PROJECT REPORT

POLAR
REFRIGERATION GMBH

BOG APPLICATION FOR AMMONIA STORAGE

Polar Refrigeration delivered a screw compressor skid to a chemical plant where major part is production of ammonia (NH3).

Ammonia is one of the most highly produced inorganic chemicals. Ammonia production plants worldwide producing more than 130 million of tonnes of ammonia per year, mainly used for fertilizing agricultural crops. Furthermore Ammonia is also used for the production of plastics, fibres, explosives and intermediates for dyes and pharmaceuticals.

Today, most ammonia is produced on a large scale by the Haber-Bosch process with capacities of up to 3,300 metric tons per day. The generated liquid ammonia from the process is stored in storage tanks.

Due to heat entering the tanks during storage , a portion of the ammonia continuously evaporates, creating a gas called boil-off gas (BOG).

BOG leads to an increase of the pressure in the tanks and losses of ammonia through the safety or blow-off valve which could have an impact to economic and safety problems.

To maintain a constant pressure inside the storage tanks and to reduce losses over the ammonia supply chain the ammonia gas is continuously sucked off by a customized screw compressor skid made by Polar, where BOG is re-liquefied and sent back to the tanks. The screw compressor skid has been designed for operation in a hazardous zone.

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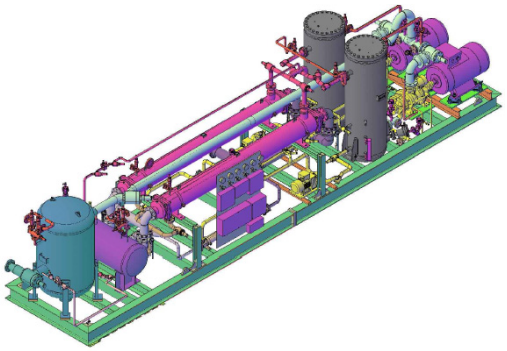
Principle

The ammonia gas is sucked off by a screw compressor through installed on skid liquid separator vessel to protect compressor from droplets of liquid. Than gas is compressed and transferred to condenser. Gaseous ammonia is liquefied by cooling water. The liquid ammonia is collected into a receiver vessel. From the receiver liquid ammonia is directed back towards the storage tank.

To increase availability of the system the most important parts of the system are redundant – compressor unit with oil circuits, oil pumps, oil filters, oil coolers, ammonia condensers.

In order to minimize the pollution of process ammonia with the compressor oil skid is equipped with specially designed efficient oil separator that guarantees oil carry over not more then 5 ppm.

The control logic of central control system is performed by remotely located PLC based on Simatic S7-300. Locally skid has explosion-proof control box to operate compressors during maintenance procedures.



Technical data

Make of compressor	GEA Grasso
Type of compressor	L-type, screw, oil flooded
No of compressor	2 (1 working / 1 standby)
Oil carry over	less than 5 ppm(w)
Refrigerant	NH3 (R717)
Design massflow	2000 kg/h
Design suction pressure	6,16 bar(a)
Discharge pressure	17,8 bar(a)
Motor rated power	160 kW

ATEX Specification

Zone	Zone 2
Group	II A
Temperature class	T1

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