



ZELLER+GMELIN

Polyurea greases

High-performance greases based on
a special urea thickener



Polyurea greases

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Polyurea greases

Lithium-free and maximum performance

Structure of technical lubricating greases

Technical greases are based on one or more base oils, active ingredients and the thickening agent, which is usually referred to as a “thickener”. A wide variety of raw materials are used in the product formulation and, depending on the combination of these raw materials, the properties of the end product are significantly influenced and adjusted.

What are polyurea greases?

A thickener that has been known for some time, but is less widely used in Europe, is the PU thickener, which is a specific thickening technology used in the production of lubricating greases.

Polyureas – also known as polyurea (PU) – are among the organic non-soap thickeners and are an alternative to metal soaps and metal complex soaps.

Advantages and new possibilities

Polyurea greases offer many advantages compared to conventional greases:

- + Improved lubricating properties
- + High temperature resistance
- + Very good water resistance
- + Excellent long-term stability
- + Very good wear protection and high pressure properties
- + High adhesion effect on metallic friction partners
- + Very good corrosion protection
- + Increased economic efficiency due to extended lubrication intervals
- + Lithium and ash-free thickener

This opens up new possibilities for applications in various industries, such as the automotive industry, aerospace and many more. The use of polyurea greases can also lead to a longer service life of machines and components and thus reduce maintenance costs.



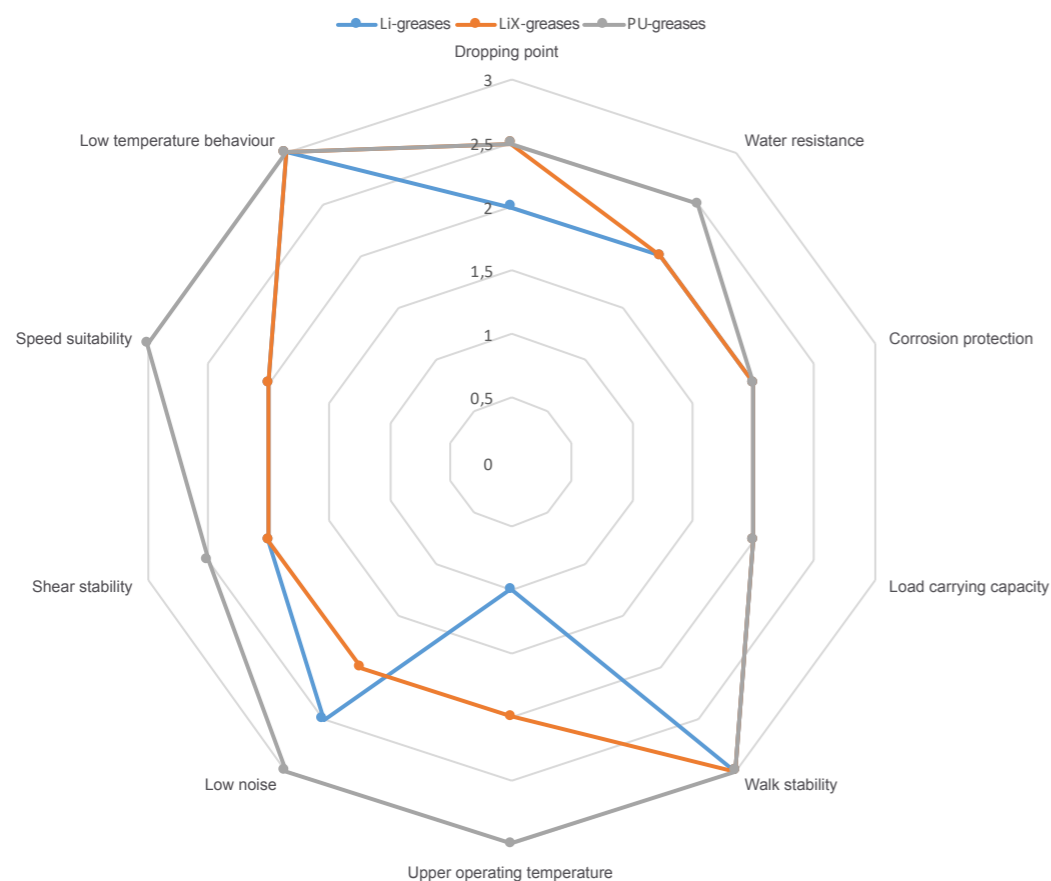
Fig. 1: Innovative PU grease

Polyurea greases

Real alternative to lithium

In addition to the advantages of PU greases, availability plays a key role!

Due to the global trend towards e-mobility, the limited raw material lithium will be less available in future. Lithium hydroxide, an important raw material for the production of lithium and lithium complex soaps, is also used in the production of lithium-ion batteries. Experts agree that this raw material will not only be characterized by rising costs, a noticeable shortage is also expected.



We at Zeller+Gmelin are convinced that we have taken the right path and will continue to research and develop in the field of polyurea greases. We have set up a complete production line for this purpose.

The manufacturing process

The secret behind quality and success!

For this thickener, too, not all polyurea greases are the same. In addition to the raw materials used, the manufacturing process has a significant influence on the product quality of the polyurea grease.

It is generally known in the industry and among rolling bearing lubrication experts that the quality of PU greases can vary greatly.

An important factor is the particle size! One disadvantage of conventional PU greases is that the polyurea thickener is straggling very inhomogeneously in its particle size distribution. This means that smaller and larger particles alternate repeatedly (see fig. 2), which results in various undesirable properties, such as poorer noise behavior, post-curing and abnormal consistency-temperature behavior (see fig. 3).

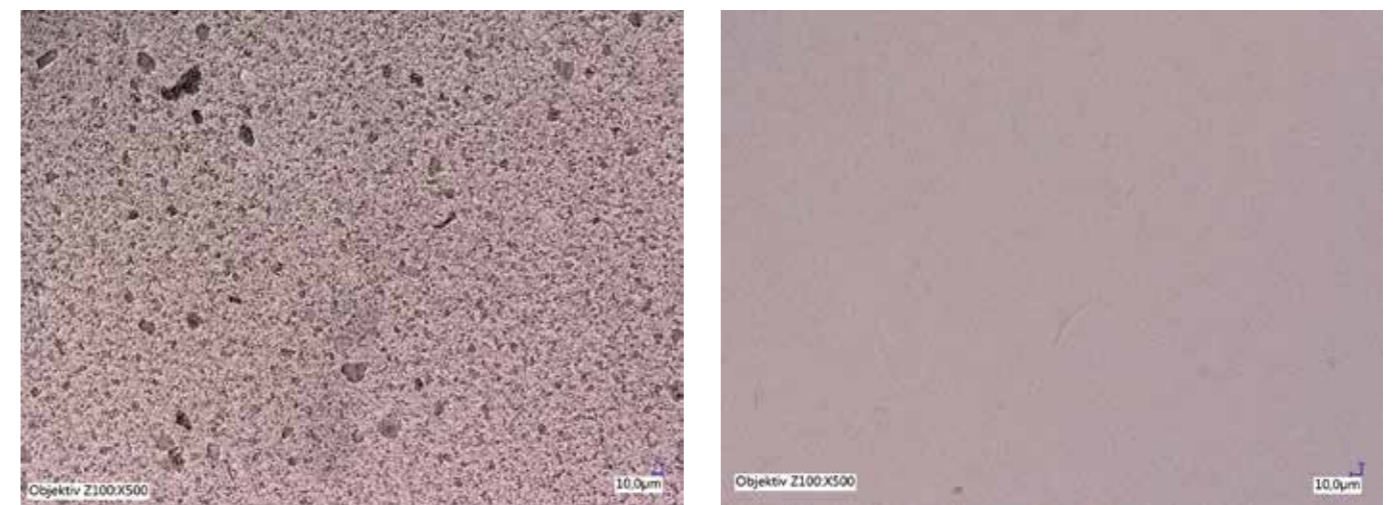


Fig. 2: Microscopic enlargement of conventional PU thickeners compared to optimized PU thickeners (500x magnification)

Zeller+Gmelin has taken on this task and, through intensive research and development, has made tangible technological progress in the field of polyurea greases. Using a new and innovative manufacturing process, Zeller+Gmelin is able to produce state-of-the-art polyurea greases with superior properties to the products available on the market.

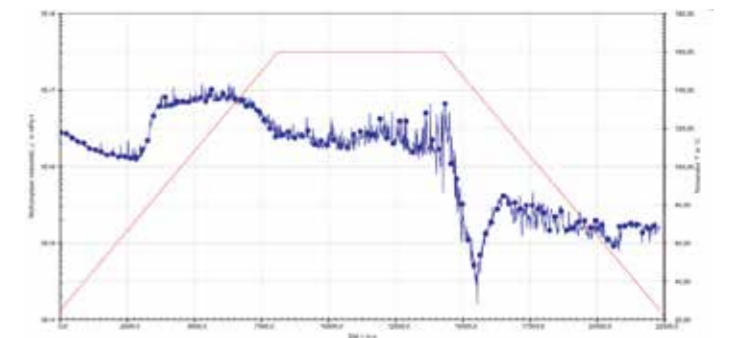


Fig. 3: Abnormal consistency-temperature behavior

ZG Polyurea greases

State-of-the-art

With the newly developed PU lubricating greases, Zeller+Gmelin shows that it is possible to optimize the PU thickener.

High temperature resistance

Outstanding results are achieved on the FE9 rolling bearing tester. At a temperature of 160 °C, the running times sometimes exceed 1000 h. At the upper operating temperature, values of up to +190 °C are achieved.

High shear stability

The new PU lubricating greases from Zeller+Gmelin are characterized by high shear stability, achieving values of less than 40 and less than 20 units respectively for the difference between fulling penetration and penetration value after prolonged rolling. This stability is underlined by the good results in the roll stability test under more stringent conditions (see table 1).

	Competitor A	Competitor B	PU-Grease 2-100 LNG	PU-Synthogrease 1-90 LHT
Δ WP 60.000-60	64	101	37	14
Δ WP RST 80 °C, 50 h	97	>157	35	17

Table 1: Rolling and shear stability according to DIN ISO 2137 or Roll Stability Tester (based on ASTM D 1831, 80 °C, 50 h)
 Competitor A: NLGI class 2, mineral oil
 Competitor B: NLGI class 2, mixture of synthetic & mineral oil

High storage stability – no post-curing

Another positive attribute of the new developments in the field of polyurea is the very good storage stability. As table 2 shows, the resting penetration remains unchanged for over a year within the scope of the measurement accuracy.

Time since production (days)	0	116	158	202	230	263	305	341	371	423
Resting penetration (0,1 mm)	273	273	273	276	273	265	274	268	270	270

Table 2: Measurement of resting penetration over time

Zeller+Gmelin was thus able to eliminate the phenomenon of post-curing known from various products on the market.

Optimized consistency-temperature behavior

Divinol polyurea greases exhibit a desirable behavior at rising temperatures, as no solidification occurs.

Products

High-performance PU greases

DIVINOL PU GREASE 2-100 LNG

- + for highest temperature loads
- + Low-noise II/1 according to FAG MoreQuiet
- + no post-hardening

Features

Thickener:	Polyurea
Base oil:	Mineral, 100 mm ² /s
NLGI Class:	2
DIN 51825:	K 2 R-30
T (min/max):	-30 °C → +180 °C



DIVINOL PU SYNTHOGREASE 1-90 LHT

- + for highest temperature loads
- + very good low-temperature properties
- + excellent mechanical resistance
- + no post-curing

Features

Thickener:	Polyurea
Base oil:	Synthetic, 90 mm ² /s
NLGI Class:	1
DIN 51825:	KP 1 R-50
T (min/max):	-50 °C → +180 °C
VKA Welding force:	2600 N



DIVINOL PU GREASE 2-70 EP-S

- + for highest temperature loads
- + very good low-temperature properties
- + no post-curing
- + based on the requirements of the rolling bearing industry

Features

Thickener:	Polyurea
Base oil:	Semi-synthetic, 70 mm ² /s
NLGI Class:	2
DIN 51825:	KP 2 R-40
T (min/max):	-40 °C → +190 °C
VKA Welding force:	2400 N



Products

High-performance PU greases

DIVINOL PU SYNTHOGREASE 2-70 LNG

- + can be used in a very wide temperature range
- + very good low-temperature properties
- + low noise level II/1 according to FAG MoreQuiet
- + no post-hardening

Features

Thickener:	Polyurea
Base oil:	Synthetic, 70 mm ² /s
NLGI Class:	2
DIN 51825:	K 2 R-50
T (min/max):	-50 °C → +180 °C

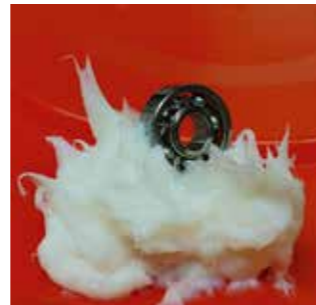


DIVINOL PU SYNTHOGREASE 1.5-460 EP

- + can be used in a very wide temperature range
- + very good low-temperature properties
- + excellent mechanical resistance
- + no post-hardening

Features

Thickener:	Polyurea
Base oil:	Synthetic, 460 mm ² /s
NLGI Class:	1.5
DIN 51825:	KPF 1.5 R-50
T (min/max):	-50 °C → +180 °C
VKA Welding force:	3600 N



DIVINOL PU SYNTHOGREASE 0-90 EP

- + synthetic gear fluid grease
- + for highest temperature loads
- + excellent low-temperature properties
- + no post-hardening

Features

Thickener:	Polyurea
Base oil:	Synthetic, 90 mm ² /s
NLGI Class:	0
DIN 51825:	GF 0 P-60
T (min/max):	-60 °C → +170 °C
VKA Welding force:	4000 N



DIVINOL PU SYNTHOGREASE 2-50 EP

- + synthetic special grease for ball screws
- + for very high operating temperatures
- + walk stable
- + no post-hardening

Features

Thickener:	Polyurea
Base oil:	Synthetic, 50 mm ² /s
NLGI Class:	2
DIN 51825:	K 2 P-40
T (min/max):	-40 °C → +170 °C



DIVINOL PU SYNTHOGREASE 1-20

- + synthetic lubricating grease for actuators
- + excellent low-temperature properties
- + exceptionally smooth running
- + no post-hardening

Features

Thickener:	Polyurea
Base oil:	Synthetic, 20 mm ² /s
NLGI Class:	1
DIN 51825:	K 1 N-60
T (min/max):	-60 °C → +140 °C
VKA Welding force:	1700 N



Your reliable partner in the automotive industry

Zeller+Gmelin was the first company to be recognized for its prelubes. With its one hundred and fifty-year history, Zeller+Gmelin has been a reliable partner to the automotive industry for many decades. Our customers include well-known car manufacturers as well as leading Tier 1 suppliers and "hidden champions". Today's vehicle models contain a wide range of components and many of these parts are produced or lubricated with our fluids, hot melts and greases. We are open to new technical solutions and optimize our products to meet our customers' requirements. For this reason, our customers value us as a reliable partner and recognize us with various awards, such as the Bosch Supplier Award.



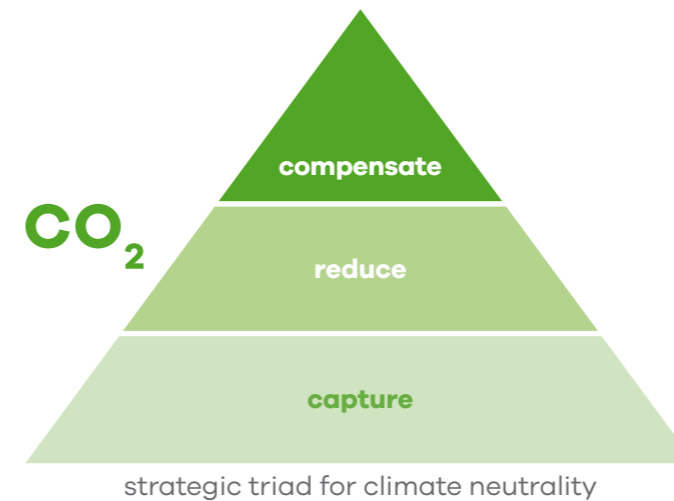
Zeller+Gmelin was the first company to receive approval for its prelubes from all German car manufacturers and today our prelubes and hotmelts are used in various steel and aluminum plants worldwide. With our product innovations in the field of cooling various components and in connection with the transformation to electromobility, we would like to set new standards together with you.

Sustainability

Conserving resources and protecting the climate

Zeller+Gmelin stands for healthy and sustainable growth. This means acting in a socially and ecologically responsible manner. The conscientious use of resources and responsibility towards future generations are central components of the company's philosophy. For years, we have been successfully working on reducing our ecological footprint and, since January 2020, we have been allowed to call ourselves the first chemical company in Baden-Württemberg. In an extensive project, we determined the CO₂ balance at the Eislingen site.

The principle of the triad of the Kyoto Protocol was applied (1997/2005):



In addition, Zeller+Gmelin can offer its customers recycling services with its own refinery "Südöl", thereby improving their sustainability and the company's carbon footprint (CCF).

EXPERTLY DONE.

Zeller+Gmelin GmbH & Co. KG · Schlosstraße 20
73054 Eisligen/Fils · Germany
Phone: +49 7161 802-0 · info@zeller-gmelin.de
www.zeller-gmelin.de