



TRENDING TOPIC

# AMMONIA-RESISTANT FILTER ELEMENTS – OPERATIONAL SAFETY FOR COOLING SYSTEMS

Ensuring a seamless cold chain across international supply chains and complex, multi-stage production processes has occupied the food industry for decades. More recently, the focus has been on reducing energy consumption with the aim of reducing costs and CO<sub>2</sub> emissions. Who thinks about the filters in the lubricating oil circuit? STAUFF has designed filter elements specifically for environments containing ammonia that significantly increase the operational safety of industrial cooling systems.

**P**iston and screw compressors are the motors of the refrigeration circuit. They compress the refrigerant, thus setting the industrial cooling in motion. In order to ensure continuous and energy-efficient operation, the compressors are equipped with a lubricating oil system. Like any oil, it needs to be carefully filtered and wear and other dirt particles need to be removed from it during operation. “The more carefully the lu-

bricating oil is filtered, the more reliable and efficient the compressors run and the more stable the cooling is,” explains Dipl. Ing. Hartmut Reich.

He is product manager for the “Filtration Technology” division at Stauff. The portfolio of the company, which is well-known and active in the international OEM market and has its headquarters in Werdohl in the Sauerland region, comprises a wide range of

## 01 Special adhesives, seals and filter materials are used in oil filters for refrigeration systems with ammonia

filter housings and replacement filter elements for industrial fluids, including hydraulic and lubricating oils. Around 10,000 different types for all industries and applications are manufactured in Werdohl. “When it comes to industrial refrigeration systems, there is an additional requirement for our products: resistance to ammonia (NH<sub>3</sub>).” Since standard filter elements do not have this property, Stauff has developed its own series for this area of application.

### AMMONIA IN THE OIL CIRCUIT

Ammonia has been used for decades as a refrigerant in industrial food refrigeration. It has good thermodynamic properties, is energy efficient and has neither ozone depletion potential (ODP) nor greenhouse gas potential (GWP). It is also readily available, which makes it economically attractive to use. In the last twenty years, the significance of ammonia in refrigeration technology has even increased in view of the increasing consideration of climate protection and the corresponding requirements for companies. However, when NH<sub>3</sub> comes into contact with oil, unfavourable chemical processes are initiated and the oil ageing is accelerated. STAUFF has been dedicated to this topic for several years and has developed ammonia-resistant filter elements in cooperation with manufacturers and users of industrial refrigeration systems, which are now firmly established on the market.



### STANDARD FILTERS EXACERBATE THE PROBLEM

The Stauff filtration expert explains the challenge: “Due to the design, the diffusion of gaseous ammonia into the lubricating oil circuit of the screw compressors cannot be completely prevented. However, the chemical reaction between the lubricating oil and the refrigerant creates deposits that clog the filters and lines and cause heat transfer to deteriorate. At the same time, the physical properties of the oil change. Volatile

## “FILTRATION IS AN INTEGRAL PART OF THE DESIGN”

**Dipl.-Ing. Hartmut Reich is a filtration expert at Stauff. Hydraulics is one of the key areas of application for Stauff filtration technology.**

### Mr Reich, why is filtration so critical in hydraulic systems?

Hydraulic systems depend on clean operating fluids. Even the slightest contamination in the hydraulic oil, such as dirt, metal particles or water, can lead to increased wear, malfunctions and premature failure of components. Effective filtration extends the life of the system and reduces unplanned downtime and maintenance costs.

### What consequences does insufficient filtration have for the reliability and efficiency of machines?

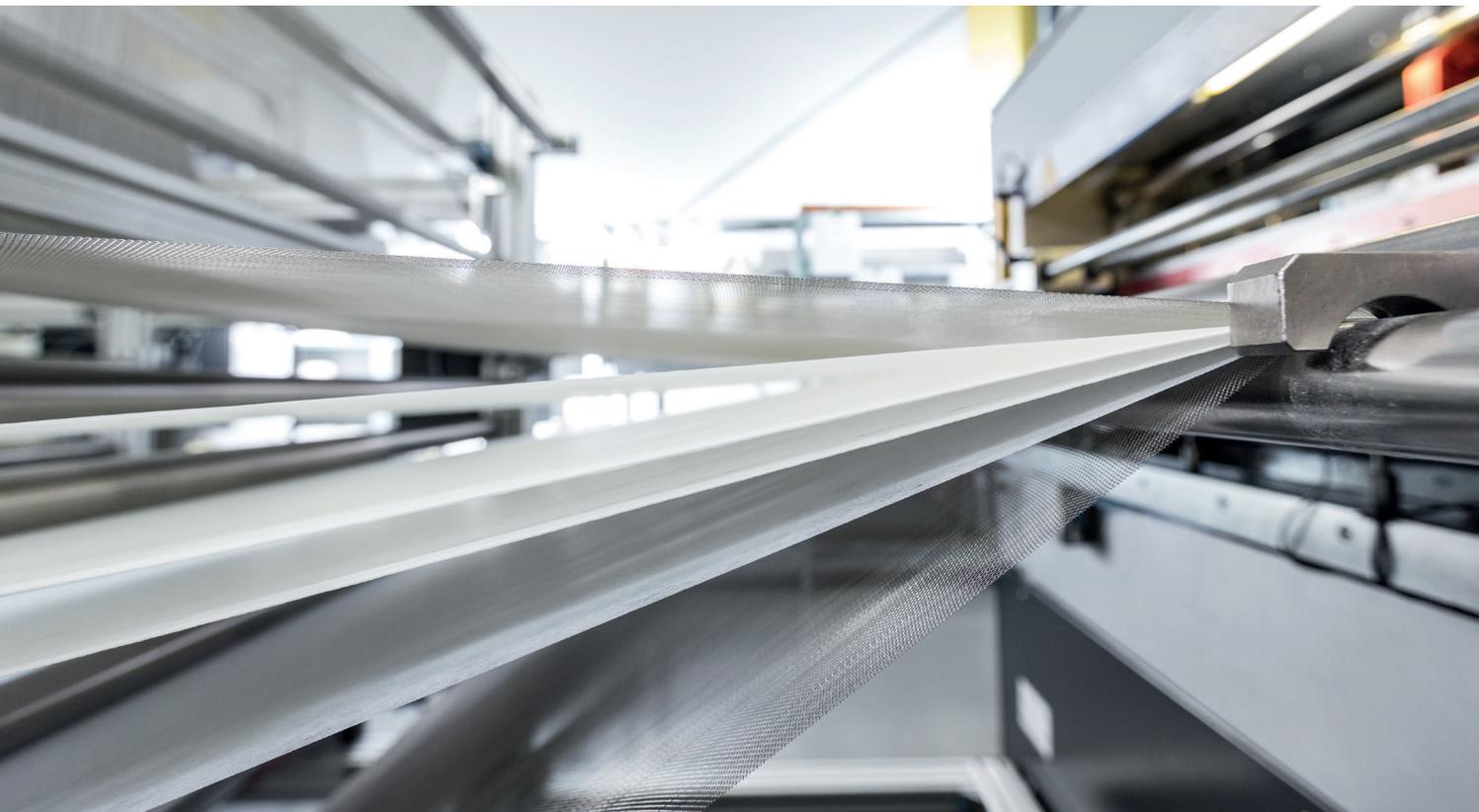
Contamination in the hydraulic oil is the main cause of hydraulic failures, which in turn are responsible for more than 80% of all machine downtime. Even small particles in the oil system can have an abrasive effect and damage the sealing faces of valves and pumps, for example. Moisture leads to corrosion with the corresponding particle formation and triggers processes that change the property profile of the oil. Damage to components occurs. One thing leads to another, until the regular power transmission is disrupted and the machines fail.



Dipl.-Ing. Hartmut Reich

### Why should designers consider filtration as early as the development stage?

The selection and positioning of suitable filtration systems is not a retrospective measure, but an integral part of the design. This is the only way to achieve the desired purity classes and ensure long-term operational safety. Positioning filtration at all recommended points in the system from the outset prevents follow-up costs and ensures its users stable performance of the machine over the entire service life.



## 02 Filter materials are combined: A filter element can contain up to seven different filter materials

components evaporate, the viscosity decreases and the lubricity decreases." This has a direct effect on the function and service life of key components such as bearings and seals. The risk of leakage and further damage to the system increases. "Conventional filters not only lose their filtering function, but also exacerbate the problem: Standard adhesives and many common sealing materials are attacked by the  $\text{NH}_3$ . They swell up, lose their adhesive

### » CONTAMINATION IN THE HYDRAULIC OIL IS THE MAIN CAUSE OF HYDRAULIC FAILURES

strength, become brittle or dissolve completely." This results in ever-increasing contamination of the oil. In the worst case, the entire refrigeration circuit is affected, so that not only the oil has to be changed, but the entire system has to be flushed and refilled. Downtimes and production losses are particularly critical in the food industry, however, as they not only mean economic losses, but closed cold chains are also essential for the shelf life and compliance with legal and hygiene regulations.

### OPERATIONAL SAFETY THROUGH COOLANT-RESISTANT FILTER ELEMENTS

For its special filters, Stauff only uses filter and sealing materials that retain their stability and functionality, even when in continuous contact with ammonia. A typical filter element, consists of up to seven different filter materials, which are combined and folded by a machine. This ensures a high dirt absorption capacity and filtration performance in confined spaces. The adhesives,

which are specially developed for use in industrial cooling systems and are used with a support tube, bellows and end cap, are also resistant to ammonia. The use of these special filters offers operators of industrial refrigeration systems numerous advantages. Harmful deposits are reliably retained, the viscosity of the oil remains stable and lubrication of the moving parts is permanently guaranteed. The filters need to be replaced less frequently, while reducing wear on compressors and other central components at the same time. This extends the maintenance intervals for the entire system. At the same time, downtime is minimised – a key benefit for food refrigeration, where the continuous availability of the refrigeration system is essential for product safety and quality. Overall, operating costs decrease while system efficiency increases.

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