
Complube



THE Revolution in Lubrication Technology

THE revolution in lubrication technology

- Contamination in the bearing?
- Liquid ingress and corrosion after cleaning or during operation?
- Bearing grease is dripping onto your produced goods?
- No relubrication possible and service life too short?
- Is there something more environmentally friendly than conventional grease?

We solve these and many other problems with our innovative solid lubricant system **COMPLUBE**.

COMPLUBE is a result of the continuous development of polymer materials.

It is a lubricant compound which consists of polymer, synthetic oil and additives. **COMPLUBE**.

FUNCTION

The original raw material is filled into the bearing without changing the bearing construction itself. After filling with special devices the bearing is treated thermally.

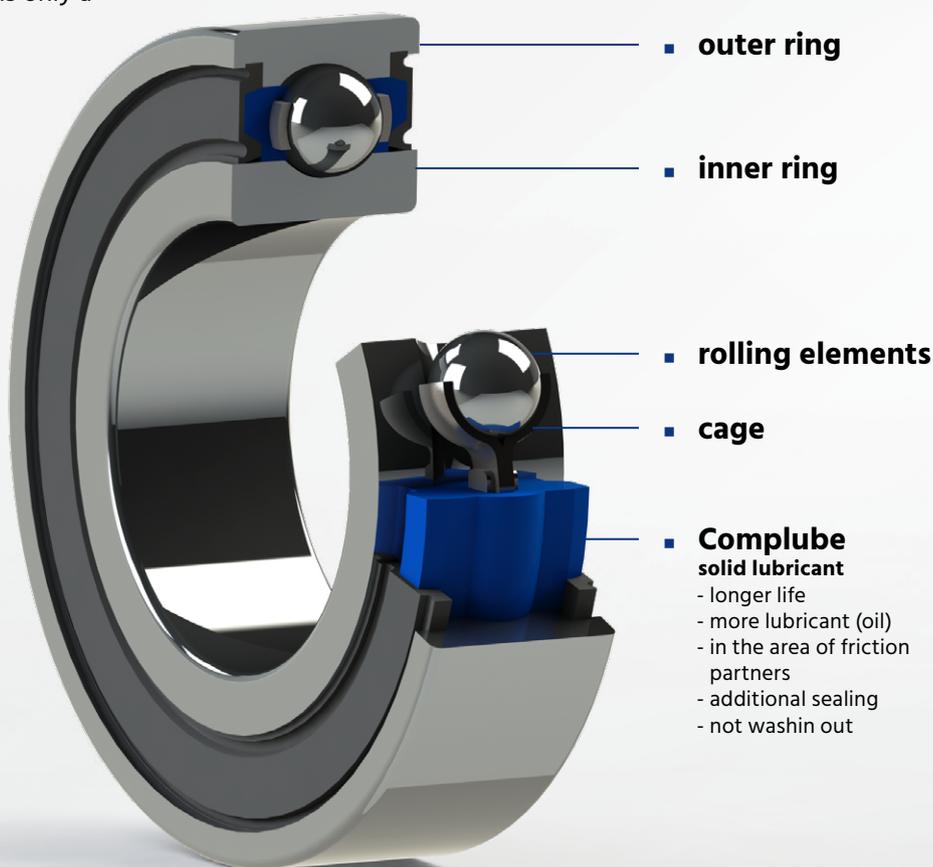
The result is an open-pored but solid lubricant which fills the entire inner structure of the bearing.

The lubricant itself now contains a very high ratio of base oil, which ensures a permanent and ideal supply of lubricant (Ratio approx. 70 % oil / 30 % polymer+additives).

The lubricant matrix releases the embedded oil to the friction partners as required - for example when the temperature rises, the pores open up and more oil is delivered to the required points - at standstill or temperature reduction, the pores absorb the lubricant again.

The rolling elements can move freely in the solid lubricant - the solid runs with the rolling elements and cage (if existing).

Between the raceways and the rolling elements, there is only a small free gap, which enables the bearing rotation.

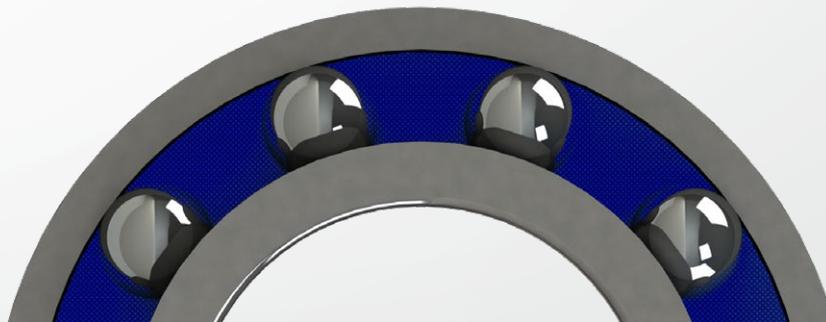


Advantages of Complube:

- Creation of a maintenance-free bearing arrangement (no relubrication required).
- Permanent, on-demand lubrication of the bearing position
- Additional sealing against contamination, liquid ingress, etc.
- Standard food approval (NSF/H1, Halal, Kosher).
- Not soluble in water
- No or hardly any lubricant leakage (no contamination of the periphery)
- Very high resistance to media, dust and chemicals
- No condensation due to temperature fluctuations
- Best suitability for oscillating movements
- Best suitability for lowest temperature ranges (see CL.LT version)
- High load carrying capacity, suitable for shock loads
- With integrated seals: Barrier against indentation of the seal (e.g. during high-pressure cleaning)
- Significant increase of bearing life or lubricant operating life
- 3-5x more base oil available: Service life increases in the range factor 2-20 - depending on application
- Very ageing-resistant base oil (synthetic)
- Environmentally friendly solution (no grease on the product or in the production area)
- Additional additives (e.g. with antimicrobial effect - see CL.AA version)



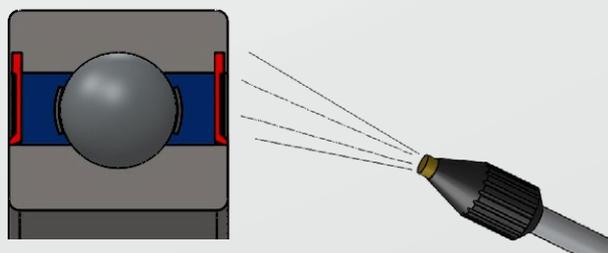
- **Rolling element lubricated with grease** (ideal condition)



- **Rolling element lubricated with Complube**

■ **Cleaning**

By completely filling with Complube the solid lubricant prevents the seal from „collapsing“.
e.g. during high-pressure cleaning.



TECHNICAL REQUIREMENTS

Basically, it is possible to fill almost any type of rolling bearing with Complube.

The lubricant is limited only by 2 application parameters:

- 1. Temperature

(Maximum continuous operating temperature: +85 °C / Maximum peak temperature +100 °C).

This is also important during assembly - here (as with standard bearings) induction heaters should be used and +120 °C should not be exceeded.

Heating plates or warm oil baths are not recommended for heating.

- 2. Speed

Due to the higher moving mass, the following speed values should be used as a guide value (operating range +20 °C)

| Bearing type | Speed rating A (max.) |
|------------------------------------|-----------------------|
| Deep groove ball bearings | |
| single row / sheet steel cage | 300000 |
| single row / polyamide cage | 40000 |
| double row | 40000 |
| axial deep groove ball bearing | 45000 |
| | |
| Self-aligning ball bearings | |
| sheet steel cage | 150000 |
| polyamide cage | 40000 |

| Bearing type | Speed rating A (max.) |
|--------------------------------------|-----------------------|
| Angular contact ball bearings | |
| sheet steel cage | 150000 |
| polyamide cage | 40000 |
| | |
| Cylindrical roller bearings | |
| sheet steel cage | 150000 |
| polyamide cage | 40000 |
| full complement (without cage) | 40000 |
| Axial cylindrical roller bearing | 40000 |

| Bearing type | Speed rating A (max.) |
|----------------------------------|-----------------------|
| Tapered roller bearings | 45000 |
| | |
| Spherical roller bearings | |
| E type | 42500 |
| CC design | 85000 |

| Bearing type | Speed rating A (max.) |
|--|-----------------------|
| Ball bearing units (UC, UK, Y-bearing, etc.) | 40000 |
| | |
| Needle bearings, track rollers, yoke type track rollers | 40000 |

Calculation of the maximum speed „n“ of the bearing used:

n = max. speed in rpm

d = bearing inner diameter

D = bearing outer diameter

A = speed Index value (see above table)

$$n = A / (0.5 \times (d + D))$$

At increased temperatures (from approx. +40 °C), the limiting speed may be slightly reduced. Please contact PGM for the correct design.

The friction behavior of rolling bearings with COMPLUBE filling is almost identical to the respective standard bearing. However, due to the sliding friction of the lubricant, this is slightly increased.

In case of further special requirements further possibilities with special additives in the solid lubricant are available to meet exactly your application requirements.

DESIGNS / SUFFIXES:

In order to serve your application in the best possible way, we have, in addition to the standard, provided a large number of adaptations and variations.

The most important ones are listed here:

| Suffix | Execution |
|---------|---|
| CL | Complube standard filling H1 Approval / viscosity 68 mm ² /s at +40 °C (ISO3104) |
| CL.HL | Complube filling for high loads H1 approval / viscosity 140 mm ² /s at +40 °C (ISO3104) |
| CL.LT | Complube filling for low temperatures (down to -50°C) H1 approval / viscosity 32 mm ² /s at +40 °C (ISO3104) |
| CL.AA | Complube filling with antimicrobial additives H1 approval / viscosity 68 mm ² /s at +40 °C (ISO3104) |
| CL.X... | Complube filling with special attributes (e.g. special viscosities, anti-wear additives, etc ...) |

Other versions are available on request.



Special designs using the COMPLUBE AA version as an example

A main market for Complube technology is the food, beverage & pharmaceutical industry.

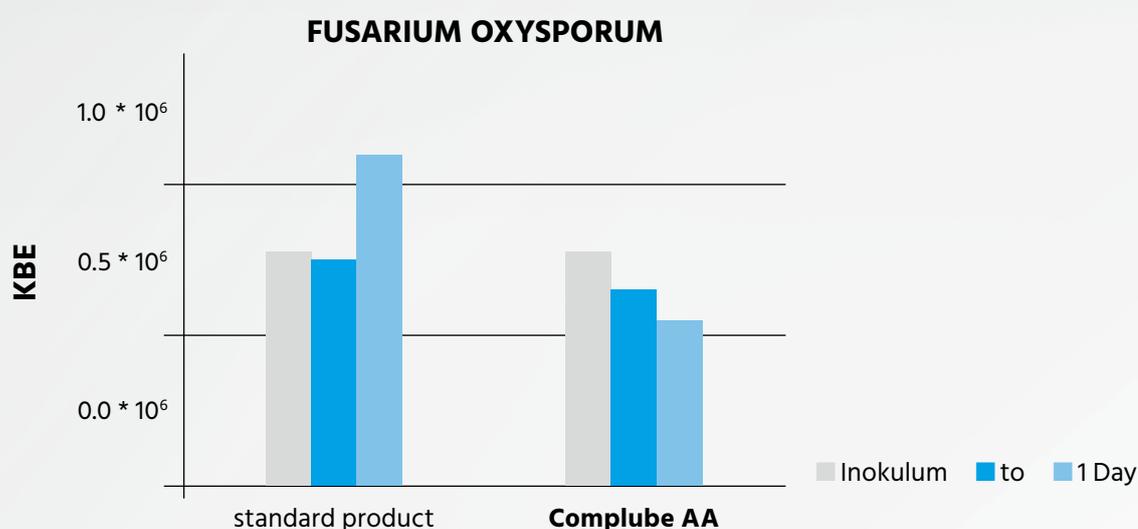
Here, due to the increasing requirements in terms of hygiene, a solution has been developed to actively prevent the formation of bacteria.

The cleaning of used rolling bearings is often very costly and/or often not feasible.

Consequently, there is a risk that pathogenic (disease-causing) germs can form in the lubricant of conventionally greased rolling bearings, which in turn can contaminate the manufactured product.

Complube AA has an antimicrobial effect due to its additives and prevents the development of these pathogens, such as *Fusarium oxysporum* or *Pseudomonas aeruginosa*.

Using the example of the pathogen *Fusarium oxysporum* (a widespread mold that is frequently found in foodstuffs, cereals, animal feed, etc.), this can be seen in the following graphic or picture graphic, respectively pictures:



Advantages of the Complube AA series:

- H1 approval
- Suppresses the growth of pathogenic germs in the active substance
- No contamination of the end product with germs in case of accidental contact with the lubricant
- Proven effectiveness with various germs and molds
- Suppresses aging or degradation processes in the lubricant

Applications of the Complube AA series:

- Food and beverage industry
- Medical technology
- Pharmaceutical and cosmetics industry
- Production of animal feed and pet food
- Hospitals and medical practices
- Tobacco products and luxury food industry

The filling or the thermoprocess can only be carried out at PGM.

You decide which basic bearing (brand) is to be filled, or we make our recommendations based on our experience in the rolling bearing market.

It is possible that the bearings for filling are provided by the customer, or PGM takes over the procurement.

Complube application overview:

- Food industry
- Beverage industry
- Packaging machines
- Pharmaceutical & medical industry
- Mining
- Wood industry
- Textile machinery
- Construction machinery
- Maritime industry
- Crane construction, materials handling, intralogistics systems
- Semiconductor industry
- Paper and corrugated board production
- Printing machinery
- Agricultural machinery
- Steel mills
- Building materials industry
- Lubrication of other drive technology parts, such as: Chains, pins, etc.



**Learn more about our comprehensive offer on the web:
www.pgmmotion.com**

| Innovative | |
|-------------------|--|
| SLIX | Special coatings (Diamondplating) |
| Complube | Torque ball screws |
| FlexGuide | Track roller guidance system W-Line / X-Line |

| Linear | |
|--------------------|-----------------------|
| LM guides | Ball bushings |
| Ball splines | Precision shafts |
| Ball screws | Stroke limited guides |
| Torque ball screws | Curved guides |
| Linear axes | Compact axes |

| Rotative | |
|-----------------|--------------------------------|
| Ball bearings | Bearings with solid lubricants |
| Roller bearings | Special bearings |

| Services | |
|---|--|
| Design of linear guides, ball screws and bearings | Repair of ball screws, linear axes and linear guides |
| Assembly of components | Support in design |

Production ▪ Sales ▪ Analysis ▪ Repair