

DIVISION 23
SECTION 23 09 14
NATURAL GAS AND CO GAS LEAK DETECTION EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide labor, materials and equipment required for the provision of complete natural gas and carbon monoxide (CO) gas leak detection systems for the detection and alarm of a natural gas or carbon monoxide leak. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specifications, apply to this Section.

1.02 RELATED SECTIONS

- A. Division 23 Sections:

1. Section 01 51 23 - Temporary Heating
2. Section 23 05 00 – Common Work Results For HVAC
3. Section 23 05 13 - Common Motor Requirements For HVAC Equipment
4. Section 23 05 23 - General Duty Valves For HVAC Piping
5. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
6. Section 23 05 53 - Identification for HVAC Piping and Equipment
7. Section 23 05 93 - Testing, Adjusting and Balancing for HVAC
8. Section 23 07 00 - HVAC Insulation
9. Section 23 09 13 - Instrumentation and Control for HVAC
10. Section 23 09 14 - Natural Gas and CO Gas Leak Detection Equipment
11. Section 23 09 23 - Control Dampers
12. Section 23 09 24 - Steam Flow Meters
13. Section 23 22 13 - Steam and Condensate Heating Piping
14. Section 23 25 19 - Water Treatment for Steam System Feedwater
15. Section 23 31 13 - Metal Ducts
16. Section 23 33 00 - Air Duct Accessories
17. Section 23 34 16 - Boiler Room Combustion Air Makeup And Ventilation System
18. Section 23 51 00 - Chimney Liner
19. Section 23 51 16 - Prefabricated Breechings and Accessories
20. Section 23 51 23 - Gas Vents
21. Section 23 52 39 - Firetube Boilers
22. Section 23 53 12 - Vacuum Condensate Pumps
23. Section 23 53 13 - Boiler Feedwater Pumps

- B. Division 26 Sections

1.03 APPLICABLE LISTINGS, CODES AND STANDARDS

- A. New York City Construction Codes.

- B. The New York City Fire Department Rules and Regulations.
- C. Testing of material and equipment shall be in accordance with 28-113 of the Administrative Code (reference MC 301.5). Whenever the NYC Construction Codes or the Rules of the Department of Buildings requires that material be listed or labeled and material proposed to be used is not so listed or labeled, the use of such material shall be subject to prior approval by the Commissioner (Office of Technical Certification and Research OTCR) and such material shall be used only to the extent set forth in such approval. Materials that were previously approved by the Board of Standards and Appeal (BSA) or by the Department (MEA) before the effective date of the NYC Construction Codes may continue to be used, but only to the extent set forth in such approval, and only if such approval is not specifically amended or repealed by the Commissioner.

1.04 SUPPLEMENTAL SUBMITTALS

- A. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to leak detection and monitoring equipment. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
- B. Provide a set of manufacturer's guarantees for the natural gas and CO gas leak detection and alarm equipment as specified.
- C. Calibration Equipment: Provide necessary equipment to perform required periodic calibration.
- D. Maintenance Data
 - 1. Maintenance Manual
- E. Certificate: Contractor's start-up and demonstration affidavit.

1.05 WARRANTY

- A. Provide a two-year warranty. All warranties shall use the date of Substantial Completion as the start date.

PART 2 - PRODUCTS

2.01 NATURAL GAS LEAK DETECTION AND ALARM SYSTEMS

- A. The Contractor shall provide a complete Natural Gas And CO Gas Leak Detection and Alarm System that shall monitor ambient air in the Central Steam Boiler Plant, and in each of the new Gas Water Heater Rooms in the Satellite Buildings, for concentrations of natural gas. Monitoring shall also be provided adjacent to the natural gas-fired domestic hot water heaters in all the Satellite Buildings, and adjacent to the gas-fired boilers in the Central Steam Boiler Plant. The systems shall each independently continuously measure and display the concentration of Natural Gas within the Central

Natural Gas And CO Gas Leak Detection Equipment

Boiler Plant, and in each of the new Gas Water Heater Rooms in the Satellite Buildings.

- B. The system shall consist of Natural Gas Sensors suspended mounted at elevation 18-inches beneath underside of slab above, and CO Gas Sensors column or wall mounted at elevation 66-inches above finished floor level, adjacent to the gas fired hot water heaters and in between all boilers. The Multi-Channel Gas Controller for remote sensors/transmitters shall be mounted in the Boiler Room and in the Gas-Fired Hot Water Heater Rooms and a Local Alarm Panel shall be wall mounted adjacent to the entry/exit door to the space served, outside of the space.
- C. When preset limits of natural gas or carbon monoxide are exceeded, the system shall go into alarm status. The system shall provide an audible and visual alarm at the preset low limit. At the high limit, the system shall provide audible, visual and relay outputs for dry contacts and shall simultaneously initiate the following:
1. Electrically shutdown all natural gas-fired equipment irrespective of mode of operation, including the boilers and gas-fired hot water heaters and gas-fired rooftop equipment (through relay output dry contacts).
 2. Close the firm gas safety shut off valve (through relay output dry contact) feeding the boilers and the domestic water heaters, and any other gas-fired equipment.
 3. Activate the local audio/visual alarms at the Boiler Room or Gas-Fired Domestic Hot Water Heater Room
- D. System Components:
1. Multi-Channel Gas Controller: Multi-Channel Gas Controller shall be microprocessor based with 3-digit LED display with flashing over-range and alphanumeric fault status indication and shall accept a minimum of six (6) channels. Internal audible alarm and LED's shall annunciate alarm and fault conditions. The multi-channel gas detection system continuously detects, monitors, displays and transmits concentrations of toxic and combustible gas. The controller shall provide relay outputs for multiple alarm levels at pre-set limits and other functions as specified herein. Power Input: 115VAC, 50-60 HZ.
 2. Each channel designed for use with the appropriate sensor shall be mounted in the controller. High, low and trouble LEDs shall provide visual indication of alarm status, while an integral buzzer provides audible indication of alarms at the controller.
 3. Natural gas alarm shall be set at 20% LEL low-level-alarm (adj.) and 50% LEL high-level-alarm (adj.) LEL within the 0 - 100% LEL measuring range. Carbon monoxide warning gas alarm shall be set at 50 PPM low-level-alarm (adj.), and 75 PPM high-level-alarm within the 0 – 100 PPM measuring range.
 4. When natural gas or carbon monoxide gas concentration from the sensors exceeds the low alarm setpoint, the audible alarm shall operate and the light indicator associated with the alarm will be activated at the Multi-Channel Gas Controller and the Local Alarm Panel. Upon further increases in the natural gas concentration, the high alarm light, audible alarm and all external indicating devices associated with that alarm shall be activated.

5. The digital displays, one for CO and one for natural gas, shall automatically display the sensed value of the respective gas sensor with the highest output. There shall also be one pushbutton for each sensor on the face of the panel. If the operator wants to read the output value of any sensor, he need only push the pushbutton of the respective sensor.
6. The Multi-Channel Gas Controller shall power each individual sensor and control the following external device loads upon detection of High Level alarms, through relay output dry contacts:

<u>Load</u>	<u>Relay Action On High Level Alarms</u>
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- | | |
|---|--|
| a. Gas Safety Shut Off Valve | Open upon detection of high-level CH ₄ Natural Gas Alarm, only. |
| b. Local Alarm Panel | Close |
| c. Gas-Fired Boilers and DHW Heater Burner Controls | Open |
| d. Malfunction | Open |

7. The Multi-Channel Gas Controller shall not power the gas safety shutoff valve directly. The Multi-Channel Gas Controller shall be equipped with integral relays and integral dry contacts for all externally controlled device loads.
8. All alarms shall be field adjustable over the full range of the instrument.
9. Enclosure Type: The enclosure shall be NEMA type with front facing channels. Lockable latch mounting brackets for the purpose of attaching the unit to a flat surface shall be provided.
10. The enclosure shall also contain:
 - a. Horn to indicate low alarm, high alarm or malfunction, silenced by an acknowledge pushbutton on the cover. Horn shall have a UL reverberant high volume setting (at 24 VDC) between 85 and 91 dB (A) at a measuring station 10'-0" away from horn. Horn shall have an adjustable Hi-Lo dB setting and shall be the equal of Wheelock.
 - b. A pilot push to test light to indicate each alarm. The light shall flash until acknowledged and remain lighted until reset.
 - c. A push to test malfunction light to operate as per subparagraph b., above.
 - d. Power supplies for all channels and the Local Alarm; control to gas safety shut off valves and gas-fired boilers and DHW heaters burner controls.
 - e. Mounting racks and all the required channels.
11. Sensors
 - a. Natural Gas: Sensors shall be continuous diffusion type, low temperature catalytic bead hydrocarbon sensors. Temperature range shall be -65°F to + 120°F with a six (6) second response time when exposed to a 50% LEL of methane gas. Each unit shall be contained within an explosion proof

housing. Calibration shall be conducted at least every ninety (90) days. Warranty shall be two years with a four-year typical life.

- b. Carbon Monoxide: Sensors shall be continuous diffusion type, designed for a minimum five (5) year life.
- c. The Mechanical Contractor shall wire the sensors to their respective channels inside the multi-channel controller with shielded cables specified by the equipment manufacturer to certify length and maximum loop resistance as required.

12. Local Alarm Panel

- a. Provide a local alarm immediately outside of the boiler room or domestic water heater room, wall mounted adjacent to the entry/exit door at an elevation of 5-feet above-finished-floor, in a NEMA type Cabinet which shall contain a horn, an alarm light, the malfunction light and an acknowledge pushbutton. The audible alarm shall be a sonalert type device rated no less than 85db at 10-feet distance. The acknowledge switch shall silence the sonalert alone.

13. Manufacturer: The products herein specified shall be of models as manufactured by one of the following manufacturers, or approved equal:

- a. CONSPEC: P2260 8 Channel Controller; P2263-XP natural gas sensor; horn by Wheelock and P2259/60-RAU Local Alarm Panel as represented by Applied Analytics Inc. (Tel No. 1-908-782-5507).
- b. General Monitors Corp.: Zero Two Series: Control Module Model 4802A; catalytic bead hydrocarbon sensor P/N 10001-1 (Natural Gas) with explosion proof housing P/N 10252-1 and stainless steel dust guard P/N 1800822; Trip Amplifier Module: Model TA502A; facilities module Model FM002A integrated in a custom control cabinet Model 990-101; horn by Wheelock and Local Alarm Panel Model No. 990-100 as supplied by Process Tech Sales & Service (Tel No. 1-908- 688-1313).
- c. MIL-RAM Technology, Inc., TOX-ARRAY 2000; Gas Controller: Model TA-2000 with TOX-ARRAY sensor Stock No. 01-2320(Natural Gas), horn by Wheelock and Local Alarm Panel, Stock No. 21-2012 as supplied by Analytical & Combustion Systems (Tel. No. 1-914-961-5660).
- d. QUATROSENSE ENVIRONMENTAL LTD (QEL): M-CONTROLLERX-0 Multi-Channel Controller, QTS-17101X-E natural gas sensor, M-RELAY-5X-6 Relay Module, horn by Wheelock and QEL-RMT00X-599 Local Alarm Panel, as supplied by Analytical & Combustion Systems (Tel. No. 1-(800) 545-2514).
- e. HONEYWELL/VULCAIN: VA301C Gas Detection Controller, SERIES Sensepoint XCD Industrial Toxic and Explosive Gas CH₄ Transmitter (Natural Gas); VA301R Relay Module, Horn by Wheelock and VA301AP Local Alarm Panel in the Custodian's office as supplied by Accardi Companies (Tel. No. 1-718-793-6900).

14. Calibration Equipment: Equipment furnished shall be turned over to NYCHA during training. Provide spare test gas in quantities sufficient to perform routine recalibration for two years.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Approved wiring diagrams and installation instruction shall be obtained from the manufacturer and followed in the installation of the leak detection/alarm equipment.
- B. Electric Work
 1. Mechanical Contractor shall provide at a minimum, control wiring connections from each sensor and annunciator to multi-channel control cabinet and accessories to make system fully operational. Equipment shall be provided with terminal boxes to receive connecting conduits. The use of wire nuts in lieu of terminal boxes for the splice connections is prohibited.
 2. Mechanical Contractor shall provide control signal wiring from the Multi-Channel Gas Controller dry contact outputs to the gas meter safety shutoff valve, boiler-burner control panels, and to the domestic hot water heater-burner control panels.
 3. Electrical Contractor of Div. 26 is to provide power wiring to the gas safety shutoff valve, boiler-burner control panels, and to the domestic hot water heater-burner control panels and all accessory power wiring to make system fully operational. Mechanical Contractor shall provide all input control wiring to multi-channel control cabinet.
 4. Conduit: Wiring shall be installed in accordance with the NYC Electrical Code. Wiring connections between each multi-channel control cabinet and the ignition assembly box shall be in either standard conduit with oil impervious gasketed connections or in flexible oil tight conduit (Sealtite). Conduits shall be not less than 3/4" standard weight galvanized steel conduit, large enough to accommodate the wires specified. Flexible oil tight conduit (Sealtite) shall be U.L. approved. No conduit shall be installed in contact with the boiler room or domestic water heater room floor.
 5. Conductors:
 - a. Conductors shall be copper of 98% conductivity, and free of splints, flaws, or other defects. They shall be in accordance with the NYC Electric Code, and with Bulletin No. 8, 1963 of the Department of Water Supply, Bureau of Electrical Control. Conductors shall be delivered in their original packages or reels, which shall be marked with the manufacturer's identification and date of manufacture.
 - b. Wiring between the burner control cabinet and associated equipment installed shall be type THHN, 90° C, 600 volts.
 6. Electrical Contractor is to provide all disconnects, thermal overload and accessories as required and as specified under Division 26.

3.02 INSTALLATION OF GAS LEAK DETECTION AND ALARM SYSTEMS

- A. The natural gas sensors shall be installed rigidly suspended at a mounting height of 18" below the floor slab above, at the locations specified and shown. CO gas sensors shall be column or wall mounted at elevation 66-inches above finished floor level, at the locations specified and shown.
- B. The locations of all the sensors, detectors, control panels and all other items and accessories shall be such that access for ease of maintenance and repair shall be provided.
- C. All control conduit and wiring between sensors, equipment and controller shall be in accordance with NYC Construction Code and Electrical Code requirements.
- D. Contractor shall establish and follow a quarterly calibration schedule for the natural gas and CO gas monitoring system during the two (2) year warranty period. A logbook shall be kept indicating the location, calibration dates, dates of sensor replacement and all other work done to all systems. During the two (2) year warranty period of the systems, the logbook shall remain on site and be available for inspection. The logbook shall be turned over to NYCHA after the expiration of the two (2) year warranty.
- E. The Mechanical Contractor shall provide the Gas Leak Detection and Alarm Panel (Multi-Channel Gas Controller) in the Central Steam Boiler Plant, and in each of the other Satellite Building's Gas-Fired Hot Water Heater Rooms, associated audio/visual Local Alarm Panels, all sensors and control wiring for equipment. Firm gas safety shutoff valves shall be provided by the Plumbing Contractor as specified under Division 22. The Mechanical Controls Contractor shall provide all control wiring and signal wiring to annunciators, sensors, equipment and accessories. The Electrical Contractor of Div. 26 shall provide power independently to the gas safety shutoff valve, boiler-burner control panels, domestic hot water heaters, i.e., all power wiring. Disconnecting means shall be provided by Electrical Contractor and shall be mounted as shown on the Electrical Drawings. Equipment power wiring amperage is not permitted to flow through the integral dry contacts of the multi-channel control panel.

3.03 FIELD QUALITY CONTROL

- A. Supervisory Personnel: Provide field service personnel in the employ of the natural gas and CO gas leak detection/alarm system manufacturer for such time as required to put installed equipment into operation. Supervisory services shall include the following:
 - 1. Training of personnel.
 - 2. Service.
- B. Training of Personnel: Approved natural gas and CO gas leak detection/alarm system manufacturer's representatives shall instruct duly authorized personnel (Custodian and DOE Maintenance Representative) in the operation and maintenance of the leak detection/alarm equipment. Provide a minimum of 4 hours of training, not to include travel time for on-site instruction of personnel. This time shall be exclusive of all pre-start-up, start-up and service call time. Provide supervisors capable of instruction, in all phases of operation and accessories.

- C. Service: Provide the services of a competent field service representative to furnish service to the facility. Service must be available within 48 hours from the time of notification.

3.04 INTERDISCIPLINARY TESTS AND FUNCTIONAL PERFORMANCE TESTS

- A. Interdisciplinary Pre-Start-Up and Start-Up Tests:
 - 1. The Contractor shall conduct interdisciplinary pre-start up and start up tests as per the manufacturer's start up procedures. Contractor shall submit signed start up affidavit signed by the factory authorized service representative indicating that all of the manufacturer's pre-start up and start up procedures have been successfully completed.

END OF SECTION

SAMPLE