

# HR PIB

HR PIB M1000

HR PIB M1300

HR PIB M2300

**Chemical Composition** Polyisobutene

CAS No.: 9003-27-4

Properties	Method	M1000	M1300	M2300
Appearance	Visual	Clear, Liquid	Clear, Liquid	Clear, Liquid
Molecular weight Mn, [g/mol]	GPC	1000	1300	2300
Viscosity @ 100°C, [mm <sup>2</sup> /s]	ASTM D445	190	430	1500
Flash point, [°C]	ASTM D92	210	215	220
Vinylidene double bonds	GC	83	83	83
Odour		Product specific	Product specific	Product specific
Glass transition temperature		approx. -70°C	approx. -70°C	approx. -70°C
Density @ 20°C, g/cm <sup>3</sup>		0.89	0.89	0.9
Solubility in water		Insoluble	Insoluble	Insoluble

**Quality control**

The above-listed data represent typical values at the time of going to press of this Technical Information. They are intended as a guide to facilitate handling and cannot be regarded as specified data. Specified product data are issued as a separate product specification.

**Application** Stability against oxidation

HR PIB M types are called high reactive PIB due to its quick chemical reaction with maleic anhydride one could believe it is sensitive to oxidation. This is not the case as the colour after 12 weeks storage at 100 °C is significantly lower with HR PIB M1000 and HR PIB M2300 compare with polybutenes (conventional PIB, see below).

**Colour (Apha) after storage at 100 °C**

Weeks	0	6	12
HR PIB M1000	10	10	60
HR PIB M2300	20	20	75
Polybutenes:			
Mn 950	20	40	125
Mn 1300	20	45	180
Mn 2300	20	60	210

In addition chemiluminescence values (CI-Intensity) of HR PIB M1000 and polybutene Mn 950 were measured in the presence of oxygen at 120 °C and 150 °C which showed that the figures are much lower with HR PIB M1000 meaning that less oxygen has reacted with HR PIB M1000 to form hydroperoxides (see below).

**Chemiluminescence (CI-Intensity) in the presence of oxygene**

CI-intensity at	120 °C	150 °C
HR PIB M1000	275	1395
Polybutenes Mn 950	345	1635

### Lubricating oils

HR PIB M1000, M1300 and M2300 are eminently suitable high-viscous components for thickening of lubricants. They are frequently used instead of brightstock in high viscous formulations. The advantages that they offer in different lubricants are described below.

### Synthetic multigrade gear oils

Combinations of shear-resistant, low-molecular-weight PIB (HR PIB M-types), poly-alpha-olefin, ester oils and a special gear oil additive can be successfully employed in manufacturing synthetic multigrade gear oils. The very high shear-resistance is due to the very narrow molar mass distribution. HR PIB M-types respond very well to anti-wear additives. When the gear oil additive listed in Table 1 is employed in the gear rig test, ratings greater than load level 12 are obtained.

**Table 1 Semi and fully synthetic multigrade gear oils**

Composition (g/100 g)	75 W/90		Semi synthetic
	Fully synthetic		
HR PIB M2300	-	27.85	-
HR PIB M1300	44.50	-	-
Ester oil	30.00	30.00	30.00
Poly- $\alpha$ -olefin 4	18.25	34.90	20.00
Raffinate SN 110	-	-	26.65
VI improver PMA	-	-	26.10
Additive Package	7.25	7.25	7.25
Viscosity DIN 51562			
100 °C (mm <sup>2</sup> /s)	14.1	14.0	14.1
Pour-point (°C) ISO 3016	-48	-51	-51
Cold-flow behaviour in accordance with SAE J 306 d			
(mPa · s) – 40 °C	90,000	44,000	40,000
Shear loss KRL (20 h)			
CEC L-45-T-93, (%)	2.6	2.9	15.9
<b>Gear rig test (FZG, A 8.3/90)</b>			
- in accordance with DIN 51354 -			-
loading stage	>12	>12	>12
- endurance test:			
Change in viscosity after 20 hours at loading stage 5			
Viscosity (mm <sup>2</sup> /s) at 100 °C	13.9	13.6	12.9
Shear loss, (%)	1.4	2.8	8.5

### Two-stroke engine oils

Extremely pure PIB burns without leaving a residue and is superior to bright-stock. It does not give rise to clouds of blue smoke. The thickening effect is decidedly greater than that of bright-stock. HR PIB does not contain chlorine, which may form dioxins on combustion.

2-stroke engine tests according to European (GD) and Japanese (JASO) requirements show the excellent performance of HR PIB M1000 in lubricity, initial torque index, detergency, JASO smoke formation and JASO exhaust blocking test.

### Transmission oils

The HR PIB grades give excellent results in increasing the viscosity of very viscous industrial and automobile transmission oils. Since they thicken effectively even if the molar mass is low, they are nearly not affected by severe shear stresses.

### Hydraulic fluids

The hydraulic fluids in rolling mills for aluminum contain a high proportion of PIB. The HR PIB products are particularly suitable for this purpose, because their high purity entails that they do not leave any stains on aluminum foil.

### Electrical uses

By virtue of their great purity very low water content and very low polarity the HR PIB grades have very good dielectric properties and are thus eminently suitable for insulating oils in cables, transformers and electrical apparatus.

### Metalworking fluids

Manifold applications exist for the products as thickener for metalworking fluids that are miscible with oil.

In addition it does not form any residues at high temperatures e. g. quenching oils give excellent results, as the PIB decompose in its monomers and the quenched metal pieces are clean on the surface.

### Adhesives

The HR PIB products M1000, M1300 and M2300 are successfully used in combination with medium and high molecular weight PIB (OPPANOL® Grades from BASF) due to its high tackiness for hot melt and pressure-sensitive adhesives.

### Sealants

HR PIB M-types have excellent properties in sealants as they reduce shrinkage, work as plastiziser, have non-drying effect, are permanently flexible even at low temperatures and improve adhesion and cohesion in combination with the medium and high molecular weight PIB.

### Cling film

In polyethylene (PE) for silage of hay 3 – 5 % of HR PIB, preferable HR PIB M2300 in combination with other low molecular weight PIB are used to form an adhesive film on the surface of the polyethylene film.

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#### **Safety**

When using this product, the information and advice given in our **Safety Data Sheet** should be observed. Due attention should also be given to the **precautions** necessary for handling chemicals.

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**Storage & Handling**

HR PIB M-types can be kept in sealed containers. Bulk lots can be delivered in road tankers or containers. If they are stored in tanks, the temperature should be 80 – 110 °C, depending on the viscosity and the availability of pumps, and they should be kept under a blanket of nitrogen.

The viscous consistency of the polymer can cause disturbances in pipelines. No special measures necessary provided product is used correctly. Protection against fire and explosion by taking precautionary measures against static discharges.

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**Note**

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and regulation are observed.