



*The Right Choice*

**Compatibility of lubricants  
with elastomers  
and plastics**



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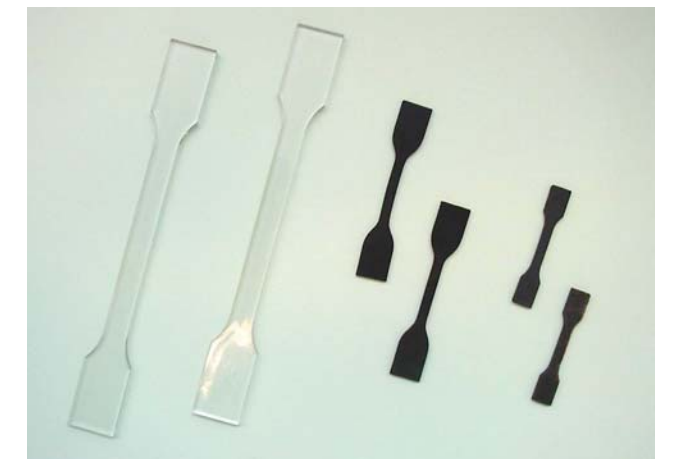
## Compatibility of lubricants with elastomers and plastics



Lubricants and their behaviour in contact with sealing materials (Elastomer)

Short terms	Elastomer (rubber)	Lubricant A	Lubricant B	Lubricant C	Lubricant D	Lubricant E	Lubricant F	Lubricant G
		<p><sup>1)</sup> silicic acid, i. e. gel or organophile bentonite</p> <p><sup>2)</sup> Polytetrafluoroethylene, micro sized</p> <p><sup>3)</sup> medical white oils are compatible</p> <p><sup>4)</sup> partly resistant means: depends on viscosity of base oil</p> <p><sup>5)</sup> not resistant against FKM at temperatures &gt; 120° C</p>	<p>▲ resistant</p> <p>△ partly resistant <sup>4)</sup></p> <p>▽ not resistant</p> <p>○ not tested</p>	<p>Mineral oil <sup>5)</sup> with metal soap, polyurea or anorganic thickener <sup>1)</sup></p> <p>e. g.: BECHEM-RHUS FA 46 BERULUB 52142 BERULUB FB 41/1 BERUTOX M 21 EPK</p>	<p>Ester oil, polyglycole, polybutene with metal soap or anorganic thickener <sup>1)</sup></p> <p>e. g.: BERULUB KRYOTOX EP 2 BERULUB PAL BERULUB FK 35 B BERULUB FK 30</p>	<p>Synthetic hydrocarbon oil with metal soap, polyurea or anorganic thickener <sup>1)</sup></p> <p>e. g.: BERULUB FB 19 / FB 34 BERULUB FR 16 / FR 43 BERUTOX FB 22 BERUTOX FH 28 KN</p>	<p>Silicone oil with organic polymer or anorganic thickener <sup>1)</sup></p> <p>e. g.: BERUSIL FO 25 / FO 26 BERULUB SIHAF 2 BERULUB FO 34 BERULUB OX 40 EP</p>	<p>Perfluoropolyether oil with organic polymer <sup>2)</sup> as thickener</p> <p>e. g.: BERUTOX VPT 54 BERUTOX VPT 64 BERUTOX VPT 64 BN 3 BERULUB FK 33</p>
ACM	Acrylate rubber	▲	○	▲	▲	▲	○	○
CR	Chloroprene rubber	▲	○	▲	▲	▲	○	▲
CSM	Chlorosulphonated PE-rubber	▲	○	▲	▲	▲	○	○
EPDM	Ethylene-propylene-diene rubber	▲	○	▲	▲	▲	○	▲
FKM	Fluorinated rubber	▲	▲	▲	▲	▲	▲	▲
FPM	Propylene-tetrafluoroethylene rubber	▲	▲	▲	▲	▲	▲	▲
NBR	Nitrile-butadiene rubber	▲	▲	▲	▲	▲	▲	▲
NR	Natural rubber	▲	○	▲	▲	▲	○	○
SBR	Styrene-butadiene rubber	▲	○	▲	▲	▲	○	▲
MFQ, MPQ, MQ, MVFQ, MVQ	Silicone rubber	▲	▲	▲	○	▲	▲	▲

Lubricants and their behaviour in contact with sealing materials (Elastomer)



The stated resistances are based on laboratory tests as well as on bibliography.

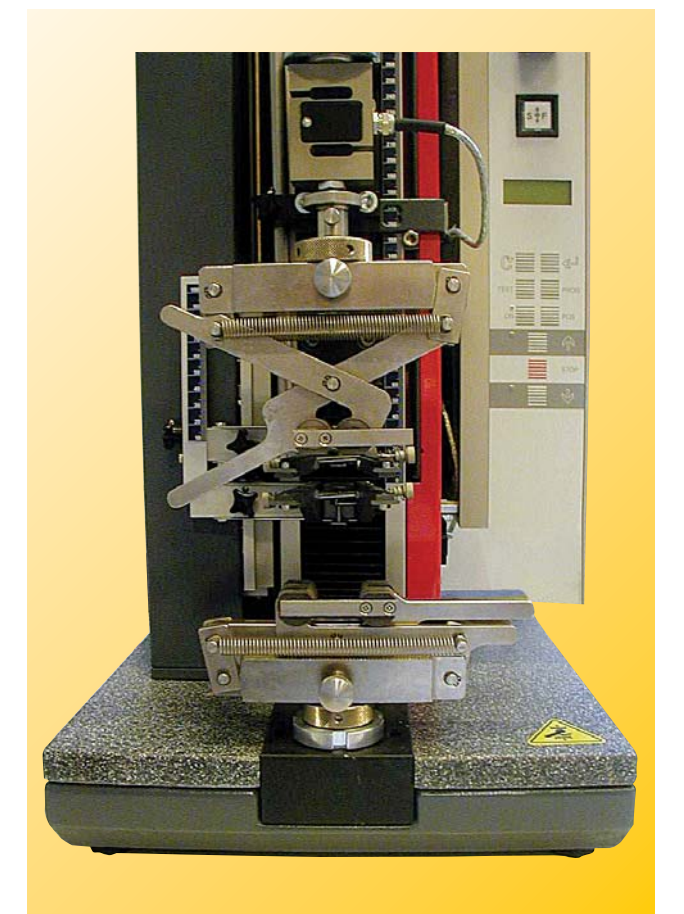
Due to the multitude of used raw materials on one hand and the complexity of chemical and morphological structures of the polymer on the other hand, we cannot give any guarantee for the statements.

In critical cases of application we ask you to perform tests or contact our Technical Service.

Lubricants and their behaviour in contact with polymeric materials (Plastics)

Short terms	Polymer (plastics)	Lubricant A	Lubricant B	Lubricant C	Lubricant D	Lubricant E	Lubricant F	Lubricant G
ABS	ABS-Copolymere	▲	○	▲	▲	▲	▲	○
CA	Cellulose acetate	▲	○	▲	○	▲	▲	▲
EPS	Expanded polystyrene	▲	○	▲	○	▲	○	▲
PA	Polyamide	▲	▲	▲	▲	▲	▲	▲
PC	Polycarbonate	○ <sup>3)</sup>	○	▲	▲	▲	▲	○
PE	Polyethylene	▲	▲	▲	▲	▲	▲	▲
PE-UHMW	- ultra high molecular mass	▲	▲	▲	▲	▲	▲	▲
PE-LD	- low density	▲	▲	▲	▲	▲	○	○
PET / PBT	Polyethylene-/polybutylenetherephthalat	▲	○	▲	○	▲	○	○
POM	Polyoxymethylene, Polyacetate	▲	▲	▲	▲	▲	▲	○
PP	Polypropylene	▲	▲	▲	▲	▲	▲	○
PPO	Polyphenylene oxide	▲	○	▲	▲	▲	▲	▲
PPS	Polyphenylene sulphide	▲	▲	▲	▲	▲	▲	▲
PS	Polystyrene	▲	○	▲	▲	▲	▲	○
PTFE	Polytetrafluoroethylene	▲	▲	▲	▲	▲	▲	▲
PUR	Polyurethane	▲	○	▲	▲	▲	○	○
PVC	Polyvinylchloride	▲	○	▲	▲	▲	▲	○
TPE	Thermoplastic elastomer	○	○	○	○	▲	○	○

Lubricants and their behaviour in contact with polymeric materials (Plastics)



Tensile testing machine to check tensile strength of elastomers and contact with our lubricants.

### **Swelling or shrinking of rubber elastic sealing materials due to contact with lubricants**

Elastomers and lubricants in contact may interrelate with each other. A lubricant can penetrate the sealing material and may influence the performance of the elastomers.

#### **There are two ways of interaction:**

- physical
- chemical

#### **Physical interaction covers two processes:**

- a) an absorption of the media by the sealing material
- b) an extraction of soluble parts – especially softeners – from the sealing material.

The result is always a change in volume, that means swelling, if (a) is larger than (b), or a shrinking, if (b) is larger than (a).

The change in volume depends on the composition of the effecting medium, on the structure of the sealing material and mainly on temperature. Every change in volume – swelling or shrinking – causes changes of the mechanical properties of the sealing material, such as hardness, elasticity, tensile strength and elongation. These changes may lead to a total destruction of the sealing material.

#### **Chemical interaction:**

Due to chemical reaction the sealing material is effected in its molecular structure. Slight chemical changes may lead to loss in mechanical performance, such as embrittlement.

The compatibility of elastomers with lubricants is proved in tests according to DIN 53 521 and EN 1817. In most cases, measuring changes in volume and hardness are sufficient to determine compatibility.

### **Stress-crack corrosion in thermoplastics due to direct contact with lubricants**

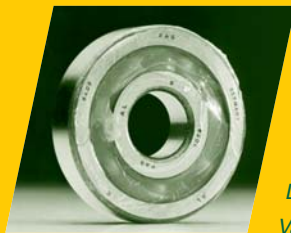
This stress-crack corrosion can be evaluated acc. to EN ISO 4600. In thermoplastic parts with internal and/or external tension cracks may develop when in contact with lubricants.

PC, PS, PMMA and ABS especially tend to form tension cracks. Tension crack formation in plastic parts free of internal tensions can be prevented partly or fully by selecting suitable lubricants.



**LUBRICATION  
TECHNOLOGY**

## **Special Lubricants Made by BECHEM**



### **Special Lubricants**

- Lubricants for high and low temperature*
- Lubricants for lifetime*
- Lubricants for plastics*
- Lubricants for electrical contacts*
- Lubricants for the food industry*
- Valve lubricants*



### **Lubricants for the Industry**

- High performance multipurpose greases*
- Special EP-greases*
- Hydraulic oils*
- Gear lubricants (Open Gear)*
- Biodegradable lubricants*
- Release agents*



### **Metal Working Mediums**

- Coolants*
- Cutting oils*
- Deep drilling oils*
- Anti corrosion oils*
- Quenching oils*
- Cleaning fluids*



### **Metal Forming Fluids**

- Cold forging oils*
- Release agents for semi-hot and hot forging*
- Wire drawing lubricants*
- Deep drawing oils*
- Tube drawing*

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