Specialty lubricants for mobile lifting and earth moving machines
Lubricant solutions for large mobile equipment

BECHEM – Lubrication solutions for industry

As the oldest German manufacturer of industrial lubricants, BECHEM today is one of the leading producers of high-quality special lubricants and metal working fluids.

BECHEM products convince by innovative formulations in the most diverse of industrial applications – in machining and forming metal working processes, in coating technology and as for-life lubricants in various technical components.

A strong network of distributors and several national and international production sites ensure that BECHEM products are readily available worldwide.

Tomorrow's technologies. Today.
Maximum performance for large mobile equipment

In the construction, mining and earthworks industries, as well as in transport technology, machines and systems are frequently subjected to extreme operating conditions. Besides environmental influences such as dust, humidity and even extreme variations in temperature, both very high and/or shock loads have to be managed. Machine downtime and possible production loss represent an enormous cost factor, and since redundant systems are in general not available, the selected lubricant is extremely important.

Based on many years of experience, BECHEM has developed the right special lubricants for these tough settings in close collaboration with leading machine manufacturers. By integrating a new generation of high-performance additives, the products extend the service life of the machines and systems thanks to improved wear properties.

Various studies have shown that maintenance costs can be cut by up to 25% through careful lubricant selection and application. BECHEM lubricants reduce power losses, maintenance costs and downtimes while meeting demands for higher efficiency and system availability. For mobile lifting and earthmoving equipment, BECHEM offers a complete range of compatible high-performance lubricants, anti-friction coatings and maintenance auxiliaries, as well as a number of biodegradable products all available worldwide.
Mining and earthmoving equipment

The excellent mechanical stability, aging stability and very good wear and corrosion protection BECHEM lubricants offer, enable reliable control over high specific loads under the influence of dust and humidity, even at extended relubrication intervals.

With newly developed high-performance additives and their physiochemical reaction with the metal surfaces, the BECHEM High-Lub FA series lubricating greases achieve lower friction and wear values. For example, the use of BECHEM High-Lub FA 50 and BECHEM High-Lub FA 67-400 KS has proven to significantly extend the service life of slewing ring bearings.

Some BECHEM lubricating greases have special synthetic lubricant combinations for use in bearings with very high contact pressures, very slow movements and/or shock loads, typical for equipment in mining and earthworks. This ensures reliable protection of the friction bodies in mixed friction.

BECHEM has developed special lubricating greases for outstanding pumping characteristics at low ambient temperatures in central lubrication systems. In very long central lubrication systems of draglines and overburden conveyor bridges, for years they have guaranteed all lubrication points are supplied reliably. Special partially synthetic high-performance greases are available for use in Arctic regions.

»Reduce power losses, extend equipment service life.«
Telescoping cranes

At many construction sites throughout the world, telescoping cranes with their high mobility offer convincing performance that makes them essential for many applications. To maintain these functions over the long-term and so that the daily telescoping can function with reduced friction and without stick-slip, an efficient lubrication is indispensable. For high construction projects rotating tower cranes with their lifting technology, as well as fast-erecting cranes or top-slewing cranes likewise bring their strengths to bear. Here as well only a perfect lubrication ensures reliable functionality. Whether in intense heat, freezing temperatures or dusty dryness, in rain, snow or ice – cranes are always exposed to the environmental influences and must be ready for operation at any time under the most varied climatic conditions.

BECHEM has developed a broad assortment of high-performance lubricants for cranes that ensure a prolongation of service life, reduction of maintenance costs through extended lubrication intervals, and efficient operation.

Lubrication of telescopic crane booms

The lubricant solutions for telescopic booms are based on highly viscous, extremely adhesive base oils. These special lubricants for telescopic booms with plastic sliding plates contain a high dose of PTFE, giving them the desired friction coefficient for the highly stressed telescopic segments. With Berulub PAL 1 and Berulub TCG 1, BECHEM offers high-performance products with a long lifespan that ensure many safe telescopic operations without the need for relubrication that can be used independent of the type of boom or type of crane.

Berulub PAL 1 improves the sliding properties of different material pairings, particularly NF metal/NF metal, NF metal/elastomer, plastic/plastic, and metal/plastic, and thus avoids stick-slip when telescoping. Thanks to the synthetic base oil the lubricating grease ensures an excellent bond, and thanks to the PTFE, which is used in the lubricant as a thickener, it ensures reduced friction as well. Environmental influences, as well as temperatures in the implementation range between -40°C and +150°C have no influence on its performance. Due to the NLGI Class 1 rating and the base oil viscosity Berulub PAL 1 can also be applied with a spray system. Berulub TCG 1 can even be applied in extreme sub-zero temperatures.

To counteract wear to the metal primer, an inevitable result of the movement of the telescopic boom, BECHEM has developed special anti-friction coatings for modern telescopic cranes. Anti-friction coatings are industrial coatings enriched with solid lubricants and additives at a specific pigment volume concentration. Besides improving their functionality, these substances give complex tribological systems such as telescopic constructions dry-running properties in case of insufficient lubrication. They also effectively protect the steel surface from corrosion without affecting the friction values of the lubricant, thus lowering the risk of downtimes significantly.

Anti-friction coating to minimize stick-slip

Berucoat AF 339 is a 2-component PTFE anti-friction coating that was developed as lifetime lubrication of components on cranes, and for tribological optimization of the existing grease lubrication.

The surface coated with Berucoat AF 339 for telescoping is dry to the touch after one hour, can be subjected to load after 3 days, and after 7 days it has cured.

Crane boom segments require corrosion protection for transport to the final assembly location, however this corrosion protection cannot be applied as a Vaseline or wax film, because dust particles remain bonded on the media, and in this case the segments would then have to be cleaned. In extensive salt spray tests with a 5% NaCl solution Berucoat AF 339 was able to convincingly outperform a zinc primer as corrosion protection. Even after 192 hours the test segment that had been sprayed was free of corrosion.

Berucoat AF 339 with the integrated PTFE is adjusted to the lubricating greases used, such as Berulub PAL 1, Berulub TCG-1 or Berulub TCG-1 V. Through this measure, friction can be reduced, stick-slip avoided and a constant low coefficient of friction can be achieved.
Harbor cranes and loading systems

The components of harbor cranes and loading systems are often subjected to the strong corrosive effects of salt water atmospheres. This makes the corrosion protection properties and water resistance of the lubricants used even more important. High loads and in some cases very low speeds in the bearings of many components, as well as the extremely high requirements for system availability, also require high load-carrying properties and excellent mechanical stability of the lubricating greases used.

The lubricating greases of the BECHEM High-Lub FA 67 series, which thanks to the use of newly engineered high-performance additives also reliably prevent downtime corrosion, were developed for these special requirements. The formation of ultra effective reaction layers reduces the friction values in highly stressed roller and plain bearings. This lowers the risk of dynamic forces occurring, which could result in loads shifting. Owing to their excellent mechanical stability, the lubricating greases of the BECHEM High-Lub FA series allow for relubrication intervals of several months. This boosts the efficiency of the crane and loading systems significantly.

Developed for the lubrication and preservation of steel ropes, BECHEM High-Lub SW 2 V combines the properties of both penetrating rope care lubricants and those that form a protective layer. BECHEM High-Lub SW 2 V protects the rope surface from wear and corrosion, as well as corrosion and wire breakage within the rope thanks to its excellent reconditioning effect. The outstanding wetting capability of BECHEM High-Lub SW 2 V and its high adhesion capacity after solvent evaporation enable long dwell times on the surface of ropes and individual wires, while reducing consumption. Special dewatering additives even enable application on wet steel ropes. BECHEM High-Lub SW 2 V in a spray can is available for small wire ropes and chains.
Lubricant solutions for bucket wheel excavators

Central lubrication system
- BECHEM High-Lub LT EP series
- BECHEM High-Lub LM EP series
- BECHEM High-Lub FA 67 series
- BECHEM High-Lub LFB 2000
- Beruplex GS 2 EP
- Beruplex PMC 42 F
- Berulub ECO Super series

Steel ropes
- Beruprotect Rope Dressing
- Berulit GA series

Bucket wheel excavator gears
- BECHEM Staroil G series
- Berugear GS BM series
- BECHEM Staroil SMO series
- Berusynth EP series

Tape unit gears
- BECHEM Staroil G series
- Berugear GS BM series
- Berusynth EP series

Electric motor bearings
- BECHEM High-Lub L 3
- BECHEM High-Lub LT 3 EP
- BECHEM High-Lub FA 67-2
- Berutox FE 18 EP

Slewing ring
- Berulit GA series

Drive unit gears
- BECHEM Staroil G series
- Berugear GS BM series
- BECHEM Staroil SMO series
Lubricant solutions for harbor cranes

Central lubrication system
- BECHEM High-Lub LT EP series
- BECHEM High-Lub LM EP series
- BECHEM High-Lub FA 67 series
- BECHEM High-Lub LFB 2000
- Beruplex CS 2 EP
- Beruplex PMC 42 F
- Berulub ECO Super 2

Steel ropes
- BECHEM High-Lub SW 2-V

Gears
- BECHEM Staroil G series
- Berugear GS BM series

Lift rack / open drive wheels
- Berulit GA 2500 Spray
- Beruplex UWS FG 34-00

Electric motor bearings
- BECHEM High-Lub L 3
- BECHEM High-Lub LT 3 EP
- BECHEM High-Lub FA 67-2
- Berutox FE 18 EP

Wheel bearings
- BECHEM High-Lub FA 67-400 KS
- BECHEM High-Lub LFB 2000
- Beruplex PMC 42 F

Lubricant solutions for mobile cranes

Steel ropes
- Beruprotect Rope Dressing
- Berulub GA series

PA sliding plates for telescopic booms
- Berulub PAL series
- Berulub TCG series

Metal sliding plates for telescopic booms
- Berulit GA series

Roller and plain bearings
- BECHEM High-Lub LT EP series
- BECHEM High-Lub LM EP series
- BECHEM High-Lub FA 67 series
- BECHEM High-Lub LFB 2000
- Berulub ECO Super 2

Slewing ring
- Berulit GA series
- Berugear UWS FG 34-00

Hydraulic equipment
- BECHEM Hydrostar D 46
- BECHEM Hydrostar HEP series

PA sliding plates for telescopic booms
- Berulub PAL series
- Berulub TCG series

Metal sliding plates for telescopic booms
- Berulit GA series

Steel ropes
- Beruprotect Rope Dressing
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Roller and plain bearings
- BECHEM High-Lub LT EP series
- BECHEM High-Lub LM EP series
- BECHEM High-Lub FA 67 series
- BECHEM High-Lub LFB 2000
- Berulub ECO Super 2

Slewing ring
- Berulit GA series
- Berugear UWS FG 34-00

Hydraulic equipment
- BECHEM Hydrostar D 46
- BECHEM Hydrostar HEP series

PA sliding plates for telescopic booms
- Berulub PAL series
- Berulub TCG series

Metal sliding plates for telescopic booms
- Berulit GA series
For maximum productivity

In regions with very cold winters, the low temperature behavior of lubricants plays a major role. Besides high requirements on lubrication properties, their conveying behavior is also very important.

**BECHEM High-Lub L 2 MO** and **BECHEM High-Lub LM 2 EP** offer not only excellent wear and corrosion protection, but also feature outstanding pumping characteristics in the sometimes very long lineages of central lubrication systems. **BECHEM High-Lub LM 0 EP** can be used at extremely low temperatures of down to -40°C.

The BECHEM range includes a number of special hydraulic and gear oils. Please inquire about the corresponding products.

Reliable, cost-effective lubrication under tough conditions requires not only the use of high-performance lubricants, but also experience in correct application. BECHEM has the necessary expertise to provide individual consultation to users. BECHEM has also developed a process for analyzing the conveying behavior of lubricating greases in central lubrication systems. This process applying the BECHEM rheometer curve, which is measured using rotation viscometers, offers significant time and cost savings.

### PRODUCT

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Component</th>
<th>Additives</th>
<th>Viscosity index</th>
<th>Viscosity at 40°C</th>
<th>Viscosity at 100°C</th>
<th>Service temperature</th>
<th>Typical applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>BECHEM High-Lub L 2 EP</td>
<td>Mineral oil</td>
<td>Lithium soap</td>
<td>2</td>
<td>180</td>
<td>15</td>
<td>-30</td>
<td>Roller and plain bearings, central lubrication systems in the normal temperature range</td>
</tr>
<tr>
<td>BECHEM High-Lub LM 2 EP</td>
<td>Mineral oil</td>
<td>Lithium soap</td>
<td>2</td>
<td>105</td>
<td>10</td>
<td>-40</td>
<td>Roller bearings and plain bearings, central lubrication systems at low ambient temperatures</td>
</tr>
<tr>
<td>BECHEM High-Lub LM 0 EP</td>
<td>Mineral oil</td>
<td>Lithium soap</td>
<td>2</td>
<td>105</td>
<td>10</td>
<td>-40</td>
<td>Roller bearings and plain bearings, central lubrication systems at low ambient temperatures</td>
</tr>
<tr>
<td>BECHEM High-Lub L 2 MO</td>
<td>Mineral oil</td>
<td>Lithium soap</td>
<td>2</td>
<td>100</td>
<td>9</td>
<td>-30</td>
<td>Pivot bearings, central lubrication systems at low ambient temperatures</td>
</tr>
<tr>
<td>BECHEM High-Lub LFB 2000</td>
<td>Mineral oil</td>
<td>Special calcium soap</td>
<td>1-2</td>
<td>150</td>
<td>9</td>
<td>-25</td>
<td>Sliding bearings, wheel bearings, pivot bearings in the normal temperature range</td>
</tr>
<tr>
<td>BECHEM High-Lub LWD 5</td>
<td>Mineral oil</td>
<td>Lithium-Calcium-Soap</td>
<td>2</td>
<td>460</td>
<td>30</td>
<td>-20</td>
<td>Extremely heavy-duty sliding ring main bearing and joint bearing</td>
</tr>
<tr>
<td>BECHEM High-Lub FA 67-400 K3</td>
<td>Mineral oil</td>
<td>Lithium-Calcium-Soap</td>
<td>2</td>
<td>1200</td>
<td>47</td>
<td>-20</td>
<td>Extremely heavy-duty pivot bearings and roller bearings, plain bearings and plain bearings in the normal temperature range</td>
</tr>
<tr>
<td>Beruplex CS 2 EP</td>
<td>Mineral oil</td>
<td>Calcium complex soap</td>
<td>2</td>
<td>150</td>
<td>13</td>
<td>-25</td>
<td>Electric motors and fan bearings under thermal load</td>
</tr>
<tr>
<td>Beruplex PMG 40 F</td>
<td>Mineral oil</td>
<td>Special calcium complex soap</td>
<td>0</td>
<td>440</td>
<td>26</td>
<td>-20</td>
<td>Sump lubrication of bucket chain bearings</td>
</tr>
<tr>
<td>Beruplex PMG 42 F</td>
<td>Mineral oil</td>
<td>Special calcium complex soap</td>
<td>1-2</td>
<td>400</td>
<td>26</td>
<td>-20</td>
<td>Extremely heavy-duty pivot bearings, roller bearings, and plain bearings in the normal temperature range</td>
</tr>
<tr>
<td>Berotub M 21 KN</td>
<td>Mineral oil</td>
<td>Polyurea</td>
<td>1-2</td>
<td>490</td>
<td>32</td>
<td>-20</td>
<td>Roller and plain bearings under thermal load</td>
</tr>
<tr>
<td>Berotub FB 22</td>
<td>Polyalkyladipin (PAO)</td>
<td>Barium complex soap</td>
<td>2</td>
<td>50</td>
<td>8</td>
<td>-40</td>
<td>Electric motors and fan bearings under thermal load</td>
</tr>
<tr>
<td>Berub ECO Super 1</td>
<td>Synthetic water</td>
<td>Lithium-Calcium-Soap</td>
<td>1</td>
<td>110</td>
<td>14</td>
<td>-55</td>
<td>Roller bearings and plain bearings, central lubrication systems at normal and low ambient temperatures</td>
</tr>
<tr>
<td>Berub ECO Super 2</td>
<td>Synthetic water</td>
<td>Lithium-Calcium-Soap</td>
<td>2</td>
<td>110</td>
<td>14</td>
<td>-45</td>
<td>Roller bearings and plain bearings, central lubrication systems at normal and low ambient temperatures</td>
</tr>
</tbody>
</table>

**PRODUCT**

<table>
<thead>
<tr>
<th>Base oil</th>
<th>Thickener</th>
<th>NLGI-grade</th>
<th>Kinematic viscosity at 40 °C</th>
<th>Kinematic viscosity at 100 °C</th>
<th>Service temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oil</td>
<td>Barium complex soap</td>
<td>9</td>
<td>8</td>
<td>140</td>
<td>Low ambient temperatures</td>
</tr>
<tr>
<td>Mineral oil</td>
<td>Synthetic water</td>
<td>10</td>
<td>14</td>
<td>180</td>
<td>Low ambient temperatures</td>
</tr>
</tbody>
</table>

### Hydraulic excavator in open cast mining

*All data and values correspond to the current state of knowledge and serve as guidance only.*

**Value marked in gray indicates short term maximum temperature.**

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BECHEM offers customers using its products comprehensive technical services, with a global network of service centers with trained technicians on call. Technical service may include the following items according to the respective agreements:

- Regular technical inspections
- Lubricant management and consultation
- Sampling and analysis of lubricant samples
- Creation of lubrication charts determining the monitoring or failure criteria
- Support during repair work
- Optimization of lubricant consumption values
- Support in optimizing lubrication systems

**Technical Service**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Base Oil</th>
<th>Additive</th>
<th>Temp. Range</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berulub PAL 1</td>
<td>Estar</td>
<td>Polytetrafluoroethylene (PTFE)</td>
<td>1°</td>
<td>-40 °C to +150 °C</td>
</tr>
<tr>
<td>Berulub PAL 3</td>
<td>Estar</td>
<td>Polytetrafluoroethylene (PTFE)</td>
<td>3°</td>
<td>-20 °C to +150 °C</td>
</tr>
<tr>
<td>Berulub TCG 1</td>
<td>Synthetic oil combination</td>
<td>Polytetrafluoroethylene (PTFE)</td>
<td>1°</td>
<td>-40 °C to +150 °C</td>
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<tr>
<td>Berulub Pulfluid Spray</td>
<td>Estar</td>
<td>Polytetrafluoroethylene (PTFE)</td>
<td>3°</td>
<td>-20 °C to +150 °C</td>
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<tr>
<td>Berulub 445</td>
<td>Mineral oil</td>
<td>Aluminium complex soap</td>
<td>2</td>
<td>-20 °C to +180 °C</td>
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<tr>
<td>Berulub GA 400 + 2500</td>
<td>Mineral oil</td>
<td>Aluminium complex soap</td>
<td>0.00</td>
<td>-20 °C to +180 °C</td>
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<tr>
<td>Berurgear UWS FG 34-00</td>
<td>Synthetic ester</td>
<td>Lithium-Calium-Soap</td>
<td>0.0</td>
<td>-50 °C to +80 °C</td>
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<tr>
<td>Berulub Paste PT 2</td>
<td>Mineral oil</td>
<td>Polyurea</td>
<td>2</td>
<td>-30 °C to +150 °C</td>
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<tr>
<td>Berulub MG Paste</td>
<td>Mineral oil</td>
<td>Gel</td>
<td>2-3</td>
<td>-20 °C to +450 °C</td>
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<tr>
<td>Berulub IKP</td>
<td>Mineral oil</td>
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<td>35</td>
<td>-15 °C to +200 °C</td>
</tr>
<tr>
<td>BECHEM High-Lub SW 2 V</td>
<td>Mineral oil</td>
<td>Special calcium soap</td>
<td>1-2</td>
<td>-25 °C to +80 °C</td>
</tr>
<tr>
<td>Beruprotect Rope Dressing</td>
<td>Mineral oil</td>
<td></td>
<td>1-2</td>
<td>-20 °C to +100 °C</td>
</tr>
<tr>
<td>Berulub GA 2500 Spray</td>
<td>Mineral oil</td>
<td>Aluminium complex soap</td>
<td>0.00</td>
<td>-20 °C to +200 °C</td>
</tr>
<tr>
<td>Berulub Gear Spray</td>
<td>Mineral oil</td>
<td></td>
<td></td>
<td>-30 °C to +90 °C</td>
</tr>
<tr>
<td>Berulub ECO GB 40 Spray</td>
<td>Estar</td>
<td></td>
<td></td>
<td>-30 °C to +90 °C</td>
</tr>
<tr>
<td>Berulub ECO</td>
<td>Polyalphaolefin (PAO)</td>
<td></td>
<td></td>
<td>-70 °C to +250 °C</td>
</tr>
<tr>
<td>Beruclean ECO</td>
<td>Polyalphaolefin (PAO)</td>
<td></td>
<td></td>
<td>-70 °C to +250 °C</td>
</tr>
<tr>
<td>Berucost AF 539</td>
<td>Polyalphaolefin (PAO)</td>
<td></td>
<td></td>
<td>-70 °C to +250 °C</td>
</tr>
</tbody>
</table>

**Technical Details**

- Telescopic booms of cranes and loading systems with PTFE sliding plates
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- Manual lubrication of gear rings
- Open drives and gear rims in case of application with lubrication systems
- Open drives and gear rims in case of application with lubrication systems
- Heavy-duty plain bearings and pivot bearings, both, bushes, spindles and guides subject to extremely high load
- Lubrication, sealing and preservation of screws, etc., dry lubrication at high temperatures
- Chains and mechanisms in dusty environments
- Wire ropes, chains and mechanisms in humid environments or salt water atmosphere
- Wire ropes in extremely dusty environments
- Telescopic booms and loading systems with PTFE sliding plates
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- Telescopic booms and loading systems with PTFE sliding plates
- Many types of lubricants and greases are used, including:
  - Multi-purpose lubricant for open gear drives and lubricating paste, very high graphite content, excellent wear protection, good adhesion, high load-carrying capacity, not sprayable
  - Operating lubricant for open gear drives, extremely high base oil viscosity, excellent wear protection, extremely high load-carrying capacity, good adhesion, contains graphite, preferably applied by spray equipment
  - Gear lubricant for open gear drives, readily biodegradable according to OECD 301 C, excellent wear protection, excellent adhesion, very high load-carrying capacity, contains light-coloured solid lubricants
  - Multi-purpose lubricating and assembly paste, prevents tribo-corrosion and stick-slip, cream-colored
  - Multi-purpose assembly paste with MoS2, prevents stick-slip and running-in damage, protects against fretting corrosion, high thermal stability, water resistant
  - Multi-purpose paste assembly paste with MoS2, prevents stick-slip and running-in damage, protects against fretting corrosion, high thermal stability, water resistant
  - Chain oil to lubricate slow-moving transport and conveyor chains with large chain links, high load-carrying capacity, low dust binding, excellent wear and corrosion protection, contains graphite
  - Wire rope lubricant, fluid, good creeping properties, excellent wear and corrosion protection, outstanding adhesion, excellent wetting properties
  - Operating lubricant optimally suited for sliding contacts metal/metal, excellent wear protection, excellent adhesion, high load-carrying capacity, solid lubricant graphite
  - Multi-purpose paste prevents stick-slip, extends relubrication intervals, excellent adhesion, media-resistant, contains PTFE, optimally suited for contact combinations of metal with PTFE/PA
  - Multi-purpose paste, prevents stick-slip, low-temperature suitability, high load-carrying capacity, excellent adhesion, contains graphite, PTFE, optimal for contact combinations of metal with PTFE/PA
  - Multi-purpose paste prevents stick-slip, extends relubrication intervals, excellent adhesion, media-resistant, contains PTFE, optimally suited for contact combinations of metal with PTFE/PA

**Values:**

- Value marked in gray indicates short term maximum temperature.
- All data and values correspond to the current state of knowledge and serve as guidance only.

**Note:**

- Value refers to the unworked penetration
- Value marked in grey indicates short term maximum temperature.