RENOLIT industrial greases make up a comprehensive and balanced program of products which not only offers optimum technical but also economic solutions for the largest possible number of industrial applications.

This brochure contains excerpts of the FUCHS industrial grease program.

In addition, the brochure also contains important information on applications, terminology and the testing of greases.

Special greases and specific customer formulations are available on request.

The following criteria need to be considered when selecting a grease:

- Operating temperature
- Load
- RPM and speed
- Ambient conditions (water, dust, acids, alkalines, etc.)
- Sealing materials and plastics.

Together with leading manufacturers of central lubrication systems, we can also offer customers perfect grease application solutions.

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### A. Core program

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Colour</th>
<th>Product information</th>
<th>Thickener</th>
<th>Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point[°C]</th>
<th>Operating temperature[°C]</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solid lubricant</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>51 502</td>
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<td></td>
</tr>
</tbody>
</table>

1. **Greases, water-resistant, up to +60 °C**

- **RENOLIT CA-CC 1**
  - K 1 C-30
  - ISO-L-X-CAHA 1
  - blue
  - S-1019
  - Calcium soap
  - Mineral oil
  - 1
  - >95
  - Tacky lubricating and sealing grease, excellent hot and cold water resistance, e.g. for Archimedian screws in waste treatment plants and power stations; softer consistency – “Winter grease”.

- **RENOLIT CA-FH 5**
  - K 2 C-30
  - ISO-L-X-CAHA 2
  - red
  - S-1021
  - Calcium soap
  - Mineral oil
  - 2
  - >95
  - Tacky lubricating and sealing grease, excellent hot and cold water resistance, e.g. for Archimedian screws in waste treatment plants and power stations; stiffer consistency – “Summer grease”.

- **RENOLIT CA-FH 3**
  - K 2 C-30
  - ISO-L-X-CAHA 2
  - light brown
  - S-1020
  - Calcium soap
  - Mineral oil
  - 2
  - >95
  - High quality lubricating and sealing grease with excellent water resistance even against hot water and alkaline solutions. Used as water pump grease.

- **RENOLIT CA-FG 30**
  - MFP 2 E-30
  - Graphite
  - S-1100
  - Calcium soap
  - Mineral oil
  - 2
  - >95
  - Graphited underwater dredger grease with good adhesion, excellent water resistance and corrosion protection. Recommended for plain and roller bearings, e.g. conveying and transporting systems, construction machines and watergates.

2. **Greases, not water-resistant, up to +120 °C**

- **RENOLIT SO-GF8**
  - GP 00 H-30
  - ISO-L-X-CBBB 00
  - brown
  - S-2511
  - Sodium soap
  - Mineral oil
  - 00
  - >140
  - Semi fluid grease with good adhesion for lubrication of high speed gearboxes and gear motors, Flender approval.

- **RENOLIT SO-GF 00**
  - G 00 H-30
  - ISO-L-X-CBBA 00
  - brown
  - S-2640
  - Sodium soap
  - Mineral oil
  - 00
  - >145
  - For the lubrication of small, light loaded gearboxes.

- **RENOLIT SO-GFD 35**
  - GP 0 H-30
  - ISO-L-X-CBBB 0
  - brown
  - S-2510
  - Sodium soap
  - Mineral oil
  - 0
  - >140
  - Recommended to lubricate high speed gears of agricultural machines.

- **RENOLIT SO-WA 3**
  - K 3 M-30
  - ISO-L-X-CCBA 3
  - brown
  - S-2110
  - Sodium soap
  - Mineral oil
  - 3
  - >170
  - For electric motors, machine tools and conveyor systems.

3. **Multipurpose greases for temperatures up to +120 °C**

- **RENOLIT MP 735**
  - KP 2 K-40
  - ISO-L-X-DCEB 2
  - light brown
  - S-4420
  - Lithium soap
  - Mineral oil
  - 2
  - >180
  - High-performance, multipurpose grease for plain and roller bearings; especially for wheel bearings if no high temperature or special greases is required, good low temperature properties. Approvals: VW TL 735 and MAN 28 Li P 2.

- **RENOLIT MP**
  - KP 2 K-40
  - ISO-L-X-DCEB 2
  - light brown
  - S-4530
  - Lithium soap
  - Mineral oil
  - 2
  - >180
  - Multipurpose grease for cars, trucks, agricultural machines and industrial applications. Approvals: DBL 68.04.00, MB-APPROVAL 267.D.

- **RENOLIT MP PLUS**
  - KP 2 K-30
  - ISO-L-X-CCEB 2
  - light brown
  - S-4422
  - Lithium soap
  - Mineral oil
  - 2
  - >180
  - High-performance, multipurpose EP grease for plain and roller bearings with excellent adhesion, very good corrosion protection and ageing stability, for e.g. cars, trucks and agricultural machines.

- **RENOLIT GP 2**
  - Also in NLGI grade 1 and 3 available.
  - K 2 K-30
  - ISO-L-X-CCEA 2
  - light brown
  - S-4425
  - Lithium soap
  - Mineral oil
  - 2
  - >180
  - Multipurpose grease for all types of plain and roller bearings.

- **RENOLIT CA-LZ**
  - Also in spray can as RENOLIT UNIMAX LZ available.
  - KP 2 K-30
  - ISO-L-X-CCHB 2
  - yellowish-green fluorescent
  - S-1082
  - Calcium soap
  - Mineral oil
  - 2
  - >140
  - Long-life tacky grease, prevents wear even in extreme conditions; highly resistant to water wash-out; long-term lubrication of cars, trucks, construction and agricultural machines.
RENOLIT DURAPLEX EP greases are specially designed for long-term and lubricated-for-life applications in roller bearings and all kinds of lubrication points with high demands regarding service life, temperature and corrosion protection, e.g. electric motors in the chemical industry, clutch release bearings of mobile cranes, construction machines, EUMUCO forging presses and truck wheel bearings.

RENOLIT DURAPLEX EP 2
Also in NLGI grade 00/000, 1 and 3 available.

RENOLIT FEP 2
Also in NLGI grade 1 and 3 available.

RENOLIT CX-EP 2
Also in NLGI grade 0 and 1 available.

RENOLIT LX-PEP 2
Also in NLGI grade 1/2, 2/3 and 3 available.

RENOLIT CX-FO 20
Also in NLGI grade 0 and 1 available.

4. Greases for temperatures > +120 °C and high loads

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Colour</th>
<th>Thickener</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature Minus</th>
<th>Operating temperature Plus</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOLIT DURAPLEX EP 2</td>
<td>KP N 2-20 ISO L-X-BDEB 2</td>
<td>yellow</td>
<td>Lithium soap</td>
<td>2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td>Heavy-duty grease containing special additives to reduce wear and to improve the EP-performance, for mechanically and thermally stressed applications in the steel industry, also for e.g. printing machines, press lubrication and dredger.</td>
</tr>
<tr>
<td>RENOLIT LXR 2 H</td>
<td>KP N-30 ISO L-X-CDEB 2</td>
<td>light brown</td>
<td>Lithium soap</td>
<td>2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td>Premium quality multipurpose grease, long-term rust protection and good corrosion protection even in the presence of salt water, compatible with Hyltrol. Recommended for central lubrication systems, sugar plants, brickworks, paper industry and because of its good adhesion as sealing grease.</td>
</tr>
<tr>
<td>RENOLIT H 443-HB 88</td>
<td>KP 3/2 N-30 ISO L-X-CDEB 3/2</td>
<td>green</td>
<td>Lithium soap</td>
<td>3/2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td>For highly stressed plain and roller bearings, even under shock loads and severe vibration, e.g. unbalanced motors, vibrating screens, vibrators, soil tampers and electrical machines. Also recommended for central lubrication systems.</td>
</tr>
<tr>
<td>RENOLIT DURAPLEX EP 2</td>
<td>KP 2-30 ISO L-X-CHEB 2</td>
<td>light brown</td>
<td>Li-X-soap</td>
<td>2</td>
<td>&gt;260</td>
<td></td>
<td></td>
<td>RENOLIT DURAPLEX EP greases are specially designed for long-term and lubricated-for-life applications in roller bearings and all kinds of lubrication points with high demands regarding service life, temperature and corrosion protection, e.g. electric motors in the chemical industry, clutch release bearings of mobile cranes, construction machines, EUMUCO forging presses and truck wheel bearings.</td>
</tr>
<tr>
<td>RENOLIT CX-EP 2</td>
<td>KP N-30 ISO L-X-CDEB 2</td>
<td>brown</td>
<td>Ca-X-soap</td>
<td>2</td>
<td>&gt;250</td>
<td></td>
<td></td>
<td>Universally applicable for thermally and/or mechanically stressed bearings, recommended for the chemical, rubber, tire, steel and quarrying industries. Easy pumpable in central lubrication systems, even over long distances.</td>
</tr>
<tr>
<td>RENOLIT CX-FO 20</td>
<td>KP N-30 ISO L-X-CDEB 2</td>
<td>light brown</td>
<td>Ca-X-soap</td>
<td>2</td>
<td>&gt;250</td>
<td></td>
<td></td>
<td>Similar to RENOLIT CX-EP series, especially designed for continuous casting, approved by Voest Alpine.</td>
</tr>
</tbody>
</table>

#### Notes
- Li-X = Lithium complex
- Ca-X = Calcium complex

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**Edition:** 06/2008

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**Edition:** 06/2008
B. Specialties

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Colour</th>
<th>Product information</th>
<th>Thicker Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point (°C)</th>
<th>Operating temperature</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Greases containing solid lubricants</strong></td>
<td></td>
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</tr>
</tbody>
</table>

**RENOIL FLM 2**
Also in NLGI grade 0 available.
KPF 2 N 30
ISO-L-X-CCEB 2
MoS₂
black
S-4570
Lithium soap
Mineral oil
2
>180

**RENOIL FG 150**
KPF 2 K 30
ISO-L-X-CCEB 2
Graphite
black
S-4565
Lithium soap
Mineral oil
2
>180
Similar to RENOLIT FLM 2, optimised for mechanically stressed bearings exposed to water.

**RENOIL FLM 302**
KPF 2 N 20
ISO-L-X-BDEB 2
MoS₂
black
S-4535
Lithium soap
Mineral oil
2
>180
For highly stressed plain and roller bearings, cardan shafts, guides, slow running gearboxes and joints. Emergency running properties.

**RENOIL FLM 502**
KPF 2 N 20
ISO-L-X-BDEB 2
MoS₂
black
S-4510
Li/Ca-soap
Mineral oil
2
>180
For highly stressed plain and roller bearings and low speeds. Emergency running properties.

**RENOIL FLM 1002**
Also in NLGI grade 1 available.
KPF 2 N 20
ISO-L-X-BDEB 2
MoS₂
black
S-4485
Li/Ca-soap
Mineral oil
2
>180
With higher base oil viscosity compared to RENOLIT FLM 502, for highly stressed plain and roller bearings, low speeds, e.g. roller mills. Emergency running properties.

**RENOIL PASTE AZ 0-1**
White solid lubricants
light grey
S-4015
Li-X-soap
Semi-synth.
0/1
>150
Assembly paste for roller bearings to prevent corrosion and fretting corrosion on the axle end. Extremely shear stable and aging resistant.

**RENOIL LX/WHITE 2**
White solid lubricants
white
S-3421
Li-X-soap
Mineral oil
2
>250
High resistance to thermal and mechanical loads even at low sliding speeds with a high corrosion protection. Recommended as assembly paste for the lubrication of three-jaw chucks and as screw protection.

**RENOIL LX/T-2 C 1**
Graphite
black
S-3540
Ca-X-soap
Mineral oil
1
>250
Highly graphited screw paste for applications in the offshore and mining industry.

**RENOIL LX-HT 2**
Also in spray can as RENOLIT UNIMAX and in NLGI grade 0 available.
MoS₂
black
S-3536
Ca-X-soap
Mineral oil
2
>270
Suitable for the lubrication of mechanically highly loaded plain and roller bearings with low speeds at high temperatures, especially when corrosion and wear protection is necessary, e.g. for open gears and klin cars.

**RENOIL LX-OTP 2**
PTFE
light brown
S-4030
Li-X-soap
Polyglycol
2/1
>250
For oscillating, highly loaded applications. Special solid lubricants minimise the release torque, even at low temperatures.

**RENOIL L 20**
MF 2 K 30
ISO-L-X-CCEA 2
Copper powder
coloured
S-4170
Lithium soap
Mineral oil
2
>180
Electric contact grease for the lubrication of commutators, collectors, slip rings, interrupter, switches, grinding and sliding contacts. Approved by Bosch VS 9771-Ft.

Li/Ca = Lithium/Calcium
Li-X = Lithium complex
Ca-X = Calcium complex

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Edition: 06/2008
For highly-loaded gearboxes which are subjected to contaminations by liquids or solid lubricants.

Good compatibility with elastomers and nonferrous metals. Supports the sealing of the gearbox and minimises the risk of leakages.

Semi-fluid grease which offers excellent corrosion protection. Primarily used in central lubrication systems of trucks and commercial vehicles. Approved by:

- WILLY VOGEL, MAN 283 Li-P 000, DEUTSCHE TECALEMIT, MB-APPROVAL 264.0, DBL 6833.00.
- Grease for industrial central lubrication systems with narrow bore lines, recommended for e.g. labelling machines, packaging machines and machine tools.
- For the lubrication of medium to small gearboxes, e.g. hand drilling machines and angle grinders.
- Good protection against wear and corrosion.
- For the lubrication of heavily loaded gearboxes, low oil separation, highly adhesive, four ball weld load > 4000N, special grease for industrial central lubrication systems, approved for the moulding presses of Müller-Weingarten, Schuler and Erfurt.
- Long life EP semi-fluid grease for a large temperature range with a good corrosion protection. For central lubrication systems of trucks, commercial vehicles and industry machines.
- Fully synthetic semi-fluid grease for extreme low temperatures, high oxidation resistance, low friction moments. Recommended for all grease lubricated sliding points, e.g. gear-boxes, servo motors and actuators.
- For highly-loaded gearboxes which are subjected to contaminations by liquids or solid lubricants. Good compatibility with elastomers and nonferrous metals. Supports the sealing of the gearbox and minimises the risk of leakages.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Colour</th>
<th>Thickener</th>
<th>NLGI-grade</th>
<th>Operating temperature</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOLIT LST 00</td>
<td>ISO L-X-OCB 00/000</td>
<td>yellow</td>
<td>Lithium soap</td>
<td>00/000</td>
<td>&gt;180</td>
<td>Also in NLGI grade 0 and 2 available.</td>
</tr>
<tr>
<td>RENOLIT LST 00</td>
<td>ISO L-X-OCB 00/000</td>
<td>green</td>
<td>Lithium soap</td>
<td>00/000</td>
<td>&gt;160</td>
<td></td>
</tr>
<tr>
<td>RENOLIT GFW 00</td>
<td>ISO L-X-BCEB 00</td>
<td>brown</td>
<td>Lithium soap</td>
<td>00/000</td>
<td>&gt;160</td>
<td></td>
</tr>
<tr>
<td>RENOLIT ELFTH 00</td>
<td>ISO L-X-AceB 00</td>
<td>brown</td>
<td>Lithium soap</td>
<td>00/000</td>
<td>&gt;160</td>
<td></td>
</tr>
<tr>
<td>RENOLIT DURAPLEX EP 00</td>
<td>ISO L-X-DCEB 00</td>
<td>green</td>
<td>Lithium soap</td>
<td>00/000</td>
<td>&gt;180</td>
<td>Long life EP semi-fluid grease for a large temperature range with a good corrosion protection. For central lubrication systems of trucks, commercial vehicles and industry machines.</td>
</tr>
<tr>
<td>RENOLIT R EP 000</td>
<td>ISO L-X-DCEB 00</td>
<td>light brown</td>
<td>Lithium soap</td>
<td>00/000</td>
<td>&gt;150</td>
<td>Fully synthetic semi-fluid grease for extreme low temperatures, high oxidation resistance, low friction moments. Recommended for all grease lubricated sliding points, e.g. gear-boxes, servo motors and actuators.</td>
</tr>
</tbody>
</table>

Li/Ca = Lithium/Calcium
Li X = Lithium complex

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Edition: 06/2008

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN ISO 6743-9</th>
<th>Colour</th>
<th>Product information</th>
<th>Thickener</th>
<th>Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature = continuous ≥ = short term</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOLIT CX 2</td>
<td>light brown</td>
<td>S-3510 Ca-X-soap Mineral oil 2</td>
<td>&gt;270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For highly-loaded plain and roller bearings, excellent wear protection and good EP performance, high working stability even in the presence of water, excellent corrosion protection. Used in steel mills, mining, cement plants, quarries, paper and construction industry, machine tools. Even for unfavourable conditions such as dusty environments, contact with water, weak acids and weak alkalines.</td>
</tr>
<tr>
<td>RENOLIT CX-TOM 15</td>
<td>light brown</td>
<td>S-3515 Ca-X-soap Semi-synth. 2/1</td>
<td>&gt;250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semi-synthetic and low temperature version of RENOLIT CXI 2, high thermal and mechanical resistance, excellent wear protection, good pumpability in central lubrication systems. For highly-loaded plain and roller bearings.</td>
</tr>
<tr>
<td>RENOLIT CX-HT 2</td>
<td>black</td>
<td>S-3536 Ca-X-soap Semi-synth. 2/1</td>
<td>&gt;270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Suitable for the lubrication of mechanically highly-loaded plain and roller bearings with low speeds at high temperatures, especially when corrosion and wear protection is necessary, e.g. for open gears and kiln cars.</td>
</tr>
<tr>
<td>RENOLIT FLM 502</td>
<td>light brown</td>
<td>S-4505 Li/Ca-soap Mineral oil 2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For highly-loaded plain and roller bearings and/or low sliding speeds.</td>
</tr>
<tr>
<td>RENOLIT FLM 1002</td>
<td>black</td>
<td>S-4510 Li/Ca-soap Mineral oil 2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For highly-stressed plain and roller bearings and low speeds. Emergency running properties.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-4485 Li/Ca-soap Mineral oil 2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>With higher base oil viscosity compared to RENOLIT FLM 502, for highly-stressed plain and roller bearings, low speeds, e.g. roller mills. Emergency running properties.</td>
</tr>
</tbody>
</table>

Ca-X = Calcium complex
Li/CA = Lithium/Calcium

### Semi-synthetic and low temperature version of RENOLIT CXI 2
Hight thermal and mechanical resistance, excellent wear protection, good pumpability in central lubrication systems. For highly loaded plain and roller bearings.

3. Heavy duty greases

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN ISO 6743-9</th>
<th>Colour</th>
<th>Product information</th>
<th>Thickener</th>
<th>Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature = continuous ≥ = short term</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOLIT CX 2</td>
<td>light brown</td>
<td>S-3510 Ca-X-soap Mineral oil 2</td>
<td>&gt;270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For highly-loaded plain and roller bearings, excellent wear protection and good EP performance, high working stability even in the presence of water, excellent corrosion protection. Used in steel mills, mining, cement plants, quarries, paper and construction industry, machine tools. Even for unfavourable conditions such as dusty environments, contact with water, weak acids and weak alkalines.</td>
</tr>
<tr>
<td>RENOLIT CX-TOM 15</td>
<td>light brown</td>
<td>S-3515 Ca-X-soap Semi-synth. 2/1</td>
<td>&gt;250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semi-synthetic and low temperature version of RENOLIT CXI 2, high thermal and mechanical resistance, excellent wear protection, good pumpability in central lubrication systems. For highly-loaded plain and roller bearings.</td>
</tr>
<tr>
<td>RENOLIT CX-HT 2</td>
<td>black</td>
<td>S-3536 Ca-X-soap Semi-synth. 2/1</td>
<td>&gt;270</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Suitable for the lubrication of mechanically highly-loaded plain and roller bearings with low speeds at high temperatures, especially when corrosion and wear protection is necessary, e.g. for open gears and kiln cars.</td>
</tr>
<tr>
<td>RENOLIT FLM 502</td>
<td>light brown</td>
<td>S-4505 Li/Ca-soap Mineral oil 2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For highly-loaded plain and roller bearings and/or low sliding speeds.</td>
</tr>
<tr>
<td>RENOLIT FLM 1002</td>
<td>black</td>
<td>S-4510 Li/Ca-soap Mineral oil 2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For highly-stressed plain and roller bearings and low speeds. Emergency running properties.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S-4485 Li/Ca-soap Mineral oil 2</td>
<td>&gt;180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>With higher base oil viscosity compared to RENOLIT FLM 502, for highly-stressed plain and roller bearings, low speeds, e.g. roller mills. Emergency running properties.</td>
</tr>
</tbody>
</table>

Ca-X = Calcium complex
Li/CA = Lithium/Calcium
## 4. Special greases

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Solid lubricant</th>
<th>Colour</th>
<th>Product information</th>
<th>Thickener Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOCAL LH 745/94</td>
<td>K 2/1 G-50 ISO-L-X-ECEA 2/1</td>
<td>light brown</td>
<td>S-1090 5-1090 CaCO3</td>
<td>2/1 &gt;135</td>
<td>Calcium soap Mineral oil</td>
<td></td>
<td></td>
<td></td>
<td>Recommended for the lubrication of automotive components such as door locks and other mechanisms, hinges, joints, sliding roofs, seat adjusters, mirror mechanisms, window lifters, bowden cables, fans, etc. Approved by VW TL 745, DDI 6810.50, BMW.</td>
</tr>
<tr>
<td>RENOLIT LK 05 i 3</td>
<td>KP 3 N-30 ISO-L-X-CDEB 3</td>
<td>light brown</td>
<td>S-3467 5-3467 Li-X</td>
<td>3 &gt;250</td>
<td>Li-X-soap Mineral oil</td>
<td></td>
<td></td>
<td></td>
<td>Highly-adhesive special grease for applications subject to oscillating movements such as packaging and washing machines.</td>
</tr>
<tr>
<td>RENOLIT HI-SPEED 2</td>
<td>KHCE 2 K-40 ISO-L-X-ECEA 2/1</td>
<td>light grey</td>
<td>S-2520 5-2520 Calcium Oil</td>
<td>2/1 &gt;180</td>
<td>Lithium soap Synth. esters</td>
<td></td>
<td></td>
<td></td>
<td>Fully-synthetic grease based on oxidation resistant oils, specially developed for the lubrication of high speed machine tool and textile machine spindle bearings.</td>
</tr>
<tr>
<td>RENOLIT HLT 2</td>
<td>KPHC 2 N-40 ISO-L-X-DCEB 2</td>
<td>light brown</td>
<td>S-4430 5-4430 PAO</td>
<td>2 &gt;180</td>
<td>Lithium soap PAO</td>
<td></td>
<td></td>
<td></td>
<td>For bearings subject to fluctuating ambient temperatures; resistant to salt water, good corrosion protection, high ageing resistance. Recommended for pneumatic applications, high speed bearings, also for life time lubrication.</td>
</tr>
<tr>
<td>RENOLIT IPR 2</td>
<td>KPHC 1 N-50 ISO-L-X-DMEB 1</td>
<td>light brown</td>
<td>S-4455 5-4455 PAO</td>
<td>1 &gt;180</td>
<td>Lithium soap PAO</td>
<td></td>
<td></td>
<td></td>
<td>EP long life grease based on a lithium soap. Good corrosion protection, even in the presence of salt water. Adhesive, good elastomer compatibility for fast high-speed bearings even at low temperatures and fluctuating ambient temperatures.</td>
</tr>
<tr>
<td>RENOLIT A5</td>
<td>light brown</td>
<td>S-4020 5-4020 PAO</td>
<td>1 &gt;220</td>
<td>Lithium soap Synthetic oil</td>
<td></td>
<td></td>
<td></td>
<td>Extraordinary ageing resistant, containing friction reducing additives. Especially for the lubrication of sliding pairs with and without plastic components, including slide oil bearings used in building construction, inspected by the MPA.</td>
<td></td>
</tr>
<tr>
<td>RENOLIT LS</td>
<td>Graphite black</td>
<td>S-0052 5-0052 HDK</td>
<td>1/2 none</td>
<td>HDK Synthetic oil</td>
<td></td>
<td></td>
<td></td>
<td>Hydrocarbon resistant special grease based on an inorganic thickener, containing solid lubricants. Resistant to gasoline, natural gas, crude oil, lubricating and hydraulic oils. For the lubrication of any type of valves exposed to these media.</td>
<td></td>
</tr>
<tr>
<td>RENOLIT LS LT</td>
<td>Graphite black</td>
<td>S-0057 5-0057 HDK</td>
<td>1 none</td>
<td>HDK Synthetic oil</td>
<td></td>
<td></td>
<td></td>
<td>Low temperature version of RENOLIT LS with improved pumplivity and low temperature properties.</td>
<td></td>
</tr>
</tbody>
</table>

Li X = Lithium complex  
HDK = Highly dispersed silic acid
Extremely high temperature grease for plain and roller bearings in all industrial applications, e.g. paint shops, drying ovens, calendar, embossing roller bearings, food and packaging industry. Recommended by Steinmüller for hot air and exhaust gas flap bearings in power stations. Not mixable with other lubricants!

For thermally stressed and low speed bearings, e.g. in road pavers, paint shops, hot-air blowers, dryers, conveyor and oven systems, tire and chemical industry.

High temperature grease for the lubrication of ejectors of plastic injection moulding machines and machine parts which are exposed to very high temperatures, e.g. bearings of kiln cars.

Synthetic grease, high mechanical resistance, good compatibility with nonferrous metals, elastomers and plastics. Suitable for the lubrication of plain and roller bearings, small gearboxes with plastic gear wheels, low temperature contact grease.

Fully synthetic grease with good adhesiveness and noise damping properties, excellent compatibility with elastomers and plastics. Suitable for the inside of vehicle interior lubrication because of its very low release of odour.

Special grease with a neutral behaviour to various plastics. For the lubrication of plastic-to-plastic or plastic-to-metal bearings, also suitable for low temperatures.

Good adhesiveness, excellent resistance against corrosive media (especially battery acid), special friction behaviour. Used as battery pole and friction dampering grease (in washing machines).

Fully synthetic grease for plain and roller bearings over a wide temperature range, good corrosion protection, water resistant, good EP properties.

4. Special greases

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Colour</th>
<th>Product information</th>
<th>Thickener</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOLIT GL 1</td>
<td>ISO 6743-9 Solid lubricant</td>
<td>light brown</td>
<td>S-4435</td>
<td>Lithium soap</td>
<td>1</td>
<td>&gt;170</td>
<td></td>
<td>Adhesive, reduces friction and wear, good corrosion protection, good thermal stability, noise reducing. For the lubrication of plain and roller bearings, gearboxes, bowden cables, guide rails and sliding roofs.</td>
</tr>
<tr>
<td>RENOLIT LX-PG 2</td>
<td>ISO-L-X-CDEB 1</td>
<td>light brown</td>
<td>S-3460</td>
<td>U-X-soap</td>
<td>2</td>
<td>&gt;250</td>
<td></td>
<td>Good elastomer (e.g. EPDM) and nonferrous metal compatibility, for high temperatures, corrosion protection, good EP properties, resistant to lubricant coolants and cutting fluids. Also for the lubrication of bearings in polyglycol oil filled gearboxes.</td>
</tr>
<tr>
<td>RENOLIT LST 2</td>
<td>ISO-L-X-CDEB 2</td>
<td>yellow</td>
<td>S-4187</td>
<td>Lithium soap</td>
<td>2</td>
<td>&gt;180</td>
<td></td>
<td>Synthetic grease, high mechanical resistance, good compatibility with nonferrous metals, elastomers and plastics. For the lubrication of plain and roller bearings, small gearboxes with plastic gear wheels, low temperature contact grease.</td>
</tr>
<tr>
<td>RENOLIT G 2000</td>
<td>ISO-L-X-CDEB 2</td>
<td>colourless to yellowish</td>
<td>S-5010</td>
<td>HDK PAO</td>
<td>2</td>
<td>none</td>
<td></td>
<td>Fully synthetic grease with good adhesiveness and noise damping properties, excellent compatibility with elastomers and plastics. Suitable for the inside of vehicle interior lubrication because of its very low release of odour.</td>
</tr>
<tr>
<td>RENOLIT G B-022/2</td>
<td>ISO-L-X-CDEB 2</td>
<td>light brown</td>
<td>S-5020</td>
<td>Bentonite PAO</td>
<td>2/1</td>
<td>none</td>
<td></td>
<td>Special grease with a neutral behaviour to various plastics. For the lubrication of plastic-to-plastic or plastic-to-metal bearings, also suitable for low temperatures.</td>
</tr>
<tr>
<td>RENOLIT G-PF 1</td>
<td>ISO-L-X-CDEB 2</td>
<td>brown</td>
<td>S-5062</td>
<td>Bentonite Mineral oil</td>
<td>1</td>
<td>none</td>
<td></td>
<td>Good adhesiveness, excellent resistance against corrosive media (especially battery acid), special friction behaviour. Used as battery pole and friction dampering grease (in washing machines).</td>
</tr>
<tr>
<td>RENOLIT UNITEMP 2</td>
<td>ISO-L-X-CDEB 2</td>
<td>light brown</td>
<td>S-5025</td>
<td>synth. Na-X PAO</td>
<td>2</td>
<td>&gt;250</td>
<td></td>
<td>Fully synthetic grease for plain and roller bearings over a wide temperature range, good corrosion protection, water resistant, good EP properties.</td>
</tr>
<tr>
<td>RENOLIT PU-FH 300</td>
<td>ISO-L-X-CDEB 2</td>
<td>light brown</td>
<td>S-5036</td>
<td>Polyurea Mineral oil</td>
<td>2</td>
<td>&gt;230</td>
<td></td>
<td>For thermally stressed and low speed bearings, e.g. in road pavers, paint shops, hot-air blowers, dryers, conveyor and oven systems, tire and chemical industry.</td>
</tr>
<tr>
<td>RENOLIT PU B-061/2</td>
<td>ISO-L-X-CDEB 2</td>
<td>light brown</td>
<td>S-5085</td>
<td>Polynya Semi-synth.</td>
<td>2</td>
<td>&gt;260</td>
<td></td>
<td>For the lubrication of chain conveyors in drying oven, spindle bearings, dryers, tumble dryers and drying cylinders in the paper industry, hot air flaps, calendar bearings and thermally-stressed electric motors.</td>
</tr>
<tr>
<td>RENOLIT ST-FTM D/1</td>
<td>ISO-L-X-BGEB 1</td>
<td>white</td>
<td>S-2652</td>
<td>PTFE Perfluorether</td>
<td>1</td>
<td>none</td>
<td></td>
<td>High temperature grease for the lubrication of ejectors of plastic injection moulding machines and machine parts which are exposed to very high temperatures, e.g. bearings of kiln cars.</td>
</tr>
<tr>
<td>RENOLIT ST B-081/2</td>
<td>ISO-L-X-BGEB 2</td>
<td>white</td>
<td>S-5075</td>
<td>PTFE Perfluorether</td>
<td>2</td>
<td>none</td>
<td></td>
<td>Extremely high temperature grease for plain and roller bearings in all industrial applications, e.g. paint shops, drying ovens, calendar, embossing roller bearings, food and packaging industry. Recommended by Steinmüller for hot air and exhaust gas flap bearings in power stations. Not mixable with other lubricants!</td>
</tr>
</tbody>
</table>

Li-X = Lithium complex  
HDK = Highly dispersed silic acid  
Na-X = Sodium complex

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. No warranty expressed or implied is given concerning the accuracy of the information or the suitability of the products.

Edition: 06/2008
5. Food grade greases

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN 51 502</th>
<th>Colour</th>
<th>Thickener Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENOLIT G 7 FG 1</td>
<td>K 2 N-20 ISO-L-X-BDEA 2</td>
<td>light brown</td>
<td>Bentonite Pharm. white oil</td>
<td>2</td>
<td>none</td>
<td>&gt;140</td>
<td>For plain and roller bearings of packaging and filling machines in the food industry. Also for the lubrication of conveyor worms in the sugar industry, for drinking water applications (hot and cold water). Approvals: NSF-H1 and KTW.</td>
</tr>
<tr>
<td>RENOLIT SI 410 M</td>
<td>KSI 2 K-55 ISO-L-X-ECEA 2</td>
<td>white transparent</td>
<td>Calcium soap Silicone oil</td>
<td>2</td>
<td>&gt;140</td>
<td></td>
<td>Beer tap grease, for the greasing of taps, bearings and seals in brewing and filling lines of the beverage industry, food processing and packaging machines. Approvals: NSF-H2, KTW.</td>
</tr>
<tr>
<td>RENOLIT SILICONE WRAS</td>
<td>MSL 3 S-40 ISO-L-X-OEGA 3</td>
<td>white</td>
<td>PTFE Silicone oil</td>
<td>3</td>
<td>none</td>
<td></td>
<td>Highly water repellent, tasteless and odourless grease. Especially formulated for the lubrication of taps, valves, mixer, tap ceramic discs and spindles as well as threaded stainless steel components. Approvals: KTW and WRAS.</td>
</tr>
</tbody>
</table>

6. Rapidly biodegradable greases

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN 51 502</th>
<th>Colour</th>
<th>Thickener Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLANTOGEL 2 N</td>
<td>KX 2 C-20 ISO-L-X-BDEA 2</td>
<td>light brown/ yellow</td>
<td>Calcium soap Rapsseed oil</td>
<td>2</td>
<td>&gt;130</td>
<td></td>
<td>For the lubrication of total loss applications such as canal lock gates, waste water treatment plants, chains, garage doors, joints and agricultural vehicles.</td>
</tr>
<tr>
<td>PLANTOGEL 2 S</td>
<td>KPE 2 K-40 ISO-L-X-CCEB 2</td>
<td>light brown</td>
<td>Li/Ca-soap Synth. esters</td>
<td>2</td>
<td>&gt;170</td>
<td></td>
<td>Rapidly biodegradable long life grease for plain and roller bearings, also useable for wheel hubs. Good pumpability in central lubrication systems, water resistant. Approved by MAN 283 Li-P 2-B and DELIMON.</td>
</tr>
<tr>
<td>PLANTOGEL 2 FS</td>
<td>KPE 2 K-30 ISO-L-X-CCEB 2</td>
<td>black</td>
<td>Li/Ca-soap Synth. esters</td>
<td>2</td>
<td>&gt;170</td>
<td></td>
<td>For the lubrication of highly-loaded plain and roller bearings, particularly at the risk to pollute soil and/or ground water. Good pumpability, adhesive, emergency running properties for the use at boundary friction conditions and at low speeds.</td>
</tr>
<tr>
<td>PLANTOGEL 000 S</td>
<td>GPE 00/000 K-40 ISO-L-X-OEGA 00/000</td>
<td>green</td>
<td>Li/Ca-soap Synth. esters</td>
<td>00/000</td>
<td>&gt;150</td>
<td></td>
<td>For central lubrication systems of machine tools, commercial vehicles, construction machinery, for low to average loaded gearboxes and gear motors. Approved by WILLY VOGEL for central lubrication systems of trucks and commercial vehicles.</td>
</tr>
</tbody>
</table>

Li/Ca = Lithium/Calcium
### 7. Silicone greases

<table>
<thead>
<tr>
<th>Product name</th>
<th>Classification DIN</th>
<th>Colour</th>
<th>Thickener</th>
<th>Base oil</th>
<th>NLGI-grade</th>
<th>Dropping point [°C]</th>
<th>Operating temperature [°C]</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RENOIL S 300 M</strong>&lt;br&gt;Also in NLGI grade 3 (S) and 00 (F) available.</td>
<td>KSI 2 P-70 ISO-L-X-EHHA 2</td>
<td>white</td>
<td>Lithium soap</td>
<td>Silicone oil</td>
<td>2</td>
<td>&gt;210</td>
<td></td>
<td>Low temperature grease for electrical and precision machinery, sealing grease for radial seals, O-rings, bellows. Approvals: DBL 6812.10 and VW TL 767 X.</td>
</tr>
<tr>
<td><strong>RENOIL S 400 M</strong>&lt;br&gt;Also in NLGI grade 1 (S) available.</td>
<td>KSI 2 R-30 ISO-L-X-EFEA 2</td>
<td>white</td>
<td>Lithium soap</td>
<td>Silicone oil</td>
<td>2</td>
<td>&gt;210</td>
<td></td>
<td>Standard silicone grease for light to averagely loaded plain and roller bearings, electric motors, guides, household equipments, fans and dryers.</td>
</tr>
<tr>
<td><strong>RENOIL S 410 M</strong></td>
<td>KSI 2 K-55 ISO-L-X-ECEA 2</td>
<td>white transparent</td>
<td>Calcium soap</td>
<td>Silicone oil</td>
<td>2</td>
<td>&gt;140</td>
<td></td>
<td>Beer tap grease, for the greasing of taps, bearings and seals in brewing and filling lines of the beverage industry, food processing and packaging machines. Approvals: NSF-H2, KTW.</td>
</tr>
<tr>
<td><strong>RENOIL S 511 M</strong>&lt;br&gt;Also in NLGI grade 1 (S) and 00 (F) available.</td>
<td>KSI 2 T-30 ISO-L-X-CGEA 2</td>
<td>light brown</td>
<td>Polyurea</td>
<td>Silicone oil</td>
<td>2</td>
<td>&gt;300</td>
<td></td>
<td>High-temperature grease for plain and roller bearings, assembly lubricant for rubber and plastics, applications also in the textile industry, brickworks, casting shops, paper mills, e.g. in hot air ventilators, drying ovens, electric motors, conveyor systems, rail cars. For the following bearing materials: metal/metal, metal/plastic and plastic/plastic.</td>
</tr>
<tr>
<td><strong>RENOIL S 704</strong>&lt;br&gt;Also in NLGI grade 2 (S) and 1 (F) available.</td>
<td>KSI 2 L-70 ISO-L-X-CTEA 2</td>
<td>colourless transparent</td>
<td>HDK</td>
<td>Silicone oil</td>
<td>3</td>
<td>none</td>
<td></td>
<td>Assembly aid for organic elastomers and plastics, sealant for elastomers, for electronic and chemical equipment, e.g. plastic chains, joints, control units, threaded connections. For the following material combinations: metal/plastic and plastic/plastic.</td>
</tr>
<tr>
<td><strong>RENOIL S 705</strong></td>
<td>MSI 3 S-40 ISO-L-X-DGIA 3</td>
<td>colourless transparent</td>
<td>HDK</td>
<td>Silicone oil</td>
<td>3</td>
<td>none</td>
<td></td>
<td>High vacuum grease with a low evaporation loss for lubrication and sealing of check valves and glass joints, which work in the range from 10⁻⁷ to 10⁻⁴ mbar; highly-adhesive and good sealing properties.</td>
</tr>
<tr>
<td><strong>RENOIL SILICONE WRAS</strong></td>
<td>MSI 3 S-40 ISO-L-X-DGIA 3</td>
<td>white</td>
<td>PTFE</td>
<td>Silicone oil</td>
<td>3</td>
<td>none</td>
<td></td>
<td>Highly water repellent, tasteless and odourless grease. Especially formulated for the lubrication of taps, valves, mixer, tap ceramic discs and spindles as well as threaded stainless steel components. Approvals: KTW and WRAS.</td>
</tr>
</tbody>
</table>

**HDK** = Highly dispersed silic acid
<table>
<thead>
<tr>
<th>Product name</th>
<th>Application area</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8. Spray cans</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RENOLIT UNIMAX LZ Basis: RENOLIT CA-LZ</td>
<td>Long-life tacky grease for lubrication of plain and roller bearings, chains and gears in the construction machinery and agricultural industry, for cars, motorcycles, household and the hobby area.</td>
<td>Maximum tackiness, resistant to salt water, good lubrication properties and long fibrous.</td>
</tr>
</tbody>
</table>
C. Terminology and tests

Introduction

Greases are firm lubricants consisting of base oils and specially selected thickeners. Additives are also added to greases to improve certain characteristics.

Greases are engineering elements, especially long-life lubricants. For a number of applications, lubricating with grease offers the advantage of offering a barrier between the sliding surfaces, thus reducing friction, wear and increasing efficiency. Compared to oils, greases have a series of benefits:

- Lower engineering complexity
- Lower maintenance input
- Lower leakage hazard
- The formation of a grease film supports the sealing effect of seals

Just a few grams of grease can protect against high repair bills and the surprisingly expensive follow-up costs caused, for example, by machine downtime. It is therefore prudent to pay special attention to greases.

1. Classification and allocation of K-type greases according to DIN 51 502

Due to the vast number of possible applications and their differing compositions, greases are classified and grouped according to certain parameters. DIN 51 502 describes the following classification:

<table>
<thead>
<tr>
<th>Classification and characteristics of a K-type grease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>DIN standard number</td>
</tr>
<tr>
<td>Letter denoting type of grease (see Table 1)</td>
</tr>
<tr>
<td>Consistency (NLGI grade, see Table 2)</td>
</tr>
<tr>
<td>Additional letter (see Table 3)</td>
</tr>
<tr>
<td>Additional number (see Table 4)</td>
</tr>
</tbody>
</table>

Table 1: Prefix letters and symbols for greases (color: white)

<table>
<thead>
<tr>
<th>Type of grease</th>
<th>Prefix letter</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greases for roller bearings, plain bearings and sliding surfaces, defined by DIN 51823</td>
<td>K²</td>
<td>K²</td>
</tr>
<tr>
<td>Greases for enveloped gears, defined by DIN 51826</td>
<td>G</td>
<td>G</td>
</tr>
<tr>
<td>Greases for open gearboxes and exposed gears (bitumen-free free lubricants)</td>
<td>O/G</td>
<td>O/G</td>
</tr>
<tr>
<td>Greases for plain bearings and seals</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

For mineral oil-based greases

The basic characteristics of synthetic greases are classified similarly to mineral oil-based products.

Add the letter from Table 1, substance group 3.

The characteristics of synthetic greases are classified similarly to mineral oil-based products.

Table 2: NLGI grades

<table>
<thead>
<tr>
<th>NLGI grade</th>
<th>Worked penetration according to DIN ISO 2137</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>445 / 475</td>
<td>Flowing</td>
</tr>
<tr>
<td>0</td>
<td>400 / 430</td>
<td>Flowing</td>
</tr>
<tr>
<td>0</td>
<td>305 / 325</td>
<td>Semi-flowing</td>
</tr>
<tr>
<td>1</td>
<td>270 / 290</td>
<td>Very soft</td>
</tr>
<tr>
<td>2</td>
<td>265 / 295</td>
<td>Soft-creamy</td>
</tr>
<tr>
<td>3</td>
<td>260 / 290</td>
<td>Slightly soft</td>
</tr>
<tr>
<td>4</td>
<td>175 / 205</td>
<td>Moderately stiff</td>
</tr>
<tr>
<td>5</td>
<td>130 / 160</td>
<td>Soft</td>
</tr>
<tr>
<td>6</td>
<td>85 / 115</td>
<td>Very soft</td>
</tr>
</tbody>
</table>

Table 3: Additional code letters for greases

<table>
<thead>
<tr>
<th>Letter</th>
<th>Max operating temperature¹</th>
<th>Water resistance, defined by DIN 51 807:</th>
<th>Worked penetration results form the basis of NLGI grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>≥40 °C</td>
<td>0–40 or 1–40</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>D</td>
<td>40–60 °C</td>
<td>2–40 or 3–40</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>E</td>
<td>60–80 °C</td>
<td>2–40 or 3–40</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>F</td>
<td>≥80 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>G</td>
<td>≥100 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>H</td>
<td>≥120 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>M</td>
<td>≥140 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>N</td>
<td>≥160 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>P</td>
<td>≥180 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>S</td>
<td>≥200 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>T</td>
<td>≥225 °C</td>
<td>2–90 or 3–90</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
<tr>
<td>U</td>
<td>over ≥240 °C</td>
<td>Subject to agreement</td>
<td>Consistency, as defined by DIN 51 818</td>
</tr>
</tbody>
</table>

1) ISO/TR 14908: 1998 the letters XM are used instead of K.
2) Lower requirements than for K-type greases

Worked penetration results form the basis of NLGI grades

3. Consistency, as defined by DIN ISO 2137

Prior to this penetration test, the grease is mechanically churned:

- \( P_w \) = 60 double strokes
- \( P_u \) = 1 x 10⁵ double strokes

Worked penetration results form the basis of NLGI grades

4. Consistency, as defined by DIN ISO 2137

Consistency, as shown by NLGI grade, is based on worked penetration figures (see Table 2).

5. Consistency stability

Consistency stability is the resistance of a grease to the mechanical shearing of the soap thickener

A strong indication of consistency stability is the worked stability

- Worked stability = \( P_w - P_u \)
- The smaller the difference, the better the consistency stability of the grease

6. Base oil

95% of greases are based on mineral base oils. The rest are based on synthetic oils like polyalphaolefins, natural and synthetic esters, glycols, polyglycols, silicone oils and other products.

Depending on the type of thickener used and the desired consistency of the finished grease, between 65% and 95% of the grease is base oil, the rest thickener and additives.

The type of base oil and its viscosity are of fundamental significance to certain basic properties of greases.

Working temperature, pumpability, EP performance, ageing stability, elastomer compatibility, tackiness, oil separation and noise suppression are just a few of the characteristics of a grease which are directly determined or influenced by the base oil.

7. Additives

Additives are included in greases to achieve certain characteristics. A grease can contain up to 10% additives. Above all, the following additives are used:

- Extreme pressure (EP) additives: to improve load-carrying behaviour
- Anti-wear (AW) additives: to protect against wear
- Corrosion protection additives: to avoid corrosion
- Anti-Oxidation (AO) additives: to improve ageing stability
- Tackiness improvers: to increase the tackiness
- Solid lubricants: to provide run-dry lubrication

8. Service temperature range

Greases generally age as a result of oxidation processes, i.e. reactions with the oxygen in the air. A critical factor is the temperature range in which the grease will be used. Ageing can be accelerated by high temperatures.

The temperature range of a grease is determined by test methods and practical trials.

10. Ageing

Greases are divided into soap and non-soap versions and these products also influence basic properties of a grease such as temperature range, water resistance and EP performance.

Soap thickeners are divided into simple and complex versions which, due to their higher dropping point, allow an increase in the upper temperature limit. The following thickeners are used in FUCHS greases:

- Simple and complex soap thickeners
- Lithium
- Calcium
- Aluminium
- Sodium
- Non-soap thickeners
- Bentonite
- Highly dispersed silicic acid
- Polyurea
- PTFE
11. Miscibility of greases

The question of the miscibility of different greases often arises when re-lubricating operations are performed. Not all greases are compatible with each other. Greases containing the same thickener and the same type of base oil are usually compatible. However, as this compatibility also depends on the additives in the grease, this cannot be taken for granted. Mixing non-compatible greases generally leads to a decrease in the dropping point and a hardening or softening of the grease.

As a rule therefore, mixing greases should be avoided. A much better option is to clean the bearing and to refill with a fresh product. If this is not possible, contact should be made with a FUCHS application engineer before a bearing is re-lubricated.

12. Compatibility with elastomers and plastics

The compatibility of lubricants with elastomers and plastics cannot be definitively answered because of the huge number of materials which exist. One can assume that mineral oils are commonly compatible with NBR elastomers but the compatibility of every additive cannot be taken from lists. At the same time, some synthetic greases attack thermoplastics while mineral oils are relatively unproblematic with these products.

The effect of inadequate compatibility of an elastomer or plastic with a grease can be unacceptable shrinking or swelling, a large change to Shore A hardness or even rupturing. A lot of experience has been gathered with a number of material/lubricant combinations. We have performed compatibility tests on most of our greases with SRE-NBR 1. Seal manufacturers use these results to evaluate their materials. In the case of untested material/grease combinations, it is recommended that realistic tests are performed by the seal manufacturers.

Elastomer Compatibility Index (ECI)

The Elastomer Compatibility Index is a reliable method of numerically describing the effect of lubrications on representative standard reference elastomers as defined in ISO 6072 and DIN S3 538. The ECI is based on changes to the volume, hardness, elongation and tensile strength of a standard reference elastomer caused by the influence of the lubricant in controlled conditions. The volume change of a standard reference elastomer is linearly proportional to the swelling behaviour of commonly used elastomers so that the volume change of a standard reference elastomer caused by a lubricating oil or grease can be extrapolated to any elastomer in question, thus eliminating the need to perform individual swelling tests. Corresponding information is available from the elastomer manufacturers.

13. Kesternich flow pressure, as defined by DIN 51 805

Flow pressure is the pressure necessary to force grease through a defined nozzle. This figure provides information about the consistency of a grease in relation to low temperatures.

The temperature generated by a flow pressure of 1400 hPa is also the lower operating temperature of a grease.

14. FAG FE9 roller bearing tests, as defined by DIN 51 821-1 and -2

A practical procedure to determine the life of greases in roller bearings.

- Test bodies: 5 FAG tapered rollers
- Axial load: 1500, 3000 and 6000 N
- RPM: 3000 and 6000 rpm
- Test temperature: Up to +250 °C
- Test criteria: F05 and F09, 9 hours

The test temperature, over 100 hours for the F 50 value, is also the upper temperature limit of K-type greases as defined by DIN S1 825.

15. EMCOR corrosion protection, as defined by DIN 51 802

Testing the corrosion inhibiting properties of lubricants in realistic, practical conditions:

- 2 roller bearings 1326 K
- 7 day cycle (8 hours running – 16 hours stationary)
- n = 80 rpm
- distilled water
- or distilled water with 3% NaCl
- evaluation criterion is the degree of corrosion on the outer race

16. Determining oil separation by DIN 51 817

This static method can assist determining the oil separation of greases during their storage. This information cannot be used to quantify the lubricity of a grease.

The grease-filled test apparatus is loaded with a 100-gram weight.

- Test duration: 18 hours or 7 days
- Test temperature: +40 °C
- Test criterion: Quantity of oil separated in %

- Oil often collects at the surface, especially in hollows of grease and at the bottom of grease containers. This is a typical phenomenon of the grease. It represents no deterioration of grease quality.

17. Dropping point, as defined by DIN ISO 2176

The dropping point is the temperature at which, in defined conditions, the three dimensional grease structure is melting, i.e. it drops out of the test cup.

The dropping point of a grease is only of limited significance to the practical behaviour of a grease.

The dropping point can be determined by automatical method IP 396 or by hand method DIN ISO 2176.

18. Water resistance – Static test as defined by DIN 51 837-1

This static procedure should illustrate how a grease behaves when exposed to distilled water.

- Test duration: 3 hours
- Test medium: Distilled water
- Test object: Grease on glass strips
- Test criterion: Optical changes
- Evaluation stages: 0 to 3, along with

- Degree of corrosion
- Description
- Description of the surface
- 0 No corrosion Unchanged
- 1 Traces of corrosion Max. 3 spots < 1 mm
- 2 Slight corrosion less than 1% of the surface area
- 3 Moderate corrosion more than 1% to less than 5%
- 4 Heavy corrosion more than 5% to less than 10%
- 5 Serious corrosion more than 10% of the surface area

Any such oil can be mixed back into the grease with suitable paddles.
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| Notes: |

<table>
<thead>
<tr>
<th>19. Copper corrosion, as defined by DIN 51 811</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test medium:</strong> Grease</td>
</tr>
<tr>
<td><strong>Test object:</strong> Copper strips</td>
</tr>
<tr>
<td><strong>Test duration:</strong> 24 hours</td>
</tr>
<tr>
<td><strong>Test criterion:</strong> Degree of corrosion based on discolouration</td>
</tr>
<tr>
<td><strong>Evaluation stages:</strong> 1 to 4, along with temperature, e.g. 1:100</td>
</tr>
<tr>
<td><strong>Degree of corrosion</strong></td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>20. Determining oxidation stability, as defined by DIN 51 808</th>
</tr>
</thead>
<tbody>
<tr>
<td>The oxidation stability of a grease indicates its resistance to the effects of oxygen in static conditions. A grease sample is exposed to oxygen under pressure. Any pressure drop is a measure of oxidation stability. The lower the pressure drop, the greater the oxidation stability of the grease. In normal circumstances the test is performed for 100 hours at 100 °C. In the case of a good grease, the pressure drop is less than 0.5 bar.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>21. Four Ball Apparatus test, as defined by DIN 51 350</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Test medium:</strong> Four bearing balls</td>
</tr>
<tr>
<td><strong>Rotational speed:</strong> 1420 rpm</td>
</tr>
<tr>
<td><strong>Load:</strong> 150 to 12000 N</td>
</tr>
<tr>
<td><strong>Test duration:</strong> 1 minute or 1 hour</td>
</tr>
<tr>
<td><strong>Test criterion:</strong> Welding load (N) and scar diameter (mm)</td>
</tr>
<tr>
<td>Greases which achieve a welding load of 2000 N or above are described as EP greases.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22. Storage/use</th>
</tr>
</thead>
<tbody>
<tr>
<td>As opposed to foodstuffs, greases are not perishable. As a result, greases do not have &quot;best-by&quot; date restrictions. Greases can be stored for years! When in reasonable conditions and in original containers, FUCHS RENOLIT industrial greases can be stored for, at least, the following periods: Rapeseed oil-based greases 2 years Mineral and synthetic oil-based greases 3 years</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Indicates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No change</td>
<td>None of the changes listed below</td>
</tr>
<tr>
<td>1</td>
<td>Slight change</td>
<td>Colour change (lightening) to the surface of the grease, caused by a marginal absorption of moisture into the upper surface of the grease</td>
</tr>
<tr>
<td>2</td>
<td>Moderate change</td>
<td>Grease starts to dissolve, indicated by the formation of a yellowish-whitish slimy layer on the grease and moderate to major turbidity in the water</td>
</tr>
<tr>
<td>3</td>
<td>Major change</td>
<td>Partial to total dissolution of the grease along with oil separation and water emulsion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of corrosion</th>
<th>Indicates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Slight discoloration</td>
<td>Weak orange, freshly ground copper colour, to dark orange</td>
</tr>
<tr>
<td>2</td>
<td>Moderate discoloration</td>
<td>Wine red, lavender blue, multi-coloured with lavender blue and/or silvery gloss</td>
</tr>
<tr>
<td>3</td>
<td>Major discoloration</td>
<td>Magenta-coloured layer with a reddish, greenish hue (peacock-like) but not grey</td>
</tr>
<tr>
<td>4</td>
<td>Corrosion</td>
<td>Translucent black, dark grey or brown a slight hue, graphite black or matt black</td>
</tr>
</tbody>
</table>

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