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# HALOGUARD™ IR w/ (Optional) Scanner GUIDE SPECIFICATIONS

## ASHRAE 15-1994 REFRIGERANT VAPOR DETECTION SYSTEM

**Section 8.13.2 Paragraph 2 Refrigeration Machinery Room, General Requirements.** - Each machinery room shall contain a detector, located in an area where refrigerant from a leak will concentrate, which shall actuate an alarm and mechanical ventilation in accordance with 8.13.4 at a value not greater than the corresponding TLV-TWA (or toxicity measure consistent therewith).

Exception: For ammonia refer to 8.14(g).

**Section 8.12.6 Combustion Equipment -** ...Combustion Equipment shall not be installed in the same machinery room with refrigerants-containing equipment except under one of the following conditions:

(a) combustion air is ducted from outside the machinery room and sealed in such a manor to prevent any refrigerant leakage from entering the combustion chamber, or
(b) a refrigerant vapor detector is employed to automatically shut down the combustion process in the event of refrigerant leakage.

### Section 1 - GENERAL

### 1.0 RELATED DOCUMENTS

1.1 Contractor shall be come familiar with requirements for Refrigerant Monitoring and Equipment Work specified in Section 15XXX, Ventilation Work specified in section 15XXX and Electrical Work specified in Division 16. Installation practices shall conform to Division 15 general mechanical and Division 16 general electrical practices and following material and installation specification.

1.2 Refrigerant gas detection system supplier /installer shall be familiar with standard practices of safety and installation for refrigerant gas monitor systems. (Unlisted gas detection supplier shall provide a list of last 12 similar projects.) Acceptable suppliers:

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System shall be "package Equipment" as defined in Section 15XXX

System shall meet or exceed the latest ASHRAE standard 1994 requirement Canadian Standard B52-1995 and EPA standard CFR. System shall incorporate all latest revisions to bring up to current standards.

### PART 2 - PRODUCTS

2.0 GENERAL: Refrigerant Monitor Specification - Paragraphs 2.1 through 2.5 detail the specification for Refrigerant Monitoring System.

2.1 Monitor shall employ photoacoustic Infrared (IR) sensor technology, for sensing down to one part per million (ppm), and calibrated for specific refrigerant (Specify Refrigerant; i.e. R-11, R-12, R-22, R-123, R-134a, etc). Monitor shall continuously measure and display the specified gas concentration. Shall be capable of detecting presence of refrigerant which is selected without signficant response to other refrigerants which might be present. System shall be capable of indicating, alarming, shutting down equipment, and automation/ventilation interface. Where combustion equipment is employed, monitoring system shall automatically shut down the combustion equipment in event of refrigerant leakage if other acceptable conditions are not specified.

2.2 Multiple chiller installations shall carefully consider whether mechanical room size and layout can adequately be monitored to comply with regulations with a single point or a multiple point system.

2.3 Monitor System Configuration - System shall conform to the design specifications as follows.

2.3.1 Description - Monitor shall activate an alarm and mechanical equipment room ventilation at less than the TLV-TWA. Sample pick-up shall be located in an area where refrigerant from a leak will concentrate (ASHRAE-15 1994).

2.3.2 The monitor shall be wall mount type for continuous monitoring.

2.3.2.1 Enclosure - The enclosure shall be NEMA 12/4/250 design type.

2.3.2.2 Enclosure shall be no more than 14 inches in any dimension.

2.3.2.3 Mounting Points shall be integral to enclosure.

2.3.2.4 All displays shall be visible from front panel. Displayed information shall include Refrigerant Type and Concentration, sample location, and self diagnostic condition reports (faults). LED's shall indicate Power, Ready, Alarm 1, Alarm 2, Alarm 3, and any fault condition. All LED's shall have a corresponding NO/NC relay so that the same information can be remotely displayed.

2.3.2.5 Analog output shall be provided when required for remote recording of gas concentration Monitor shall be able to transmit gas concentration and self-diagnostic information up to 1000 ft. (optional).

2.3.2.6 Coverage shall be expandable with Two (2), Four (4), or Eight (8) Channel Scanner (Optional).

2.3.2.7 TWA Integration – When TLV-TWA exposure limit for the specific refrigerant is less than the full scale range of the monitor, monitor shall calculate an 8 hr. time weighted average (TWA) exposure. TWA concentration shall be displayed on LCD. Alarm LED shall be activated if preprogrammed TWA exposure limit is exceeded (Optional).

2.3.2.7 Monitor shall employ an internal pump to draw samples up to 300 ft.

2.3.2.8 Sample Tubing extension lengths shall be minimized.

2.3.2.8 Accuracy - The display accuracy shall be +/- 1 ppm in the 0 - 100 ppm range and +/- 10% of reading or better for values over 100 ppm.

2.3.2.9 Operating Temperature - 40$^{o}$F to 120$^{o}$F non-condensing

2.3.3 Monitor Design Requirements

2.3.3.1 Display - A 2 line LCD shall be provided for display of sensor location, gas type and concentration, alarm type, malfunction diagnostics and set-up information. Self-diagnostics to include IR source check, sample pump check, chopper function check, temperature and electrical continuity. All error codes are to be plain language, malfunction codes are not permitted..

2.3.4.2 Alarm Set Points - Three (3) levels of alarm shall be provided for High, Low, and Off Scale conditions. Alarm set points shall be independently adjustable. At least two (2) alarm levels shall be user adjustable at values less than full scale. Relays shall be user selectable Latching or Non-latching.

A third, non-user adjustable alarm shall be provided at greater than the full scale value. This offscale alarm shall be capable of initiating combustion process shutdown and used to provide remote notification to prevent persons from entering a highly contaminated space without breathing protection.

2.3.4.3 Visual Alarm Indication – LED's shall energize for each level of alarm, fault or malfunction. Additional LED's shall indicate that unit is receiving power and ready for operation.

2.3.4.4 Relay Outputs – Each alarm set points shall activate a discrete relay. Four (4) dry contacts shall be provided to initiate output signal for three (3) level alarms and

malfunction at local panel, interface with both the DDC or BMS and the machine room ventilation system. Contact ratings shall be rated 7 amps at 120 VAC, SPDT, Form C.

2.3.4.5 Audible Alarm (Optional) - An audible alarm (90dB) shall energize when alarm condition or fault condition occurs. Audible alarm shall pulse at variable frequency to indicate type of alarm.

2.3.4.6 Visual Indication (Optional) - An amber strobe light alarm shall energize when high or offscale alarm or fault condition occurs.

2.3.4.7 Analog Output Signal (Optional) - The system shall be capable of providing a 0 - 5 VDC/ 0 - 10 VDC or 4 - 20mA analog signal proportional to gas concentration for interface with DDC or BMS.

2.3.5 Power Requirements - System shall operate on 115 - 230 VAC, 50Hz/60Hz.

2.3.6 Sequential Sampling Capability -Monitor shall be capable of adding up to three (3) additional sampling points (4 point total). (Alternate: Monitor shall be capable of adding up to seven (7) additional sampling ports (8 point total).)

2.3.6.1 The scanner must be integral to the controller. Scanning time between channels, shall be adjustable 0 to 10 seconds.

2.3.6.2 Manual override push button shall be provided to hold and display any sensor reading for two minutes.

2.4 Maintenance - System shall require no periodic adjustments other than checking against a clean air source every 6 months. Span calibration frequency shall be no more than once every 12 months. Changes in External Zero Filters and Line Filters are unacceptable. Internal Sample Filters should be visually checked every 6 to 12 months and replaced if needed.