

A Solution for Safely Monitoring Ammonia Leaks in Liquid Circuits according to EN 378

GfG's (Switzerland) MiniCal III made in Switzerland offers a solution to safely monitor NH₃ leaks. So what do they mean by 'safely'? Safely means that the operator may be sure that leakages are already detected in smallest ppm quantities! This is only possible if the measuring device is able to continuously detect even smallest leaks in closed or open circuits. This begs another question: Why is measuring the smallest concentrations of NH₃ so crucial? The NH₃ will corrode non-ferrous metals and damage the pipeline network, causing considerable reconstruction costs and environmental contamination.

Ammonia is an aggressive and toxic chemical and the potential risk to public health and the system itself should not be underestimated. This risk can be minimized as an early and reliable detection of leaks minimizes the effects and damages and will allow operators to conform to Europe's EN378 regulations. The MiniCal III can offer a solution to both air and room monitoring and water, water/glycol-brine circuit monitoring.

Not only is the monitoring of the air in regards to NH₃ leakages of high importance. If, for example, cooling systems are cooled down with water from public waters, streams, rivers, etc. it is of paramount importance to monitor the coolant for NH₃ leakages downstream before it reaches the consumer, condenser or desuperheater.

Many systems are optimised in the secondary circuit using water/glycol or special brine mixtures. Thus, there is a risk of leakage between the primary circuit ammonia and the brine circuit. If the secondary system includes components made from non-ferrous metals, then the escaping ammonia is bound in to the non-ferrous metal (copper). The result of this change in the copper's composition will be a gradual erosion of the wall's thickness, leading to an eventual rupture. Therefore, it is absolutely vital to detect this in a secure way (down to ppm range).

NH₃ in water/glycol circuits can only be detected, in the required concentrations, via ion-selective measuring systems, such as the GfG MiniCal.

If leakage occurs without monitoring, it would be necessary

to drain and clean the whole system. As a consequence, there would be considerable subsequent costs for the operator.

In open systems i.e. lakes, streams, rivers the water will considerably be contaminated by an ammonia leakage which will result in enormous damage to the marine environment. In addition, the cooling system would need to be completely overhauled.

If the GfG MiniCal III monitoring is installed, the operator will be warned of leakage at an early point in time and secondary measures can be taken to avoid further discharge of NH₃.

GfG's latest monitoring technology offers absolute security to the operator by ion-selective measurement methods. The long-term reliability of more than 1000 systems, which GfG has already installed are proof of this measuring technology's suitability for a variety of installations such as (evaporative condensers, desuperheaters, catch basins, etc.) or brine circuit mixtures such as ethylene glycol, Tyfoxit, Pekasol, Marlotherm, Therminol, Gilotherm, Santotherm, Talin, and many more.

So how does this system work? In water ammonia will be present as an ion. The escaping of NH₃ dissolves in water and can be detected as NH₄⁺ ion by means of an NH₄⁺ ion-selective electrode. In all direct measurements in water, whether if in the circuit or in the basin, an electrode selectively measures and therefore only one measuring station is required downstream of the consumer/condenser, etc. The provided measuring systems can be used up to an operating pressure of 6 bars. Optionally

Measuring systems are also available optionally for pressures up to 10 bars with limits of detection of smallest concentrations of 0.2 ppm ... 10/100 ppm as measuring range. At the case of this type of a leakage only the NH₄⁺ ion which has escaped into the water will be measured.

In water/glycol or brine circuits, the ammonia cannot dissolve in the mixture since the shift in balance of hydrogen ions on the one hand and the inhibitors and stabilizers on the other, do not permit such a dissolution. In other words in brine mixtures, leakages of ammonia are mostly NH₃ gas. For this reason, the measurement is performed using NH₃ ion-gas selective electrodes. It is necessary to adapt the inner buffer as well as the membrane system of the electrode according to the brine mixture which needs to be measured.

The company GfG is unsurpassed in the monitoring of water/water-brine circuits due to their years of experience and product development within this discipline.

In most cases, these measuring systems are directly installed downstream before reaching the consumer in closed circuits and can be used for pressures of 6/10 bars and temperatures of -45°C - +90°C.

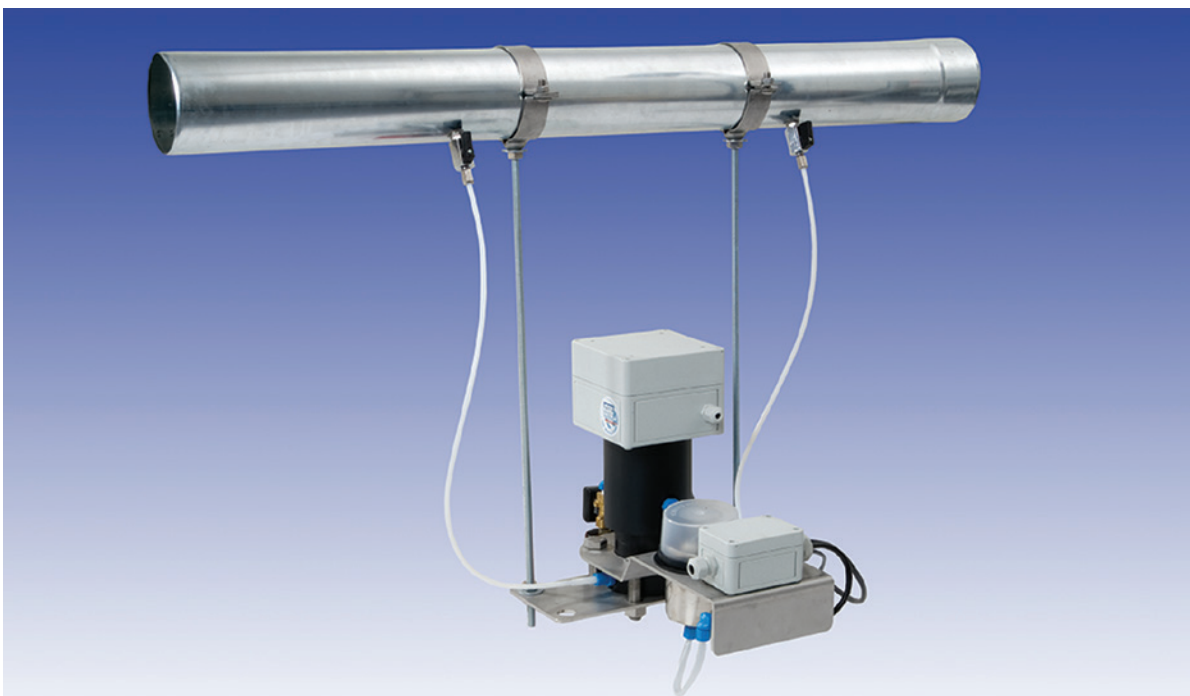
GfG's trained technicians offer consultation on the advantages regarding choice, placing and the monitoring concept for the specialised companies with a need for their kind of system. GfG's consultants have the experience and knowledge of the range of products for gas monitoring and water monitoring as well as complete warning centres with corresponding contact outlets and the diagram editing. Therefore, interfaces and additional costs resulting of different works, service costs, etc. are avoided and the procurement costs as well as the service costs are kept at a minimum.

The GfG specialised consultant will consider the regulatory requirements and directives as well as the on-site conditions and integrate them into a safety concept in cooperation with the installer of the cooling system. At this stage, the shut off (machine switch off, shut-off valves, etc.) needs to be carried out with specialist knowledge of cooling techniques. Also, the machines and valves need to be set so the monitor can report when a measurement indicating an emergency is taken and described in the safety concept by the installer of the cooling system.

These comprehensive measures guarantee trouble-free operation with the ammonia coolant and the operator can be assured of the best protection for his system because leaks will be detected at an early stage before the system is damaged.

MiniCal III systems are currently installed in a wide range of facilities including artificial ice-rinks, airport cooling systems, food production, slaughterhouses, cold storage warehouses, industrial cooling systems and breweries.

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GfG MiniCal III Item No. W12052III.DD