Chiller Room
Refrigerant Gas Detection

Refrigerant Detection System

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 (S&S Middle East 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 @ 230VAC rating on fan relays. [minimum relay capacity for direct fan activation when <1HP 230VAC 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 70 dBA @ 1m.
		11. Control panel will be 180x255x76mm.
		12. 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]
		13. Mute Function: the control panel shall provide a mute function to silence all integral buzzers and connected audible / visual alarms.
		14. Outputs
			1. 4x 6A @ 230VAC 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 (S&S Middle East RTFT)
		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. (S&S Middle East Sounder Beacon)
		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 70dBA @ 1m
		4. Visual strobe
		5. Adjustability of strobe and sounder settings.
	2. 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. 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 mounted 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. 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. Internal control panel buzzer will sound.
			5. The control panel will display the zone location of the detector in alarm and corresponding PPM level.
			6. The detectors will display the alarm level in red.
			7. Internal detector buzzer will sound.
			8. The system will remain in alarm until manually reset at the control panel.