

Heat Pump RWZI Utrecht

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Scope of the project



– District heating grid Utrecht (Brownfield project) owned by Eneco

Brownfield situation :

Industrial Heat pump

- Source Heat pump : Purified effluent water (Sewage treatment plant)
- Capacity : 27 MW
- Number of houses connected : 20.000
- Important requirement : Performance guarantee although quality effluent water is unclear.

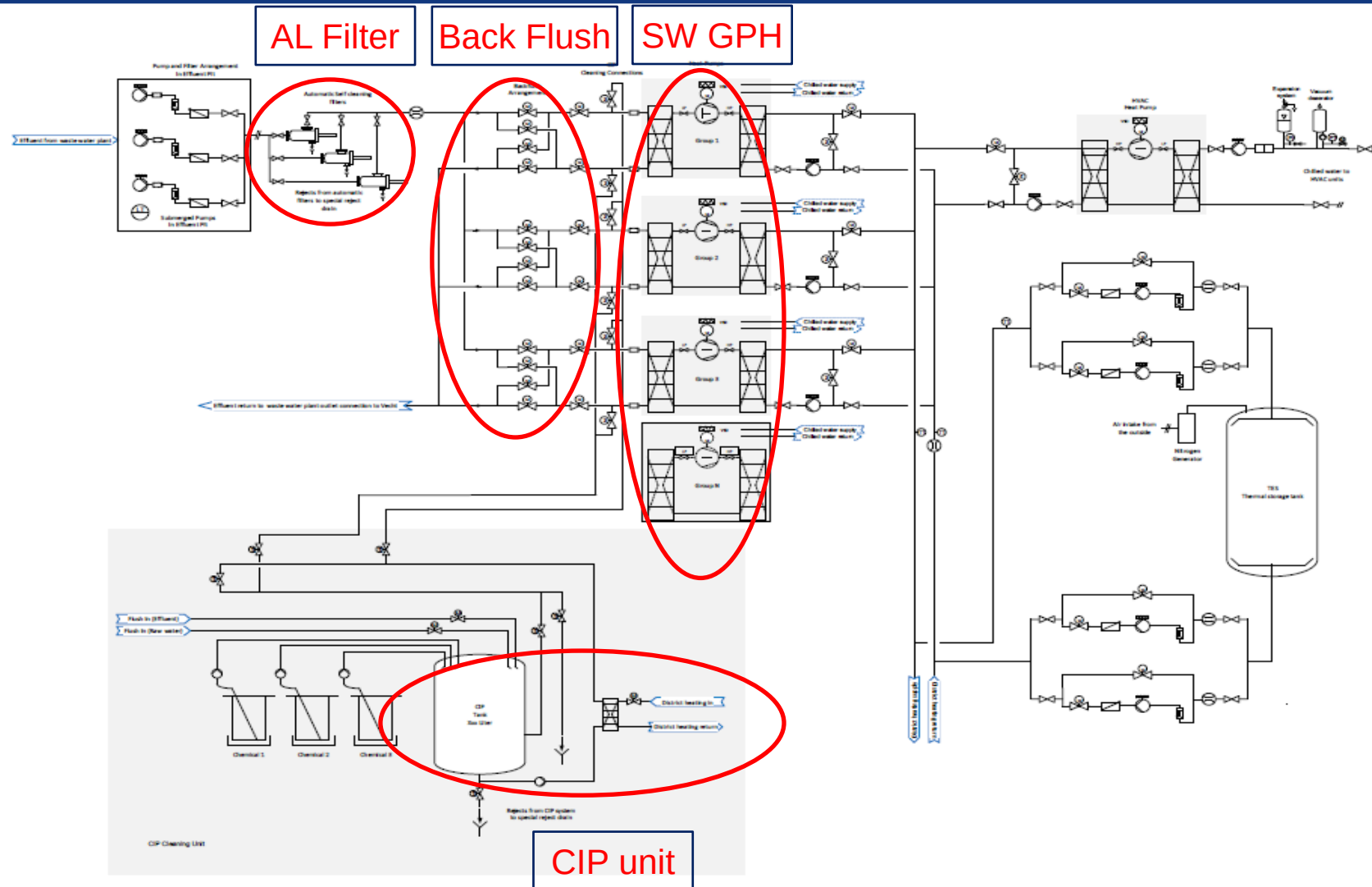
First contact started in May 2020

Decision for Ammonia Heat pumps

Alfa Laval Scope: Filter Concept (Filter, Backflush Valves, CIP)
Evaporators (Semi-Welded Plate Heat Exchangers)
Condensers (Semi-Welded Plate Heat Exchangers)

Process Flow Diagram

– Productscope for Alfa Laval

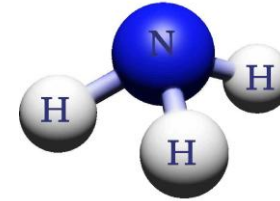


Design Evaporators

– Semi-Welded Plate Heat Exchanger 8 x T20MWFS164

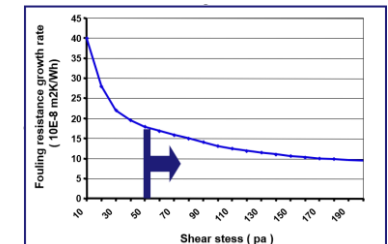
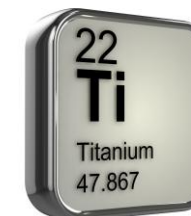
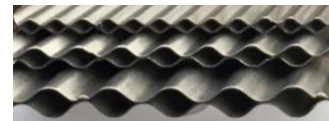


- Low NH3 charge (versus S&T)
- Small footprint (versus S&T)
- 4 x 2 heat exchangers placed, parallel (+ 1 spare)
- Shear stress 70 pa
- Free channel 4 mm
- Fouling factor 1,2
- K-value margin 10%
- Oil drain on back side
- Design pressure 21,7 barg
- Plate material Titanium 0,7 mm
- Ratings for different conditions



Calculation:

$$\text{Margin} = 100 \frac{k_{\text{clean}} - k_{\text{service}}}{k_{\text{service}}}$$



Design

– Waterside system



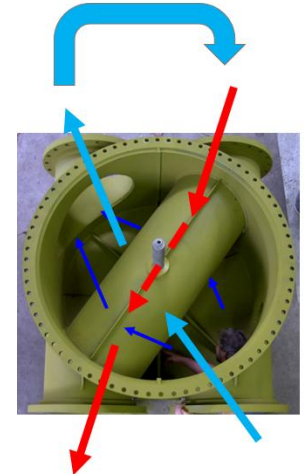
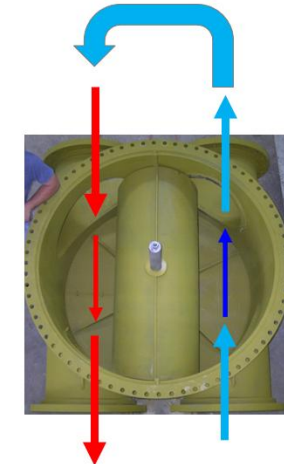
2 x Automatic Filter ALF 40R

- 700 m³/h – 2200 m³/h (totally needed 1800 m³/h)
- Titanium basket, mesh size 1,5 mm



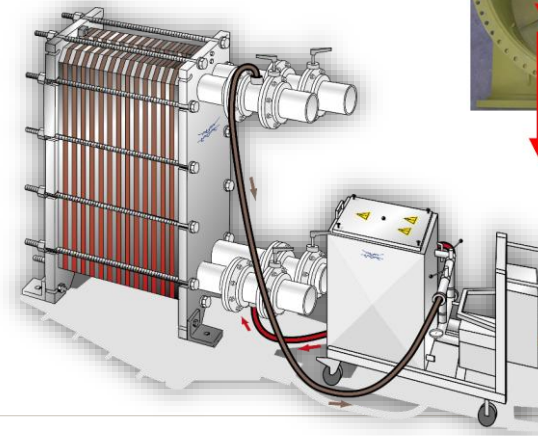
8 x Back Flush Valves

- Each heat exchanger equipped with a backflush valve
- Backflushing every 30 minutes for 30 seconds



1 x AL Cip unit

- CIP 1800L (HEX volume 600 l)
- Fixed installation



Final Project scope



8+1 x T20MWFS164



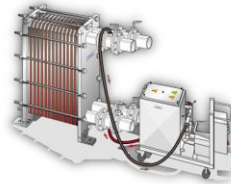
2 x ALF 40R



8 x Back flush valves
type HX



1 x CIP 1800L



8 x T10EWFX as condenser

Operator:



Heat Pump
Manufacturer:



YouTube:

https://youtu.be/n_BRoP9MAu4?si=ppvG3vQCxEV6RMxJ



Findings



- In operation since September 2024
- Backflushing every 30 minutes for 30 seconds
- Backflushing has no effect on compressors
- CIP was not needed until now
- Analysis of the water to determine the right CIP liquid
- Presence during commissioning & during thermal performance measurements