Ultra high temperature heat pump for direct steam production

OCHSNER Energie Technik

Summary of technology

The Ochsner ultra-high temperature heat pump technology for direct steam production can be used as an alternative to steam boilers to provide steam for industrial applications. One of the main applications is the paper industry that requires steam for paper drying. The technology is currently in the laboratory demonstration phase where it is being tested for industrial use.

The heat pump is based on an electricity-driven hermetic single-stage refrigerant circuit. It equips a semi-hermetic rotary screw compressor. The lubrication system includes an internal oil circuit and an external oil circuit for additional cooling.

The condenser produces steam by evaporating the water on the sink side. On the source side, the evaporator heat exchanger has a shell & tube design and uses high-temperature water as transport media.

The state-of-the-art COPs in a given application for different temperatures are shown in Table 1.
Figure 2: Ultra–high temperature heat pump for direct steam production

Table 1: Performance.

<table>
<thead>
<tr>
<th>$T_{\text{source, in}}$ ($^\circ\text{C}$)</th>
<th>$T_{\text{source, out}}$ ($^\circ\text{C}$)</th>
<th>$T_{\text{sink, in water}}$ ($^\circ\text{C}$)</th>
<th>$T_{\text{sink, out steam}}$ ($^\circ\text{C}$)</th>
<th>COP$_{\text{heating}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>58</td>
<td>63</td>
<td>115</td>
<td>115</td>
<td>3.3</td>
</tr>
<tr>
<td>65</td>
<td>80</td>
<td>120</td>
<td>120</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Figure 3 shows the temperature limits of the condenser outlet and evaporator inlet.

Figure 3: Limits of use

FACTS ABOUT THE TECHNOLOGY

Heat supply capacity: 1,640 kW

Temperature range: condenser +100/+120°C, evaporator +40/+80°C

Working fluid: R1233zd

Compressor technology: semi hermetic screw

Specific investment cost for installed system without integration: 350 - 700 €/kW

TRL level: TRL4

Expected lifetime: 20 years.

Size: Weight 15,000 kg, footprint 5.2 m²

Contact information

Karl Ochsner, Ochsner Energie Technik

karl.ochsner.sen@ochsner-energietechnik.com

+43 676 881234 100

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.