

**SECTION 230931 NATURAL GAS & CO GAS DETECTION AND ALARM**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes CO (carbon monoxide) and Methane (natural gas) monitors and notification appliances.

1.3 ACTION SUBMITTALS

A. Product Data:

- 1. For each type of monitor, include sensing range in ppm, temperature and humidity range, alarm outputs, display range, furnished specialties, installation requirements, and electric power requirement.

B. Shop Drawings:

- 1. Wiring Diagrams: Power, signal, and control wiring.
- 2. Locations of the specific sensors and alarm panel location

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gas monitoring equipment to include in emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. One calibration kit including clean air calibration gas bottle for zero calibration and specific refrigerant calibration gas for span calibration, minimum 58-L capacity, pressure regulator, and tubing.

**PART 2 - PRODUCTS**

2.1 Manufacturers: Subject to compliance with requirements, provide products by the following:

- A. Mine Safety Appliances Company (MSA).
- B. Honeywell Analytics/Vulcain.
- C. Approved Equal.

2.2 Z GARD CONTROLLER

- A. Provide a standalone CO/LEL controller as shown on the plans. The controller shall be housed in a NEMA 1 Painted steel enclosure. Operating range shall be from -20 degrees F to 122 degrees F. Units that are not capable of these temperature limits shall be provided with a method of auxiliary heat and fans as required to maintain the required ambient conditions.
- B. Controller shall accept 110 Vac, direct to the controller, internal step down transformers shall be provided to power up to the field mounted CO and LEL sensors. System shall be UL and or CSA listed to accommodate controller and step down transformer in one panel. If alternate system requires mounting of more than 1 panel the manufacturer shall include all costs required for additional field wiring to accommodate this task.
- C. The Controller shall be connected via a 4-wire field bus to remotely mounted Z Gard sensors that are automatically recognized and establishes the sensors range and gas type. The sensors shall be linked by a RS485 network communication system. The controller shall continuously monitor the sensors for excessive levels of the Specified target gases and provide the necessary notification controls in the event that the gas levels rise above the preset limits.
- D. The controller shall manage the Z Gard S sensor inputs on the RS485 Serial communications network. The controller shall provide minimum of 8 relays that can be used to start fans and open OA Louvers. Upon sensing the concentration of target gas at levels equivalent to the warning or alarm set point the relay contact(s) shall energize signaling the event.
- E. The controller shall have a programmable Off time delay function that is adjustable from 0 – 600 seconds. The warning and alarm relay shall deactivate from 0-600 seconds after the warning or alarm occurrence has abated.
- F. The controller shall have the capability of providing a full scale, 2 wire 4 to 20 ma sourcing analog output that is representative of the highest concentration level of any zone of sensors on the network. This output shall be able to communicate with the BAS system.
- G. The Controller shall have a local Readout display indicating the active Sensor Point number, the corresponding gas concentration level and gas type, Warning and Alarm indication, Zone number, number of Sensors, Voting and Diagnostic status of the system. The display will scan through all active channels in 5 second intervals. The readout display will be visible from a minimum of 5 feet and will be present always, and will not require being turned on or off.

- H. The Controller shall have an LCD Readout for the purpose of displaying the Diagnostic Status of the system and associated Sensors. The User Interface Keypad of 16 items to access the menu driven operating parameters located inside the front door of the enclosure. All setup parameters shall be accessed using the keypad.
- I. The controller shall include 4 Common LEDs to indicate Sensor Okay, Warning, Alarm and Sensor Fail status.
- J. This Controller shall include a local mounted Audible Alarm rated @ 90 dB with push-button reset switch. The pushbutton reset switch shall silence and reset the Audible Alarm when alarm points are exceeded. The Common LED visual alarms will remain on as long as any Warning or Alarm levels are exceeded. This push-button will reset latched alarms if normal gas conditions exist. A horn relay shall be included to facilitate control of a remote alarm reset pushbutton.
- K. Warning and Alarm Set Point Levels - The controller shall provide 4 relays for control of the wall mounted exhaust fans and outdoor intake louvers. Provide manual 3-hour override timers for each relay. Timers shall be labelled to the system served.
- L. The controller shall provide a normally energized Sensor Fail Relay. If a loss of communication occurs between the Controller and remote Sensor Transmitter the Sensor Fail Relay will be activated and the Sensor Okay LED located on the Controller door will turn off.
- M. All Warning, Alarm and Sensor Fail Relays shall be Form C, single pole, double throw. Contacts shall be rated for 10 Amps 1/8 HP @ 125VAC, 5 amps resistive at 250VAC or 30VDC.
- N. The contacts shall be capable of being selected normally open or normally closed.
- O. The control panel must be a MSA Z Gard CX controller or engineer approved equal by General Monitors or Mil Ram.
- P. Optional remote relay panel shall be available for remote fans operation.
- Q. BACnet interface shall be included for communications to the BMS system.

### 2.3 Z-GARD CO AND LEL SENSORS

- A. Provide as shown on the plans Carbon monoxide and LEL sensors. Sensors have been located for radius coverage and points of egress. Locations as shown on the plans shall not be modified by the manufacturer.
- B. Sensor's housing shall be NEMA 4 enclosure with plastic cover. Sensors shall utilize electro chemical technology. Accuracy of the sensors shall not be less than  $\pm 2\%$  of Full Scale with no requirement of periodic addition of reagents. Solid State Sensors shall not be acceptable.
- C. When used with the Z Gard C Controller: The RS 485 Network communication wiring from the Sensor to the Z Gard C Controller shall be a shielded 4-wire cable of sufficient gage to meet distance requirements of the Z Gard RS 485 Network Communication. The Sensor Transmitter terminal strips shall be removable for ease of wiring and accept up to 10 GA AWG wire.

- D. The Sensor electronics shall consist of dual PCB that is microprocessor-based computer-aided and factory-calibrated for the target gas compounds with compensation for ambient humidity and temperature and linearized signal output. The PCB includes all the components required to power, operate the sensor, make calibration adjustments, and set the network address jumpers when used in the Z Gard Communication network. The single PCB shall be mounted to the enclosure using industry standard hardware.
- E. CO sensors shall be located at 5' AFF.
- F. LEL sensors shall be located 12" below the roof line.

#### 2.4 MONITOR ALARM SEQUENCE

- A. The MSA Control panel will constantly Poll the CO and LEL sensors located in the Boiler Room. Upon increase in CO levels above 25 PPM or LEL levels above 10% LEL the alarm shall sound.
- B. If the CO increase above 35 PPM or the LEL increase above 35% LEL the 2nd alarm contact shall close, and the boilers shall be checked to ensure they are working properly.

#### 2.5 NOTIFICATION APPLIANCES

- A. Horns: Comply with UL 464; electric-vibrating-polarized type, listed by a qualified testing agency with provision for housing the operating mechanism behind a grille. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn.
- B. Visible Alarm Devices: Comply with UL 1971; three color xenon strobe lights, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The words "CO and/or NATURAL GAS/METHANE DETECTION" printed in minimum 1/2-inch- high letters on the lens. Rated light output is 75 candelas.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Audible Alarm-Indicating Devices: Install at each entry door to, mechanical equipment room, and position not less than 6 inches below the ceiling. Install horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- B. Visible Alarm-Indicating Devices: Install adjacent to each alarm horn at each entry door to mechanical equipment room, and position at least 6 inches below the ceiling. Install in accordance with manufacturers recommendations.

**3.2 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
  - 1. Inspect field-assembled components, equipment installation, and electrical connections for compliance with requirements.
  - 2. Test and adjust controls and safeties.
  - 3. Test Reports: Prepare a written report to record the following:
    - a. Test procedures used.
    - b. Test results that comply with requirements.
    - c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Repair or replace malfunctioning units and retest as specified above.

**3.3 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain refrigerant detection devices.

END OF SECTION 230931