OPERATING MANUAL

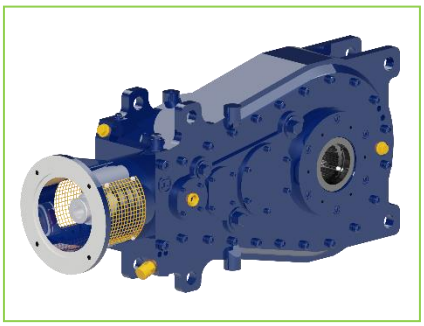
ZIMM® Germany

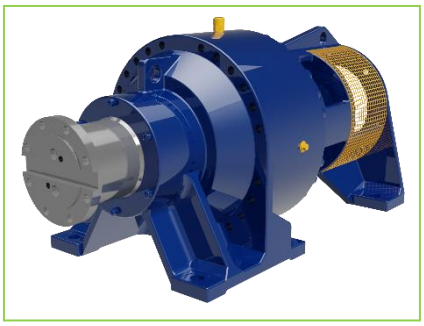
Reliable - Powerful - Experienced

ZIMM Industrial gearboxes

Spiral bevel, angle, spur, transfer, planetary and bevel planetary gear units

Lubricant recommendations





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Technische und inhaltliche Änderungen vorbehalten

Legal notices

ZIMM GmbH accepts no liability for damage caused by failure to observe this operating manual.

Technical support

The lubricant selection was made with the kind support of SET-AK, the open working group of UNITI e.V. (the German Federal Association of Medium-Sized Mineral Oil Companies), and VSI e.V. (the German Industrial Lubricant Association).

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This operating manual is also available for download in other languages.

Additional interesting information on industrial gear units and suitable components can be found on our website

1 About this document

1.1 Using this operating manual

This operating manual is part of the ZIMM industrial gearboxes.

➔ Read the operating manual carefully before use.

➔ Keep the operating manual for the entire service life of the gearbox.

➔ Keep the operating manual available to operating and maintenance personnel at all times.

➔ Forward the operating manual to the following owners or users.

➔ Update the operating manual whenever a supplement is received from the manufacturer.

1.2 Symbols and labels

Symbol	Meaning
CAUTION	Information on avoiding material damage
NOTE	Note on understanding
✓	Prerequisite for an instruction manual

Tab. 1: Symbols and labels

2 Gear oils

The gear oils listed in these lubricant recommendations are manufactured and distributed worldwide with the quality and properties required for gearboxes.

CAUTION

The oil viscosity and oil group on the type plates or the information on the technical data sheet, as well as notes in the gearbox operating manual, must be observed! Gear oil properties differing from these are only permissible after consultation.

NOTE

If a gear oil other than the one specified in these lubricant recommendations is used, the operator assumes responsibility for the technical suitability of the lubricant. In this case, we recommend use of a lubricating oil that exhibits the specified quality characteristics, meets the specified quality requirements, and is confirmed by the oil manufacturer. The lubricants specified in the recommendations meet the following quality requirements:

2.1 Oil quality

- ✓ ZIMM industrial gearboxes are approved exclusively for CLP-quality oils which, in accordance with DIN 51517-3 / ISO 12925-1, contain agents to increase corrosion protection and aging resistance and to reduce wear in mixed friction areas.
- ✓ The scuffing load capacity in the FZG test in accordance with DIN ISO 14635-1 must reach at least load stage 12. Corresponding proof can be found on the data sheets of the respective gear oil.
- ✓ In the rolling bearing lubricant test in accordance with DIN 51819-3, the rolling element wear must be below 30 mg, and the cage wear below 200 mg.
- ✓ Sufficient resistance to micropitting in accordance with micropitting test FVA 54 must be achieved with micropitting load stage 10 or higher.
- ✓ Low foaming with less than 20% foam formation
- ✓ Suitability with elastomer materials of the shaft sealing rings based on FVA Guideline 606

- ✓ Compatibility with residue (approx. 1%) of the running-in oils and preservative oils used
- ✓ Compatibility with the related coating materials
- ✓ Compatibility with sealing materials between the sealing surfaces based on FVA Guideline 606

2.2 Oil purity classes in accordance with ISO 4406

If not explicitly specified in an operating manual, the following ISO degrees of purity must be taken into account within the gearboxes.

Gearbox type	ISO-grade	Recommended filter fineness
Mechanical drives – general	-/15/12	25 … 60 µm
Large gearboxes (weight > 1 metric ton)	-/19/16	

Tab. 2: Oil groups

2.3 Oil groups

In these lubricant recommendations, a distinction is made between the following oil groups:

VG = ISO viscosity grade; numerical value corresponds to the kinematic viscosity at 40 °C in centistokes (mm^2/s).

Oil groups	Symbol	Table
Mineral oils	CLP (ISO VG)	M
Poly-alpha-olefins (synthetic, PAO)	CLP-HC (ISO VG)	HC
Polyglycols (synthetic, PG)	CLP-PG (ISO VG)	PG
Biodegradable oils (synthetic ester oils)	CLP-E (ISO VG)	E

Tab. 3: Oil groups

2.4 Service life

Standard values for service life at an oil average operating temperature of approx. 80 °C:

Mineral oils and biodegradable oils	Max. 2 years or 10,000 operating hours
Poly-alpha-olefins (PAO) and polyglycols (PG)	Max. 4 years or 20,000 operating hours

NOTE

The service life is reduced at an average operating temperature above 80 °C.

Standard value: A temperature increase of 10K cuts the service life in half.

2.5 Oil temperatures

Compared to mineral oils, synthetic oils have an extended operating temperature range and a higher viscosity index, i.e. a flatter viscosity/temperature curve.

Reference values for the operating temperature range in connection with the gearbox:

- Mineral oil: –10 … +90 °C (Short duration +100 °C)
- PG and PAO oil: –25 … +100 °C (Short duration +110 °C)
- Biodegradable oils (synthetic esters): –15 ... +90 °C.

NOTE

The operating temperature limits of individual gear oils may differ from the values specified. For these, the manufacturer’s flash point / pour point specifications for the oils must be observed.

NOTE

If the requirements for the gearbox application are exceeded, the manufacturer’s specifications (data sheets) on the permissible operating temperatures must be observed.

2.6 Oil change

The operational reliability of the gearbox and the service life of the oil are significantly influenced by the degree of purity of the gear oil. Therefore, care must always be taken to ensure that the oil in the gearbox is clean. For oil changes, follow the instructions in the gearbox operating manual. For large quantities of oil, it is advisable to perform oil changes or oil cleaning on the basis of the results of an oil analysis. For oil changes involving the same type of oil, the residual amounts in the gearbox must be kept as low as possible. The use of alternative lubricants for filling is permitted under the following conditions without approval from ZIMM:

1. Use of an alternative gear oil listed in the tables of the same oil group and viscosity class is possible if:
   a. Use of alternative lubricants is not excluded by the gearbox specifications.
   b. Their compatibility and miscibility have been approved by the manufacturer of the new lubricant.
2. Use of an alternative gear oil not listed in the tables of the same oil group and viscosity class is possible if:
   a. Use of alternative lubricants is not excluded by the gearbox specifications.
   b. The oil quality and oil purity requirements according to these lubricant recommendations are met.
   c. Their compatibility and miscibility have been approved by the manufacturer of the new lubricant.

CAUTION

Gear oils of different oil groups, viscosity classes, and manufacturers must not be mixed together. When changing from very different oil types or oils with very different additives, but especially when changing from polyglycols (CLP PG) to another gear oil or vice versa, the gearbox must always be flushed thoroughly with the new oil. Residue of the used oil must be completely removed. The gear oils must not be mixed with other substances under any circumstances. Flushing with petroleum or other cleaning agents is not permitted, since residue of the flushing agent may remain in the gearbox.

NOTE

ZIMM's recommendations do not constitute approval of different oil types in terms of their compatibility or miscibility with each other.

3 Greases

Gearboxes can be equipped with grease lubrication for lubrication of gears or bearings.

CAUTION

Use of greases is only permitted if this is specified in the operating manual of the gearboxes. The relubrication periods must be observed.

NOTE

In closed gearboxes with internal oil lubrication, mixing of gear oils with bearing greases must not be allowed to occur.

3.1 Grease groups

In these lubricant recommendations, a distinction is made between the following grease groups: Here the specified temperature ranges (code letter “G/K...”) represent the minimum requirement of the recommended grease types:

- ➔ **Gear greases** are suitable for lubricating gears and bearings in closed small gearboxes and open drives with low circumferential speeds (e.g. for sprockets and racks).
- ➔ In addition to lubrication, **rolling bearing greases** are also used to seal bearing points, e.g. when a shaft is oriented vertically or extreme environmental influences such as dust or splash water are present.

NOTE

If the minimum requirements for the operating temperatures are exceeded (specification by the customer), the manufacturer’s specifications of the permissible operating temperatures must be observed.

Grease group	Symbol	Table
Gear greases based on mineral base oils Operating temperature −10 ° to +100 °C	GP *G-10	G I
Greases for open gearboxes and gearing Based on synthetic base oils (PAO) Operating temperature −10 ° to +120 °C	GP HC*K-10	G II
Greases based on synthetic base oils (polyglycols) Operating temperature -30° to +120°C	GP PG*K-30	G III
Rolling bearing greases based on mineral base oils Operating temperature -10° to +100°C	KP *G-10	K I
Rolling bearing greases based on synthetic base oils (PAO) Operating temperature -30° to +120°C	KP HC*K-30	K II
Rolling bearing greases based on biodegradable base oils Operating temperature -30° to +100°C	KP E*G-30	K III

Tab. 4: Grease group

(*) For the consistency number, see table (NLGI grades in accordance with DIN 51818)

NOTE

Lithium soap solid lubricants are used unless otherwise specified.

3.2 Grease quality

Greases must meet the following specified quality requirements:

➔ Suitability with the elastomer materials of the shaft seals

➔ Compatibility with sealing materials between screw mounting surfaces

We would like to point out that every lubricant manufacturer or lubricant supplier is responsible for the quality of its own product. The NLGI grade specified in this operating manual is always authoritative for the selection of the lubricant. If a different viscosity or NLGI grade is used, or a lubricant other than the one recommended here, the operator assumes responsibility for the technical suitability of the lubricant. If a lubricant that not listed in these recommendations is used, we advice having the lubricant manufacturer confirm its suitability according to the above quality criteria.

CAUTION

Notes in the operating manuals and information on the type plates and additional plates must be observed! Deviations are only after consultation with ZIMM!

3.3 Service life and service temperature

NOTE

The upper and lower limits for the service temperatures (dropping point) of individual greases can vary considerably. This data, as well as other data and properties of the greases, can always be found on the lubricant manufacturers' technical data sheets.

Unless otherwise specified in the operating manual, the service life is specified with the following standard values:

Operating temperature up to 70°C	Max. 4 years or 30,000 operating hours
Operating temperature up to 70 °C	Max. 2 years or 15,000 operating hours

3.4 Grease change

For the first lubricant change after commissioning of the gearbox, as well as subsequent lubricant changes, the instructions in the operating manual must be observed. For changes involving same lubricant, the residual quantities must be kept as low as possible. Lubricants of different grades and manufacturers must not be mixed with each other. The manufacturer of the new grease must confirm compatibility with residue of the grease that is being replaced.

NOTE

ZIMM's recommendations do not constitute approval of different grease types in terms of their their compatibility or miscibility with each other.

4 Marking

CAUTION

The oil viscosity and oil group on the type plate or specifications on the technical data sheet, as well as notes in the gearbox operating manual, must be observed! Specifications differing from these are only permissible after consultation.

NOTE

Use of lubricants that do not meet the specified quality requirements may void the warranty. Submission of maintenance records with proof of the specified/recommended oil change and lubrication intervals is required under ZIMM's warranty.

NOTE

For oil-lubricated gearboxes with separate grease lubrication points, unless explicitly specified, no additional identification of the grease type is provided on the type plate. The information on grease type, grease quantity, and relubrication intervals can be found in the gearbox documentation.

4.1 Type plate

NOTE

The information on the type plate differs in a STANDARD or MAKE marking of the lubricants to be used.

4.1.1 Short designation in accordance with DIN 51502

This information is provided **if the gearbox is delivered without oil/grease and no make has been specified by ZIMM or its customer**. Selection of an adequate gearbox lubricant according to the selection tables is recommended.

Mineral oil per table M	Synth. oils per table HC (poly-alpha-olefins)	Synth. oils per table PG (polyglycols)
Grease with mineral base oil per table G I	Rolling bearing grease with synthetic base oil per Table K II	Rolling bearing grease, biodegradable per Table K III

Tab. 5: Type plate – examples with short designation in accordance with DIN 51502

4.1.2 Make identification

The make is specified if the gearbox is supplied with lubricant or a make has been specified. Use of a different lubricant is only permissible after consultation.

Mineral oil VG 220 Brand: Castrol	Synth. oils (PAO) VG 320 Brand: Fuchs Lubritech	Synth. oils (PG) VG 460 Brand: Klüber
Grease with mineral base oil Brand: Castrol	Rolling bearing grease with synthetic base oil Brand: Shell	Rolling bearing grease, biodegradable Brand: Klüber

Tab. 6: Type plate – examples with short designation in accordance

NOTE

Gearboxes with oil filling are also marked with an information plate and label on the gearbox upon delivery.

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