SECTION 28 31 00

FIRE DETECTION AND ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope :
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals shown, specified and required to design, furnish, install, calibrate, test, adjust and place into satisfactory operation a fire alarm system.
   2. CONTRACTOR shall retain the services of a designer/installer regularly engaged in the installation of fire alarm systems to design and install the fire alarm system in accordance with requirements of federal, state, and local codes and standards.
   3. Permits and Inspections: CONTRACTOR shall be responsible for the following:
      a. Preparation and submission of plans for permitting to the authority having jurisdiction (AHJ).
      b. Obtaining and paying associated fees of all permits required.
      c. Arranging and coordinating inspections of the installation at the times and stages of construction required by the AHJ.
      d. Arranging and coordinating the final inspection and acceptance testing of the system by the AHJ.
      e. Obtaining the final inspection permit.
   4. The fire alarm system shall be installed in the following buildings:
      a. Administration Building.
      b. Chemical Building.

B. General:
   1. The basic design shall be that each building will have its own FACP (Fire Alarm Control Panel) that will monitor and control the detection system and the notification system for that building. The FACP located in the Admin Building shall serve as the master panel for the campus. All other FACPs and fire protection system control panels shall communicate with the master.
   2. New initiation devices and notification devices are not shown on the Drawings. Suggested locations for the FACPs are shown on the Drawings.
   3. The routing of conduits between buildings are shown on the Drawings. The FACPs shall utilize the fiber optic cabling run between buildings as the means of communication.

C. Related Sections:
   1. Division 26
   2. Division 21

1.2 QUALITY ASSURANCE

A. General:
   1. It is the intent of these Specifications to provide a complete fire alarm system that complies with the requirements of all applicable federal, state, and local codes and standards. Equipment, materials, software, installation practices, etc. that do not meet these requirements or do not meet the performance standards herein specified shall not be acceptable.
   2. All references to model numbers and other pertinent information herein is intended to establish the standards of performance, quality and appearance, and is based upon equipment already designed and manufactured.

B. Supplier:
   1. In order to insure standardization, proper interfacing and compatibility, it is required that all equipment offered under this Section shall be furnished by a single supplier. The supplier shall provide all equipment required for a proper installation and shall coordinate all design and shop drawings.
   2. All items of equipment, including wire and cable, shall be compatible.
   3. Supplier shall have and maintain an adequate service organization or service representatives located within 200 miles of the project site knowledgeable in the maintenance and installation of equipment required.

C. Reference Standards: Comply with applicable provisions and recommendations of the following except where otherwise shown or specified.
   1. National Fire Protection Association
   2. National Electrical Code.
   3. Underwriters' Laboratories.
   4. National Electrical Manufacturer Association.
   5. Factory Mutual.

1.3 SUBMITTALS

A. Shop Drawings:
   1. Manufacturer's literature, illustrations, specifications and engineering data including: general arrangement, outline drawings, dimensions, materials, size, and performance data.
   2. Fabrication, assembly, and installation drawings.
   3. Operation and maintenance data.
   4. Spare parts and maintenance materials.
   5. Design drawings and calculations prepared by designer/installer shall be submitted to ENGINEER for review and approval prior to submission to AHJ and prior to proceeding with work.

B. Delegated Design: The design calculations and design drawings for the fire alarm system shall be prepared under the direction of a Professional Engineer or Architect registered in the state where the work is located. All design drawings and the first sheet of calculations shall bear the professional's seal and signature. Jurisdiction of professional engineer's registration, registration number, and name shall be on the seal.

C. The design drawings shall be prepared in sufficient detail that all fire alarm system components are clearly defined and located.

D. The design drawings shall show the following:
   1. Complete point-to-point connection and riser diagrams clearly labeling all interconnected components, conduit and wire.
   2. Component locations superimposed on project plan drawings.

E. Field Inspections:
   1. Submit copies of the signed, approved permit forms following each inspection by the AHJ.

F. Provide Operation and Maintenance manuals as specified in Section 01730.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:
   1. Fire-Lite
   2. Approved equivalent

B. Fire Alarm Control Panel (FACP):
   1. General: The FACP shall provide power, annunciation, supervision and control for initiating devices and notification devices. The FACP shall also provide alarm and trouble reporting and interlocks to other equipment.
   2. All external circuits shall be listed as power limited circuits per Article 760 of The National Electric Code.
   3. The FACP shall be modular in construction, and contain all modules necessary to operate according to applicable codes and standards, this Section and the Drawings.
   4. Where the protected area consists of multiple buildings or a building large enough that more than one panel is required, the panels shall be interconnected or networked. One panel shall be designated as the Master Fire Alarm Control Panel (MFACP). The MFACP shall echo the alarms and trouble reports of the other panels in the system. It shall also be possible to acknowledge or reset the remote alarms from the MFACP.
   5. The FACP shall operate from a 120 Vac single phase power supply.
      a. Provide internal standby power supply.
         1) The standby power shall be capable of powering the system for 24 hours in a quiescent state and then providing at least 5 minutes of full scale alarming.
         2) Provide charger and monitoring for the standby power system
   6. The FACP shall provide supervision of system electronics, wiring, initiation devices, notification devices, and software.
      a. Failure of system hardware or wiring shall be indicated by a trouble indication on the FACP.

b. Software and processor operation shall be monitored by an independent hardware watchdog, which will indicate their failure. Each processor in the system shall have its own hardware watchdog circuitry.
c. Ground fault detection shall be provided for all system circuits.

7. The FACP shall support the following features:
   a. Support for addressable analog detectors (smoke, heat, etc.) and other addressable initiating devices.
   b. Support for addressable notification devices.
   c. Alarm verification programmable on a device-by-device basis.
   d. "Almost" dirty detector reporting.
   e. Peak value logging (by device).
   f. Automatic drift compensation of detectors.
   g. Event history: shall store alarm, supervisory and trouble information.
   h. Subsequent alarm and trouble annunciation with reminder of acknowledged or silenced conditions.
   i. One person test feature allowing one individual to test the devices in the system.
   j. The FACP shall have the ability to bypass a zone, an initiating device, or an output through programming. There shall be a separate indication to show that part of the system has been bypassed.
8. FACP user interface:
   a. Light emitting diodes (LED's) shall indicate system power, alarm, supervisory/trouble, part of system bypassed, and Test/Program mode.
   b. An LCD display shall display system messages and also allow for display of custom label information as it relates to system messages.
   c. Switches for Alarm acknowledge, Alarm silence, System reset and a System drill function.
9. FACP Enclosure:
   a. FACP enclosure shall be designed to accommodate the control unit, input and output modules, power supplies and all other components utilized in the system.
   b. Enclosure shall be suitable for surface mounting unless noted or shown otherwise on the Drawings.
   c. Enclosure shall consist of a back box and door cover assembly fabricated of sheet steel.
   d. Door cover shall be mounted with a sag resistant, steel piano hinge and fitted with a key locking arrangement.
   e. Door cover shall contain viewing slots to permit viewing of the user interface.
10. Support modules: The following modules shall be available for use as required:
    a. Relay output modules: Form "C" relays for programmable outputs such as general alarm, trouble outputs, and interlocks to HVAC and other equipment or monitoring systems.
       1) Contacts shall be rated at 120 Vac, 3 amp. The relay coil shall be supervised.
       2) Assume two outputs of each type per panel.

b. Relay input module: The module shall accept dry contact inputs from remote sources. Action taken upon receipt of contact change of state shall be programmable.
c. Networking or communications module: The module shall allow communications between multiple fire alarm control panels installed in the same facility.

C. Horn/Strobe:
1. Operates from 24 vd-c power supply.
2. Die cast metal housing.
3. Textured red enamel finish.
4. Polarized.
5. Sound output 99 dBA at 10 feet.
6. UL listed.
7. White polycarbonate lens, with red “FIRE” lettering, to protect strobe circuitry.
8. Strobe shall produce 8000 peak candlepower at approximately 1 flash per second.
9. Horn/strobes shall be of sufficient quantity and locations so that an alarm shall be clearly visible and audible to all occupants of the building(s) regardless of where occupants are at.

D. Manual Pull Station:
1. Molded polycarbonate with red matte finish. Raised molded lettering highlighted in white.
2. Alarm switch resetting requires opening front cover. Cover shall be hinged to backplate assembly and locked by allen head screw.
3. Normally open SPST switch.
4. Weather proof gasket, as required.
5. Manual Pull Stations shall be of sufficient quantity and locations to make the buildings be in conformance with applicable codes and standards.

E. Area Smoke Detectors
1. Surface Mounted:
2. Photoelectric type.
3. Listed per UL268A.
4. Contacts and Ratings: two Form C, 120 Vac, 1 ampere and 30 Vac/dc, 2 ampere; and one Form A, 30 Vac/dc, 2 ampere.
5. Provide with electrical outlet box and all mounting accessories, 120 Vac wiring kit.
6. Provide subbase and all other accessories required for a functioning detector.
7. Area Smoke Detectors shall be of sufficient quantity and locations so to make the buildings be in conformance with applicable codes and standards.

F. Duct Smoke Detectors:
1. Duct smoke detectors shall be photoelectric. Each smoke detector and its air duct housing shall be self-compensating for the effects of air velocity (from 300 to 4,000 CFM), temperature, humidity and atmospheric pressure. It shall

not be necessary to field adjust the sensitivity to compensate for the above effects. Each smoke detector shall utilize solid state components and be equipped with an alarm indicating LED which shall flash when the smoke detector is activated and shall be provided with a form "C" remote relay with contacts rated at 3 amps 120 VAC or 24 VDC. The smoke detectors address shall be set by electronic means only, no mechanical means such as dipswitches, rotary dials or by inserting programmable pins shall be used. The smoke detector mounting base shall be of the twist/lock type.

G. Remote Annunciator Station: System remote annunciator shall be located, as a minimum, within the Admin Building lobby as shown on the Drawings.

H. Fire protection system connections: Provide connection to the various flow switches, tamper switches that are part of the fire protection system. Also provide connection to the Clean Agent Control Panel for status and trouble alerts.

2.2 SPARES

A. Spare Parts:
   1. Ten percent of each type of detector. (Minimum of 1).
   2. Ten percent of each type of module in FACP (power supply, supplementary relay, input, dialer, output; minimum of one).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fire alarm system including conduit and cable in accordance with Division 26 Contract Documents, the approved Shop Drawings and the manufacturer's recommendations.

B. Division 26 Contractor shall install all conduit and cable required for the complete system, including 120 volt power requirements from local lighting panels. This Contractor shall provide pull and junction boxes as required.

C. Bond metallic conduits entering non-metallic enclosures to a ground terminal within the enclosure.

3.2 FIELD QUALITY CONTROL SERVICES

A. CONTRACTOR shall retain a qualified factory-trained serviceman to perform the following services:
   1. Inspect and adjust the equipment after installation and verify that it operates properly.
   2. Be present during inspections by the AHJ.
   3. Instruct OWNER's personnel in the operation and maintenance of the equipment.

B. Field Tests:
   1. Field testing to be supervised by a factory-trained serviceman.
   2. Verify that the entire installation has been made in accordance with the approved shop drawings, and that the fire alarm system is ready for total operation.
   3. Adjust and leave equipment in proper working order.

C. CONTRACTOR shall make available to OWNER a local service department of a duly authorized distributor of the equipment manufacturer which shall stock the manufacturer's standard parts.

D. CONTRACTOR shall provide a service and maintenance agreement. On-the-premises maintenance parts, and labor, shall be provided during normal working hours at no cost to the OWNER for a period of twelve months. Said period shall start upon OWNER's acceptance of entire fire alarm system.

3.3 TRAINING

A. Training shall be conducted by a factory qualified representative.

B. Training shall comply with requirements of Division 01.

C. User Training:
   1. Provide six hours of training to users in use and functionality of the system.
   2. Each session shall accommodate up to 20 users.
   3. Training schedule shall be submitted for approval.

+ + END OF SECTION + +