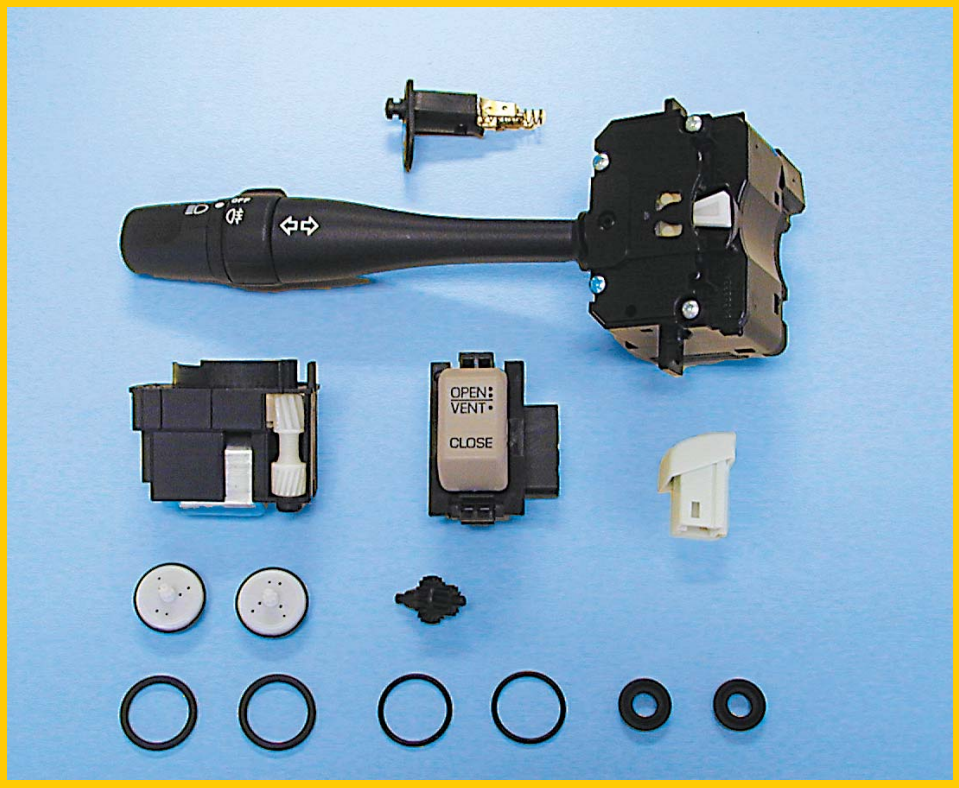
BECHEM

LUBRICATION TECHNOLOGY



The Right Choice

Compatibility of lubricants with elastomers and plastics

Compatibility of lubricants with elastomers and plastics

Compatibility of lubricants with elastomers and plastics

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

[1] silicic acid, i. e. gel or organophile bentonite
[2] Polytetrafluoroethylene, micro sized
[3] medical white oils are compatible
[4] partly resistant means: depends on viscosity of base oil
[5] not resistant against FKM at temperatures > 120°C

▲ resistant
△ partly resistant [4]
▽ not resistant
⬭ not tested

Short terms	Elastomer (rubber)	Lubricant A	Lubricant B	Lubricant C	Lubricant D	Lubricant E	Lubricant F	Lubricant G
		Mineral oil [3] with metal soap, polyurea or anorganic thickener [1] e. g.: BECHEM-RHUS FA 46, BERULUB 52142, BERULUB FB 41/1, BERUTOX M 21 EPK	Ester oil, polyglycole, polybutene with metal soap or anorganic thickener [1] e. g.: BERULUB KRYOTOX EP 2, BERULUB PAL, BERULUB FK 35 B, BERULUB FK 30	Synthetic hydrocarbon oil with metal soap, polyurea or anorganic thickener [1] e. g.: BERULUB FB 19 / FB 34, BERULUB FR 16 / FR 43, BERUTOX FB 22, BERUTOX FH 28 KN	Silicone oil with organic polymer or anorganic thickener [1] e. g.: BERUSIL FO 25 / FO 26, BERULUB SIHAF 2, BERULUB FO 34, BERULUB OX 40 EP	Perfluoropolyether oil with organic polymer [2] as thickener e. g.: BERUTOX VPT 54, BERUTOX VPT 64, BERUTOX VPT 64 BN 3, BERULUB FK 33	Special ester oil with Polyurea or anorganic thickener [1] (electrical contact grease) e. g.: BERULUB FK 64, BERULUB FK 97 E, BERULUB FK 80, BERULUB FK 122	Special mixture of synthetic oil with anorganic thickener [1] for fittings e. g.: BERULUB HYDROHAF GR, BERULUB HYDROHAF 2, CERITOL WAGA 2 FUTUR, BERUSOFT 30
ACM	Acrylate rubber	▲	⬭	▲	▲	▲	⬭	⬭
CR	Chloroprene rubber	△	▽	△	▲	▲	⬭	▲
CSM	Chlorosulphonated PE-rubber	▲	▽	▲	▲	▲	⬭	⬭
EPDM	Ethylene-propylene-diene rubber	▽	▽	▽	▲	▲	⬭	▲
FKM	Fluorinated rubber	▲	▲	▲	▲	▲	▲	▲
FPM	Propylene-tetrafluorethylene 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 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	▽ [3]	▽	△	▲	▲	▲	▽
PE	Polyethylene	▲	▲	▲	▲	▲	▲	▲
PE-UHMW	- ultra high molecular mass	▲	▲	▲	▲	▲	▲	▲
PE-LD	- low density	△	△	▲	▲	▲	⬭	⬭
PET / PBT	Polyethylene-/polybutyleneterephthalat	▲	⬭	▲	⬭	▲	⬭	⬭
POM	Polyoxymethylene, Polyacetate	▲	△	▲	△	▲	▲	⬭
PP	Polypropylene	▲	△	▲	▲	▲	▲	⬭
PPO	Polyphenylene oxide	▲	▽	▲	▲	▲	▲	▲
PPS	Polyphenylene suphide	▲	△	▲	△	▲	△	△
PS	Polystyrene	△	▽	▲	△	▲	▲	⬭
PTFE	Polytetrafluoroethylene	▲	▲	▲	▲	▲	▲	▲
PUR	Polyurethane	△	▽	▲	▲	▲	⬭	⬭
PVC	Polyvinylchloride	▲	▽	▲	▲	▲	▲	⬭
TPE	Thermoplastic elastomer	⬭	⬭	⬭	▽	▲	⬭	⬭

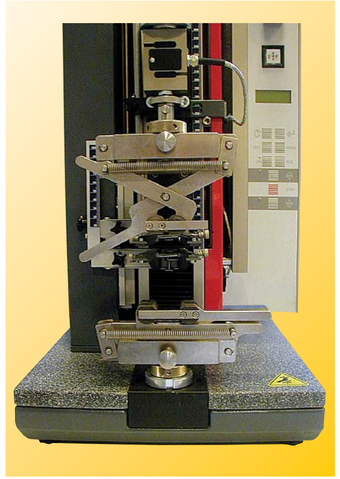
Lubricants and their behaviour in contact with sealing materials (Elastomer)

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

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.



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 compatibiliy 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

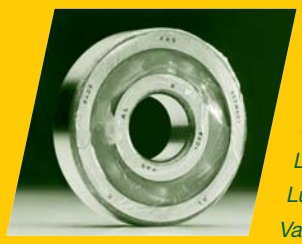
This stress-crack corrosion can be evaluated acc. to EN ISO 4600. In thermoplastic parts with internal and/or external tension cracks may develop when in contact with lubricants.

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.

BECHEM

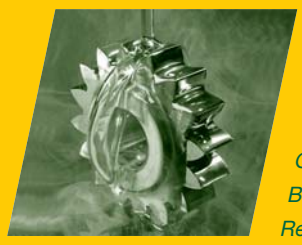
LUBRICATION TECHNOLOGY

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

CARL BECHEM GMBH

Weststraße 120
D-58089 Hagen

Tel. +49 (0) 23 31 935-0
Fax +49 (0) 23 31 935-1199

e-mail: bechem@bechem.de
http://www.bechem.com