

Guidelines for Refrigerant Leak Monitor Installation

These simple guidelines, a manufacturer's instruction manual and the assistance of a knowledgeable safety officer can ensure proper installation of an effective commercial refrigerant leak-detection system

BY KIMBERLY LEWIS

Refrigerant leak monitoring is necessary for several reasons, including cost savings, worker protection and industry regulation compliance.

First, the replacement cost of refrigerants is high. Refrigerant monitors reduce operating costs by detecting leaks early enough to prevent a major, costly loss of refrigerant gas.

Second, the threshold-limit value (TLV) determines the amount of refrigerant gas a worker can be exposed to while in a mechanical equipment room. Exceeding this amount can result in serious health and safety consequences.

Third, ANSI/ASHRAE Standard 15-1994 requires the installation of leak detectors in mechanical equipment rooms.

Refrigerant leak monitor installation doesn't have to be complicated. Working closely with a facility safety officer and paying careful attention to a manufacturer's instructions will guide you toward creating an effective monitoring system.

It is important to always read a system's instruction manual before installing any monitoring system. Because there are a variety of instruments and technologies involved, specific installation procedures will vary. Monitors will perform as designed only if they are installed, used and serviced in accordance with a manufacturer's instructions.

Monitor placement guidelines

The following are important steps to follow for the installation of a refrigerant monitor. Make sure you:

- Locate the monitor and/or sample point as close as possible to potential leak points (see Figure 1 on page 18).
- Select a location where personnel will see the instrument readout panel and display, if applicable.

- Mount the unit so it can easily be accessed for service and calibration.
- Check wiring codes. The monitor should be installed, located and operated in accordance with all applicable codes (for example, the National Fire Prevention Code (NFPC) and the National Electric Code (NEC)).
- Verify that the monitor is rated as explosion-proof if the area to be monitored is classified as a potentially explosive environment. This includes Class 1, Group A, B, C and D areas as defined by the NEC.
- Properly exhaust the instrument to a safe area or to outside atmosphere.
- If ventilation exists in a chiller room, smoke tubes can help determine the most appropriate gas monitoring location.

The following is a list of things not to do during installation. Make sure you:

- Don't mount the unit to a structure that is subject to vibration and shock, such as piping and piping supports.
- Don't locate the unit near an excessive heat source or in wet or damp locations.
- Don't mount the unit where it will be exposed to direct solar heating.
- Don't install the monitor in areas where condensation may form. Condensation may clog or block the sampling line, preventing the instrument from receiving fresh gas samples.

Other factors to consider include:

- If the monitor has a display, it can be placed just outside the doorway to the monitored area, allowing personnel to check gas levels before entering the area.
- If the unit has multipoint sequencing capability, then it may be possible to install it in a remote location separate from the sampling area(s).



Refrigerant monitor location is critical, especially in multi-chiller equipment rooms.

- If the unit has a pump option, use end-of-line filters to protect the pump. These may be included with the unit.

Installing the monitor

While unpacking the unit, thoroughly check the contents of the shipping container. Search through all packing material and containers to prevent accidental discarding of usable or valuable parts. Inspect internal components for damage. With the unit's front door open, carefully inspect the components and assemblies inside.

The arrangement of the equipment in the room also can have an impact on the most effective place to sample. As general guidelines:

- If there is one chiller in the room, sample at the perimeter of the unit.
- For two chillers, sample between them.
- With three or more chillers, multiple monitors or a single monitor with a multipoint sampling system should be used. Airflow patterns must always be considered.

Ensure that the area being sampled is sufficiently monitored. Some units offer multipoint sequencers that can expand the instrument's monitoring capability (see Figure 2 on page 18). Certain monitors also are capable of monitoring different types of refrigerants. Determine which gas your unit is designed to detect and the number of sampling locations it has.

For gases heavier than air, sampling 12-18 inches above the floor generally is sufficient for early warning

and to provide adequate protection for someone working close to the floor. If it is expected that an occupant's breathing zone may be less than 12-18 inches off the floor, locate the sampling point accordingly.

Consider the following guidelines when selecting the location for the sampling point(s):

- Place the end of the sample line in the location(s) most likely to develop a refrigerant gas leak or spill, including valves, fittings and the chiller itself. Also, monitor any refrigerant storage location(s).
- Because most refrigerant gases are heavier than air, monitor them close to the floor. Make sure that pits, stairwells and trenches are monitored since they may fill with gas before the main area.
- If you will monitor ammonia, which is lighter than air and tends to accumulate near the ceiling, position the sampling point at a higher level.
- Ensure that the sampling area is free of particulate matter and condensing moisture, and that the sample lines will not draw moisture.
- To reduce transport time, select sampling locations that result in the shortest possible line length.

Sampling system installation

Route the tubing into the areas to be monitored. For refrigerant monitoring, 1/4-inch outside diameter rigid copper tubing with compression-type fittings is recommended for most refrigerants. Soldered connections on

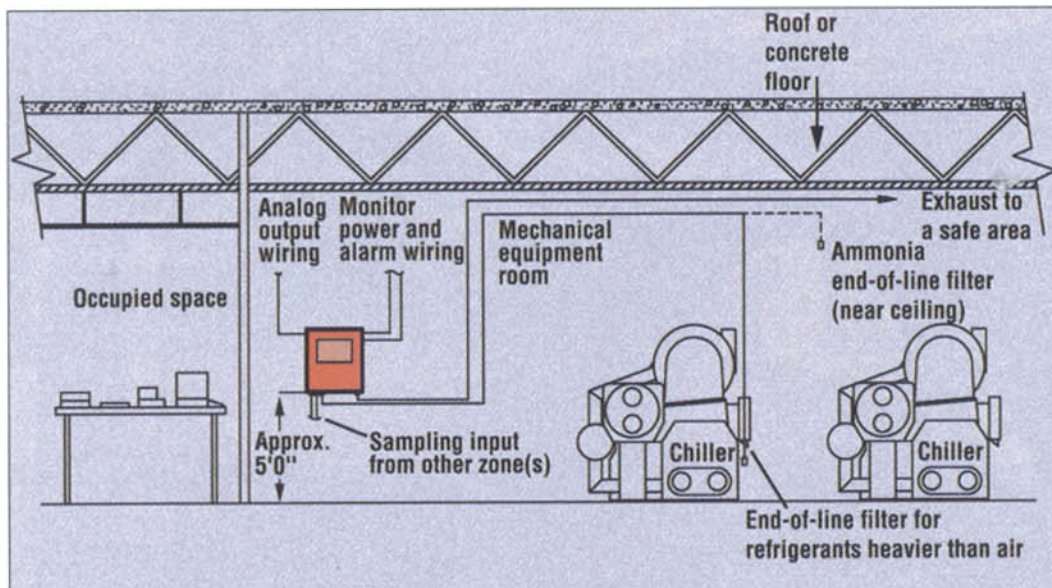


Figure 1. Install the leak monitor as close as possible to potential leak points.

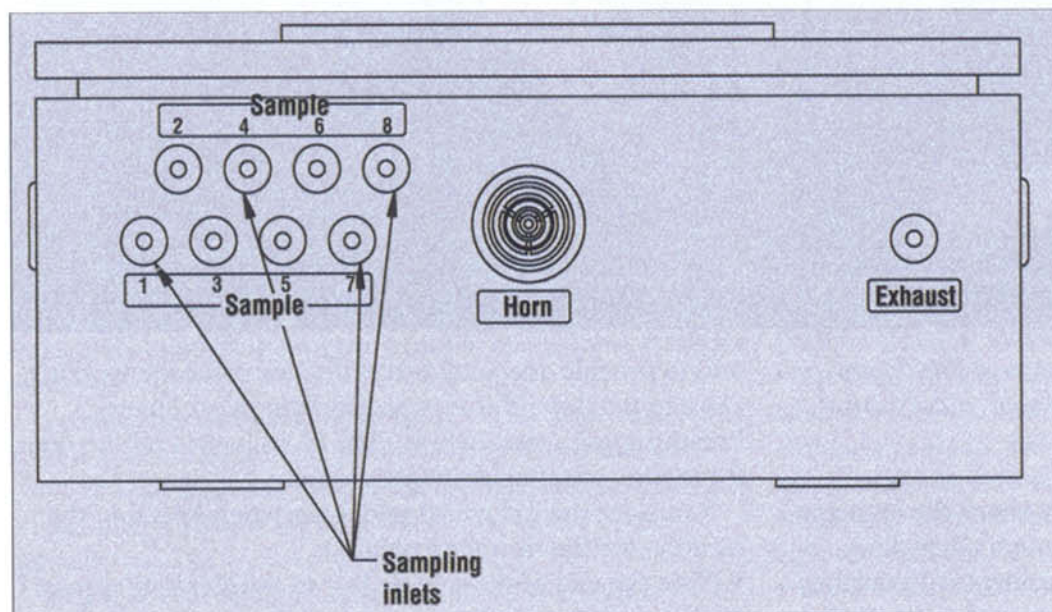


Figure 2. In a mechanical room with three or more chillers, use multiple monitors or a single monitor with a multipoint sampling system.

the sample line(s) should be avoided due to the possibility of the monitor being sensitive to the solvents in the soldering flux paste.

For ammonia monitoring, stainless steel tubing and filters are recommended. Do not use copper or brass tubing, or connection components, as they are not compatible with ammonia.

After the line(s) are installed and before they are connected to the monitor:

- Clean lines with compressed air or nitrogen to remove any debris.
- Perform a leak check to assure they are free of leaks.
- Connect the line(s) to the sample port(s) on the monitor.
- To ensure that the gas sample is clean and noncondensing, install end-of-line filters in all sample inlet lines.

When addressing power wiring connections, a separate, dedicated power source is recommended for most refrigerant monitors. This ensures that the monitor remains

powered when other circuits are shut down for servicing, routine maintenance or shift changes.

The incoming power provided to the monitor determines the configuration of the fuses and wiring to the main power terminal block. Consult the instrument instruction manual for fuse and wire connection details. Ensure that power is clean and reliable.

Refrigerant monitors can be equipped with a variety of outputs, including a display, LEDs for alarm indications, analog outputs for use with a digital control system or building automation system, beacon, audible alarm, and relays such as an RS232 or RS485. If the unit has alarms, contact the facility's safety officer to set the proper alarm values.

If the unit has a trouble relay, consult with the safety officer to determine the best way to respond to a fault condition. Some vendors supply diagnostic software that helps pinpoint where a fault condition exists.

As with any type of gas monitor, the only true check of its performance is to perform a calibration by applying gas directly to the sensor. Calibrate monitors regularly and maintain a log of calibration adjustments. The manufacturer usually supplies calibration kits as an option. For the

highest accuracy, use the actual gas of interest rather than a synthetic span gas.

Though some instruments provide an autozero feature, calibration with the actual gas of interest is still required. To prevent inaccurate readings, the auto-zero line must be monitored and properly maintained to ensure that no refrigerant enters.

The frequency of the calibration test depends on the operating time and gas exposure of the sensors. Calibrate new monitors until the calibration records prove that stability exists. Then you can reduce the calibration frequency to the schedule set by the safety officer or plant manager.♦

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