

POLYGLYKOL BM 11/580

# Technical Data Sheet

## POLYGLYKOL BM 11/580

### Base oil component for industrial applications

<b>Composition</b>	Polyalkylene glycol
<b>Product properties <sup>1</sup></b>	
<b>Appearance (20°C)</b>	Clear viscous liquid
<b>Colour index [APHA] EN 1557</b>	Max. 100
<b>Refractive index (20°C) DIN 51432</b>	Approx. 1.4464
<b>Molecular weight</b>	Approx. 1400 g/mol
<b>pH value (10% w/w in water) DIN EN 1262</b>	Approx. 5.0 – 7.0
<b>Water content</b>	Max. 0.5 %
<b>Contact angle V2A steel (5% in aq.*)</b>	Approx. 33.9°
<b>Surface tension (5% in aq.**)</b>	Approx. 37.2 mN/m
<b>Density (20°C) DIN 51757</b>	Approx. 1.00 g/cm <sup>3</sup>
<b>Viscosity (20°C) DIN 51562</b>	Approx. 23 mm <sup>2</sup> /s
<b>Viscosity (40°C) DIN 51562</b>	Approx. 12.7 mm <sup>2</sup> /s
<b>Viscosity (100°C) DIN 51562</b>	Approx. 3.6 mm <sup>2</sup> /s
<b>Viscosity index ASTM D 2270</b>	Approx. 210
<b>Cloud point (1% in aq.)</b>	Approx. 62.5°C
<b>Cloud point (5g in 25g 25% BDG)</b>	Approx. 50°C
<b>Pour point ISO 3016</b>	Approx. < -62°C
<b>Pour point ISL D-7346-14</b>	Approx. -72°C
<b>Flash point DIN 51376</b>	Approx. 199°C
<b>Ignition temperature DIN EN 14522</b>	Approx. 340°C
<b>Four ball test DIN 51350/3B (60 min. / 300N)</b>	Approx. 0.55 mm
<b>Seizure / welding load</b>	Approx. <1200 / 1500 N

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<sup>1</sup> These characteristics are for guidance only and not to be taken as product specifications. The tolerances are given in the product specification sheet. For further product properties, specifications, safety, and ecological data, please refer to the MSDS.

\*) Contact angle of water on V2A steel: 64°

\*\*) Surface tension of water: 71.6 mN/m

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## Profile

### Product properties

Polyglykol BM 11/580 is a clear, neutral viscous liquid at room temperature. It displays an extremely low solidification point of lower than -62°C and no evaporation loss even at temperatures as high as 100°C. It has a very high viscosity index of around 210 despite its low molecular weight. It is soluble in both water and low viscous naphthenic oil.

### Solubility

Table 2: Solubility of Polyglykol BM 11/580 in water and various oils

	Water	Naphthenic mineral oil*	Rapeseed oil	Sunflower oil	Paraffinic mineral oil*
Solubility	✓	✓	✓	✓	-
	Trimelliate ester	TMP Trioleate ester	PAO*		
	✓	✓	-		

✓ Soluble

- Insoluble

\* Low viscous

### Thermo-oxidative degradation

To increase the thermo-oxidative stability, Lubricant Additive 1655 (LA 1655) can be used:

Table 3: Results of thermo-gravimetric analysis (TGA)

Addition of LA 1655	Temperature 5% mass loss	Temperature 10% mass loss	Center point T	Inflection point T	Residue
	°C	°C	°C	°C	%
none	175.8	187.9	222.3	234.5	0
+ 3% LA 1655	216	236	261.6	268.3	1.3
+ 8% LA 1655	222	245	278.8	289.2	3.8

Pyrolysis under air flow (30mL/min) from RT to 400°C, heating rate: 10°C /min

## Elastomer compatibility - EPDM

Compared to mineral oils and esters, such as TMP trioleate esters, Polyglykol BM 11/580 has a very good compatibility with EPDM sealings:

Table 4

Base oil	Mineral oil HLP 46	Polyglykol BM 11/580 +4% Lubricant Additive 1655 N <sup>a)</sup>	Ester TMP trioleate based hydraulic fluid	ISO 4925 requirements
Relative change in volume	+117%	<b>+6%</b>	+49%	Min. 0% Max. 10%
Change in hardness IRHD	33	<b>-3</b>	-24	Min. 0% Max. -15

Conditions: EPDM RM 69, 100°C, 7d, Average of two measurements

a) Lubricant Additive 1655 N - additive package designed for polyglycols to improve oxidation stability, corrosion, and EP/AW properties. Replaced with Lubricant Additive 1655.

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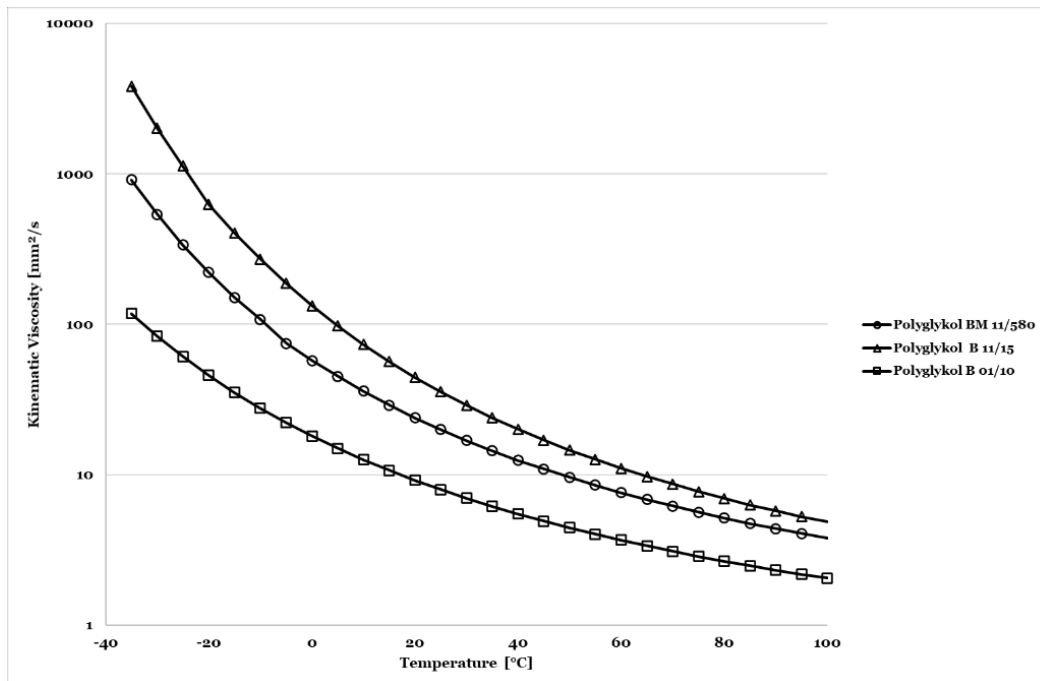
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## Viscosity / temperature behaviour of Polyglykol BM 11/580

Polyglykol BM 11/580 is the ideal component for low temperature applications. As shown in Figure 1, the viscosity of Polyglykol BM11/580 is relatively low even at -40°C.

Figure 1: Temperature – Kinematic viscosity scan



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## Application

Fields of industrial application:

- Low viscous base oil component for high performance lubricants with low friction coefficients, excellent wear properties and good thermal stability
- Base oil for manufacturing greases with good low temperature behavior
- Lubricity improver for fully synthetic metal working fluids

## Application example: Base oil for grease formulations

Due to its beneficial low temperature behavior Polyglykol BM 11/580 can be used to formulate greases for low temperature applications:

Table 5: Grease formulation with soap thickener for various NLGI grades

Material	NLGI 1	NLGI 2	NLGI 3
	Amount (wt %)		
Polyglykol BM11/580	88.89	83.54	82.36
12-hydrostearic acid	9.84	14.57	15.62
Monohydrated lithium hydroxide	0.8	1.18	1.27
Calcium hydroxide	0.47	0.70	0.75

In the following table (Table 6) the properties of the NLGI grade 2 grease based on Polyglykol BM 11/580 with no further additives is compared to a PAO based grease with the same composition and NLGI grade:

Table 6: Properties of the greases

	Property	Method	Li/Ca BM11/580	Li/Ca PAO 4
Oil	Kinematic viscosity oil (40°C, mm <sup>2</sup> /s)	DIN 51562	13	19
	Kinematic viscosity oil (100°C, mm <sup>2</sup> /s)	DIN51562	3.6	3.8
	Viscosity index oil	ASTM D-2270	210	127
	Pour Point oil (°C)	ISO 3016	-73	-75
Grease	NLGI grade	ASTM D-217	2	2
	Consistency (1/10mm)	ASTM D-217	275	281
	Worked penetration - 100000 strokes (1/10mm)	ASTM D-217	291	322
	Drop point (°C)	ASTM D-566	186	190
	Oil separation (168H- 40°C, %)	ASTM D-1742	-2.3	-6.2

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Polyglykol BM 11/580 can be thickened with inorganic thickeners, e.g., silica, as well:

Table 7: Grease formulation with silica, NLGI 2

Material	NLGI 2
Polyglykol BM11/580	81.8
Pyrogenic silica (HDK 18)	18.2
Monohydrated lithium hydroxide	1.18

The grease displayed a consistency (1/10 mm) of 271 and a worked penetration -100000 strokes (1/10mm) of 294 according to ASTM D-217.

### Application example: Fully synthetic formulation

Polyglykol BM 11/580 can be used as a lubricity improver in fully synthetic metal working fluid formulations:

Table 8: Fully synthetic formulation and its properties

Start formulation	Low pH	High pH
Hostacor IT	4	4
MEA	-	0,4
Polyglykol BM 11/580	5	5
Water	91	90,6
Appearance RT	clear	clear

pH value	8,1	9,37
Tapping Torque Ncm		
Peak / Average of means 1500rpm / 8mm / Alu 6082	90 / 68*	123 / 87**

\*without lubricity improver: 223 / 125 Ncm

\*\*without lubricity improver: 255 / 132 Ncm

## Safety

Further information on handling, storage and dispatch is given in the safety data sheet.

## Storage behaviour

When stored in a cold, dry place in a closed container Polyglykol BM 11/580 can be kept for at least two years.

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