Brazed Plate Heat Exchangers

Universal solutions for industrial and domestic applications
With partnership into the future

FUNKE is a leader in the development and production of quality heat exchangers with a heat transfer area of up to 2400 m². The range of products comprises shell-and-tube heat exchangers, bolted and brazed plate heat exchangers as well as oil/air cooling units and electrical oil pre-heaters. Thus, as one of the few producers worldwide, FUNKE offers solutions with optimum thermodynamic designs for different industries and virtually all applications.

FUNKE focuses on customer orientation, highest quality standards, flexibility and advisory skills – important benefits a company of just the right size is able to offer.

Construction
FUNKE brazed plate heat exchangers are made of corrugated stainless steel plates. The plates are assembled in a 180° angle to each other. Depending on the requirements of the application, the plates are vacuum brazed to a pressure-resistant unit using either copper or nickel. This results in separate flow gaps with counter-flow of the media involved in the heat exchange (standard).

With a large range of standard- and special designs the FUNKE brazed plate heat exchangers can cover manifold applications in different industrial areas and domestic applications.
Advantages
The series GPL, GPLK und TPL provide for a well balanced ratio of high heat transfer rates with low pressure losses. The thermodynamically optimized corrugation of the embossed plates and the inserted turbulators (TPL) allow for high turbulent flow even at low volumetric flow rates. This allows for efficient use of the heat exchange area available and leads to a perfectly optimized heat transfer. The high turbulent flow also results in an efficient self-cleaning effect, which greatly reduces maintenance and time-out. FUNKE brazed plate heat exchangers have a compact design and are used for high pressures and temperatures.

Applications
Typical applications for brazed plate heat exchangers are
- Heating, cooling, condensing
  - System separation
  - Heat extraction and heat recovery in domestic and process technology
  - Refrigeration engineering
  - Mechanical engineering
  - Oil cooling
  - Hot water/Process water
  - Heating engineering (solar thermal systems, central heating, floor heating)
  - Evaporation/Condensing in cooling systems
  - Air drying
  - Hydraulic oil cooling
  - Cooling of machines and motors
  - Mold machine temperature control
  - Economizing

Media
Copper brazed plate heat exchangers are mainly used for media such as
- Oil and oil containing fluids
- Glycol mixtures
- Alcohols
- Refrigerants
- Gas/Air
- Water
- many more (according to media properties and its viscosity)

Information
Copper brazed plate heat exchangers GPLK should not be used for the following media:
- Seawater
- Ammonia
- Deionates
- Silicone oils
- high chloride media

For applications with
- Ammonia
- Deionates
- Silicone oils
the nickel brazed plate heat exchangers NPL/NPLK are recommended.
Series GPL / GPLK
These series were designed for universal applications with media of low viscosity. Main feature is the balanced ratio of high heat transfer rates to minimal pressure drops. Yet at low volume flows the thermodynamically optimized V-corrugation of the plates generates a highly turbulent flow, resulting in an optimum use of the heat transfer area available.

Special design series NPL / NPLK
Construction and function are identical to GPL / GPLK. Deviant is the solder which in this case is nickel.

Special design series GPLS
The standard safety heat exchanger with the double wall. The function is identical to a heat exchanger plate, one double wall element consists of two plates one above the other which are not brazed at the circumferential outer wall, so that leakage can escape at all sides of the unit.

Series TPL
The TPL-series is a special development for the demands in mechanical engineering and plant engineering (e.g. for cooling of hydraulic oil and motor oil). The TPL-volume of the flow gap is up to 80% larger compared to units with conventional heat exchanger plates. With special turbulence sheets inserted in the flow gaps and thermodynamically highly efficient diagonal media flow in combination with maximal diameter connections very high heat transfer rates are obtained. Variable designs of these elements allow for optimal adaptation to different applications. Due to the efficient performance of the FUNKE TPL for media with higher viscosities the unit can be of a much smaller size compared to conventional plate heat exchangers!

Technical Data
Application conditions

<table>
<thead>
<tr>
<th>Series</th>
<th>max. operating pressure (bar)</th>
<th>max. operating pressure (bar)</th>
<th>max. operating temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPL/GPLK</td>
<td>30 / exception GPLK 80: 16 bar</td>
<td>45</td>
<td>200 / 150</td>
</tr>
<tr>
<td>TPL</td>
<td>30</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>GPLS</td>
<td>30</td>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>NPL/NPLK</td>
<td>16 / 10</td>
<td>27 / 10</td>
<td>200 / 150</td>
</tr>
</tbody>
</table>

Performance
2.0 to 6 000 kW

Material
For the plates stainless steel 1.4401 / AISI 316 is used. For the series GPL, GPLK, TPL, APL, SPL the solder is copper. For the series NPL and NPLK the solder is nickel.
### Overview types GPL and GPLK

<table>
<thead>
<tr>
<th>Type</th>
<th>Solder</th>
<th>Overall</th>
<th>Dist. (connection)</th>
<th>Connection</th>
<th>No. of plates</th>
<th>Empty weight (N) (max)</th>
<th>Volume/Channel (ltr./Channel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td></td>
<td>A (mm)</td>
<td>B (mm)</td>
<td>E (mm)</td>
<td>C (mm)</td>
<td>D (mm)</td>
<td>(standard)</td>
</tr>
<tr>
<td>GPL 2</td>
<td>NPL 2</td>
<td>230</td>
<td>89</td>
<td>12+2.3xN</td>
<td>182</td>
<td>43</td>
<td>G 3/4&quot;</td>
</tr>
<tr>
<td>GPL 3</td>
<td>NPL 3</td>
<td>325</td>
<td>89</td>
<td>12+2.3xN</td>
<td>279</td>
<td>43</td>
<td>G 3/4&quot;</td>
</tr>
<tr>
<td>GPL 4</td>
<td>NPL 4</td>
<td>171</td>
<td>124</td>
<td>12+2.3xN</td>
<td>120</td>
<td>73</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>GPL 5</td>
<td>NPL 5</td>
<td>332</td>
<td>124</td>
<td>12+2.3xN</td>
<td>281</td>
<td>73</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>GPL 6</td>
<td>NPL 6</td>
<td>529</td>
<td>124</td>
<td>12+2.3xN</td>
<td>478</td>
<td>73</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>GPL 7</td>
<td>NPL 7</td>
<td>529</td>
<td>269</td>
<td>14+2.4xN</td>
<td>460</td>
<td>200</td>
<td>G 2&quot;</td>
</tr>
<tr>
<td>GPL 8</td>
<td>NPL 8</td>
<td>529</td>
<td>269</td>
<td>14+2.4xN</td>
<td>421</td>
<td>161</td>
<td>G 2 1/2&quot;</td>
</tr>
<tr>
<td>GPL 9</td>
<td>NPL 9</td>
<td>798</td>
<td>269</td>
<td>14+2.4xN</td>
<td>690</td>
<td>161</td>
<td>G 2 1/2&quot;</td>
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<tr>
<td>GPL 10</td>
<td>NPL 10</td>
<td>870</td>
<td>383</td>
<td>23+2.4xN</td>
<td>723</td>
<td>237</td>
<td>DN 100</td>
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<tr>
<td>GPLK 10</td>
<td>NPLK 10</td>
<td>206</td>
<td>73</td>
<td>8+2.27x(N-1)</td>
<td>172</td>
<td>42</td>
<td>G 1/2&quot;</td>
</tr>
<tr>
<td>GPLK 20</td>
<td>NPLK 20</td>
<td>194</td>
<td>80</td>
<td>10+2.25xN</td>
<td>154</td>
<td>40</td>
<td>G 3/4&quot;</td>
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<tr>
<td>GPLK 30</td>
<td>NPLK 30</td>
<td>311</td>
<td>80</td>
<td>10+2.3xN</td>
<td>278</td>
<td>40</td>
<td>G 3/4&quot;</td>
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<tr>
<td>GPLK 40</td>
<td>NPLK 40</td>
<td>306</td>
<td>106</td>
<td>10+2.4xN</td>
<td>250</td>
<td>50</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>GPLK 50</td>
<td>NPLK 50</td>
<td>304</td>
<td>106</td>
<td>10+2.4xN</td>
<td>250</td>
<td>70</td>
<td>G 1&quot;</td>
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<tr>
<td>GPLK 55</td>
<td>NPLK 55</td>
<td>522</td>
<td>106</td>
<td>10+2.4xN</td>
<td>466</td>
<td>50</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>GPLK 60</td>
<td>NPLK 60</td>
<td>524</td>
<td>124</td>
<td>10+2.4xN</td>
<td>444</td>
<td>64</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>GPLK 70</td>
<td>NPLK 70</td>
<td>528</td>
<td>245</td>
<td>11,5+2.4xN</td>
<td>456</td>
<td>174</td>
<td>G 2&quot;</td>
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<tr>
<td>GPLK 80</td>
<td>NPLK 80</td>
<td>527</td>
<td>246</td>
<td>11+2.85xN</td>
<td>430</td>
<td>148</td>
<td>G 2 1/2&quot;</td>
</tr>
</tbody>
</table>

N = number of plates

Optional: angular feet

Connections may be changed at each side as long as counter flow is continued.

### Overview types TPL

<table>
<thead>
<tr>
<th>Type</th>
<th>Overall</th>
<th>Dist. (connection)</th>
<th>Connection</th>
<th>No. of plates</th>
<th>Empty weight (N) (max)</th>
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<tr>
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<td>C (mm)</td>
<td>D (mm)</td>
<td>(standard)</td>
</tr>
<tr>
<td>TPL 00-K</td>
<td>274</td>
<td>111</td>
<td>6+4xN</td>
<td>213</td>
<td>40</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>TPL 00-L</td>
<td>439</td>
<td>111</td>
<td>6+4xN</td>
<td>378</td>
<td>43</td>
<td>G 1&quot;</td>
</tr>
<tr>
<td>TPL 01-K</td>
<td>383</td>
<td>168</td>
<td>6+4xN</td>
<td>309</td>
<td>43</td>
<td>G 1 1/2&quot;</td>
</tr>
<tr>
<td>TPL 01-L</td>
<td>631</td>
<td>168</td>
<td>6+4xN</td>
<td>557</td>
<td>73</td>
<td>G 1 1/2&quot;</td>
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<tr>
<td>TPL 02-K</td>
<td>488</td>
<td>225</td>
<td>6+4xN</td>
<td>403</td>
<td>73</td>
<td>G 2&quot;</td>
</tr>
<tr>
<td>TPL 02-L</td>
<td>818</td>
<td>225</td>
<td>6+4xN</td>
<td>733</td>
<td>73</td>
<td>G 2&quot;</td>
</tr>
</tbody>
</table>

1: hot side IN
2: cold side OUT
3: hot side OUT
4: cold side IN

Optional: extended end plate with holes for fastening, angular feet respectively
Connections

TPL/GPL/GPLS/NPL
standard:
• threaded nozzles (male threads)
optional:
• soldered connections
• threaded nozzles (female thread)
• flanges on request

GPLK/NPLK
standard:
• threaded nozzles (male threads)
• flat sealing screw (FSS) joints

Insulation (optional)

Heat insulation
PU-foam with a long-term thermal stability up to 135°C. Normally consisting of two parts, fastened to the heat exchanger with tension belts or spring locks.

Cold insulation
Diffusion tight insulation on the basis of nitrile rubber with a long-term thermal stability of up to 105°C. Available as self-adhesive multiple part set.

Mounting (optional)

TPL
• extended end plate
• angular feet

GPL/GPLK/GPLS/NPL/NPLK
• angular feet
• wall brackets
• transport hooks

Note: Angular feet are only used for units with a minimum weight of approximately 10 kg.
Brazed Plate Heat Exchangers for industrial applications

**Oil Cooler System**

- Oil Tank
- Pump
- Water

**Heat Pump System**

- Compressor
- Condenser
- Hot Water
- Expansion Valve

**Power Plant / Energy Center**

- Water
- Tank
- Warm Water
- Cold Water

**Chiller**

- Compressor
- Separator
- Oil Cooler
- Cold Water
- Condenser
- Cold Water
- Economizer
- Bypass
- Accumulator

**Air Compressor System**

- 75hp Above (Water cooled)
- Lubricant
- Cooler Brazed Heat Exchanger
- Air Inlet (90°C)
- Oil Inlet (85°C)
- Oil Outlet (55°C)
- Air Outlet (10°C)
- Cooling Water Outlet
  - Water vs. Oil
- Cooling Water Inlet
  - Water vs. Air

**Vacuum Pump Cooling System**

- Water Cooled Motor
- Gear Oil
- 30°C
- 25°C
- Air Inlet
- Pump
- 30°C
- Air Outlet
- Cold Water
- Motor Cooling Water
- 25°C
- Cold Water
Quality means safety. Each unit built by FUNKE is design and pressure tested. Additional approvals are also available in accordance with quality authorities such as:

- American Bureau of Shipping (ABS)
- Bureau Veritas (BV)
- Det Norske Veritas (DNV)
- Germanischer Lloyd (GL)
- Lloyds Register of Shipping (LRS)
- Schweizerischer Verein für technische Inspektionen (SVTI)
- Technischer Überwachungsverein (TÜV)

as well as customers’ test and inspection regulations.

FUNKE has been certified according to DIN EN ISO 9001:2008 and is an approved manufacturer according to:

- EU Pressure Equipment Directive 97/23/EC (PED), Module H/H1
- HP0 in connection with DIN EN 729-2
- ASME U-Stamp
- GOST R (incl. RTN & hygiene certificate)
- China Certificate