring a separate power source.

2.5 NOTIFICATION APPLIANCES

A. Strobes

- (1) All strobes shall meet the requirements of NFPA/ANSI standards and ADA Accessibility Guidelines.

B. Horns

C. Horn/Strobes

D. Bells

3 EXECUTION

3.1 INSTALLATION

3.2 CERTIFICATION TESTING

3.3 SYSTEM TRAINING

