



Leakage alarm in cooling plants with HFC (HCFC)

Fluorinated greenhouse gases can be found in many varieties with different characteristics but are in common heavier than air and may thus in higher concentrations displace enough oxygen to induce asphyxiation. The gases are usually not toxic (except R123a) but have a negative impact on the environment with ozone depletion potential, ODP (CFCs, HCFCs) and global warming potential, GWP (HFC).

When is gas detection needed?

The use of HFCs in refrigeration plants is regulated by the European Refrigeration standard (EN378:2008) where the requirement is that all plants with a charge > 25 kg must have installed a gas detection system in the machinery room and other areas where there is a risk for personal safety or of reaching practical limits.

The Fluorinated greenhouse gases are also regulated by the F-Gas Regulation (EC 842/2006), which requires permanently installed gas detection equipment at charges > 300 kg and continuous leakage control.

How often the leakage control should be made is dependent on how large the refrigerant charge is. In general you can say that the number of times can be halved if a fixed gas detection system is installed.

In general all EC and EFTA countries have national legislation for:

- The maximum exposure limit of hazardous gases to humans. Usually certain maximum exposure times for certain concentrations and gases are regulated.
- Personal safety that states, among other things, that buildings and workplaces, where risk of fire, dangerous leakages, oxygen deficiency or the like may lead to personal injuries, must be designed to avoid and diminish the negative outcome of an event. One of the precautions often recommended is that a gas detection system should be installed.

What is an alarm system?

A gas detection system consists of a chain - from discovery of the risk to the corrective action! It is

important to think through the measures to be taken at each alert level and plan for the appropriate staff to be informed, such as service personnel and the individual responsible for safety.

Design and installation

When planning, it is important that all potential leakage points are identified. One should also think about where flashing lights and sirens must be installed to ensure that staff is made aware of the danger so as to prevent them from putting themselves in a dangerous situation by entering gas filled spaces.

When installing the detectors one must also take into consideration room characteristics, supply and exhaust ventilation, etc. to achieve maximum coverage and to avoid false alarms.

Appropriate alarm levels

Alarm levels will depend on where the detector is placed and what should be protected. The following levels can be regarded as benchmarks for various applications:

- Pre-alarm (C)	100 – 300 ppm
- Leakage alarm (B)	1000 ppm
- Main alarm (A)	> 2000 ppm

Alarm level function

- C = Alarm for maintenance staff.
- B = Urgent alarm for maintenance staff, flashlight activated.
- A = Emergency alarm; as the B alarm plus activated siren.

Operation and maintenance manuals

Under current regulations the alarm system is to be inspected by an authorised representative at least once a year and the results must be recorded in the logbook.

To keep in mind:

- Gas detection equipment must in general be powered by a UPS in the event of a power loss. (For at least 60 minutes)
- During service it's likely that concentrations of gas will rise. Hence it would make sense to have an installed "service function" to temporarily block an outgoing alarm.
- Flashing lights that are activated at C or B alarm level must NOT be installed so they are visible to the public and thus may cause unnecessary anxiety / action.