

## SECTION 16721

### FIRE ALARM SYSTEMS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. The general provisions of the contract including General and Special Conditions and General Requirements shall apply to all work under this Section.

##### 1.2 DESCRIPTION OF WORK

- A. Furnish all labor, material and equipment necessary for a complete and operational fire alarm system. Perform an acceptance test and make adjustments as required by the Authorities Having Jurisdiction.

##### 1.3 RELATED WORK IN OTHER SECTIONS

- A. Related work in other sections:
  - 1. Electrical General Provisions                      Section 16010
  - 2. Raceways and Boxes                                Section 16110
  - 3. Wire and Cable                                        Section 16120
  - 4. Electrical Identification                            Section 16195
  - 5. Grounding    Section 16450

##### 1.4 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. National Fire Alarm Code (NFPA 72)
  - 2. International Building Code
  - 3. International Fire Code
  - 4. American National Standard Institute
  - 5. National Electrical Manufacturers Association
  - 6. Underwriters Laboratories
  - 7. Applicable National Fire Protection Association Standards

##### 1.5 QUALIFICATIONS

- A. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

##### 1.6 SUBMITTALS

- A. Submit prior to ordering equipment:
  - 1. Wiring diagrams showing connections between all system components.
  - 2. Description of system operation.
  - 3. Annunciator schedule showing titles for each fire alarm and supervisory zone.
  - 4. Manufacturer's literature marked to show model and catalog number for all equipment.
  - 5. Manufacturer's installation instructions, operations and maintenance instructions.
  - 6. A complete layout of the entire system including conduit routing, conduit sizes, wire sizes and types.

7. Provide a color code schedule for wiring.
  8. Battery sizing calculations indicating circuit loading and power supply loading. Voltage drop calculations shall be submitted for all notification appliance circuits exceeding 1.5 Amps or 300' length.
  9. Submittals shall be as a complete set. Partial submittal will not be acceptable.
  10. Drawings shall not be on less than 8-1/2 by 11 inch sheets and shall identify all symbols used.
- B. Submit prior to building occupancy
1. Contractor shall submit, upon completion of system verification, a point-by-point check list indicating the date and time of each item inspected and issue a Record of Completion confirming that the inspection has been completed and the system is installed and functioning in accordance with the specifications.
- 1.7 RECORD DOCUMENTS, OPERATIONS AND MAINTENANCE MANUALS
- A. Complete record documents before scheduling acceptance test. Record documents shall include all information required by the above SUBMITTALS section.
- 1.8 GUARANTEE
- A. All equipment and systems shall be guaranteed for a period of one year following acceptance of the system by the Owner.

## **PART 2 - PRODUCTS**

### 2.1 GENERAL

- A. Any equipment proposed as equal to that herein specified must be proven by the Contractor. Submit to the Engineer: the manufacturer's name, model numbers of substitute equipment and materials, engineering data sheets, and a list of ten (10) installations of similar equipment which have been satisfactorily installed and in continuous operation on a user's premises over a period of three (3) years. See section 16010 for additional substitution request requirements.

### 2.2 INTELLIGENT/ADDRESSABLE CONTROL PANELS

- A. Provide intelligent analog addressable control panels unless otherwise indicated on the drawings.
- B. One signaling line circuit (SLC) system:
1. Fire alarm control panel shall be intelligent analog addressable control panel with the following features and options:
    - a) 318 intelligent/addressable device capacity (159 detectors and 159 monitor/control modules). Style 4, 6 or 7 as indicated on the drawings.
    - b) The Notification Appliance Circuits shall be programmable to synchronize with System Sensor, Gentex and Wheelock Notification Appliances.
    - c) The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
    - d) Auto detector test.
    - e) Maintenance alert.
    - f) Dead front panel.
    - g) Digital Communicator when telephone connection is indicated on drawings.
  2. Notifier model NFS-320.
- C. Two signaling line circuit (SLC) system:

1. Fire alarm control panel shall be intelligent analog addressable control panel with the following features and options:
  - a) Overall 636 intelligent points (159 detectors/159 modules per SLC) Style 4, 6 or 7 as indicated on the drawings.
  - b) Auto detector test.
  - c) Maintenance alert.
  - d) Dead front panel.
  - e) Digital Communicator when telephone connection is indicated on drawings.
2. Notifier model NFS-640.

## 2.3 INTELLIGENT/ADDRESSABLE INITIATING DEVICES

- A. Provide intelligent/addressable initiating devices compatible with intelligent/addressable control panels when intelligent/addressable control panels are specified on the drawings.
- B. Pull Stations
  1. Manual pull stations shall be non-code, non-break-glass, double action type.
  2. Individually addressed.
  3. Notifier model NBG-12LX
- C. Smoke Detectors
  1. Smoke detector shall be photoelectric type. Detector shall be analog addressable low-profile and shall have an LED, which will blink when polled by the control panel and turn steady red on alarm.
  2. Notifier model FSP-851
- D. Duct Smoke Detectors
  1. Smoke detector shall be photoelectric type. The detector housing shall be UL listed per UL 268A specifically for use in air-handling systems. The detector shall operate at air velocities of 100 to 4,000 feet per minute (0.5 to 20.32 meters per second). The duct detector housing shall incorporate an airtight smoke chamber in compliance with UL 268A, Standard for Smoke Detectors for Duct Applications. The housing shall be capable of mounting to either rectangular or round ducts without adapter brackets. An integral filter system shall be included to reduce dust and residue effects on detector and housing, thereby reducing maintenance and servicing. Sampling tubes shall either be telescoping or be easily installed after the housing is mounted to the duct by passing through the duct housing.
    - a) Operating temperature range: 32°F to 131°F (0°C to 55°C).
    - b) Operating humidity range: 10% to 93% relative humidity.
    - c) Air duct velocity range: 100 to 4,000 ft/min (0.5 to 20.32 m/s).
  2. Notifier model FSD-751PL.
- E. Heat Detectors
  1. Heat detectors shall be combination rate-of-rise and fixed temperature. Fixed temperature setpoint shall be 135 F. High temperature areas shall be 190 F setpoint.
  2. UL approved for 50' spacing.
  3. Notifier model FST-851R

## 2.4 HORNS

- A. Horns shall be an electronic sounder type and operate at 24 VDC. Sounder shall be listed to Underwriter's Laboratories Standard 464 for fire protection signaling systems. Sounder shall have eight tone options, selected by means of clip(s).
- B. System Sensor Model MA12/24D

## 2.5 STROBES

- A. Strobe shall listed to UL 1971 Standard for the Hearing Impaired and shall be approved for Fire Protective Service. Strobe shall be wired as a Primary Signaling Notification appliance. Strobe shall also comply with the Americans with Disabilities Act requirements for visible signaling appliances. Strobe shall operate on 24 VDC from a regulated DC supply or full-wave rectified, unfiltered supply. The signaling strobe shall be powered independently from the horn. Strobe shall have no measurable inrush current in excess of operating peak current. The strobe light shall consist of a Xenon flash tube and associated lens/reflector system. Each strobe shall be designed for one flash per second with continuously applied minimum voltage. All strobes shall be capable of mounting to a standard 4" (101.6 mm) x 4" (101.6 mm) x 1-1/2" (38.1 mm) backbox and shall be semiflush-mount with separate mounting plate. Provide minimum candela ratings (per UL 1971) as indicated on the drawings.
- B. System Sensor Models, average current requirement, and Candela rating
  - 1. Model SS2415ADA      75 mA              15 Cd
  - 2. Model SS2475ADA      170mA              75 Cd
  - 3. Model SS24110ADA      210mA              110Cd

## 2.6 HORN/STROBES

- A. Above specified horn, combined with above specified strobe.
- B. System Sensor Models, average current requirement, and Candela rating
  - 1. Model MASS2415ADA      120mA              15 Cd
  - 2. Model MASS2475ADA      215mA              75 Cd
  - 3. Model MASS24110ADA      255mA              110Cd

## 2.7 FIRE ALARM CABLE

- A. Initiating circuits shall be 2 conductor #18 type FPL cable. West Penn Wire # 975
- B. Signaling line circuits shall be 2 conductor shielded type FPL data cable.
  - 1. #18, West Penn Wire # D975
  - 2. #16, West Penn Wire # D991
- C. Notification circuits shall be 2 conductor type FPL cable minimum size #14 AWG. West Penn Wire # 995. Provide larger size if required by circuit voltage drop calculations. Where installed in conduit, THHN conductors may be substituted for fire alarm cable.

## PART 3 - EXECUTION

### 3.1 WIRING:

- A. All conductors shall be installed in conduit.
- B. Label wiring at all termination points.

### 3.2 DETECTOR INSTALLATION

- 1. Smoke detectors shall not be installed until after the construction clean up of all trades is final.
- 2. Any smoke detectors installed prior to the final construction clean up shall be cleaned or replaced with new detectors.

### 3.3 ACCEPTANCE TEST

- A. Prior to scheduling acceptance test, check system and perform preliminary testing to verify that the system operates correctly and is ready for an acceptance test.
- B. Perform an acceptance test in the presence of the Owner and the Fire Marshal.
- C. Test all functions of the system in accordance with the inspection, testing and maintenance requirements of the National Fire Alarm Code. Record each device and function tested.
- D. Verify accuracy of record documents.

-- End of Section --