MARKETS AND APPLICATIONS
FROM NATURAL GAS PROCESSING TO POLYOLEFIN PRODUCTION AND INDUSTRIAL GAS APPLICATIONS

GAS TRANSPORT & STORAGE

- CₙHₙ boil-off gas (BOG) handling
- Liquefied natural gas (LNG)
- Liquefied petroleum gas (LPG)
- Liquefied ethylene gas (LEG)
- Natural gas handling and reliquefaction

GASES HANDLED (INCLUDING CRYOGENIC, CONTAMINATED, CORROSIVE, EXPLOSIVE AND TOXIC GASES)

- CH₄ METHANE
- C₂H₄ ETHYLENE
- C₃H₆ PROPYLENE
- CO₂ CARBON DIOXIDE
- O₂ OXYGEN
PETROCHEMICAL/ CHEMICAL INDUSTRY

- Polypropylene production
- Polyethylene production
- Ethylene oxide
- Ethylene glycol
- Fertilizer production
- Acetic acid production

INDUSTRIAL GASES

- Air separation
- Steel production
- Food and beverage
- Polysilicon production

GASES HANDLED (INCLUDING CRYOGENIC, CONTAMINATED, CORROSIVE, EXPLOSIVE AND TOXIC GASES)

- VCM (VINYL CHLORIDE MONOMER)
- Ar (ARGON)
- NH₃ (AMMONIA)
- N₂ (NITROGEN)
- CO (CARBON MONOXIDE)
Burckhardt Compression is recognized as the global technology leader in the reciprocating compressor world. As an OEM with over 160 years of in-house experience in developing, engineering and manufacturing compressors, we are committed to highest reliability and best quality.

75 YEARS OF CONTINUOUS DEVELOPMENT – A SUCCESS STORY

Since Burckhardt Compression first introduced the Laby® Compressor in 1935 we have been able to increase our application know-how. In close cooperation with our customers we have transferred this know-how into a second to none compressor solution with outstanding performance. Originally designed for the safe compression of ammonia, continuous improvements and further developments have made the Laby® today one of the most reliable compressor solutions for numerous applications handling complex gases:
- Bone-dry gases
- Humid gases
- Cryogenic gases
- Dirty, dust laden, contaminated gases in fouling services
- Clean gases where no pollution of the gas is allowed
- Reactive, explosive, corrosive or toxic gases

All major industrial gas suppliers, global players in the polyolefin production, renowned process licensees, international partners for gas liquefaction systems and many producers of chemicals trust Burckhardt Compression and depend on the unsurpassed reliability of Laby® Compressors. Thousands of installations underscore this long success story.

WHAT’S THE SECRET BEHIND?

The Laby® is a vertical in-line reciprocating compressor with a simple and rugged compressor design including two features which make the Laby® unique.

LABYRINTH SEALING – FOR CONTACTLESS, OIL-FREE COMPRESSION

The unique technology is applied between the piston and cylinder wall and between the piston rod gland and the piston rod. The labyrinth sealing effect is created by numerous tiny throttling points. At each of these throttling points, pressure energy is transformed into kinetic energy as a result of the flow restriction. The process continues at each throttling point/volume chamber combination along the piston and piston rod gland until the required reduction in pressure is attained. A small clearance volume is maintained between the adjoining surfaces. The low level amount of gas passing through the sealing system is recovered internally.

SEPARATION OF SEALING AND GUIDING ELEMENTS – FOR LOWEST WEAR AND LOWEST MAINTENANCE

The strict separation of the lubricated guiding elements in the crankgear from the contactless sealing elements of the piston and piston rod is essential for the functionality and efficiency of the compressor. The oil scraper rings, located close to the guide bearing, ensure the most efficient removal of oil from the piston rod. Lubricating oil is prevented from entering the compression room.
YOUR BENEFITS

HIGHEST AVAILABILITY AND RELIABILITY
- No permanent mechanical friction in the compression area – no wear
- Minimum quantity of wear parts
- Longest MTBO
- Lowest maintenance costs

MOST ECONOMIC OPERATION
- No contamination of highly pure gases with oil or abrasives from piston rings or rider rings
- No loss of valuable product
- Lowest operating costs

HIGHEST SAFETY
- Safest compressor for oxygen service
- No friction – no hot spots in the cylinder

INDEPENDENT RESEARCH HAS REVEALED

MTBF (MEAN TIME BETWEEN FAILURE) OF RECIPROCATING COMPRESSORS

![MTBF Chart]

Extra-long distance piece for separation of lubricated guiding elements and contactless sealing elements

Robust and precise linear guides for maximum durability and longest lifetime:
- Guide bearing with oil scrapers
- Robust, forced-feed lubricated crosshead

Contactless labyrinth sealings for highest reliability:
- Oil-free gas compression
- Lubricated area

INDEPENDENT RESEARCH HAS REVEALED

MTBF (MEAN TIME BETWEEN FAILURE) OF RECIPROCATING COMPRESSORS

![MTBF Chart]

Up to 2.5 times higher reliability!

LABY® COMPRESSORS

IN-HOUSE DESIGNED AND MANUFACTURED MAIN PARTS – FOR RELIABILITY

PISTONS AND CYLINDERS WITH LABYRINTH SEALING
- Contactless – no wear
- Oil-free compression
- No cylinder liner required
- Single or double acting
- Simple and robust 3-piece design
- Contactless sealing and applied materials allow high discharge temperatures if required by the process
- No tribological limitations – material selection according to process requirements

CAPACITY CONTROL OPTIONS
- Adaptation to process requirements
- For highest efficiency in part-load operation
- Valve unloaders
- Variable speed
- Clearance pockets

PISTON RODS
- Nitrated steel for maximum wear resistance against oil scrapers

CROSSHEADS
- Heavy duty single piece design for precise linear movement of the piston
- Forced-feed lubricated
- Water cooled crosshead guide for constant tolerances and precise guiding

MECHANICAL SHAFT SEAL OPTIONS (NOT ILLUSTRATED)
- For gastight crankgear
- No loss of gas to the environment for highest safety and efficiency

RUGGED DESIGN – FOR DURABILITY

CRANKSHAFT
- High strength forged steel

DESIGN FEATURES
FOR MAXIMUM RELIABILITY, AVAILABILITY AND DURABILITY
KEY COMPRESSOR COMPONENTS – FOR BEST PERFORMANCE AND LONGEST LIFETIME

COMPRESSOR VALVES
- Burckhardt Plate Valve™
- Burckhardt Poppet Valve™
- Manley® Valve, licensed by Burckhardt Compression
- Selection and custom engineering according to application requirements
- Maximum durability due to in-house leading valve technology
- Over 120 years of experience in design, manufacturing and service

PISTON ROD GLANDS WITH LABYRINTH SEALING
- Radially floating, self-centering sealing elements
- Various designs and materials for lowest wear

OIL SCRAPERS
- Highly efficient oil removal
- Separation of lubricated from non-lubricated area
- Material selection according to specific application

GUIDE BEARINGS
- For precise linear movement of piston rod and piston
- Easy exchangeable guide bearing bush

MAIN BEARINGS
- Tri-metal, babbitt design
- Interchangeable with big end bearings
- Forced-feed lubricated

CRANKGEAR
- Vertical in-line design
- Small footprint
- Various designs: open, closed or gastight up to 25 barg

OIL SUMP IN BASE PLATE
- No separate oil tank required

GEAR OIL PUMP
- Crankshaft driven
- For forced-feed lubrication

DISTANCE PIECES
- Extra-long, single compartment
- Implementation of purge or vent gas depending on application
SIMPLE AND RUGGED DESIGNS OF ALL LABY® TYPES
EASY OPERATION AND LONGEST MTBO IN YOUR APPLICATION

INDUSTRIAL GASES – HIGHEST PURITY FOR NON-TOXIC GASES

APPLICATION EXAMPLE
Oxygen for steel production

MAIN FEATURES OF LABY® TYPE D “OPEN”
– Crankgear under atmospheric pressure
– Open distance piece (purging as option)

YOUR BENEFITS
– Delivery of pure gas
  · No contamination with oil
  · No contamination with abrasives from piston rings and rider rings
– Highest operational safety
  · No permanent mechanical friction in the cylinder
  · No hot spots

AIR SEPARATION UNIT, SWEDEN

Gas
Laby® type   O₂
Suction volume   4D300
Suction temperature   5'340 m³/h / 9'072 scfm
Suction pressure   10 °C / 50 °F
Discharge pressure   1.2 bara / 17.4 psia
Shaft power   46 bara / 667 psia
Speed   1'030 kW / 1'380 hp
Speed   420 rpm
INDUSTRIAL GASES –
HIGHEST SAFETY FOR TOXIC, CORROSIVE OR EXPLOSIVE GASES

APPLICATION EXAMPLE
Carbon monoxide for acetic acid production

MAIN FEATURES OF LABY® TYPES D AND K
“GASTIGHT”
- Gastight crankgear
- Crankgear under suction pressure
- Mechanical crankshaft seal
- Closed distance piece

YOUR BENEFITS
- Highest operational safety
  - No permanent mechanical friction in the cylinder
  - No hot spots
  - No decomposition of carbon monoxide
  - No leakage of toxic process gas to the atmosphere

Petrochemical production, Malaysia

<table>
<thead>
<tr>
<th>Gas</th>
<th>CO mix</th>
</tr>
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<tbody>
<tr>
<td>Laby® type</td>
<td>4D250</td>
</tr>
<tr>
<td>Suction volume</td>
<td>2'620 m³/h / 4'451 scfm</td>
</tr>
<tr>
<td>Suction temperature</td>
<td>35 °C / 95 °F</td>
</tr>
<tr>
<td>Suction pressure</td>
<td>1.5 bara / 22 psia</td>
</tr>
<tr>
<td>Discharge pressure</td>
<td>26 bara / 577 psia</td>
</tr>
<tr>
<td>Shaft power</td>
<td>575 kW / 770 hp</td>
</tr>
<tr>
<td>Speed</td>
<td>490 rpm</td>
</tr>
</tbody>
</table>
**PETROCHEMICAL/CHEMICAL INDUSTRY – HIGHEST RELIABILITY FOR CONTAMINATED GASES**

**APPLICATION EXAMPLE**
Polypropylene/polyethylene, EO/EG production

**POLYPROPYLENE PRODUCTION, BELGIUM**

<table>
<thead>
<tr>
<th>Gas</th>
<th>C(_2)H(_6)</th>
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</thead>
<tbody>
<tr>
<td>Laby(^\text{®}) type</td>
<td>3K160</td>
</tr>
<tr>
<td>Suction volume</td>
<td>725 m(^3)/h / 1'232 scfm</td>
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<tr>
<td>Suction temperature</td>
<td>30 °C / 86 °F</td>
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<tr>
<td>Suction pressure</td>
<td>6.8 bara / 98.6 psia</td>
</tr>
<tr>
<td>Discharge pressure</td>
<td>24.9 bara / 361.1 psia</td>
</tr>
<tr>
<td>Shaft power</td>
<td>228 kW / 305 hp</td>
</tr>
<tr>
<td>Speed</td>
<td>494 rpm</td>
</tr>
</tbody>
</table>

**MAIN FEATURES OF LABY\(^\text{®}\) TYPES D AND K “GASTIGHT”**
- Gastight crankgear
- Mechanical crankshaft seal
- Closed distance piece
- Seal gas

**YOUR BENEFITS**
- Highest reliability
  - Absolutely unaffected by particles in the gas (polymerisation product, catalyst fines, dust, dirt, etc.)
- Highest efficiency
  - No loss of valuable product
- Highest operational safety
  - No leakage of process gas to the atmosphere
**GAS TRANSPORT AND STORAGE –**
**HIGHEST FLEXIBILITY FOR LNG, LPG, LEG, C_nH_m BOG**

**APPLICATION EXAMPLE**
Boil-off gas handling

**MAIN FEATURES OF LABY® TYPES D AND K**
"GASTIGHT"
- Gastight crankgear
- Mechanical crankshaft seal
- Closed distance piece

**YOUR BENEFITS**
- Highest flexibility
  - Insensitive to fluctuating suction conditions (pressure, temperature, gas composition)
  - No cool down required for cryogenic gases
- Highest efficiency
  - No loss of valuable product
  - No purge gas required
- Highest operational safety
  - No leakage of process gas to the atmosphere

**LNG BOG, SPAIN**

<table>
<thead>
<tr>
<th>Gas</th>
<th>CH₄ mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laby® type</td>
<td>2D250</td>
</tr>
<tr>
<td>Suction volume</td>
<td>3'015 m³/h / 5122 scfm</td>
</tr>
<tr>
<td>Suction temperature</td>
<td>-150 °C / -238 °F</td>
</tr>
<tr>
<td>Suction pressure</td>
<td>1.17 bara / 17 psia</td>
</tr>
<tr>
<td>Discharge pressure</td>
<td>10.3 bara / 149 psia</td>
</tr>
<tr>
<td>Shaft power</td>
<td>520 kW / 697 hp</td>
</tr>
<tr>
<td>Speed</td>
<td>495 rpm</td>
</tr>
</tbody>
</table>
TECHNICAL DATA
LARGE VARIETY OF COMPRESSOR FRAME SIZES FOR A WIDE RANGE OF APPLICATIONS

PERFORMANCE RANGE

TECHNICAL DATA AND DIMENSIONS
### K-TYPE COMPRESSORS – GASTIGHT DESIGN

<table>
<thead>
<tr>
<th>Type</th>
<th>Cranks</th>
<th>Stroke (mm/in)</th>
<th>Max. Speed (rpm)</th>
<th>Rated Power$^1$ (kW/hp)</th>
<th>Width (mm/in)</th>
<th>Height (mm/in)</th>
<th>Length (mm/in)</th>
<th>Weight (kg/lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2K90</td>
<td>2</td>
<td>90 / 3.5</td>
<td>1'000</td>
<td>115 / 154</td>
<td>640 / 25</td>
<td>1'500 / 59</td>
<td>950 / 37</td>
<td>1'900 / 4100</td>
</tr>
<tr>
<td>2K105</td>
<td>2</td>
<td>105 / 4.1</td>
<td>1'000</td>
<td>188 / 252</td>
<td>530 / 21</td>
<td>1'720 / 68</td>
<td>1'150 / 45</td>
<td>2'500 / 5'500</td>
</tr>
<tr>
<td>2K120</td>
<td>2</td>
<td>120 / 4.2</td>
<td>880</td>
<td>226 / 303</td>
<td>760 / 30</td>
<td>1'720 / 68</td>
<td>1'150 / 45</td>
<td>2'300 / 5'000</td>
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<tr>
<td>2K140</td>
<td>2</td>
<td>140 / 5.5</td>
<td>850</td>
<td>303 / 406</td>
<td>880 / 35</td>
<td>2'080 / 82</td>
<td>1'330 / 52</td>
<td>4'700 / 10'300</td>
</tr>
<tr>
<td>2K158</td>
<td>2</td>
<td>158 / 6.2</td>
<td>750</td>
<td>485 / 665</td>
<td>910 / 36</td>
<td>2'340 / 92</td>
<td>1'600 / 63</td>
<td>5'600 / 12'700</td>
</tr>
<tr>
<td>2K160</td>
<td>2</td>
<td>160 / 6.3</td>
<td>750</td>
<td>485 / 665</td>
<td>1'500 / 59</td>
<td>2'280 / 90</td>
<td>1'480 / 58</td>
<td>5'500 / 12'100</td>
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<tr>
<td>2K250</td>
<td>2</td>
<td>250 / 9.8</td>
<td>500</td>
<td>1'660 / 2226</td>
<td>970 / 38</td>
<td>3'570 / 141</td>
<td>2'310 / 91</td>
<td>18'300 / 40'300</td>
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<tr>
<td>3K120</td>
<td>3</td>
<td>120 / 4.2</td>
<td>750</td>
<td>350 / 469</td>
<td>900 / 35</td>
<td>2'290 / 90</td>
<td>1'750 / 69</td>
<td>6'100 / 13'400</td>
</tr>
<tr>
<td>3K140</td>
<td>3</td>
<td>140 / 5.5</td>
<td>750</td>
<td>485 / 665</td>
<td>1'040 / 41</td>
<td>2'280 / 90</td>
<td>2'140 / 84</td>
<td>9'000 / 19'800</td>
</tr>
<tr>
<td>3K160</td>
<td>3</td>
<td>160 / 6.3</td>
<td>750</td>
<td>485 / 665</td>
<td>1'010 / 40</td>
<td>2'340 / 92</td>
<td>2'140 / 84</td>
<td>9'000 / 19'800</td>
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<tr>
<td>4K165</td>
<td>4</td>
<td>165 / 6.5</td>
<td>750</td>
<td>1'042 / 1'397</td>
<td>1'110 / 44</td>
<td>2'400 / 94</td>
<td>2'850 / 112</td>
<td>16'000 / 35'200</td>
</tr>
</tbody>
</table>

### D-TYPE COMPRESSORS

<table>
<thead>
<tr>
<th>Type</th>
<th>Cranks</th>
<th>Stroke (mm/in)</th>
<th>Max. Speed (rpm)</th>
<th>Rated Power$^1$ (kW/hp)</th>
<th>Width (mm/in)</th>
<th>Height (mm/in)</th>
<th>Length (mm/in)</th>
<th>Weight (kg/lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2D140</td>
<td>2</td>
<td>140 / 5.5</td>
<td>1'000</td>
<td>174 / 233</td>
<td>760 / 30</td>
<td>2'060 / 81</td>
<td>1'160 / 46</td>
<td>2'700 / 5'900</td>
</tr>
<tr>
<td>2D160</td>
<td>2</td>
<td>160 / 6.3</td>
<td>750</td>
<td>304 / 407</td>
<td>370 / 26</td>
<td>2'280 / 90</td>
<td>1'250 / 49</td>
<td>3'900 / 8'600</td>
</tr>
<tr>
<td>2D200</td>
<td>2</td>
<td>200 / 7.9</td>
<td>600</td>
<td>480 / 643</td>
<td>830 / 33</td>
<td>3'000 / 118</td>
<td>1'480 / 58</td>
<td>5'700 / 12'500</td>
</tr>
<tr>
<td>2DL200$^2$</td>
<td>2</td>
<td>200 / 7.9</td>
<td>600</td>
<td>480 / 643</td>
<td>1'200 / 47</td>
<td>3'100 / 122</td>
<td>1'300 / 51</td>
<td>8'000 / 17'600</td>
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<td>2D205</td>
<td>2</td>
<td>205 / 8.1</td>
<td>600</td>
<td>700 / 938</td>
<td>980 / 39</td>
<td>2'900 / 114</td>
<td>1'650 / 65</td>
<td>7'400 / 16'300</td>
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<tr>
<td>2D250$^3$</td>
<td>2</td>
<td>250 / 9.8</td>
<td>520</td>
<td>1'760 / 2'350</td>
<td>1'980 / 78</td>
<td>3'720 / 146</td>
<td>2'630 / 104</td>
<td>21'000 / 46'200</td>
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<tr>
<td>3D130</td>
<td>3</td>
<td>130 / 5.1</td>
<td>750</td>
<td>185 / 248</td>
<td>730 / 29</td>
<td>2'270 / 89</td>
<td>1'390 / 55</td>
<td>3'900 / 8'500</td>
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<tr>
<td>3D160</td>
<td>3</td>
<td>160 / 6.3</td>
<td>750</td>
<td>304 / 407</td>
<td>850 / 33</td>
<td>2'580 / 102</td>
<td>1'500 / 59</td>
<td>6'300 / 13'800</td>
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<tr>
<td>3D200$^3$</td>
<td>3</td>
<td>200 / 7.9</td>
<td>600</td>
<td>490 / 657</td>
<td>1'060 / 42</td>
<td>3'080 / 121</td>
<td>2'110 / 83</td>
<td>9'400 / 20'700</td>
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<tr>
<td>4D150</td>
<td>4</td>
<td>150 / 5.9</td>
<td>750</td>
<td>304 / 407</td>
<td>830 / 33</td>
<td>2'480 / 98</td>
<td>1'900 / 75</td>
<td>10'500 / 23'100</td>
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<tr>
<td>4D200</td>
<td>4</td>
<td>200 / 7.9</td>
<td>600</td>
<td>500 / 670</td>
<td>950 / 37</td>
<td>2'850 / 112</td>
<td>2'290 / 90</td>
<td>12'000 / 26'400</td>
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<tr>
<td>4D225$^3$</td>
<td>4</td>
<td>225 / 8.9</td>
<td>600</td>
<td>726 / 973</td>
<td>1'000 / 39</td>
<td>2'970 / 117</td>
<td>2'700 / 106</td>
<td>13'900 / 30'600</td>
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<tr>
<td>4D250$^3$</td>
<td>4</td>
<td>250 / 9.8</td>
<td>520</td>
<td>1'025 / 1'374</td>
<td>1'180 / 46</td>
<td>3'290 / 130</td>
<td>3'230 / 127</td>
<td>18'400 / 40'500</td>
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<td>4D300$^3$</td>
<td>4</td>
<td>300 / 11.8</td>
<td>450</td>
<td>1'533 / 2'055</td>
<td>1'200 / 47</td>
<td>3'300 / 130</td>
<td>3'230 / 127</td>
<td>27'600 / 60'800</td>
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<tr>
<td>4D375$^3$</td>
<td>4</td>
<td>375 / 14.8</td>
<td>380</td>
<td>2'055 / 2'755</td>
<td>1'600 / 63</td>
<td>4'380 / 172</td>
<td>4'180 / 165</td>
<td>43'400 / 95'600</td>
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<tr>
<td>6D375$^3$</td>
<td>6</td>
<td>375 / 14.8</td>
<td>380</td>
<td>2'055 / 2'755</td>
<td>1'670 / 66</td>
<td>4'380 / 172</td>
<td>5'370 / 211</td>
<td>49'100 / 108'200</td>
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<tr>
<td>6LP190$^2$</td>
<td>6</td>
<td>190 / 7.4</td>
<td>750</td>
<td>1'500 / 2'010</td>
<td>1'200 / 47</td>
<td>2'900 / 114</td>
<td>4'700 / 185</td>
<td>20'000 / 44'000</td>
</tr>
<tr>
<td>6LP250$^2$</td>
<td>6</td>
<td>250 / 9.8</td>
<td>520</td>
<td>4'000 / 5'360</td>
<td>2'200 / 86</td>
<td>4'800 / 189</td>
<td>5'600 / 220</td>
<td>50'000 / 110'000</td>
</tr>
</tbody>
</table>

$^1$ Higher rated power possible with special crankshaft materials
$^2$ Fully balanced design available
$^3$ Gastight design available
KEY COMPRESSOR COMPONENTS
LATEST TECHNOLOGY FOR BEST PERFORMANCE AND LONGEST LIFETIME

Top quality crossheads, connecting rods, bearings, piston skirts and crankshafts for highest reliability

Always having the best MTBO (mean time between overhaul) and lowest life cycle costs in mind, we develop, design and manufacture a wide range of top quality compressor components. We select the technology and materials and engineer all compressor components according to your application-specific requirements and operating conditions.

We supply our compressor components for all your reciprocating compressors.

COMPRESSOR VALVES

We offer all three types of compressor valve technologies:

- Burckhardt Poppet Valve™
- Burckhardt Plate Valve™
- Manley® valve, licensed by Burckhardt Compression

In-house engineered valve technology
SEALING AND GUIDING TECHNOLOGY

- Piston rod glands: various designs and materials according to application requirements
- Oil scraper ring: single-piece metal or 3-piece plastic design
- Guide bearing bush: tribology research and laboratory tests for highest durability

RESEARCH & DEVELOPMENT

The Laby® design and the unique labyrinth sealing technology are continuously upgraded according to technological developments made in our own R&D department. Constantly, we examine the flow behavior of gases in oscillating sealing labyrinths. Bench tests and computer simulations lead to constant refinements of labyrinth shape and size, labyrinth clearance and other parameters. New materials and different design types are continuously being tested. By selecting the optimum materials and design, the lifetime of compressor components and complete compressor systems will be extended.

BURCKHARDT COMPRESSION’S KEY COMPRESSOR COMPONENTS STAND FOR:

- Longest mean time between overhaul and operation time
- Shortest downtimes
- Less operating costs


LEADING COMPRESSOR TECHNOLOGY
FOR LOWEST LIFE CYCLE COSTS

The Laby® Compressors are the great result of the vast experience gained by Burckhardt Compression over many decades. The unique design has been accomplished through close collaboration with our customers throughout the world. Based on their needs, Burckhardt Compression provides a rugged and reliable compressor of Swiss design and manufacture. Certified Swiss manufacturing, quality management and a committed workforce ensure a constant high level of quality.

<table>
<thead>
<tr>
<th>INITIAL COSTS</th>
<th>OPERATING COSTS</th>
<th>MAINTENANCE COSTS</th>
<th>LOWEST LIFE CYCLE COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding performance through:</td>
<td>Low consumption of consumables</td>
<td>Elimination of many wear parts</td>
<td>Our philosophy of attractive initial costs, lowest operating costs, substantially reduced maintenance costs and fair pricing of our services result in lowest life cycle costs.</td>
</tr>
<tr>
<td>- High-precision manufacturing</td>
<td>- Easy operation</td>
<td>- Key compressor components are designed for highest durability</td>
<td></td>
</tr>
<tr>
<td>- Top quality standards</td>
<td>- Outstanding durability of all compressor components</td>
<td>- Longest MTBO</td>
<td></td>
</tr>
<tr>
<td>- Know-how and expertise</td>
<td>- No loss of valuable product</td>
<td>- Reduction in lost production time</td>
<td></td>
</tr>
<tr>
<td>- Rugged design</td>
<td>- Shorter and less production downtimes</td>
<td>- Attractive pricing of spare parts</td>
<td></td>
</tr>
<tr>
<td>→ Premium solution at attractive initial costs</td>
<td>→ Compressor with lowest operating costs</td>
<td>→ Compressor with lowest maintenance costs</td>
<td></td>
</tr>
</tbody>
</table>

**80% LESS MAINTENANCE COSTS**

“The comparison between labyrinth and conventional units (...) involves the exact same service in the same size range; there, the maintenance cost for lube-free conventional machines exceeded that of the labyrinth machines by almost five to one.”

Source: H.P. Bloch, Chemical Engineering, July 18, 1988

![Maintenance Costs Chart](chart.png)
MANUFACTURING

WITH STATE-OF-THE-ART MACHINING TECHNOLOGY

Cutting-edge 3D CNC Measurement Machine for quality inspection

Dörries Scharmann, Heavyspeed CNC Milling Machine
Centric table load: 40'000 kg, spindle stroke: 1'000 mm

Okuma MacTurn550, CNC Multitasking Center
One of the 10 machining centers

Okuma MacTurn350, Multitasking Center
Fully automatic parts feeding

Dörries Scharmann, CNC Boring Mill
4 tables, spindle stroke: 600 mm
BURCKHARDT COMPRESSION
THE RECIPROCATING COMPRESSOR COMPANY
WITH THOROUGH IN-HOUSE EXPERTISE...
...ENSURING COMPREHENSIVE SUPPORT BOTH FOR EPC CONTRACTORS AND PLANT OPERATORS

RESEARCH & DEVELOPMENT
- Tribology incl. test beds
- Finite element analysis
- Mechatronics
- Labyrinth sealing technology
- Material research

SERVICES
- Engineering services
- Spare parts logistics
- Revamps
- Field service
- Valve service
- Component repair
- Technical support
- Monitoring and diagnostics
- Training

COMPRESSOR DESIGN
- Instationary fluid dynamics
- Pre-sales support, incl. detailed documentation
- Engineering analysis
- Feasibility study
- Selection and sizing
- Pulsation and vibration studies
- 3D CAD
- Compressor valves
- Material selection according to application requirements

PLANT ENGINEERING
- Contracting
- Customer and standard specifications
- Compressor and auxiliaries on modules
- Cooling water system
- Instrument and control, motors
- PLC programming
- Turn-key projects

MANUFACTURING
- State-of-the-art machining technology
- CAM in-house machining
- Purchasing
- Assembly
- Test beds
- Quality assurance
# SERVICES

## ENHANCE YOUR MAINTENANCE

<table>
<thead>
<tr>
<th><strong>BURCKHARDT VALVE SERVICE</strong></th>
<th><strong>FAST VALVE SERVICE WITH EXTENSIVE GUARANTEE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Analysis of valve condition</td>
<td>- Analysis of valve condition</td>
</tr>
<tr>
<td>- Tracking of valve history</td>
<td>- Tracking of valve history</td>
</tr>
<tr>
<td>- OEM valve engineering</td>
<td>- OEM valve engineering</td>
</tr>
<tr>
<td>- Valve cleaning and overhauls</td>
<td>- Valve cleaning and overhauls</td>
</tr>
<tr>
<td>- Complete quality inspection</td>
<td>- Complete quality inspection</td>
</tr>
<tr>
<td>- State-of-the-art leak test</td>
<td>- State-of-the-art leak test</td>
</tr>
<tr>
<td>- Root cause analysis</td>
<td>- Root cause analysis</td>
</tr>
<tr>
<td>- Corrosion protection</td>
<td>- Corrosion protection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SPARE PARTS LOGISTICS</strong></th>
<th><strong>OEM GUARANTEE AND BEST LIFE CYCLE COSTS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Original spare parts with OEM guarantee</td>
<td>- Original spare parts with OEM guarantee</td>
</tr>
<tr>
<td>- Spare parts frame agreements</td>
<td>- Spare parts frame agreements</td>
</tr>
<tr>
<td>- Stock recommendations</td>
<td>- Stock recommendations</td>
</tr>
<tr>
<td>- Express service for emergencies</td>
<td>- Express service for emergencies</td>
</tr>
<tr>
<td>- Over 16'000 parts on stock</td>
<td>- Over 16'000 parts on stock</td>
</tr>
<tr>
<td>- 12 month guarantee</td>
<td>- 12 month guarantee</td>
</tr>
<tr>
<td>- Save time and money: use the Burckhardt e-Shop™ – the easy spare parts identification and ordering system</td>
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</tr>
</tbody>
</table>

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<thead>
<tr>
<th><strong>FIELD SERVICE</strong></th>
<th><strong>ONSHORE AND OFFSHORE: BENEFIT FROM OUR SKILLED RECIP EXPERTS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- On-site assembly and installation</td>
<td>- On-site assembly and installation</td>
</tr>
<tr>
<td>- Erection/commissioning</td>
<td>- Erection/commissioning</td>
</tr>
<tr>
<td>- High safety standards – SCC and HUET certified</td>
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</tr>
<tr>
<td>- Turn-key installations</td>
<td>- Turn-key installations</td>
</tr>
<tr>
<td>- Start-up support</td>
<td>- Start-up support</td>
</tr>
<tr>
<td>- Service contracts/preventive maintenance</td>
<td>- Service contracts/preventive maintenance</td>
</tr>
<tr>
<td>- Plant overhaul/revision</td>
<td>- Plant overhaul/revision</td>
</tr>
<tr>
<td>- 12 month guarantee</td>
<td>- 12 month guarantee</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th><strong>TECHNICAL SUPPORT</strong></th>
<th><strong>PROFESSIONAL SUPPORT FROM OUR WELL TRAINED AND EXPERIENCED SPECIALISTS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Performance analysis for optimized and efficient compressor operation</td>
<td>- Performance analysis for optimized and efficient compressor operation</td>
</tr>
<tr>
<td>- Start-up support</td>
<td>- Start-up support</td>
</tr>
<tr>
<td>- Troubleshooting</td>
<td>- Troubleshooting</td>
</tr>
<tr>
<td>- Root cause analysis</td>
<td>- Root cause analysis</td>
</tr>
<tr>
<td>- Emergency availability 24/7</td>
<td>- Emergency availability 24/7</td>
</tr>
<tr>
<td>- On-site failure analysis</td>
<td>- On-site failure analysis</td>
</tr>
<tr>
<td>- Online diagnostic support</td>
<td>- Online diagnostic support</td>
</tr>
<tr>
<td>- Consulting</td>
<td>- Consulting</td>
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<table>
<thead>
<tr>
<th><strong>COMPONENT REPAIR</strong></th>
<th><strong>SAVE MONEY AND GET “AS NEW” GUARANTEE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Condition analysis</td>
<td>- Condition analysis</td>
</tr>
<tr>
<td>- Recommendations concerning which parts can be repaired or need to be replaced</td>
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</tr>
<tr>
<td>- Incorporation of the latest technology where possible</td>
<td>- Incorporation of the latest technology where possible</td>
</tr>
<tr>
<td>- 12 month guarantee</td>
<td>- 12 month guarantee</td>
</tr>
<tr>
<td>- Repair of crossheads, piston rods, guide bearings, bearings, pistons</td>
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<tr>
<th><strong>ENGINEERING SERVICES</strong></th>
<th><strong>SOPHISTICATED IN-HOUSE SIZING AND ANALYSIS TOOLS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- State-of-the-art pulsation and vibration analysis</td>
<td>- State-of-the-art pulsation and vibration analysis</td>
</tr>
<tr>
<td>- Finite element analysis</td>
<td>- Finite element analysis</td>
</tr>
<tr>
<td>- Unique analysis models for high pressure application up to 3'500 bar</td>
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</tr>
<tr>
<td>- Reverse engineering and reengineering for own as well as for other brand compressor systems</td>
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</tr>
<tr>
<td>- Dynamic analysis for any compressor parts</td>
<td>- Dynamic analysis for any compressor parts</td>
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</table>
**REVAMPS**
**REJUVENATE OR TUNE YOUR COMPRESSOR**
- Modernizing
- Upgrades/retrofits
- Relocation of machines
- Debottlenecking
- Turn-key installations
- Operation mode studies for own as well as for other brand compressor systems
- Conversion from lubricated to non-lubricated conversions

**MONITORING AND DIAGNOSTICS**
**EXTEND MEAN TIME BETWEEN OVERHAUL**
- Support for system evaluation
- Comprehensive customized service from diagnostic service to predictive maintenance
- Full-service agreements for maximum availability
- Online diagnostic services
- Broad experience through compressor installations in various processes
- Burckhardt Compression recommends

**COMPRESSOR TECHNOLOGY TRAINING**
**HAVE YOUR OWN COMPRESSOR SPECIALISTS**
- Theoretical and practical training from our compressor experts
- Training center with full-size equipment (Laby®, Process Gas and Hyper Compressor)
- Standard trainings, customer specific programs on request

**SERVICE CENTERS WORLDWIDE**
Full range of services and top performing components through global organization and local service centers.

24 hours emergency:
+41 52 262 53 53
Reciprocating Compressors
Leading technology for lowest life cycle costs

- Laby® Compressors
  - Contactless and oil-free

- Laby®-6i Compressors
  - Fully balanced

- Process Gas Compressors
  - API 618 – lowest life cycle costs

- Hyper Compressors
  - Safe and reliable up to 3'500 bara / 51'000 psia

- Standard High Pressure Compressors
  - Compact package for demanding applications

Compressor Components
Best performance and longest lifetime

- Compressor valves
- Redura® rings & packings
- Capacity control systems
- Capital parts
- Labyrinth piston compressor components
- Hyper/secondary compressor components

Services
The full range

- Burckhardt Valve Service
- Spare parts logistics
- Field service
- Technical support
- Revamps & upgrades
- Component repair
- Condition monitoring & diagnostics
- Training

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Compressors for a Lifetime®