CHILLVENTA

Chillventa Specialist Forums 2024
Chillventa Fachforen 2024

CONNECTING EXPERTS.

Overcoming the obstacles to achieve temperature above 100 °C with hydrocarbon-based Heat Pumps

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Johnson controls Denmark

Johnson Controls at a glance

Nearly
140 Years
of innovation experience

More than
9,200
active patents

Named in
40+
leading sustainability

We are in
90%
of the world's most iconic buildings

100,000
experts globally

4+ million
customers globally

More than
+35.2M
metric tonnes of CO_2e reduced for our customers since 2000

Customers saved more than
$7.2 billion
in energy and operational savings since 2000

150 countries offering a local service from
2000 locations

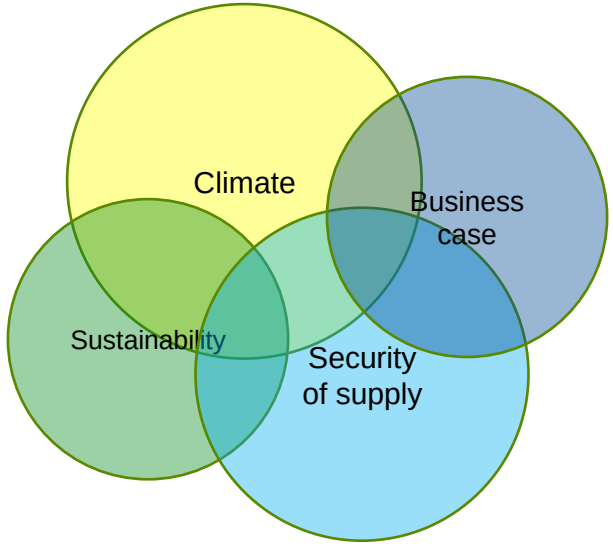
$78 million
in charitable contributions in the past 5 years

+1.86 million
volunteer hours in the past 5 years

100% increase
in energy productivity since 2022

Why is heat pumps needed?

We need a reliable, safe and cheap energy system for the European union



Doubling of the rate of deployment of heat pumps, and measures to integrate geothermal and solar thermal energy in modernised district- and communal heating systems.

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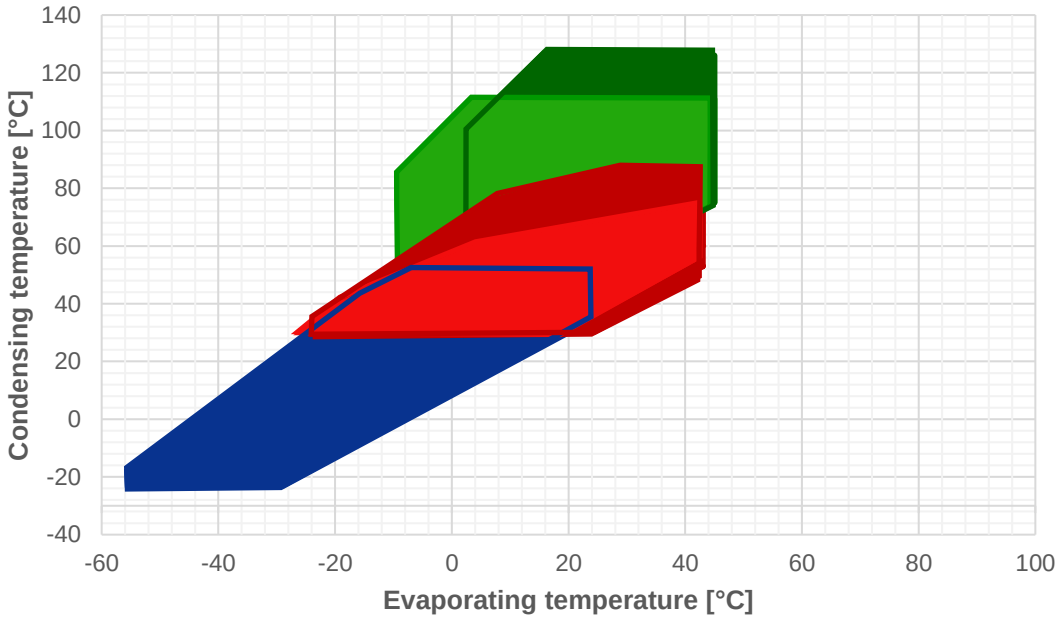
Why development of new heat pumps

Current

- Ammonia (28 bar) / R-717 brings temperature up to 56 C
- Ammonia (52 bar) / R-717 brings temperature up to 77 C
- Ammonia (60 bar) / R-717 brings temperature up to 90 C

Close to release

- Iso-butane / R-600A (28 bar) brings temperature up to 110 C
- Butane / R-600 (28 bar) brings temperature up to 125 C



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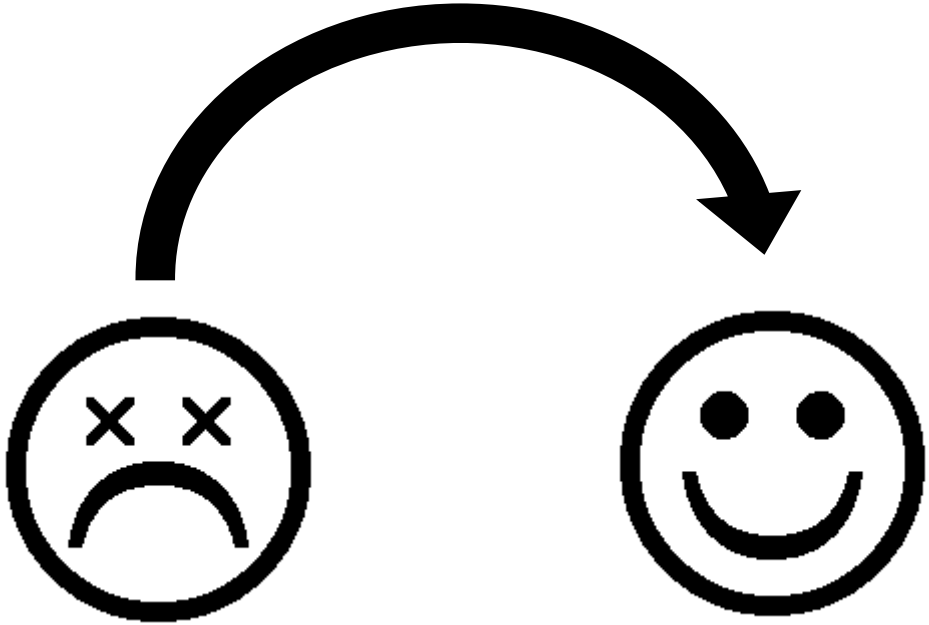
Challenges to overcome

- Equalization of during standstill
- Condensation of liquid unwanted places
- Superheat is important
- ATEX necessity or not for A3 refrigerant



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Equalization of during standstill

- Big temperature difference between operating and standstill
- Example of operating condition could be:
  - Suction pressure: 2,8 bar (G) = 40°C
  - Discharge pressure: 21,1 bar(G) = 120°C
- Butane @ 19°C = 1 bar (G)
- This makes it possible for gas to condensate un-wanted places during standstill if this challenge is not addressed
- Electrical heat is required to address this during standstill

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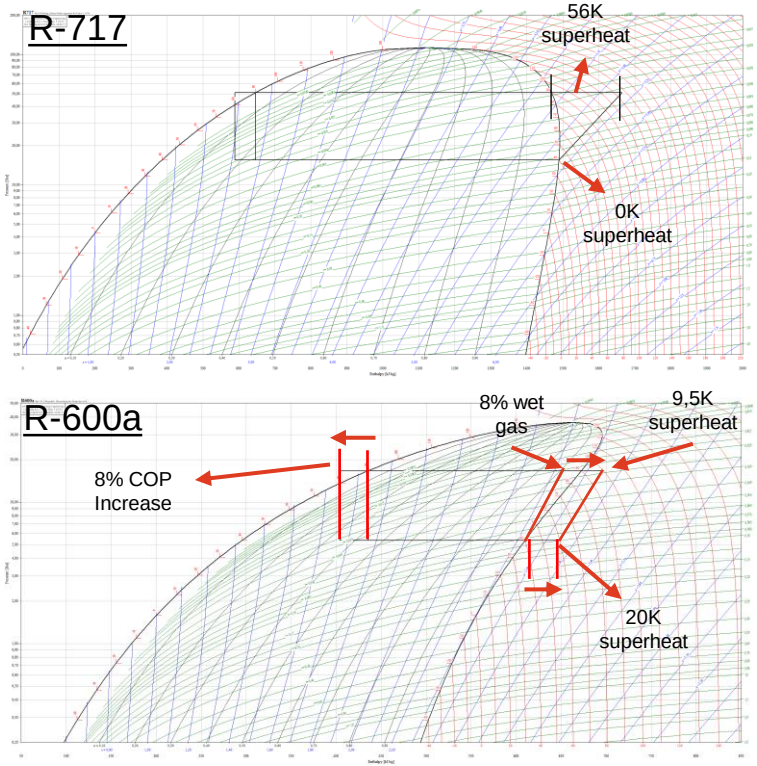
Superheat is important

Std. with suction gas heat exchanger(SGHX)

- Avoid compressing into 2 phase area
- Improved COP with SGHX



Operating condition

- Evap. +40°C & Cond. 90°C

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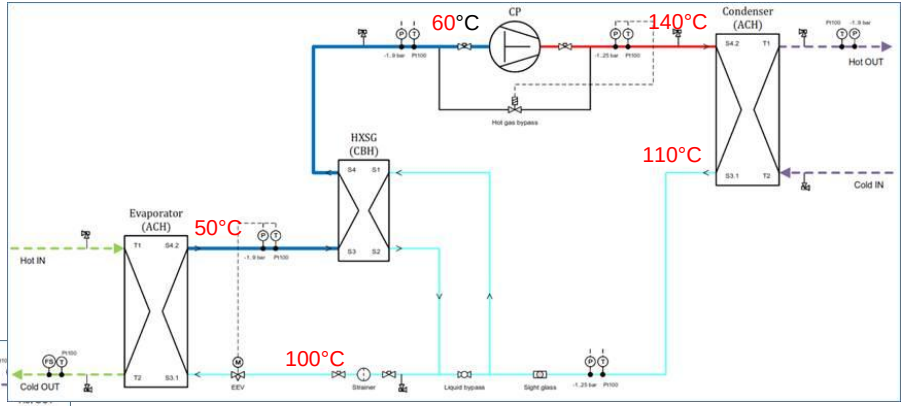
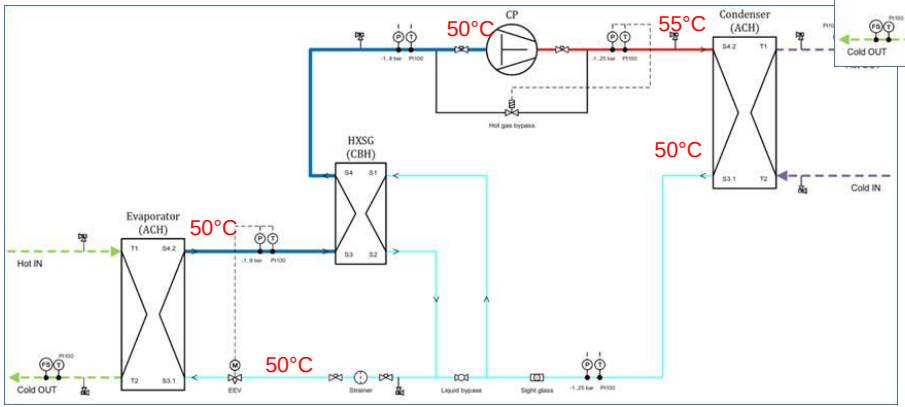
Superheat is important

Stable operating



Initial after start-up



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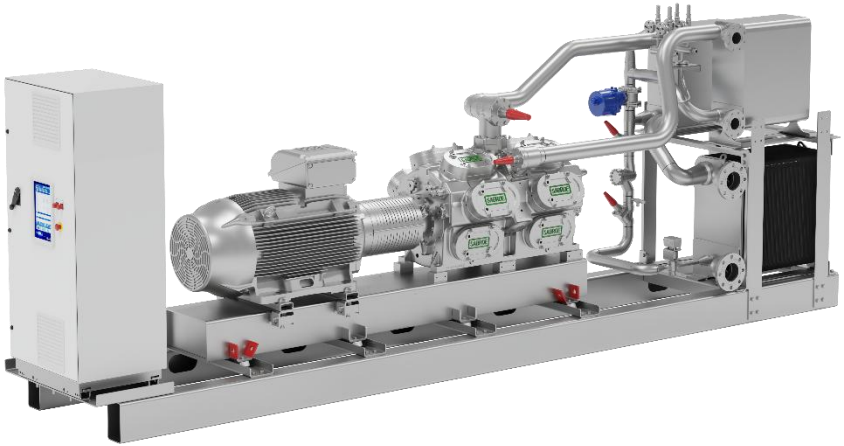
HitemHP key points

- Standardised & modular industrial heat pump
- Hydrocarbon; Efficient, environmentally friendly and low-cost refrigerant
- Outgoing water temperature up to 125°C
- Heating capacity up to 1.200 kW
- Heat pump based on low pressure refrigerants
- Longer service intervals compared high pressure compressors
- High energy-efficiency, low operation cost
- Low refrigerant charge
- Outstanding part-load performance and maximum operating flexibility
- Small footprint, 1.200 kW, only 6,5 x 1 x 2 m (L x W x H)
- Large capacity range with SMC 104, 106, 108, 112 & 116 S & L



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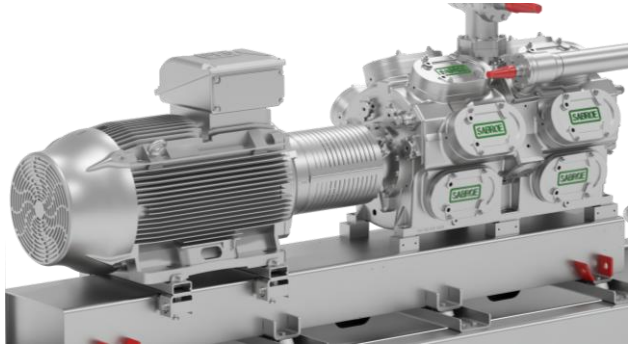
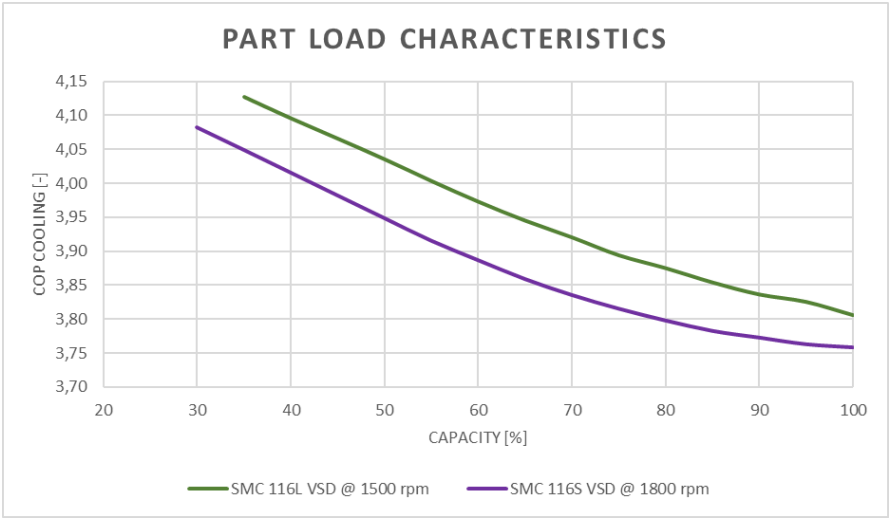
HitemHP compressor range

High flexibility of utilizing Sabroe standard pressure range of compressors

- Sabroe SMC compressor 104, 106, 108, 112 & 116
  - S versions up to 1.800 rpm
    - Min. turndown: 28%
    - Capacity reg. band: 28-100%
  - L versions up to 1.500 rpm
    - Min. turndown: 33%
    - Capacity reg. band: 33-100%





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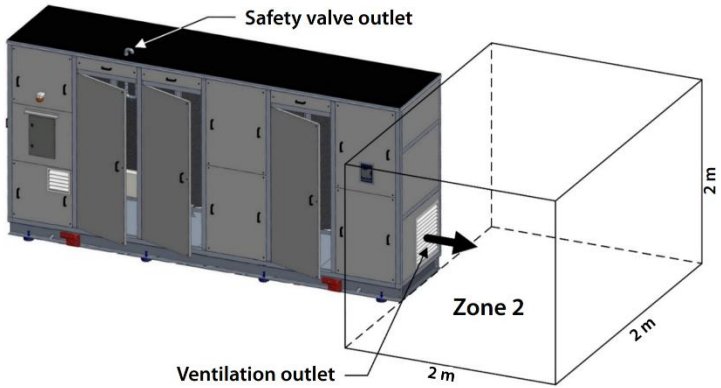
ATEX necessity or not for A3 refrigerant

- Design according to EN378 and EN60079-10 opens for different solutions
  - Ventilated enclosure in occupied space
    - Requires constant flow
    - Stop of equipment if flow stops
  - Machinery room placed outside of occupied spaces
    - ATEX component for equipment that is powered on during leakage can occur like:
      - Gas detectors
      - Ventilator etc.
    - Power cut off to non-Atex equipment if refrigerant is detected
- Using a class A3 refrigerant(flammable) **doesn't** necessary require full ATEX components on the heat pump
- NH3 and HC based chiller and HP **not** in the same machinery room



NB: This is not a complete exhaustive list each company needs to do their own risk assessment

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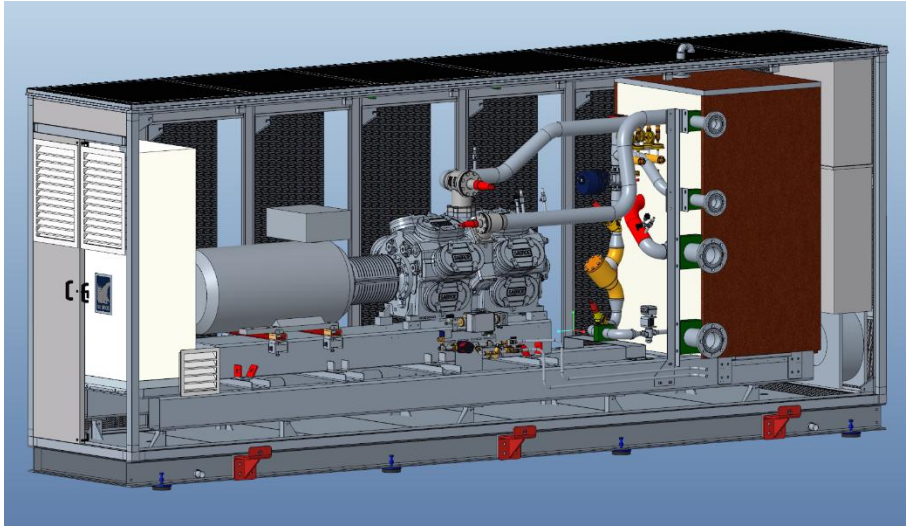
HitemHP – Enclosure

Enclosure features

- Available for both in door installation and outdoor installation
- Frame made of aluminium profiles
- Outside plates of aluzinc (0.8 mm) for excellent corrosion resistance
- Perforated galvanised sheet plate inside
- Inside sheet plate is double-cross reinforced
- Roof is waterproofed with bitumen membrane
- 50 mm insulation in panels, 40 mm in doors and removable panels
- Adjustable feet for easy and stable mounting of the enclosure
- Easy service access through hinged doors and removable panels
- ATEX-certified ventilation
- Meets air flow requirements for emergency mechanical ventilation
- Temperature sensors
- Ceiling lights
- Heating panel
- Temperature control for heating and ventilation
- Gas detector
  - Safety control with siren and signals
  - Pre-alarm: activation of alarm and mechanical ventilation
- Main alarm: automatic stop of refrigerating system
- Compliance: PED and DS/EN 378 Location classification III.



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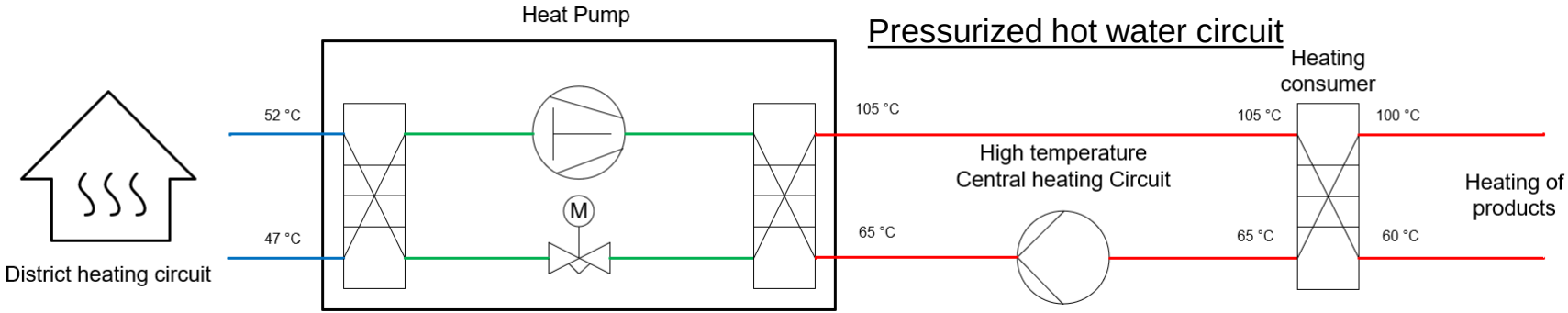
HitemHP application examples

Operating data:

- Heating cap.: 879 kW
- Cooling cap.: 701 kW
- COP heating: 4,7
- Unit size: HitemHP 116L

Savings:
Co2 emission reduction: 623 tons/year



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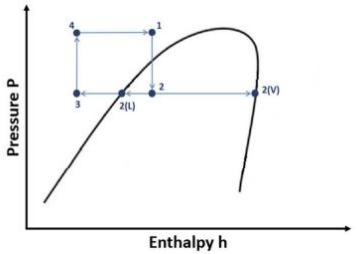
HitemHP application examples

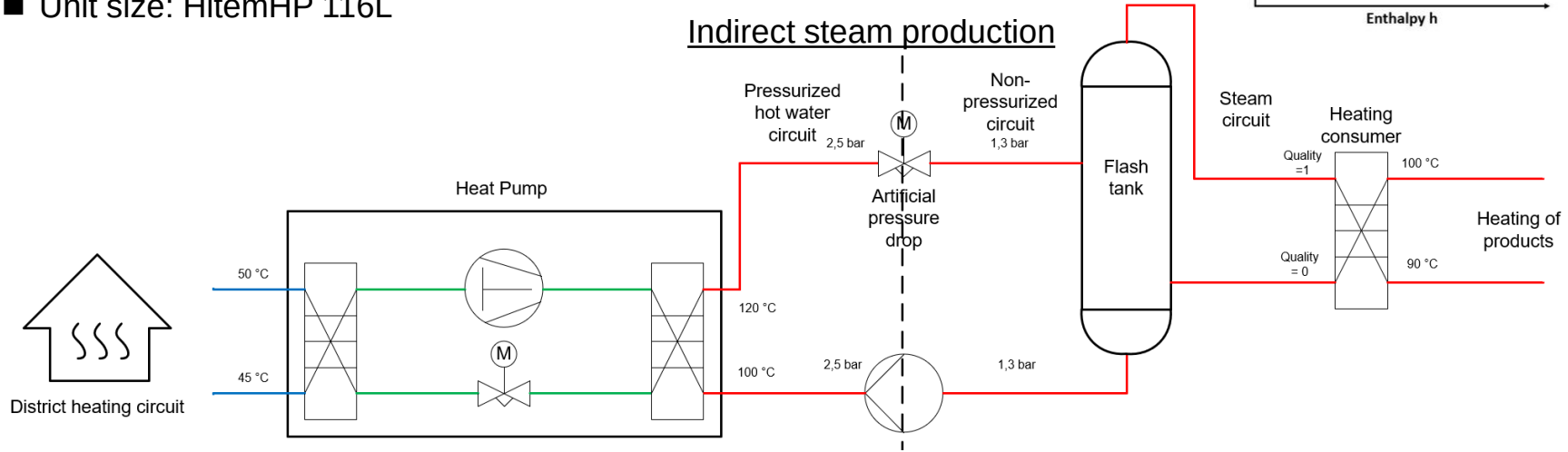
Operating data:

- Heating cap.: 636 kW
- Cooling cap.: 450 kW
- COP heating: 3,2
- Unit size: HitemHP 116L

Savings:
Co2 emission reduction:
246 tons/year



Indirect steam production



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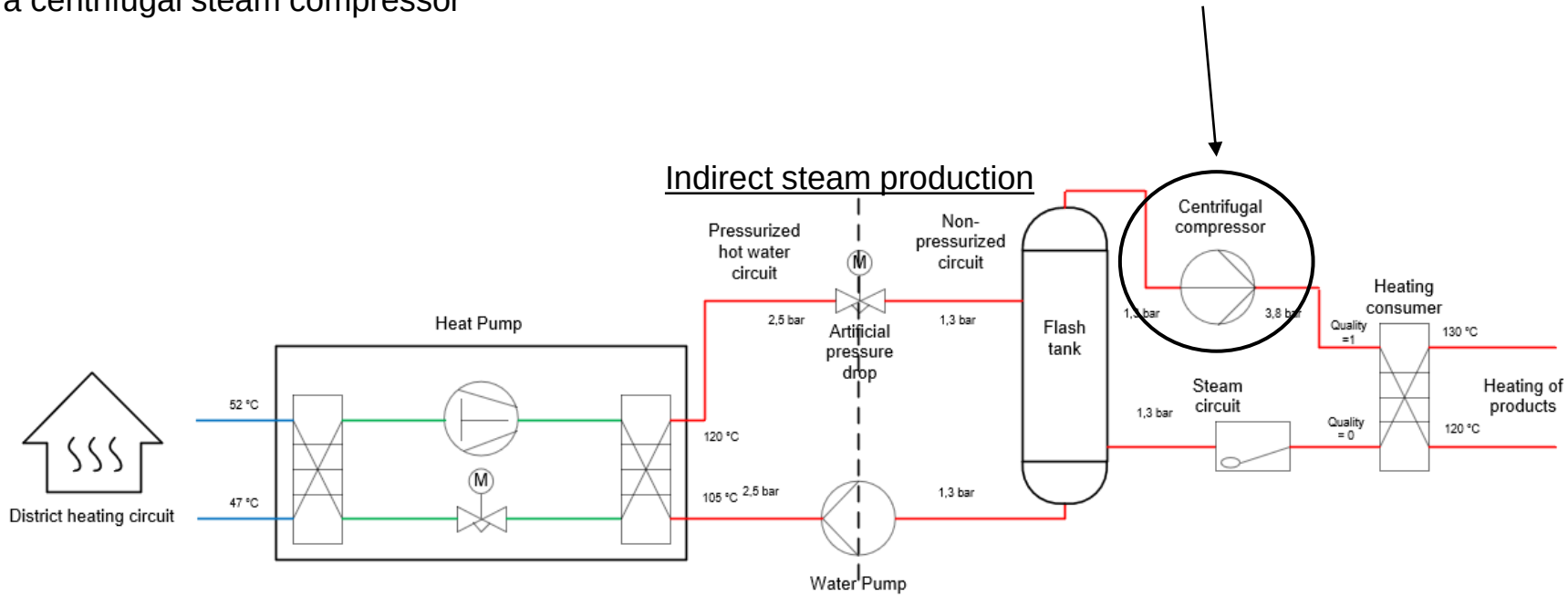
HitemHP application examples

If higher steam temperatures can be achieved with a centrifugal steam compressor



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Sabroe End-of-Line test centre (EOL)

Full satisfaction – No surprises

- All Sabroe units are tested before leaving the factory
- Guaranteed performance and documented capabilities
- Customers are welcomed to witness the test

Want to know more? Visit us at booth 7-240 in hall 7

CHILLVENTA

Maximizing Heat Pump Potential: Empowering Steam Generation with MVR Technology

Specialist forum: Tue 13:40-14:00
Hall 4A Booth 4A-419

Unveiling the Cyber Security Challenges in Industrial Controllers: Stay Informed and Protected!

Specialist forum: Wed 12:00-12:20
Hall 8 Booth 8-516

Overcoming the obstacles to achieve temperature above 100 °C with hydrocarbon-based Heat Pumps

Specialist forum: Wed 12:20-12:40
Hall 4A Booth 4A-419

Future developments in refrigeration technology - thinking about heat

Specialist forum: Thu 11:00-11:20
Hall 8 Booth 8-516

Unlocking the potential of absorption heat transformer. The path to de-carbonization of steam generation

Specialist forum: Thu 13:20-13:20
Hall 8 Booth 8-516

Complex made simple – how and why sales and selection tools helps you select the best products

Specialist forum: Tue 11:40-12:00
Hall 8 Booth 4A-419

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