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FLSMIDTH
MAAG GEAR

Recommended Lubricants

For Gearboxes and Toothed couplings



Impressum

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1. Contact

If you have any questions, we will be glad to help you.

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2. Scope

This document is valid for gearboxes and toothed couplings made by FLSmidth MAAG Gear AG.

3. Quality characteristics

For our gearboxes, we recommend to use only oils as listed under Chp. 8 "Recommended Lubricants for gearboxes". Should you decide to use any other oil, the oil should meet at least the quality characteristics as listed below. Polyglycol and Poly- α -Olefin oils may only be used after the written approval from us, except if specifically prescribed.

Criterion	Quality characteristics	Standard
Corrosion protection, aging resistance	CLP-quality with additives for increased corrosion protection increased aging resistance and reduced wear in mixed-friction areas.	DIN 51517-3
Scuffing resistance	Failure load stage ≥ 12	FZG Test DIN 51354-2 A/8.3/90
Roller bearing wear	Rolling element wear, less than 30 mg Cage wear to be reported	FE-8 Roller bearing test DIN 51819-3 D-7.5/80-80
Grey-staining resistance	GFT load stage ≥ 10 or GF class high	Grey-staining test FVA 54
Foaming	Increase in total volume 1 minute after switching off $\leq 15\%$ Increase in oil air dispersion 5 minutes after switching off $\leq 10\%$	Foam test ISO 12152
Compatibility with sealing material SRE-NBR-28/SX	Relative volume change -0 / +10 % Change of Shore-A hardness -10 / + 5 Reduction of tensile strength 30 % Reduction of elongation at break 40 %	DIN 51517-3 (DIN-ISO 1870)
Compatibility with other materials	Compatible with the paints used for gear-unit interiors. Compatible with residues of corrosion-protection agent and test run oils. Compatible with liquid seals between joint surfaces.	

4. Oil groups

Principally, a distinction is made between the following oil groups:

- Mineral oils (MIN oil)
- Polyglycols (PG oil)
- Poly- α -olefins (PAO oil)

Our gearboxes are normally intended for operation with mineral oil.

Poly- α -olefin oils **can** be used, provided that MAAG Gear has agreed to such use in writing.

Polyglycol and poly- α -olefin oils **must** be used, when this is expressly prescribed for a gearbox or a special application.

5. Temperature range

Compared with mineral oils, polyglycol and poly- α -olefin oils have a greater temperature range:

- Mineral oils -10°C to +90°C
- Polyglycol und Poly- α -Olefine oils -20°C to +100°C

For exact values see the data sheet from the respective oil manufacturer.

6. Oil service life

Like other parts in a gearbox, the oil is also affected by aging and wear.

The following values may be used as a guideline for the service life of the lube oils used for the lubrication in our gearboxes.

Oil	Recommended service life
Mineral oil	2 years or 10'000 operating hours
Polyglycols	4 years or 20'000 operating hours
Poly- α -Olefins	

For large amounts of oil we recommend to determine the right moment for an oil change by regular analysis of the oil.

Please refer also to the operating instructions of your gearbox to find the specific values recommended.

7. Purity of oils

The reliability and the life time of the gearbox and its additional components depend mainly on the cleanliness of the oil. Therefore, keep the oil clean.

Oil changes with oil of the same manufacturer and same type will normally not result in problems.

Oils of different oil groups and manufacturers must not be mixed.

Cleanliness classes

The cleanliness class depends on the filter-fineness of the oil filter in use.

Filtration	Cleanliness Class (acc. ISO 4406)
≤ 10 μ	19/16/13
> 10 μ	22/19/16

These cleanliness classes are minimal requirements for used oil.

7.1 Flushing




Flushing can help to remove dirt or residues of previously used oil. Since for our gearboxes almost a whole oil filling is needed for flushing, it makes not too much sense to previously flush the gearbox with a separate oil filling. As a substitute we recommend to analyze the operating oil after the first few operating hours and change it if necessary. This is similar to flushing, but may save a whole oil filling, in case an oil change is not necessary.




If flushing is carried out any way, pay attention to the following:


When changing to very different type of oil, especially from mineral- to poly glycol oils or vice versa, the old oil must be removed as good as possible. In this case, very small amounts of the other oil can lead to unexpected problems.

To achieve an intensive cleaning and mixing with the remaining oil, the gearbox must be operated in idle mode with the flushing oil for a short time (10 – 60 minutes). The flushing time depends on the oil volume and the extent of the previous contamination. For flushing, use only the same oil type, viscosity and brand as the later operating oil.


8. Recommended Lubricants for gearboxes




Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oils	VG 460		GEAR RSX 460	MAK AMOCAM PLUS 460
	VG 320		GEAR RSX 320	MAK AMOCAM PLUS 320
	VG 220		GEAR RSX 220	MAK AMOCAM PLUS 220
	VG 150		GEAR RSX 150	MAK AMOCAM PLUS 150
	VG 100		GEAR RSX 100	MAK AMOCAM PLUS 100
Poly-α-Olefins	VG 460	ANDEROL 5460 XEP 5460 Plus	SYNTOGEAR PE 460	MAK Syngear 460
	VG 320	ANDEROL 5320 XEP 5320 Plus	SYNTOGEAR PE 320	MAK Syngear 320
	VG 220	ANDEROL 5220 XEP 5220 Plus	SYNTOGEAR PE 220	MAK Syngear 220
	VG 150	ANDEROL 5150 XEP	SYNTOGEAR PE 150	MAK Syngear 150
	VG 100			MAK Syngear 100




Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	Evolit BGF 460	Energol GR-XP 460	BESLUX XP-460
	VG 320	Evolit BGF 320	Energol GR-XP 320	BESLUX XP-320
	VG 220	Evolit BGF 220	Energol GR-XP 220	BESLUX XP-220
	VG 150	Evolit BGF 150	Energol GR-XP 150	
	VG 100	Evolit BGF 100	Energol GR-XP 100	
Poly-α-Olefins	VG 460	Evolit SGF 460		BESLUX GEARSYNT XP-460
	VG 320	Evolit SGF 320		BESLUX GEARSYNT XP-320
	VG 220	Evolit SGF 220		BESLUX GEARSYNT XP-220
	VG 150			BESLUX GEARSYNT XP-150
	VG 100			


Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	Alpha SP 460 Optigear BM 460 Optigear 1100-/-460	Meropa XL 460	RENOLIN CLP 460 RENOLIN CLP PLUS 460
	VG 320	Alpha SP 320 Optigear BM 320 Optigear 1100-/-320	Meropa XL 320	RENOLIN CLP 320 RENOLIN CLP PLUS 320
	VG 220	Alpha SP 220 Optigear BM 220 Optigear 1100-/-220	Meropa XL 220	RENOLIN CLP 220 RENOLIN CLP PLUS 220
	VG 150	Alpha SP 150 Optigear BM 150 Optigear 1100-/-150	Meropa XL 150	RENOLIN CLP 150 RENOLIN CLP PLUS 150
	VG 100	Optigear BM 100 Optigear 1100-/-100		RENOLIN CLP 100 RENOLIN CLP PLUS 100
Poly-α-Olefins	VG 460	Alphasyn EP 460 Optigear Synthetic PD 460	Meropa Syntetic EP 460	RENOLIN UNISYN CLP 460
	VG 320	Alphasyn EP 320 Optigear Synthetic PD 320	Meropa Syntetic EP 320	RENOLIN UNISYN CLP 320
	VG 220	Alphasyn EP 220 Optigear Synthetic PD 220	Meropa Syntetic EP 220	RENOLIN UNISYN CLP 220
	VG 150	Alphasyn EP 150 Optigear Synthetic PD 150	Meropa Syntetic EP 150	RENOLIN UNISYN CLP 150
	VG 100		Meropa Syntetic EP 100	RENOLIN UNISYN CLP 100

Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	GEARMASTER CLP 460		Klüberoil GEM 1 – 460 N
	VG 320	GEARMASTER CLP 320		Klüberoil GEM 1 – 320 N
	VG 220	GEARMASTER CLP 220		Klüberoil GEM 1 – 220 N
	VG 150	GEARMASTER CLP 150		Klüberoil GEM 1 – 150 N
	VG 100	GEARMASTER CLP 100		Klüberoil GEM 1 – 100 N
Poly- α -Olefins	VG 460	GEARMASTER SYN 460	Servosyngear AMP 460 Servosyngear Plus 460	Klübersynth GEM 4 – 460 N
	VG 320	GEARMASTER SYN 320	Servosyngear AMP 320 Servosyngear Plus 320	Klübersynth GEM 4 – 320 N
	VG 220	GEARMASTER SYN 220	Servosyngear AMP 220 Servosyngear Plus 220	Klübersynth GEM 4 – 220 N
	VG 150	GEARMASTER SYN 150	Servosyngear AMP 150	Klübersynth GEM 4 – 150 N
	VG 100	GEARMASTER SYN 100		

Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	DUOLEC 1607	STEELO 460	Mobilgear 600 XP 460
	VG 320	DUOLEC 1606	STEELO 320	Mobilgear 600 XP 320
	VG 220	DUOLEC 1605	STEELO 220	Mobilgear 600 XP 220
	VG 150	DUOLEC 1604	STEELO 150	Mobilgear 600 XP 150
	VG 100	DUOLEC 1603		Mobilgear 600 XP 100
Poly-α-Olefins	VG 460	DUOLEC Syn Gear Lubricant 9846	STEELO SYNTH 460	Mobil SHC 634 Mobil SHC Gear 460
	VG 320	DUOLEC Syn Gear Lubricant 9832	STEELO SYNTH 320	Mobil SHC 632 Mobil SHC Gear 320
	VG 220	DUOLEC Syn Gear Lubricant 9822	STEELO SYNTH 220	Mobil SHC 630 Mobil SHC Gear 220
	VG 150	DUOLEC Syn Gear Lubricant 9815	STEELO SYNTH 150	Mobil SHC 629 Mobil SHC Gear 150
	VG 100			Mobil SHC 627

Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	Gearlube SP-e460	GEAR COMPOUND PLUS 460	
	VG 320	Gearlube SP-e320	GEAR COMPOUND PLUS 320	
	VG 220	Gearlube SP-e220	GEAR COMPOUND PLUS 220	
	VG 150	Gearlube SP-e150	GEAR COMPOUND PLUS 150	
	VG 100		GEAR COMPOUND PLUS 100	
Poly- α -Olefins	VG 460		GEAR SINTEC CLP 460	Enduratex Synthetic EP 460
	VG 320		GEAR SINTEC CLP 320	Enduratex Synthetic EP 320
	VG 220		GEAR SINTEC CLP 220	Enduratex Synthetic EP 220
	VG 150		GEAR SINTEC CLP 150	Enduratex Synthetic EP 150
	VG 100		GEAR SINTEC CLP 100	

Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	Q8 Goya NT 460	Omala S2 G 460 Omala S2 GX 460	LoadWay EP 460
	VG 320	Q8 Goya NT 320	Omala S2 G 320 Omala S2 GX 320	LoadWay EP 320
	VG 220	Q8 Goya NT 220	Omala S2 G 220 Omala S2 GX 220	LoadWay EP 220
	VG 150	Q8 Goya NT 150	Omala S2 G 150 Omala S2 GX 150	LoadWay EP 150
	VG 100		Omala S2 G 100 Omala S2 GX 100	
Poly-α-Olefins	VG 460	Q8 El Greco 460	Omala S4 GX 460 Omala S4 GXV 460	
	VG 320	Q8 El Greco 320	Omala S4 GX 320 Omala S4 GXV 320	MERETA 320
	VG 220	Q8 El Greco 220	Omala S4 GX 220 Omala S4 GXV 220	MERETA 220
	VG 150	Q8 El Greco 150	Omala S4 GX 150 Omala S4 GXV 150	MERETA 150
	VG 100			

Lubricant group	Viscosity ISO-VG / DIN 51519 at 40°C (mm ² /s)			
Mineral oil	VG 460	KASSILA GMP 460 CARTER EP 460 CARTER XEP 460		
	VG 320	KASSILA GMP 320 CARTER EP 320 CARTER XEP 320		
	VG 220	KASSILA GMP 220 CARTER EP 220 CARTER XEP 220		
	VG 150	CARTER XEP 150		
	VG 100			
Poly- α -Olefins	VG 460	CARTER SH 460		
	VG 320	CARTER SH 320		
	VG 220	CARTER SH 220		
	VG 150	CARTER SH 150		
	VG 100			

9. Quality characteristics for coupling greases

For our toothed couplings we recommend to use only greases as listed under Chp. 10 "Recommended Lubricants for toothed couplings". Should you decide to use any other grease, it must meet at least the quality characteristics as listed below.

Criterion	Quality characteristics	Standard
Viscosity	NLGI Class 00	DIN 51718
Walkpenetration	400 - 430	DIN ISO 2137
Wear protection	EP additives or EP characteristics	
Permissible temperature range	-20°C – 100°C	

10. Recommended Lubricants for toothed couplings

	<p>Energrease LS-EP 00</p>
	<p>Tribol GR 3020/1000-00 PD Castrol Tribol GR 100-00 PD</p>
	<p>Multifak EP 00</p>
	<p>RENOLIT SO-GFB</p>
	<p>MONOLEC 4700</p>
	<p>Polyflex EP00-160</p>
	<p>Mobilux EP 004</p>
	<p>SAM - 2810 (#00)</p>
	<p>Fett 174</p>
	<p>Gadus S2 V220 00</p>