SECTION 28 44 00 – 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 (AGS 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
			4. 24VDC Permanent Output for low voltage control wiring
	2. Detectors (AGSRTFT)
		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.
			1. Place detector as close to chiller as possible.
		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.
		10. The detectors must be factory calibrated.
			1. Re-calibration must be performed if signs of sensor drift are noticed. See manufacturers guide to recognizing sensor drift and calibration procedure.

* 1. Remote audible and visual alarm strobes. (AGSAAB)
		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 (AGSESOTW) [If using A2L]
		1. Locate outside of each exit
		2. Shall shut down all potential ignition sources including compressors, pumps, and close any refrigerant solenoid valves to mitigate releasable charge.
		3. Shall be twist release manual reset type.
		4. Shall come with one (1) N.O. min 10A contact and one (1) N.C. min 10A contact.
	3. Remote Manual Fan Activation Switch (AGSMGFS)
		1. Locate outside of each exit.
		2. Fan activation switch shall manually activate emergency ventilation fan when switched on.
	4. Signage
		1. Contractor shall provide appropriate signage for all alarms, emergency shut offs, and fan switches located at the room exits.

[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.
			1. The refrigerant monitoring system shall come with a pre-programmed sequence of operation that is compliant to ASHRAE 15 and local code requirements. The contractor shall not have to field program the sequence of operation, but only do the control wiring.
			2. See manufacturers factory set ups for A1 type and A2L type refrigerant gases.
		2. Scope of Work
			1. The full system shall be provided by the mechanical controls contractor and shall be responsible for coordinating with all other trades to accomplish a complete installation.
			2. The mechanical controls contractor shall coordinate with Div. 26 to provide 120VAC power to system control panel, and any transformers required for low voltage control wiring.
			3. The 24VAC permanent output within the control panel may be utilized in lieu of a Div. 26 provided transformer. Check with manufacturer on power specs of internal transformer.
		3. 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.
		4. All sensors shall be mounted to the proper height in accordance with the manufacturer’s installation instructions.
		5. Interlock the control panel with ventilation fans to activate on high alarm.
		6. Daisy chain all remote gas detectors and audible alarm strobes from the control panel.
			1. Provide conduit for all alarm strobe and detector wiring.
		7. 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.
		8. 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. The control panel displays detector gas levels and indicates “pre-alarm” status for the detector in alarm.
			3. 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 energize.
			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 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 manually reset at the control panel.
		3. Upon activation of the emergency shutdown switch (AGSESOTW) [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.
		4. Upon activation of the manual fan activation switch (AGSMGFS)
			1. Emergency exhaust ventilation fans will be energized and activated until the switch is reverted to its original state.
	3. COMMISSIONING
		1. After installation, test equipment should validate functions described under sequence of operation by 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
			1. American Gas Safety, LLC. warrants to the original purchaser and/or ultimate customer ("Purchaser") of AGS 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 AGS' discretion if shipped prepaid to AGS 6304 Benjamin Road, Suite 502, Tampa, FL 33634 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 AGS that the part failed due to defective materials or workmanship. The repair or replacement of any such defective part shall be AGS' sole and exclusive responsibility and liability under this limited warranty.

END OF SECTION 28 3500