



Ammonia heat pump recovers waste heat at Alfa Laval production plant

Alfa Laval is one of the world's largest heat exchanger suppliers, supporting customers with products that boost energy efficiency and performance in their processes. At their Gunnesbo site in Lund, south Sweden, Alfa Laval is also leading the industry in heat recovery. Since 2013 the low temperature waste heat that is generated in the component production has been recovered via an innovative ammonia-based heat pump system.

This heat pump solution is able to meet the heating requirements of the entire factory and corporate headquarters. The waste heat alone is able to accommodate both space heating and hot water demand. This not only avoids exposing the environment to roughly 146 metric tons of CO₂ per year, but it also just makes great business sense. Prior to the heat pump installation, Alfa Laval purchased around 3,700 MWh of district heating. Today that number can reduce by an estimated 85% thank to process heat recovery. In other words, the investment paid for itself in under three years.

Double efficiency, easily implemented with Ammonia as refrigerant

Taking the sustainability further it was also important to avoid selecting a refrigerant with possible negative impact on climate or environment. The demand was to select a natural and future-proof refrigerant. It was then found possible to obtain a heat pump system with twice the efficiency, versus using existing off-the-shelf commercial system, when applying an industrial system with the natural and future-proof ammonia as refrigerant.

Lower charge with semi-welded plate heat exchangers

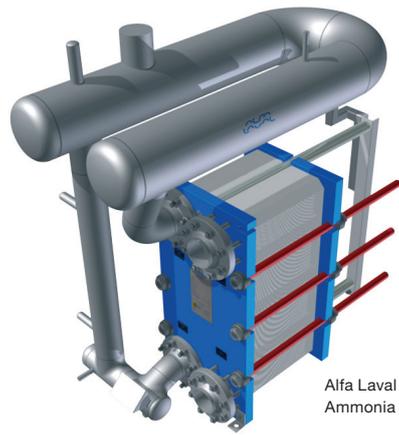
The heart of the newly designed system is a flooded semi-welded evaporator, combined with an Alfa Laval U-turn separator. It absorbs the thermal energy of the oil cooling system, which is heated to around 40°C in the factory's plate production pressing operations. The heat pump after compression delivers the heat from the semi-welded condenser to the buildings' heating-water circuit, thus boosting the water temperature to 65°C. The system is keeping the ammonia filling to a minimum benefitting these compact, high efficiency semi-welded plate heat exchangers and thus only needs 40 kg of ammonia. In total, the heat pump has a heating capacity of 827 kW.

Really practical

Alfa Laval is using this successful project as a showroom for customers, organisations, and employees to see the benefits for themselves.

Major equipment in the plant

- Sabroe reciprocating ammonia compressor
- Witt high pressure float valve
- Alfa Laval MK15-BW semi-welded plate evaporator, equipped with U-turn ammonia separator module
- Alfa Laval M10-BW close approach semi-welded plate condenser



Alfa Laval U-turn™
Ammonia flooded evaporator



Heat pump machine room

Industrial heat pump	Alfa Laval, Lund
Environment	
Source	Heat recovery from plate presses
Supply	Space and DHW heating
Temperatures	
Temperature source (30% glycol)	40°C → 30°C
Evaporation temperature	28°C
Temperature supply (water)	55°C → 65°C
Condensing temperature	65°C
Energy input compressor	
Drive power	Electricity 117 kW
Refrigerant	
Refrigerant	R717/Ammonia
Global warming potential (GWP)	0
Ozone depletion potential (ODP)	0
PFAS content	0
Quantity	40 kg
Summary energy efficiency	
Annual heating production	3,100 MWh/year
Heating capacity	823 kW
Cooling capacity	706 kW
Useful cooling	Yes
System with thermal storage	Limited peak hot water buffer
Expected operating hours	5,000 hours/year
COP heating	7.0 heating kW/electrical power kW
CO ₂ reduction	146 metric tons/year
COP cooling	6.0 cooling kw/electrical power kW
Total COP	13.0
Finance	
Payback time	< 3 years
Expected time in service	30 years
Annual cost of service	< 5% of investment cost



Energy savings
85%



Emissions savings
146 tonnes/year

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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Alfa Laval reserves the right to change specifications without prior notification.