

RENOLIN PG

Fully synthetic EP industrial gear oils based on special, selected polyglycols (PAG)

Description

The RENOLIN PG oils are fully synthetic industrial gear oils based on special, newly developed polyglycol base oils. Thus the RENOLIN PG products offer a very high oxidation and temperature stability. Polyglycols have a very good viscosity-temperature-behaviour (high natural, shear-stable VI) and can therefore be used within a wide temperature range (depending on the viscosity grade and the working conditions from -35°C up to 160°C). Special additives adapted to these polyglycols further improve the good properties of the base oils – high wear protection, excellent corrosion protection also at the presence of condensation water, low foaming, very good compatibility with non-ferrous metals.

The excellent anti-wear properties could be proven in different tests with RENOLIN PG. The load stage >14 was passed in the standard FZG test (FZG A/8,3/90), and the load stage >12 was passed in the FZG test A/16,6/140 (high speed, high temperature FZG test). RENOLIN PG has a high micropitting resistance - load stage "high" - and a good pitting resistance. RENOLIN PG was tested in a special "low speed" FZG test (according to DGMK (Deutsche Wissenschaftliche Gesellschaft für Erdöl, Erdgas und Kohle e.V.) – FZG scuffing test) which RENOLIN PG passed with excellent results (wear category: "low" = excellent). This special test shows the excellent wear protection of RENOLIN PG at two different temperatures (90°C and 120°C) under mixed and boundary lubrication conditions. The lubricating film remains stable even at high pressures and under mixed friction conditions. Thus

Benefits / Advantages

- Excellent wear protection
- High scuffing load carrying capacity
- Very high resistance to micropitting
- Excellent roller bearing wear protection (FE8)
- Increase of efficiency, reduction of temperature - low friction coefficient
- Excellent viscosity-temperature behaviour (high VI)
- For use at high and low operating temperatures
- High ageing stability
- Good corrosion protection
- Excellent air release
- Low foaming





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Description (continued)

the friction coefficient is low, and a temperature reduction by up to 20°C can be achieved compared with mineral oil-based lubricants.

Efficiency tests in a worm gear test rig demonstrated the high performance and the low friction coefficient which is especially of great importance for the use in worm gears. The results of RENOLIN PG in the FE8 roller bearing wear test were excellent. Tests in a special test rig at the University of Munich (FZG Institute – Forschungsstelle für Zahnräder und Getriebebau) led to excellent results regarding antiwear behaviour and efficiency.

Note

RENOLIN PG is not miscible and compatible with mineral oils, ester oils and polyalphaolefins. When changing between polyglycols from different manufacturers, the compatibility has to be checked. Before changing-over, it is recommended to clean the system and to flush with RENOLIN PG. The compatibility with elastomers, varnishes and coatings should also be checked before changing from mineral oil to polyglycols. The specifications of the roller bearing and gear manufacturers have to be observed. In general these oils should not be used for dynamic frictional contact with aluminium.

Application

The RENOLIN PG gear oils are mainly suitable for the lubrication of gear units and worm gears / roller bearings and friction bearings which are subject to

high mechanical and thermal stress. Especially in applications with high sliding velocities (e.g. worm gear units) the RENOLIN PG oils offer advantages compared with mineral oil-based gear oils. Due to the high oxidation stability, the oil change intervals can be extended and the maintenance costs can be reduced also at higher operating temperatures. The use of RENOLIN PG in worm gears (steel-bronze pairing) leads to a significant reduction of friction and wear.

The RENOLIN PG products can also be used for paper machines, calenders, conveying machines and milling bearings. Peak temperatures of up to 200°C are temporarily tolerable.

Specifications

The RENOLIN PG products fulfil and exceed the minimum requirements according to:

- DIN 51 517-3 (2004): CLP-PG
- ISO 6743-6 and ISO 12925-1: CKC / CKD / CKE / (CKS) / CKT
- AGMA 9005/E02: EP

Among others, the RENOLIN PG products are approved by:

- A. Flender
- Alpha Getriebebau
- SEW



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Recommendations / method of changing over from mineral oil-based fluids to RENOLIN PG

General recommendations / procedure in conjunction with the recommendations of the bearing and gear manufacturers (according to VDMA Guideline 24 569 and ISO CD 15380).

1. Drain the existing lubricating oil while warm.
2. Carefully drain all circuit components, pipes, pumps, and if necessary, clean mechanically. Pipes should be drained and cleaned with the help of air. Make sure that the system is free of any residual fluid.
3. Elastomers (Seals, pipes and hoses), filter materials, zinc-coated components, paints, all inner materials which are normally compatible with mineral oil should be checked with regard to their compatibility with polyalkylene glycol.
4. A flushing and cleaning procedure is recommended to reduce any residual mineral oil content. The system should be filled with the minimum oil volume which is necessary to operate the system. The cleaning and flushing time depends on the conditions of the whole system (e.g. contamination with ageing products, contamination with oxidation layers, dirt, water, etc.).
5. After the cleaning and flushing procedure the fluid should be drained off – if necessary clean mechanically. Refill the unit with fresh RENOLIN PG.
6. Mineral oil has a lower specific density than RENOLIN PG. Residual mineral oil will lie on top of the surface of the tank. This mineral oil can then be absorbed from the surface.
7. It is recommended to check the filters of the unit after some days. RENOLIN PG has good wetting properties. Contaminants, ageing products from former mineral oil will be absorbed by RENOLIN PG. These contaminants can be filtered out in the system filters.

The recommendations of the manufacturer of the system / unit should be observed regarding the oil change intervals. The condition of the used oil can be checked by oil analyses.

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Typical data:

Product name		68	100	
Properties	Unit			Test method
ISO VG		68	100	DIN 51 519
Kinematic viscosity				DIN EN ISO 3104
at 40 °C	mm ² /s	68	100	
at 100 °C	mm ² /s	13.8	19.6	
Viscosity index	-	212	220	DIN ISO 2909
Density at 15 °C	kg/m ³	1035	1043	DIN 51 757
Colour	ASTM	0.5	0.5	DIN ISO 2049
Flashpoint, Cleveland open cup	°C	240	260	DIN ISO 2592
Pourpoint	°C	-51	-48	DIN ISO 3016
Neutralisation number	mgKOH/g	0.6	0.6	DIN 51 558-1
Copper corrosion	Degree of corr.	1 – 100 A 24	1 – 100 A 24	DIN EN ISO 2160
Steel corrosion	Degree of corr.	0 – A	0 – A	DIN ISO 7120
Mechanical testing in the FZG gear test rig FZG A/8,3/90				DIN ISO 14635-1
	Failure load stage	> 12	> 12	
Micropitting test Flender GG-V 378	GFT class		very high	Flender Inhouse Test
FE-8 roller bearing test, 7,5/80/80		Typical values:		DIN 51 819-3
Wear roller element	mg	< 5	< 5	(pass = < 30 mg)
Wear cage material	mg	< 30	< 30	(pass = < 100 mg)

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Typical data:

Product name		150	220	320	
Properties	Unit				Test method
ISO VG		150	220	320	DIN 51 519
Kinematic viscosity					DIN EN ISO 3104
at 40 °C	mm ² /s	145	220	320	
at 100 °C	mm ² /s	27.0	36.8	54.4	
Viscosity index	-	224	218	237	DIN ISO 2909
Density at 15 °C	kg/m ³	1051	1075	1075	DIN 51 757
Colour	ASTM	0.5	0.5	0.5	DIN ISO 2049
Flashpoint, Cleveland open cup	°C	260	240	240	DIN ISO 2592
Pourpoint	°C	-51	-36	-39	DIN ISO 3016
Neutralisation number	mgKOH/g	0.6	0.6	0.6	DIN 51 558-1
Copper corrosion	Degree of corr.		1 – 100 A 24		DIN EN ISO 2160
Steel corrosion	Degree of corr.	0 – A	0 – A	0 – A	DIN ISO 7120
Mechanical testing in the FZG gear test rig					DIN ISO 14635-1
FZG A/8,3/90	Failure load	> 14	> 14	> 14	
FZG A/16,6/140	stage	> 12	> 12	> 12	
Micropitting test Flender GG-V 378	GFT class		very high		Flender Inhouse Test
FE-8 roller bearing test, 7,5/80/80			Typical values:		DIN 51 819-3
Wear roller element	mg	< 5	< 5	< 5	(pass = < 30 mg)
Wear cage material	mg	< 30	< 30	< 30	(pass = < 100 mg)
DGMK – FZG wear test, C/0,05/90:120/MS12, test procedure 1, 2 and 3			Wear category: low 23.7 mg total wear		DGMK – FZG wear test (low speed test)

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Typical data:

Product name		460	680	1000	
Properties	Unit				Test method
ISO VG		460	680	1000	DIN 51 519
Kinematic viscosity					DIN EN ISO 3104
at 40 °C	mm ² /s	460	680	1000	
at 100 °C	mm ² /s	75.1	110.3	162	
Viscosity index	-	245	261	281	DIN ISO 2909
Density at 15 °C	kg/m ³	1075	1075	1075	DIN 51 757
Colour	ASTM	0.5	0.5	0.5	DIN ISO 2049
Flashpoint, Cleveland open cup	°C	280	280	280	DIN ISO 2592
Pourpoint	°C	-36	-33	-36	DIN ISO 3016
Neutralisation number	mgKOH/g	0.6	0.6	0.6	DIN 51 558-1
Copper corrosion	Degree of corr.	1 – 100 A 24			DIN EN ISO 2160
Steel corrosion	Degree of corr.	0 – A	0 – A	0 – A	DIN ISO 7120
Mechanical testing in the FZG gear test rig					DIN ISO 14635-1
FZG A/8,3/90	Failure load	> 14	> 14	> 14	
FZG A/16,6/140	stage	> 12	> 12	> 12	
Micropitting test Flender GG-V 378	GFT class	very high			Flender Inhouse Test
FE-8 roller bearing test, 7,5/80/80		Typical values:			DIN 51 819-3
Wear roller element	mg	< 5	< 5	< 5	(pass = < 30 mg)
Wear cage material	mg	< 30	< 30	< 30	(pass = < 100 mg)
DGMK – FZG wear test, C/0,05/90:120/MS12, test procedure 1, 2 and 3		Wear category: low 23.7 mg total wear			DGMK – FZG wear test (low speed test)



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