



## HeatBooster Heaten AS



Figure 1: HeatBooster VHTHP

### Summary of Technology

Heaten's patented very-high-temperature heat pump is based on an efficient, durable and highly flexible piston compressor. The HeatBooster turns waste heat into process heat with a value, and is the only technology that can provide an output temperature up to 165 °C.

- The HeatBooster system layout is a one-stage, closed-loop vapor compression heat pump ideal for single or cascade configurations. The heart of the heat pump is a reciprocating compressor.
- The driving energy of the HeatBooster is electricity.
- There are vast opportunities for implementation of Heaten's technology. Some of the relevant applications are district heating, sugar refining, pulp & paper, plastics manufacturing, drying systems and breweries.
- The table below shows typical expected performances under relevant operating conditions. The performance data are based on the actual performance of an industrial 200 kW thermal pilot system, including design and performance improvements.
- Heaten's piston compressor can utilize heavy-duty production tooling and facilities worldwide.
- The HeatBooster uses standard lubricant types that are compatible with the respective working fluids.
- Heaten is currently scaling up the current technology platform to a product family in the megawatt range
- The suitable heat transfer fluid on the source and sink sides is water or steam. The temperature range for the heat source is 2 – 150 °C, and the temperature range for the heat sink is 70 – 200 °C.
- The HeatBooster has a rapid start-up and shut-down time and has a turn-down ratio down to about 20 %. It can handle rapid load changes.
- Standard units span from 1 to 6 MW (can also be delivered as direct-steam version).





Figure 2: HeatBooster compressor

Table 1: Performance.

Example #	T <sub>source,in</sub> [°C]	T <sub>source,out</sub> [°C]	T <sub>sink,in</sub> [°C]	T <sub>sink,out</sub> [°C]	COP <sub>heating</sub> [-]
1	80	60	115	120	3,6
2	40	30	80	90	3,3
3	95	85	135	140	4,1
4	120	115	155	165	4,8

### Project example

Customer projects are confidential and differ in application and economics, depending on industry needs, customer asks, and regulatory environment.

Heaten's very-high-temperature heat pumps are applied in the following key industries: Paper, food & beverages, chemicals, automotive, metal, plastic, textile, and wood.

Key processes are: Drying, boiling, evaporation, sterilization, distillation, molding, cleaning, washing, steaming, tempering, and a long list of specific industrial processes exist, such as bleaching and/or bioreactors.

Please see Table 1. for main performance indicators.

Key success areas for the application of heat pumps are system engineering and integration at customer sites and close cooperation between heat pump suppliers, and customers EPC's.

### FACTS ABOUT THE TECHNOLOGY

**Heat supply capacity:** 1MW nominal.

**Temperature range:** Up to 165 °C (current hardware is prepared for up to 215 °C)

**Working fluid:** Most common working fluid including 4<sup>th</sup> generation refrigerants (HFOs)

**Compressor technology:** Reciprocating, custom design.

**Specific investment cost for installed system without integration:** Expected range from 250 to 350€/kW

**TRL level:** 7-9: Heaten's technology has achieved TRL 9.

TRL 7 refers to the current scaling up of the compressor .

**Expected lifetime:** Low-maintenance design and service life of 20 years.

**Size:** Family from 1MW – 6MW. The 1 MW variant fits into a small 20-foot container and the 6 MW heat pump will fit into a normal-size 40 foot container.

### Contact information

Geir Robstad, Heaten AS

✉ gr@heaten.com

☎ (+47) 41 20 20 82

http://heaten.com

All information were provided by the supplier without third-party validation. The information was provided as an indicative basis and may be different in final installations depending on application specific parameters.

