



## Carbon dioxide alarm in refrigeration plant

Carbon dioxide as refrigerant has become increasingly common over last few years and is likely to increase more in the coming years. Carbon dioxide is odourless and is not usually a poisonous gas, but it does have two characteristics that make it hazardous to humans:

- Displaces oxygen
- Influence our breathing (respiratory capacity)

## When is gas detection needed?

The use of carbon dioxide 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 the practical limits.

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

The maximum exposure limits 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 alarm 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)  
(Is not applicable when the carbon dioxide occurs naturally in certain scale. Up to ~ 1000 ppm is accepted as a good indoor environment)
- Leakage alarm (B) 2000 ppm
- Main alarm (A) > 5000 ppm

## Alarm level function

- C = Not applicable
- B = Urgent alarm for maintenance staff, flashing light activated.
- A = Emergency alarm; as the B alarm plus activated siren. Refrigeration plant is shut down (power supply as well)

## Operation and maintenance manuals

Under current regulations the alarm system must 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)
- There are special requirements for CO<sub>2</sub> detectors for use in freezers (low temperature rooms). Infrared optical measurement technology can malfunction due to condensed air and mists. Select only products designed for low temperatures.
- Flashing lights and sirens that are activated must NOT be installed so they are visible to the public and thus may cause unnecessary anxiety or action.