SECTION 23 8500 – REFRIGERANT GAS DETECTION SYSTEM PART 1 - GENERAL

PART 1 – GENERAL

1. RELATED DOCUMENTS
	1. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 01 Specification Sections, apply to this Section
	2. SUMMARY
	3. Provide a complete installation of a refrigerant gas detection system and automatic means of ventilating the space during a leak condition.
	4. The system shall include, but not be limited to, the following:
		1. Central Control Panel
		2. Remote Refrigerant Detectors
		3. Remote Audible and Visual Alarm Beacons
	5. SUBMITTALS
	6. Provide data for each factory supplied piece of equipment.
	7. Shop Drawings
		1. Wiring diagrams.
		2. Schematic of system components and set up.

PART 2 – PRODUCTS

* 1. CONTROL PANEL (CGS MERLINGUARD)
		1. Located inside of the mechanical room mounted at 48” A.F.F.
		2. Front fascia mounted manual reset button that resets the alarm condition. [complies with ASHRAE 15 manual reset location]
		3. Clear screen display that shows the individual sensor serial number, target gas, and parts per million readings.
		4. Provides an integral 24VDC power output and Modbus input for remote sensors. [field supplied 24VDC power supply for sensors is not required]
		5. Capable of transmitting pre-alarm and high-alarm conditions to a BMS system.
		6. Front fascia mounted manual fan switch that activates the connected ventilation system. [required for A2L type gases per ASHRAE 15]
		7. The control panel will be capable of operating within relative humidity ranges of 5-95% non- condensing and temperature ranges of -4° F to 140° F (-20° C to 60° C).
		8. Minimum 6A @ 120VAC rating on fan relays. [minimum relay capacity for direct fan activation when <1HP 120VAC fans are utilized]
		9. The unit will accept up to eight (16) remote detectors although less may be required for designated detection area.
		10. Integral audible and visual alarms capable of 85 dBA @ 10 ft.
		11. 24VDC output signals to activate remote audible and alarm beacons with in-built adaptable tones and strobes.[eliminates field supplied 24VDC power supply for strobes]
		12. Mute Function: the control panel shall provide a mute function to silence all integral buzzers and connected audible / visual alarms.
		13. Outputs
			1. 4x 6A @ 120VAC Relay Outputs
			2. 0-10V Linear Output representing gas concentration.
			3. 24VDC Strobe Output
	2. Detectors (CGSRTFT)
		1. The detector shall utilize a non-dispersive infrared type (NDIR) with a minimum accuracy of +/- 5% FS range below 50% F.S. and +/- 7% of FS range above 50% full scale.
		2. Detectors shall be of the diffusion type.
		3. Modbus communication and 24VDC power supply. [compatible with control panel. Modbus allows for communication of detector status, serial#, ppm, in a digital display]
		4. Factory set high alarm levels to the corresponding ASHRAE OEL value. [high alarm ties to alarm sequence, OEL setpoint complies with ASHRAE 15]
		5. Pre-alarm levels shall be factory set to the specifications in this document.
		6. The detectors shall be capable of sensing for the type of refrigerant specified in the equipment and shall come factory calibrated.
		7. Provide one detection point per chiller.
		8. Detectors shall perform a self-test function to monitor for faults, and send pre-alarm signal when a fault is detected.
		9. Detectors shall have a response time of no more than 90s.

* 1. Remote audible and visual alarm strobes. (CGSAAB)
		1. Locate outside of each exit, or per floor plans. [outside of each exit per ASHRAE 15 requirements]
		2. 24VDC Power supply [compatible with control panel power supply]
		3. Minimum of 85dBA @ 1ft
		4. Visual strobe
		5. Adjustability of strobe and sounder settings.
	2. Emergency Shutdown Button (CGSESOTW) [If using A2L]

[Add / remove tables as necessary. All high alarm levels reflect ASHRAE OEL.]

|  |  |  |  |
| --- | --- | --- | --- |
| **GAS** | **Pre Alarm (PPM)** | **High Alarm (PPM)** | **Mounting Height** |
|  |  |  |  |
| **R-1233zd** | **75** | **1000** | **1ft A.F.F.** |
| **R-1234yf** | **175** | **1000** | **1ft A.F.F.** |
| **R-1234ze** | **175** | **1000** | **1ft A.F.F.** |
| **R-123** |  | **50** | **1ft A.F.F.** |
| **R-125** | **75** | **1000** | **1ft A.F.F.** |
| **R-134a** | **175** | **1000** | **1ft A.F.F.** |
| **R-143a** | **75** | **1000** | **1ft A.F.F.** |
| **R-227ea** | **75** | **1000** | **1ft A.F.F.** |
| **R-22** | **75** | **1000** | **1ft A.F.F.** |
| **R-438a** | **75** | **990** | **1ft A.F.F.** |
| **R-32** | **350** | **1000** | **1ft A.F.F.** |
| **R-404a** | **175** | **1000** | **1ft A.F.F.** |
| **R-407a** | **75** | **1000** | **1ft A.F.F.** |
| **R-407c** | **175** | **1000** | **1ft A.F.F.** |
| **R-407f** | **75** | **1000** | **1ft A.F.F.** |
| **R-410a** | **350** | **1000** | **1ft A.F.F.** |
| **R-417a** | **75** | **1000** | **1ft A.F.F.** |
| **R-422a** | **75** | **1000** | **1ft A.F.F.** |
| **R-427a** | **75** | **1000** | **1ft A.F.F.** |
| **R-434a** | **75** | **1000** | **1ft A.F.F.** |
| **R-448a** | **75** | **860** | **1ft A.F.F.** |
| **R-449a** | **175** | **800** | **1ft A.F.F.** |
| **R-450a** | **75** | **880** | **1ft A.F.F.** |
| **R-452a** | **75** | **790** | **1ft A.F.F.** |
| **R-452b** | **75** | **870** | **1ft A.F.F.** |
| **R-453a** | **75** | **1000** | **1ft A.F.F.** |
| **R-454a** | **75** | **690** | **1ft A.F.F.** |
| **R-454b** | **75** | **850** | **1ft A.F.F.** |
| **R-454c** | **75** | **620** | **1ft A.F.F.** |
| **R-455a** | **75** | **650** | **1ft A.F.F.** |
| **R-507** | **75** | **1000** | **1ft A.F.F.** |
| **R-513a** | **75** | **650** | **1ft A.F.F.** |
| **R-514a** | **75** | **320** | **1ft A.F.F.** |
| **R-442a** | **75** | **1000** | **1ft A.F.F.** |
| **R-422d** | **75** | **1000** | **1ft A.F.F.** |
| **R-424a** | **75** | **990** | **1ft A.F.F.** |

PART 3 – EXECUTION

* 1. INSTALLATION
		1. Comply with ASHRAE 15.
		2. Install hazardous gas monitoring equipment including sensors, audible alarms, as shown on Contract Drawings, and as recommended by manufacturer of equipment, and as required by authorities having jurisdiction.
		3. All sensors shall be mounting to the proper height in accordance with the manufacturer’s installation instructions.
		4. Interlock the control panel with ventilation fans to activate on high alarm.
		5. Daisy chain all remote gas detectors and audible alarm strobes from the control panel.
			1. Provide conduit for all alarm strobe and detector wiring.
		6. Install remote audible and visual alarm strobes outside of each exit.
			1. Install signage for each remote audible and visual alarm strobe used to communicate the nature of the alarm.
		7. Verify the refrigerant type being utilized and provide the proper refrigerant sensor from the manufacturer as required.
	2. SEQUENCE OF OPERATION
		1. Immediately upon pre-alarm level detection.
			1. BMS system shall be alerted of pre-alarm condition.
			2. Emergency exhaust ventilation fan is energized and activated.
			3. The control panel displays detector gas levels and indicates “pre-alarm” status for the detector in alarm.
			4. The detector displays levels in yellow.
		2. Immediately upon high alarm level detection.
			1. BMS system will be notified of high alarm condition.
			2. Remote audible and visual alarms outside of the exists will activate.
			3. Purge fans connected to the MERLINGUARD control panel will remain energized.
			4. All refrigerant compressors, refrigerant pumps, and any other specified potential ignition sources must be shut down. [A2L Requirement remove if using A1]
			5. All specified normally closed refrigerant solenoids must be de-energized and closed. [A2L Requirement remove if using A1]
			6. Internal control panel buzzer will sound.
			7. The control panel will display the zone location of the detector in alarm and it’s corresponding PPM level.
			8. The detectors will display the alarm level in red.
			9. Internal detector buzzer will sound.
			10. The system will remain in alarm until reset manually at the control panel.
		3. Upon activation of the emergency shutdown switch (CGSESOTW) [A2L Requirement remove if using A1]
			1. Emergency shutdown switch shall be interlocked with the control circuit that shuts down refrigerant compressors, refrigerant pumps, solenoid valves, and potential ignition sources.
			2. All pieces of equipment specified above, will de-energize and shutdown.
	3. COMMISSIONING
		1. After installation, test equipment to demonstrate operation of functions described above under sequence of operation by utilizing sample test gas.
		2. Provide testing kits (including gas bottles) for testing.
		3. A testing procedure to ensure proper control wiring may be used by utilizing the internal manual test function on the detectors.
	4. WARRANTY.
		1. Limited Warranty

Canadian Gas Safety, Inc warrants to the original purchaser and/or ultimate customer ("Purchaser") of CGS products ("Product") that if any part thereof proves to be defective in material or workmanship within thirty six (36) months, such defective part will be repaired or replaced, free of charge, at CGS' discretion if shipped prepaid to CGS 150 King Street West, Suite 200, Toronto, ON M5H 1J9 in a package equal to or in the original container. The Product will be returned freight prepaid and repaired or replaced if it is determined by CGS that the part failed due to defective materials or workmanship. The repair or replacement of any such defective part shall be CGS' sole and exclusive responsibility and liability under this limited warranty.

END OF SECTION 28 3500