

Press release

Ammonia – naturally safe

Frankfurt (Main), 06-20-2016. In the times of climate change and energy revolution, ammonia is the logical alternative for a number of applications in the fields of refrigeration and air conditioning: Energy efficiency and climate friendliness are the strong points of the natural refrigerant. With the right experts, made-to-measure planning and operational safety are possible even for large and complex systems.

In particular against the background of the EU regulation on fluorinated greenhouse gases, ammonia (NH₃) is becoming more and more prevalent as a refrigerant: With an ozone depletion potential (ODP) and a global warming potential (GWP) of 0, it is extraordinarily environment-friendly. What's more, the natural refrigerant, also called R717, has excellent thermodynamic characteristics – freezing and refrigerating systems using ammonia work efficiently even at high outside temperatures.

Modern safety standards and transferring knowledge to operators

International regulations, as for example the European Standard EN 378-2, make sure that systems and appliances filled with the refrigerant R717 work safely. Ammonia systems built in the past 20 or 30 years meet the highest safety standards. The technological development has also made substantial progress: Modern detectors and monitoring methods provide additional safety. In order to guarantee a safe and correct everyday operation of such systems, the industry has concentrated on providing the necessary training. For example, a number of manufacturers of units and systems as well as components offer special training courses where qualified personnel can learn about the safety provisions and prepare for the work with ammonia-based systems.

Maximum safety thanks to customized training

For more than 15 years, Star Refrigeration Ltd., a member of eurammon, has been offering its customers specific hazard assessments for ammonia-based systems, so-called Ammonia Hazard Assessments (AHA). Star's consultancy team, Star Technical Solutions (STS), has worked with operators to ensure they comply with local regulations and to work out individual, customized hazard assessments for the actual site. "Standards are important, but training even more so," says Andy Pearson, Managing Director for Star Refrigeration Ltd.

The hazard assessment takes into account all parameters and generates a separate risk assessment for every possible scenario. This is based on the actual site conditions, system design, and the present safety systems. It also considers emission scenarios in different weather conditions. Star Technical Solutions also train site personnel on what action(s) should be taken in the event of a dangerous situation happening on site and inform them of possible risks.

"Another way to simplify the handling of ammonia and reduce possible risks is to reduce the refrigerant contents," says Andy Pearson. This means that the safety of ammonia-based systems can also be improved by using a combination with CO₂, another natural refrigerant, in the medium or high temperature ranges, and cascade systems in the low temperature range.

Reduced contents for improved safety

Reducing the amount of ammonia was the solution for a project realized for the Rapp brewery by eurammon member GEA Refrigeration Germany GmbH. The modern refrigerating system uses 1,600 kg of ammonia – in Germany, the regulations of the Federal Immission Control Act (Bundes-Immissionsschutzgesetz) apply only to quantities of 3,000 kg or more.

Previously, the brewery used R22, a partially halogenated fluorochlorocarbon (H-CFC), whose availability has been restricted for several years already. Since January 1, 2015, it must not even be used in old systems anymore, which means, that also the maintenance of old systems is no longer possible. Now the traditional Bavarian family business wanted a new cooling system that met all their priorities: durability, energy efficiency, and a high level of availability. Also, the new system should do away with the old, decentralized structures, and react flexibly to the seasonal fluctuations of the cooling demand. eurammon member GEA Refrigeration Germany developed a custom-made, environment-friendly solution that was able to measure up to all of these requirements – with the natural refrigerant, ammonia.

The system is equipped with five NH₃ piston compressors by GEA Grasso, which between them provide a cooling capacity of 1,000 kW. The efficient GEA Grasso piston compressors have power levels of 50, 75 and 100 percent, making it possible to adjust the refrigerating capacity in close increments. This guarantees a particularly effective partial load operation. The five compressors are activated gradually, as required. A load alternation system makes sure that all compressors are operated as equal as possible in order to have a balanced

amount of operating hours for each compressor. While in winter one machine is sufficient, up to four compressors will be running at the same time in summer. The fifth machine serves as a backup for failures, and makes it possible to carry out maintenance work without production downtimes. In order to improve the operational safety, most modern isolation valves were installed and all pipes in the entire plant are designed for a service life of 50 years.

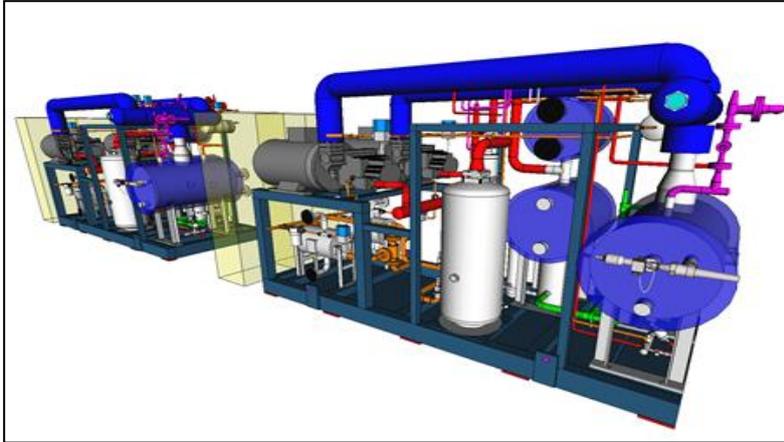
Safety even in sensitive areas

The fact that ammonia systems are a safe option even for densely populated areas is illustrated by a project realized by Walter Wettstein AG in Zurich. From 2011 until 2015, the Balgrist Campus AG, together with Nissen Wentzlaff architects and Grunder Kiwi AG as HVAC planner, had planned a new campus building. The focus was on a long-term solution that was both environment-friendly, and as energy-efficient as possible. Also, the system should be able to efficiently utilize the cooling and heating potential of the building. An ammonia heat pump was the perfect solution. The challenging thing about this project was that an ammonia-based system had to be implemented adjacent to a large hospital complex right in the middle of a major city in Switzerland.



eurammon member Walter Wettstein AG came up with a solution that satisfied all ecology-, economy- and safety-related aspects: The experts installed two combined chilled water/heat pump systems, filled with 80 kg of ammonia each, and providing between them a total cooling capacity of 720 kW, and a heating capacity of 900 kW. The compact units feature fully welded plate heat exchangers and

integrated separators. The system was put into operation in 2015. This project shows that ammonia-based systems are safe even in sensitive contexts, and are in no way harmful to the environment.



Caption: Planning and production of the units at the factory of Walter Wettstein AG in CH 3073 Gümlingen

Ammonia – always a good choice

Considering the use of F-gases has been gradually banned by the European Union, ammonia has a safe future as an alternative to synthetic refrigerants. Planners and operators would be well advised to consult experts and look into national safety regulations regarding R717. With the right knowledge, ammonia is an efficient and at the same time safe solution for a wide variety of requirements.

About eurammon

eurammon is a joint initiative of companies, institutions and individuals who advocate an increased use of natural refrigerants. As a knowledge pool for the use of natural refrigerants in refrigeration engineering, the initiative sees as its mandate the creation of a platform for information sharing and the promotion of public awareness and acceptance of natural refrigerants. The objective is to promote the use of natural refrigerants in the interest of a healthy environment, and thereby encourage a sustainable approach in refrigeration engineering. eurammon provides comprehensive information about all aspects of natural refrigerants to experts, politicians and the public at large. It serves as a qualified contact for anyone interested in the subject. Users and designers of refrigeration projects can turn to eurammon for specific project experience and extensive information, as well as for advice on all matters of planning, licensing and operating refrigeration plants. The initiative was set up in 1996 and is open to companies and institutions with a vested interest in natural refrigerants, as well as to individuals e.g. scientists and researchers.

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