BORNEmann pumps & systems for tank storage, terminals and refineries for the efficient and economic storage & transport of mineral oil products
OUR EXPERTISE FOR TANK STORAGE AND TERMINALS AND REFINERIES

Tank Farms and Tank Terminals are usually situated close to oil refineries or in locations where marine tankers containing products can discharge their cargo. Some depots are attached to pipelines from which they draw their supplies.

Bornemann pumps have a wide field of application in tank farms and terminals. They can be employed at all places where a high suction capability is required. Loading and unloading of ships, rail tankers, road tankers and conveying into storage tanks is just as possible as extraction from tanks, even with high viscosity and long pipes.

A refinery performs three basic steps: separation, conversion and treatment. Each function in the refining process is designed to maximize the value of the refined petroleum products produced.

Refineries run twenty-four hours a day. Bornemann twin screw pumps are the ideal solution for transfer within terminals where both low and high viscosity products have to be moved or metered. Product applications: mazut, bitumen, tar, heavy fuel and light products.

APPLICATION ADVANTAGES

- Loading and unloading with wide range of capacity
- Circulation from tank to tank
- Stripping of tank and pipes
- Operation with wide range of product viscosity
- Operation at high or low pressure
- Full Control in all kind of operation modes
- Reduced installation costs for pipes and valves
- High safety due to variable operation
- Low Pulsation
- No fixed duty points

Bornemann twin screw pumps prove their worth in pumping applications of all kinds throughout the world, which must perform under extreme environmental conditions.

Their advantages are operational safety, reliability and consistent performance, long life and low operating costs.

Bornemann twin screw pumps are rotary positive displacement pumps; the gearwheels and roller bearings are externally mounted and never come in contact with the pumped media.

Around 80 models are available, in various materials, sizes and forms, providing application-optimized solutions.

RELIABLE PERFORMANCE, DAY BY DAY

Bornemann twin screw pumps are double-flow and self priming. There is no metal-to-metal contact between the pump screws and the housing.

As the pumping elements rotate, the intermeshing of the two screws along with the pump housing form chambers. These chambers fill with the pumped fluid and transfer it from the suction side to the higher pressure discharge side of the pump.

The pump is designed to allow for reverse flow by simply changing the shaft direction. The suction becomes the discharge and vice versa, all without any modifications to the pump.

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Positive Displacement Pumps

- Create constant flow. Volume is moved from suction to discharge side
- Without discharge pipe the liquid would exit at atmospheric pressure
- Suitable for applications where a constant flow is required also handling at variable system pressure
- Speed/capacity range 1:10

Centrifugal Pumps

- Create constant pressure, in accordance with the pump curve
- Kinetic energy is transformed into pressure
- Without discharge pipe the liquid would exit at this developed pressure
- Limited flexibility in variable operation
- Fixed working points*
- Sensible for viscosity/density

Technological Competence and Extensive Flexibility

- Bornemann twin screw pumps are self priming
- Twin screw pumps are ideally suited for low and high viscous media
- Overall efficiency with different working points
- Compact design ensures space-saving set-up
- Functional principle ensures low-pulsation and low-noise operation
- Short-term dry run operation possible
- High suction lift up to 8.5 m (25 feet)
- Constant flow at varying pressures and volumes
- Intensive research and development to increase efficiency and profitability
- In conformity with ATEX 94/9/EG, API 676 and the German TA Luft 2002

<table>
<thead>
<tr>
<th>Pump Type</th>
<th>Capacity (m³/h)</th>
<th>Differential Pressure</th>
<th>Viscosity (cSt)</th>
<th>Max. Product Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>W/V universal pump</td>
<td>10 - 2,800</td>
<td>50 - 12,300</td>
<td>up to 50</td>
<td>0.5 - 200,000</td>
</tr>
<tr>
<td>HC/VHC high capacity pump</td>
<td>up to 4,500</td>
<td>up to 29,800</td>
<td>up to 36</td>
<td>1 - 20,000</td>
</tr>
<tr>
<td>HP high pressure pump</td>
<td>up to 200</td>
<td>up to 1,350</td>
<td>up to 150</td>
<td>1 - 10,000</td>
</tr>
<tr>
<td>SLI compact pump</td>
<td>up to 180</td>
<td>up to 790</td>
<td>up to 36</td>
<td>up to 250</td>
</tr>
</tbody>
</table>

1 - Basis for centrifugal and screw pump 1 cSt (system 1)

2 - New performance curve shows the capacity decrease for centrifugal pumps and the capacity increase for screw pumps. The higher the viscosity the higher the capacity (applicable for Twin Screw Pumps)

* duty point will vary with changing pressure, throttle valve necessary
HIGHER FLEXIBILITY OF OPERATION WITH ONE INSTALLATION AND CONTROL SYSTEM ONLY

ONE FOR ALL

ADVANTAGES
• High flow rate
• Casted pump casing
• High efficiency up to 80%
• Handling of wide ranges of viscosities and differential pressures with one pump
• Self priming and excellent NPSH value
• Large capacity control by speed variation control
• Wide range of screw pitch sizes per model
• Smooth and low pulsation handling of the product (very little shear forces transported into the liquid)

CONTROL AND PROTECTION BY CONTROL SYSTEM

GENERAL FEATURES
• Safe design for human and environment
  - Independent operating ESD system
  - Pump protection system
  - Pump control system
  - Design in accordance with European or American Standards
  - Ready for operation in hazardous area
  - Standard components in use
  - Pre-tested operational system with FAT at the Bornemann workshop
  - ATEX Zone 1

ELECTRICAL DESIGN
• Completely engineered system
• KIS-operation (Keep-It-Simple)
  - Human Machine Interface (HMI) in the control room
  - Local control panel on skid
  - HMI on the skid (if requested)
• All necessary pump protection procedures programmed
• Manual and automatic pump operation procedures
• The control system is ready to communicate to a station control system by Profinet, Modbus, Device-net or Ethernet

IS ONE PUMP ABLE TO HANDLE ALL APPLICATIONS?

Pump I
1500 m³/h @ 100 mlc, max. 150 cSt / VLCC

Pump II
1000 m³/h @ 100 mlc, max. 150 cSt / Barges

Pump III
150 m³/h @ 100 mlc, max. 150 cSt / Railcars

Twin Screw Pump with Control System
Capacity range: 50m³/h - 4500 m³/h
Viscosity range: 0.5 cSt - 2500 cSt
Compact design

Below: KIS Operation

Above: Operation by Local control panel
HC PUMP – WITH AN EXCELLENT RATE OF PERFORMANCE TO SIZE/WEIGHT

A key design feature of Bornemann Twin Screw Pump Type HC/VHC is their unique screw geometry. These deep-chamber screws allow for an optimum diameter/length ratio, ensuring deflection-free performance and maximum output capacity.

Bornemann twin screw pumps are the ideal solution for transfer within terminals where both low and high viscosity products have to be moved or metered. All fluids whether neutral, alkaline or acid and aggressive, abrasive or gaseous are sucked up safely, dosed and pumped.

Due to Bornemann’s unique design of separately manufactured shafts and screws, many different material combinations are available.

Many Benefits Speak For Themselves

• Wide range of performance
• Optimum diameter / length ratio
• High pressure ratings
• Flow rate is increased by up to 30%*
• Total efficiency is improved by up to 15 %*
• Suction lift capacity is increased by up to 8,5 m³ (27.8 feet)
• Pump weight is reduced by up to 35 %*
• Space savings of up to 30 %*
• Pumps can be mounted vertically or horizontally
• Low price
• Capacity up to 4500 m³/h
• Cast housing
• Standardization

*Compared to the standard

More Power – Sustained Performance Up To 4500 m³/h

This two-piece design also allows the screws and shafts to be replaced independently of one another, maximizing interchangeability while reducing maintenance cost and downtime.

The optional relief valve is designed to ensure a quick response and minimum pressure increase upon opening.

All relief valves are designed for 100 % of the rated capacity.

The HC/VHC pump’s axial bearings are a rugged dual angular ball-bearing style that ensures reliable performance under high axial load conditions. The bearings and timing gears are lubricated in an oil bath. A specially developed gear adjustment mechanism makes service much easier by eliminating the need for gear re-adjustment during maintenance of the pump.

Material Execution

• Nodular cast iron (GGG-40.3)
• Cast steel (GS-C 25)

Mechanical Seals

• M7N 90 (standard)
• EN 12756

Performance Data

• Screw diameter up to Ø 465 mm
• Max. suction pressure 10 bar
• Max. discharge pressure 16 bar
• Max. differential pressure 16 bar
• Speed range 200 – 1500 min⁻¹
• Viscosity range 1 – 20,000 cSt
• Operating temperature up to 120 °C
• Flow rate 100 – 4500 m³/h
• Oil lubrication drive end
• Heating food (optional)
TANKSTORAGE PLANT EQUIPPED WITH BORNEMANN PUMPS

A flexible Terminal facility for the storage and handling of petroleum products, chemicals and heavy products requires high capacity pumps. Bornemann Pumps will assure a reliable performance and a quick turn around.

APPLICATIONS

- Loading and unloading of barges and tankers via jetties
- Loading and unloading of tank trucks or rail cars
- Tank to tank circulation
- Transfer
- Stripping

In dedicated installations to handle only one tank or in multi-connected installations to serve several tanks.

APPLICATIONS IN OIL TERMINALS AND TANK FARMS FOR THE PROFESSIONAL AND ECONOMIC STORAGE

<table>
<thead>
<tr>
<th>Country</th>
<th>Pump Type</th>
<th>Control System</th>
<th>Liquid</th>
<th>Capacity</th>
<th>Pressure</th>
<th>Fuel Oil</th>
<th>Gasoil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>HP 255</td>
<td>The Netherlands</td>
<td>Diesel Oil, Naphtha</td>
<td>248 m³/h (1100 gpm)</td>
<td>39 bar (570 psi)</td>
<td>850 cSt - 50 °C</td>
<td>10 cSt</td>
</tr>
<tr>
<td>China</td>
<td>HC 232</td>
<td>The Netherlands</td>
<td>Diesel Oil, Naphtha</td>
<td>200-600 m³/h (-2600gpm)</td>
<td>8 bar (116 psi)</td>
<td>10 cSt</td>
<td></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>HC 370</td>
<td>The Netherlands</td>
<td>Diesel Oil, Naphtha</td>
<td>150 - 1,500 m³/h (660 - 6,600 gpm)</td>
<td>1 - 10 bar (15 - 150 psi)</td>
<td>850 cSt - 50 °C</td>
<td>10 cSt</td>
</tr>
<tr>
<td>Russia</td>
<td>W8.5zk</td>
<td>The Netherlands</td>
<td>Diesel Oil, Naphtha</td>
<td>1000 m³/h (4400 gpm)</td>
<td>8 bar (116 psi)</td>
<td>850 cSt - 50 °C</td>
<td>10 cSt</td>
</tr>
<tr>
<td>Singapore</td>
<td>W7.2z</td>
<td>The Netherlands</td>
<td>Diesel Oil, Naphtha</td>
<td>200 m³/h (880 gpm)</td>
<td>8 bar (116 psi)</td>
<td>850 cSt - 50 °C</td>
<td>10 cSt</td>
</tr>
<tr>
<td>Middle East</td>
<td>W9.5zk</td>
<td>The Netherlands</td>
<td>Diesel Oil, Naphtha</td>
<td>1400 m³/h (6200 gpm)</td>
<td>12 bar (175 psi)</td>
<td>850 cSt - 50 °C</td>
<td>10 cSt</td>
</tr>
</tbody>
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