



Ammonia alarms in refrigeration plants

Ammonia is a commonly used refrigerant, but since high concentrations can directly be lethal, ammonia must be treated with great respect.

In most cases, the main purpose of using gas detection systems for ammonia is to trigger an emergency alarm. The alarm should lead to actions such that no danger to people within the facility or in the surroundings arises.

When is gas detection needed?

The use of ammonia in refrigeration plants is regulated by the European Refrigeration Standard (EN378: 2008), where the requirement is that all plants with a charge > 50 kg must have installed gas detection systems in machinery rooms and other areas where there is a risk to personal safety or of reaching practical limits.

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 others, that buildings and workplaces where a 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 incident.

Toxic gases and what specific measures to be taken. Ammonia is typically a toxic gas. The legislation usually recommends a risk analysis to avoid and diminish the risk exposure. Generally, the risk analysis leads to a recommendation to install gas detection equipment.

What is an alarm system?

A gas detection system consists of a chain – from the discovery of the risk to the corrective action! It is important to think through the measures to be taken at each alert level, and to plan for the appropriate staff to be informed, such as service personnel, individuals responsible for safety and rescue services.

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 and 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 the room characteristics, supply and exhaust ventilation, etc. to achieve maximum coverage and 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) 50 – 300 ppm
- Leakage alarm (B) 500 – 1000 ppm
- Main alarm (A) > 3000 ppm

Alarm level function

- C = Alarm for maintenance staff.
- B = Urgent alarm for maintenance staff. Flashing lights and sirens are activated.
- A = Emergency alarm; as the B alarm plus alarm to the rescue services. The refrigeration plant is shut down (power supply as well)

NOTE! High level (A) in the vent lines should not be passed on to rescue services.

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 loss of power. (For at least 60 minutes)
- During service and oil change it's likely that the concentration of ammonia will rise to 100-200 ppm. Hence it makes sense to have an installed "service function" that temporarily blocks outgoing alarm.
- Flashing lights that are activated at C or B alarm levels must NOT be installed so they are visible to the public, thus possibly causing unnecessary anxiety or action.
- Normally, when ammonia leakage has occurred, the refrigeration plant shall be stopped and the site should be ventilated, but in some cases it may be preferable to contain the leakage until the appropriate action can be taken.