

SEAL-JET Materials



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Polyurethanes

In this brochure, our most commonly used sealing materials. If you can't find what you're looking for, ask about our other options.



PU (ECOPUR)

ECOPUR is premium sealing grade thermoplastic polyurethane elastomer (TPU), offering low compression set, excellent pressure and abrasion resistance as well as high tensile properties and tear strength. In sealing applications, this grade is mostly used for U-cups, lip seals, wipers and packings, but may also be used for dampers and other customized parts. Products from this material can be used in mineral oil, in water up to 40°C and in bio-degradable hydraulic oils like vegetable oils and synthetic esters up to 60°C. Depending on the seal design and the housing conditions, seals made of ECOPUR can be used up to 400 bar (for high pressure demands, experts from Top Sealing Partner recommend to use anti-extrusion-rings).

| Property | Unit | Value | Standard |
|---|-------------------------|------------------------------|-------------------------------------|
| Standard color | - | Green | 0 |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 95 ±2 48 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,20 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 50 ≥ 430 ≥ 12 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 27 ≤ 33 | DIN ISO 815 DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 100 18 | DIN ISO 34-1 DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | °C °C °C | -30 < -60 +110 +125 | - |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (ς) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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HPU (H-ECOPUR)

H-ECOPUR is a hydrolysis-resistant thermoplastic polyurethane elastomer (TPU). It combines the engineering properties of ECOPUR with a high resistance to hydrolysis which is otherwise rarely found in polyurethanes. It is stable in water up to +90°C and has an outstanding stability in mineral oil. Because of its resistance to hydrolysis, H-ECOPUR can be used for water hydraulic and for applications in mining, tunneling and presses. H-ECOPUR is particularly recommended for the use in pure and seawater, for HFA and HFB fluids and biologically degradable hydraulic fluids (vegetable oils and synthetic esters) and food articles. H-ECOPUR meets food contact regulations according EC1935/2004 and FDA.

| Property | Unit | Value | Standard |
|---|-------------------------|------------------------------|-------------------------------------|
| Standard color | - | Red | |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 95 ±2 48 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,20 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 50 ≥ 330 ≥ 13 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 27 ≤ 33 | DIN ISO 815 DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 100 17 | DIN ISO 34-1 DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | °C °C °C | -20 < -60 +110 +125 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\ge) and smaller than or equal to (\le) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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SPU (S-ECOPUR)

S-ECOPUR has been optimized with regard to the tribological characteristics of wear resistance. This was achieved by the addition of a synergetic combination of solid lubricants. This special material is therefore best suitable for most applications with starved lubrication such as water hydraulics and oil-free pneumatics.

| Property | Unit | Value | Standard |
|---|-------------------------|------------------------------|-------------------------------------|
| Standard color | - | Grey/black | |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 95 ±2 48 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,23 ±0,02 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 45 ≥ 380 ≥ 17 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 30 ≤ 35 | DIN ISO 815 DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 120 21 | DIN ISO 34-1 DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | °C °C °C | -20 < -60 +110 +125 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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TPU (T-ECOPUR)

T-ECOPUR (TPU) is modified for low temperature applications. The properties of T-ECOPUR are similar to those of ECOPUR, but the minimum service temperature is extended to -50°C. For that reason, T-ECO-PUR is most suitable for applications in severe climate conditions and processes for frozen goods.

| Property | Unit | Value | Standard |
|---|-------------------|----------------------|---|
| Standard color | - | Blue | |
| Durometer hardness* | Shore A | 95 ±2 | DIN ISO 7619 |
| Durometer hardness* | Shore D | 48 ±3 | DIN ISO 7619 |
| Density | g/cm ³ | 1,17 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength | MPa | ≥ 50 | DIN 53504 |
| Elongation at break | % | ≥ 450 | DIN 53504 |
| 100% modulus | MPa | ≥ 12 | DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression –40 °C / 24 h, 20% compression | % % % | ≤ 27 ≤ 33 ≤ 45 | DIN ISO 815 DIN ISO 815 DIN ISO 815 |
| Tear strength | N/mm | 80 | DIN ISO 34-1 |
| Abrasion | mm ³ | 15 | DIN ISO 4649 |
| Minimum service temperature | °C | 50 | |
| Brittleness temperature | °C | < -60 | |
| Maximum service temperature | °C | +100 | |
| Short term | °C | +120 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

Testing time is 3 seconds

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GPU (G-ECOPUR)

G-ECOPUR is a casted hydrolysis-resistant polyurethane-elastomer (CPU) with similar properties to H-ECOPUR, especially regarding its chemical stability. G-ECOPUR can be used in the same hydraulic fluids as H-ECOPUR. Generally, G-ECOPUR is used for seals with a diameter from 540 mm up to 4000 mm, where seals can be made in one piece. Larger diameters are feasible using our special welding technique.

| Property | Unit | Value | Standard |
|---|--------------------|-----------------------------|-------------------------------------|
| Standard color | - | Red | |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 95 ±2 47 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,17 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 45 ≥ 330 ≥ 11 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 30 ≤ 40 | DIN ISO 815 DIN ISO 815 |
| Abrasion | mm ³ | 18 | DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | °C °C °C | -30 <-60 +110 +125 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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XPU (X-ECOPUR)

Compared to standard materials, harder grades show nearly the same tensile strength and elongation at break at a considerably higher stiffness, as well as higher tear strength. X-ECOPUR versions have higher extrusion resistance than standard polyurethanes and therefore allow higher pressure at same geometries. The X-ECOPUR grades have increased wear resistance, extended lifetime and a strongly reduced tendency to stick-slip compared to standard polyurethanes.

| Property | Unit | Value | Standard |
|---|--|----------------|------------------------------|
| | | Value | Standard |
| Standard color | - | Dark green | |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 97 ±1 57 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,21 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength | MPa | ≥ 45 | DIN 53504 |
| 100% modulus | [%] MPa | ≥ 400 ≥ 16 | DIN 53504 DIN 53504 |
| Compression set: | | | |
| 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 30 ≤ 35 | DIN ISO 815 DIN ISO 815 |
| Tear strength | N/mm | 130 | DIN ISO 34-1 |
| Abrasion | mm ³ | 18 | DIN ISO 4649 |
| Minimum service temperature Brittleness temperature | °C °C | -30 < -60 | - |
| Maximum service temperature Short term | °C °C | +115 +130 | - |
| | - The second sec | 100 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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XHPU (X-ECOPUR H)

Compared to the standard grade H-ECOPUR, X-ECOPUR H (TPU) has a significantly higher hardness. The composition of the material based on special raw materials provides outstanding friction and wear characteristics as well as pressure resistance. This material exhibits an outstanding chemical and hydrolysis resistance for applications in mineral oil, biodegradable hydraulic fluids (HETG and HEES, etc) and water based fluids (HFA and HFB).

| Property | Unit | Value | Standard |
|---|-------------------------|------------------------------|-------------------------------------|
| Standard color | - | Dark red | 0 |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 97 ±1 60 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,22 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 45 ≥ 350 ≥ 22 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 70 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 30 ≤ 35 | DIN ISO 815 DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 160 20 | DIN ISO 34-1 DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | °C °C °C | -20 < -60 +115 +130 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq), are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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XSPU (X-ECOPUR S)

Compared to the S-ECOPUR standard material, X-ECOPUR S is harder and therefore further improves sliding properties. X-ECOPUR S has a better extrusion resistance than the standard material and therefore seals made of this material can be used at higher pressure, assuming the same profiles are used. X-ECOPUR S is most suitable for poor lubricated working conditions. The material can also withstand dry-running depending on the overall service conditions.

| Property | Unit | Value | Standard |
|---|-------------------------|-----------------------------|--|
| | | | |
| Standard color | - \ / | Dark grey | |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 97 ±1 58 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,23 ±0,02 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 38 ≥ 300 ≥ 22 | DIN 53504 DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 33 ≤ 39 | DIN ISO 815 DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 160 29 | DIN ISO 34-1 DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | °C °C °C | -20 <-60 +115 +130 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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GPU54D (G-ECOPUR54D)

G-ECOPUR 54D is a casted hard grade hydrolysis resistant polyurethane (CPU) most suitable for heavy duty large diameter applications. It has comparable chemical and mechanical properties to G-ECOPUR but with higher shore hardness and improved friction and wear characteristics.

| Property | Unit | Value | Standard |
|---|---------------------|-----------------------------|-------------------------------------|
| Standard color | | Red | |
| Durometer hardness* Durometer hardness* | Shore A Shore D | 97 ±1 54 ±3 | DIN ISO 7619 DIN ISO 7619 |
| Density | g/cm ³ | 1,19 ±0,01 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | N/mm² % N/mm² | ≥ 45 ≥ 330 ≥ 15 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 70 °C / 24 h, 20% compression 100 °C / 24 h, 20% compression | % % | ≤ 30 ≤ 40 | DIN ISO 815 DIN ISO 815 |
| Abrasion | mm ³ | 18 | DIN ISO 4649 |
| Minimum service temperature Brittleness temperature Maximum service temperature Short term | 。 で 。 で | -30 <-60 +110 +125 | |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq) , are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

* Testing time is 3 seconds

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PU SOFT

PU SOFT is a hydrolysis-resistant polyurethane. In sealing applications, this grade is mostly used for static seals, rod and piston seals, wiper seals and rotary seals. It is recommended as a substitute for NBR in most of the hydraulic and pneumatic applications. PU SOFT is resistant to mineral oils, HFD-U and HETG-fluids, sour oils and

gases, cold water as well as diluted acids and bases.

| Properties | | Value | Unit | DIN Standard |
|---------------------|----------|-------|-------------------|-------------------|
| Hardness | | 86 ±3 | Shore A | DIN ISO 7619-1 |
| Density | | 1,188 | g/cm ³ | DIN EN ISO 1183-1 |
| 100% Modulus | | 6,5 | MPa | DIN 53504 |
| 300% Modulus | | 33,3 | MPa | DIN 53504 |
| Elongation at break | | 355 | % | DIN 53504 |
| Tensile strength | | 44,2 | MPa | DIN 53504 |
| Compression set | 23°C/70h | 18 | % | DIN ISO 815-1 |
| Compression set | 70°C/22h | 17 | % | DIN ISO 815-1 |
| Compression set | 70°C/70h | 21 | % | DIN ISO 815-1 |
| Compressive modulu | JS | 15,1 | MPa | Acc. Studer/Kunz |
| Rebound resilience | | 41 | % | DIN ISO 4662:2017 |
| Tear resistance | | 69 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | | 51 | mm ³ | DIN ISO 4649 B |
| min. Service temper | ature | -30 | °C | |
| max. Service temper | rature | +95 | °C | |

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PU HOT is a hydrolysis-resistant (H-PU), casted Polyurethane, based on MDI, Polycarbonate Polyol and certain additives. Due to the excellent stability of the physical properties at higher temperatures and outstanding thermal ageing resistance, compared to other Polyurethanes it is recommended for applications where temperature and mechanical stress of the material reach the limits of standard Polyurethanes. PU HOT has been optimized to withstand the risk of rapid gas decompression (RGD) or explosivedecompression (ED) which is an essential demand in the oil and gas industry.

Physical properties

| Density: | DIN ISO 1183-1 | g/cm ³ | 1,09 ±0,03 |
|-----------------------------------|----------------|-------------------|------------|
| Hardness at 23°C: | DIN ISO 7619-1 | Shore A | 96 ±2 |
| Hardness at +100°C: | DIN ISO 7619-1 | Shore A | 93 ±2 |
| 100% Modulus: | DIN 53504 | N/mm ² | ≥ 10 |
| 300% Modulus: | DIN 53504 | N/mm ² | ≥ 25 |
| Tensile strength: | DIN 53504 | N/mm² | ≥ 45 |
| Elongation at break: | DIN 53504 | % | ≥ 350 |
| Tear strength: | DIN ISO 34-1 | kN/m | ≥ 110 |
| Compression set, 24h, 70°C, 25%: | DIN ISO 815-1 | % | ≤ 25 |
| Compression set, 24h, 100°C, 25%: | DIN ISO 815-1 | % | ≤ 30 |
| Compression set, 24h, 125°C, 25%: | DIN ISO 815-1 | % | ≤ 65 |
| | | | |

Temperature range:

-30°C to 135°C

Chemical resistance

Resistant to:Water up to 90°C, Sea Water, Mineral Oils, Vegetable Oils, Silicone Oils, Ozone,
Oxygen (cold), HFA fluids, HFB fluids, diluted Acids and LyesNot Resistant to:Steam, conc. Acids and Lyes, conc. Alcohols, Solvents, HFD fluids

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PU C-RED is a MoS2 filled, hydrolysis-resistant polyurethane. It is recommended in application where reduced friction and poor lubrication is an issue. The material is able to reduce or eliminate the stick-slip effect when it appears. Mostly used for U-seals, wipers, packings and rotary seals up to 400 bar pressure in standard hydraulics and applications with poor lubrication or even pneumatics. Due to its outstanding hydrolysis resistance it can be used in the most common hydraulic fluids, oil in water emulsions but also water power applications, applications in the mining industry and presses.

Physical properties

| Density: | DIN ISO 1183-1 | g/cm ³ | 1,16 ±0,03 |
|-----------------------------------|----------------|-------------------|------------|
| Hardness at 23°C: | DIN ISO 7619-1 | Shore A | 95 ±2 |
| Hardness at +100°C: | DIN ISO 7619-1 | Shore A | 93 ±2 |
| 100% Modulus: | DIN 53504 | N/mm ² | ≥ 10 |
| 300% Modulus: | DIN 53504 | N/mm ² | ≥ 30 |
| Tensile strength: | DIN 53504 | N/mm ² | ≥ 45 |
| Elongation at break: | DIN 53504 | % | ≥ 320 |
| Tear strength: | DIN ISO 34-1 | kN/m | ≥ 110 |
| Compression set, 24h, 70°C, 25%: | DIN ISO 815-1 | % | ≤ 25 |
| Compression set, 24h, 100°C, 25%: | DIN ISO 815-1 | % | ≤ 35 |
| | | | |

Temperature range:

-30°C to 125°C

Chemical resistance

Resistant to:Water up to 90°C, Sea Water, Mineral Oils, Vegetable Oils, Silicone Oils, Ozone,
Oxygen (cold), HFA fluids, HFB fluidsNot Resistant to:Steam, conc. Acids and Lyes, conc. Alcohols, Solvents, HFD fluids

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Elastomers

In this brochure, our most commonly used sealing materials. If you can't find what you're looking for, ask about our other options.





Nitrile butadiene rubber (NBR) is a family of synthetic rubber copolymers of acrylonitrile and butadiene. It is a copolymer manufactured from acrylonitrile and butadiene that provides good resistance to the following media:

- Most mineral oils and greases with a mineral oil base, HFA, HFB and HFC pressure fluids
- Normal fuels like gasoline, diesel and light heating oils
- Animal and vegetable oils and fats and hot water

Poor resistance is given to HFD fluids, aromatic fluids (such as benzene), esters, ketones and amines or concentrated acids and bases. Nitrile rubbers can be used for radial shaft seals or U-cups, packings, special seals and various customized components. Nitrile rubber tolerates short-term dry running of the sealing lip.

| Property | Unit | Value | Standard |
|--|------------------------------|---------------------|---|
| Standard color | - /> | Black | |
| Durometer hardness | Shore A | 85 ±5 | DIN ISO 7619 |
| Density | g/cm ³ | 1,32 ±0,02 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥16 ≥130 ≥11 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 100 °C / 24 h Tear strength Abrasion | % N/mm mm ³ | ≤15 20 90 | DIN ISO 815 DIN ISO 34-1 DIN ISO 4649 |
| Swelling behavior ASTM Oil No. 1, 168 h / 100 °C Change in durometer hardness Volume change ASTM Oil No. 3, 168 h / 100 °C Change in durometer hardness | Shore A % | +1 -3 | DIN ISO 7619 DIN 53521 DIN ISO 7619 |
| Volume change | % | +9,1 | DIN 53521 |
| Swelling behaviour, water, 168 h / 70 °C Change in durometer hardness Volume change | Shore A % | -3 +4 | DIN ISO 7619 DIN 53521 |
| Heat resistance, air 168 h / 100 °C Change in durometer hardness Volume change | Shore A % | +2 -0,5 | DIN ISO 7619 DIN 53521 |
| Minimum service temperature Maximum service temperature Short term | °C °C °C | -30 +100 +120 | |
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NBR SOFT

NBR SOFT is a material for softer settings and general applications. It is resistant to mineral oil, HFC and cold water. Products from this material can be used in Rod and Piston seals, Wiper Seals, Rotary Seals and Static Seals.

| Properties | Value | Unit | DIN Standard |
|----------------------------|-------|-------------------|-------------------|
| Hardness | 73 ±5 | Shore A | DIN ISO 7619-1 |
| Density | 1,220 | g/cm ³ | DIN EN ISO 1183-1 |
| 100% Modulu <mark>s</mark> | 6,1 | MPa | DIN 53504 |
| Elongation at break | 238 | % | DIN 53504 |
| Tensile strength | 14,0 | MPa | DIN 53504 |
| Compression set 23°C/70h | 3,3 | % | DIN ISO 815-1 |
| Compression set 70°C/22h | 5,9 | % | DIN ISO 815-1 |
| Compression set 100°C/22h | 9,9 | % | DIN ISO 815-1 |
| Rebound resilience | 31 | % | DIN ISO 4662:2017 |
| Tear resistance | 4,4 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | 136 | mm³ | DIN ISO 4649 B |
| min. Service temperature | -35 | °C | |
| max. Service temperature | +110 | °C | |

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NBR COLD

NBR COLD is designed for low temperature applications and is resistant to mineral oil, HFC and cold water. Products from this material can be used in Rod and Piston seals, Wiper Seals, Rotary Seals and Static Seals.

| Properties | Value | Unit | DIN Standard |
|---------------------------|-------|-------------------|-------------------|
| Hardness | 82 ±5 | Shore A | DIN ISO 7619-1 |
| Density | 1,293 | g/cm ³ | DIN EN ISO 1183-1 |
| 100% Modulus | 12,2 | MPa | DIN 53504 |
| Elongation at break | 147 | % | DIN 53504 |
| Tensile strength | 16,3 | MPa | DIN 53504 |
| Compression set 23°C/70h | 7,7 | % | DIN ISO 815-1 |
| Compression set 70°C/22h | 9,9 | % | DIN ISO 815-1 |
| Compression set 100°C/22h | 13,7 | % | DIN ISO 815-1 |
| Rebound resilience | 45 | % | DIN ISO 4662:2017 |
| Tear resistance | 4,5 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | 79 | mm³ | DIN ISO 4649 B |
| min. Service temperature | -50 | °C | |
| max. Service temperature | +105 | °C | |

Top-Osa Oy

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NBR HARD

NBR HARD is a black Nitrile Butadiene Rubber commonly referred to as NBR, Nitrile or BUNA. Because of its good physical characteristics and chemical resistance to the most common hydraulic fluids NBR is excellently suitable for sealing material. NBR materials are one of the most used elastomers in sealing applications. Products from this material can be used in static and dynamic seals (standard and special), wipers, O-rings, flange seals, rotary seals, rubber energizers (preload elements).

Physical properties

| Densthu | DIN 100 4402 4 | -13 | 1 04 | |
|---|------------------|-------------------|------|-------|
| Density: | DIN ISO 1183-1 | g/cm ² | 1,31 | ±0,03 |
| Hardness at 23°C: | DIN ISO 7619-1 | Shore A | 95 | ±3 |
| Tensile strength: | DIN 53504 | N/mm² | 21,2 | * |
| Elongation at break: | DIN 53504 | % | 56,8 | * |
| Tear resistance: | DIN ISO 34-1 B/b | N/mm | 16,2 | * |
| Rebound resiliance: | DIN 53512 | % | 26,0 | * |
| Compression set, 24h, 70°C, 25%: | DIN ISO 815-1 | % | 13,5 | * |
| Compression set, 24h, 100°C, 25%: | DIN ISO 815-1 | % | 14,2 | * |
| * mentioned values are subject to a tolerance of +/- 25 | % | | | |
| | | | | |
| | | | | |

Temperature range:

-25°C to 100°C

Chemical resistance

| Resistant to: | water up to 70°C, HFA, HFB, HFC Fluids, mineral/vegetable oils, Diesel fuel, Gasoline Fuel, Alcohols |
|-------------------|--|
| Not Resistant to: | Steam, HFD fluids, Ozone |

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FPM BLACK

FPM BLACK is Fluorocarbon elastomere. FPM materials have a very high resistance to hydraulic fluids, chemicals and a number of organic compounds and operate in temperatures between -25 to +220°C. FPM BLACK is recommended for applications where its outstanding resistance to heat, chemicals, weathering and ozone is required. Products from this material can be used in Static and dynamic seals (standard and special), wipers, O-rings, flange seals, rotary seals, rubber energizers (preload elements). Applications where high temperature and/or chemical resistance is required.

| Properties | Value | Unit | DIN Standard |
|----------------------------|-------|---------|-------------------|
| Hardness | 80 ±5 | Shore A | DIN ISO 7619-1 |
| Density | 1,96 | g/cm³ | DIN EN ISO 1183-1 |
| 100% Modul <mark>us</mark> | 5,6 | MPa | DIN 53504 |
| Elongation at break | 123 | % | DIN 53504 |
| Tensile strength | 11,9 | MPa | DIN 53504 |
| Compression set 23°C/70h | 4,6 | % | DIN ISO 815-1 |
| Compression set 100°C/22h | 23,0 | % | DIN ISO 815-1 |
| Compression set 175°C/22h | 38,6 | % | DIN ISO 815-1 |
| Rebound resilience | | % | DIN ISO 4662:2017 |
| Tear resistance | 4,2 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | 211 | mm³ | DIN ISO 4649 B |
| min. Service temperature | -20 | °C | |
| max. Service temperature | +220 | °C | |

Top-Osa Oy

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FPM BROWN

FPM BROWN is a Fluorocarbon elastomere. FPM materials have a very high resistance to hydraulic fluids, chemicals and a number of organic compounds and operate in temperatures between -25 to +220°C. FPM BROWN is recommended for applications where its outstanding resistance to heat, chemicals, weathering and ozone is required.

FPM BROWN is FDA approved, can be used in food and medical applications. Products from this material can be used in Static and dynamic seals (standard and special), wipers, O-rings, flange seals, rotary seals, rubber energizers (preload elements). Applications in the food industry where high temp. and/or chemical resistance is required.

| Properties | Value | Unit | DIN Standard |
|---------------------------|---------------------|-------------------|-------------------|
| Hardness | <mark>85 ±</mark> 5 | Shore A | DIN ISO 7619-1 |
| Density | 2,512 | g/cm ³ | DIN EN ISO 1183-1 |
| 100% Modulus | 6,5 | MPa | DIN 53504 |
| Elongation at break | 207 | % | DIN 53504 |
| Tensile strength | 10,3 | MPa | DIN 53504 |
| Compression set 23°C/70h | 9,8 | % | DIN ISO 815-1 |
| Compression set 100°C/22h | 17,4 | % | DIN ISO 815-1 |
| Compression set 175°C/22h | 17,7 | % | DIN ISO 815-1 |
| Rebound resilience | 8 | % | DIN ISO 4662:2017 |
| Tear resistance | 6,3 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | 205 | mm ³ | DIN ISO 4649 B |
| min. Service temperature | -25 | °C | |
| max. Service temperature | +220 | °C | |

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FPM SOFT

FPM SOFT is a material for softer settings. It is resistant to mineral oil, HFD-U and HETG, to acidic oils and gases, to cold water. Products from this material can be used in static seals, rod and piston seals, wiper seals and rotary seals.

| Properties | Value | Unit | DIN Standard |
|----------------------------|-------|-------------------|-------------------|
| Hardness | 74 ±5 | Shore A | DIN ISO 7619-1 |
| Density | 2,130 | g/cm ³ | DIN EN ISO 1183-1 |
| 100% Modul <mark>us</mark> | 3,9 | MPa | DIN 53504 |
| Elongation at break | 252 | % | DIN 53504 |
| Tensile strength | 10,3 | MPa | DIN 53504 |
| Compression set 23°C/70h | 8,6 | % | DIN ISO 815-1 |
| Compression set 150°C/22h | 15,2 | % | DIN ISO 815-1 |
| Compression set 175°C/22h | 16,2 | % | DIN ISO 815-1 |
| Rebound resilience | 8 | % | DIN ISO 4662:2017 |
| Tear resistance | 5,1 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | 209 | mm ³ | DIN ISO 4649 B |
| min. Service temperature | -25 | °C | |
| max. Service temperature | +220 | °C | |

Top-Osa Oy

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EPDM

EPDM rubber is a elastomer with excellent resistance to heat, ozone, weathering, hot water, steam, washing agents and polar organic solvents. EPDM is an FDA approved material.

EPDM is not resistant to mineral oil and other unpolar media.

Products from this material can be used in Static and dynamic seals (standard and special), wipers, O-rings, flange seals, rotary seals, rubber energizers (preload elements); cleaning and washing technology.

| Property | Unit | Value | Standard |
|---|-------------------------|----------------------|--|
| Standard color | - | Black | |
| Durometer hardness | Shore A | 85 ±5 | DIN ISO 7619 |
| Density | g/cm ³ | 1,22 ±0,02 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥ 11 ≥ 110 ≥ 8 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set 100 °C/24 h | % | ≤16 | DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 18 120 | DIN ISO 34-1 DIN ISO 4649 |
| Compatibility with SL-DOT 4, 168 h / 100 °C Change in durometer hardness Volume change | Shore A % | 0/-1 +2,1 | DIN ISO 7619 DIN 53521 |
| Heat resistance, air 70 h / 150 °C Change in durometer hardness Change in tensile strength Change in elongation at break | Shore A % % | +4 -15 -22 | DIN ISO 7619 DIN 53504 DIN 53504 |
| Minimum service temperature Maximum service temperature Short term | °C °C °C | -50 +150 +160 | |
| | | | |

IMPERIANT INULE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards. The values density, durometer hardness (Shore A) and those marked with the symbols, greater than or equal to (\geq) and smaller than or equal to (\leq), are nominal values and must be fulfilled for each batch. These values are tested on selected samples.

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HNBR

Hydrogenated nitrile butadiene rubbers are saturated copolymers of acrylonitrile and butadiene and are suitable for higher service temperatures (up to 150°C) compared to standard nitrile rubbers and offer improved weathering, ageing and ozone resistance. HNBR can be used for applications with aliphatic hydrocarbons like propane or butane, mineral oils, greases as well as sulfonated crude oil. Furthermore, it can be used in many diluted acids, bases, salt solutions and glycol-water mixtures. Low compatibility is given to fuels, which have a high content of aromatic hydrocarbons (premium blend petrol), gasolines (petrol/alcohol blends), ketones, esters, ethers and chlorinated hydrocarbons like trichloroethylene and tetrachloroethylene. The exact physical and chemical properties vary depending on the polymer's composition.

| Property | Unit | Value | Standard |
|---|-------------------------|---------------------|--|
| | | | |
| Standard color | - /> | Black | |
| Durometer hardness | Shore A | 85 ±5 | DIN ISO 7619 |
| Density | g/cm ³ | 1,24 ±0,02 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | ≥18 ≥180 ≥9 | DIN 53504 DIN 53504 DIN 53504 DIN 53504 |
| Compression set 100 °C/24 h | % | ≤ 22 | DIN ISO 815 |
| Tear strength Abrasion | N/mm mm ³ | 24 90 | DIN ISO 34-1 DIN ISO 4649 |
| Swelling behavior ASTM Oil No. 1, 70 h / 100 °C Change in durometer hardness | Shore A | +6 | DIN ISO 7619 DIN 53521 |
| ASTM Oil No. 3, 70 h / 100 °C Change in durometer hardness Volume change | Shore A % | -8 +11 | DIN ISO 7619 DIN 53521 |
| Swelling behavior, wet Change in durometer hardness Volume change | Shore A % | 0 +2,5 | DIN ISO 7619 DIN 53521 |
| Heat resistance, air 70 h / 150 °C Change in durometer hardness Volume change | Shore A % | +5 0 | DIN ISO 7619 DIN 53521 |
| Minimum service temperature Maximum service temperature Short term | °C °C °C | -30 +150 +160 | |
| | | | |

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MVQ (SILICON RUBBER)

MVQ is a silicone rubber, which can be used for O-rings, gaskets and special seals. Due to its poor mechanical properties compared to other rubbers, MVQ is mainly used for static applications. It is highly resistant to weathering, ozone and ageing. The compatibility with mineral oils depends on the content of aromatic hydrocarbons in the oil. MVQ is an FDA approved material.

| Properties | Value | Unit | DIN Standard |
|---------------------------|-------|-------------------|-------------------|
| Hardness | 84 ±5 | Shore A | DIN ISO 7619-1 |
| Density | 1,503 | g/cm ³ | DIN EN ISO 1183-1 |
| 100% Modulus | 5,3 | MPa | DIN 53504 |
| Elongation at break | 192 | % | DIN 53504 |
| Tensile strength | 6,4 | MPa | DIN 53504 |
| Compression set 70°C/70h | 5,0 | % | DIN ISO 815-1 |
| Compression set 100°C/22h | 33,7 | % | DIN ISO 815-1 |
| Compression set 175°C/22h | | % | DIN ISO 815-1 |
| Rebound resilience | 51 | % | DIN ISO 4662:2017 |
| Tear resistance | 10,2 | N/mm | DIN ISO 34-1 A |
| Abrasion resistance | 657 | mm³ | DIN ISO 4649 B |
| min. Service temperature | -60 | °C | |
| max. Service temperature | +210 | °C | |

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TOPFLAS (TFE/P/FEPM)

TOPFLAS is a unique fluoroelastomer based on an alternating co-polymer of tetrafluoroethylene and propylene (TFE/P). This material is chemically related to fluororubber.

TOPFLAS has the following properties:

- High resistance to mineral oils
- Outstanding resistance to hot water and hot stream up to 230°C
- Excellent resistance to sour gas and amines
- Excellent resistance to brake fluids (based on glycol, mineral oil or silicon oil) and fire-resistant hydraulic fluids)
- Good radiation resistance

Compared to fluororubber materials, TOPFLAS shows slightly higher tensile strength and a similar heat resistance, however does not reach the compression set level of standard rubbers.

| Property | Unit | Value | Standard |
|--|-------------------|---------------------|-------------------------------------|
| Standard color | | Black | |
| Durometer hardness | Shore A | 83 ±5 | DIN ISO 7619 |
| Density | g/cm ³ | 1,73 ±0,03 | DIN EN ISO 1183-1 |
| Tensile strength Elongation at break 100% modulus | MPa % MPa | 10 190 6 | DIN 53504 DIN 53504 DIN 53504 |
| Compression set: 175 °C / 24 h | % | 33 | DIN ISO 815 |
| Tear strength | N/mm | 20 | DIN ISO 34-1 |
| Minimum service temperature Maximum service temperature Short term | 0° °C °C | -10 +200 +220 | Ξ |
| | | | |

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TopFlon Materials

In this brochure, our most commonly used sealing materials. If you can't find what you're looking for, ask about our other options

TopFlon PTFE materials

TopFlon is a trade name of Top Sealing Partner for PTFE materials.

What is **PTFE**?

Polytetrafluoroethylene (PTFE) is a synthetic fluoropolymer of tetrafluoroethylene. Being hydrophobic, non-wetting, high density and resistant to high temperatures, PTFE is an incredibly versatile material with a wide variety of applications, though it's perhaps best-known for its non-stick properties.

Virgin PTFE (TF100)

PTFE is one of the most chemically inert materials known and is used in many different applications and industries.

PTFE is an incredibly versatile material with a wide variety of applications. It has extreme chemical resistance, a massive temperature range, is completely unaffected by UV, excellent electrical insulation properties. Flexible, low friction, inert.

The key properties that Virgin PTFE is widely known for it's extreme chemical resistance, thermal stability, electrical insulation and it's very low coefficient of friction. TF100 is FDA approved material.

Glass Filled PTFE (TF200, TF201)

Glass fibre is used as a PTFE filler as it offers much improved compression and wear properties. The material may also be inert gas sintered to further improve creep properties and reduce porosity and gas permeability (there would be a consequent loss of tensile properties).

Glass Filled PTFE is reinforced with glass fibres with the percentage varying between 5% and 40% depending on the needs of the application. As the filler percentage increases so does the properties the filler offers (increased compressive strength, lower deformation under load) but conversely the coefficient of friction properties of the material increases over that of virgin PTFE.

Bronze filled PTFE (TF300, TF301)

The addition of Bronze to PTFE gives better dimensional stability and lowers creep, cold flow and wear. It increases hardness and compressive strength whilst also increasing thermal and electrical conductivity.

Bronze Filled PTFE is reinforced with bronze powder with the percentage varying between 40% and 60%, resulting in a very hard wearing material. It has weaker chemical resistance than other grades of PTFE and isn't suitable for electrical applications.

Carbon filled PTFE (TF400, TF401, TF402, TF411, TF412)

Carbon Filled PTFE was developed to provide a PTFE based material with improved mechanical strength. Carbon in itself is a brittle material with poor wear properties and mechanical strength. However with the two combined in Carbon Filled PTFE formulations, the resultant material has excellent mechanical and wear properties, retains the excellent frictional properties and is an excellent choice for seals and rings in dynamic and high pressure applications. Carbon filled PTFE also provides good thermal conductivity, low permeability and is also electrically conductive making it a good choice for anti-static applications.



| TF100 | | | | |
|---|------------------------------|-------------------------|---------------|--|
| VIRG | IN PTFE | | | |
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm ³ | ASTM D792 | 2,14 - 2,18 | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 50 | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 20 | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 200 | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | 4 - 5 | |
| Deformation under load at room temperature after 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 17 | |
| Permanent deformation as above after 24 hours of rest at room temperature - CD | % | ASTM D621 | ≤ 8 | |
| TRIBC | LOGICAL | | | |
| Dynamic coefficient of friction | 1 5 | ASTM D3702 | 0,06 | |
| THI | ERMAL | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 12 - 13 | |
| ELECTRICAL | | | | |
| Dielectric strength (specimen 0,5 mm thick) | KV/mm | ASTM D149 | ≥ 20 | |
| Volume resistivity | Ω·cm | ASTM D257 | 1018 | |
| Dielectric strength (specimen 0,5 mm thick) | Ω | ASTM D257 | 1017 | |

CD=Cross Direction

The data we are herewith providing are all based on laboratory testing and are proposed to technical designers as possible and useful advice. Deviations from the values hereabove indicated may occur, but they do not constitute themselves either detriment of quality or reason for rejection.

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| TF200 | | | | |
|--|------------------------------|--------------------------|--------------------|--|
| PTFE+ 25% | GLASS FIBER | 2 | | |
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm ³ | ASTM D792 | 2,20 - 2,26 | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 60 | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 17 | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 230 | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | 8 - 9 | |
| Deformation under load at room temperature 24 Hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 10 | |
| Permanent deformation as above after releasing of 24 hours at room temperature - CD | % | ASTM D621 | ≤ 6,5 | |
| TRIBO | LOGICAL | | | |
| Dynamic coefficient of friction | 6 5 | ASTM D1894 ASTM D3702 | 0,15 - 0,3 | |
| Wear factor | 9 | ASTM D3702 | 0,015 - 0,030 | |
| THERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 7,5 - 11 | |
| ELECTRICAL | | | | |
| Volume Resistivity | Ω • cm | ASTM D257 | > 10 ¹⁵ | |
| Surface Resistivity | Ω | ASTM D257 | > 10 ¹⁵ | |

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| TF201 PTFE+ 15% GLASS FIBER+ 5% MOS2 | | | | |
|--|------------------------------|--------------------------|---------------|--|
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm ³ | ASTM D792 | 2,20 - 2,30 | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 55 | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 15 | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 230 | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | ≥ 8 | |
| Deformation under load at room temperature 24 hours at 13,7 N/mm ² - CD | % | ASTM D621 | ≤ 8 | |
| Permanent deformation as above after releasing of 24 hours at room temperature - CD | % | ASTM D621 | ≤ 4 | |
| TRIBC | LOGICAL | | | |
| Dynamic coefficient of friction | 6,5 | ASTM D1894 ASTM D3702 | 0,08 - 0,18 | |
| Wear factor K | 9 | ASTM D3702 | 0,015 - 0,021 | |
| THERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Coefficient of Linear Expansion (25° - 100°C) | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 9 - 12 | |

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| TF300 PTFE+ 40% Bronze+ 2% Carbon | | | | |
|--|----------------------|-------------------------|--------------------|--|
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm ³ | ASTM D792 | 2,98 - 3,16 | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 58 | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 20 | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 220 | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | ≥ 8 | |
| Deformation under load at room temperature 24 Hours at 13,7 N/mm ² - CD | % | ASTM D621 | ≤ 8 | |
| Permanent deformation as above after releasing of 24 hours at room temperature - CD | % | ASTM D621 | ≤ 5 | |
| TRIBC | LOGICAL | | | |
| Dynamic coefficient of friction-PV = 0,7 N/mm ² • m/s | 15 | ASTM D3702 | 0,15 - 0,25 | |
| Wear factor(K)- PV = 0,7 N/mm2 m/s | µm/h●N/mm2 ●m●min | ASTM D3702 | 0,010 - 0,030 | |
| THERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Coefficient of Linear Expansion (25° - 100°C) | 10⁻⁵(mm/mm)/ °C | Similar to ASTM D696 | 8 - 11 | |
| ELECTRICAL | | | | |
| Surface Resistivity | Ω | ASTM D257 | > 10 ¹² | |

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| TF | TF301 | | | |
|---|------------------------------|--|-------------------|--|
| PTFE+ 60% Br | onze+ 2% Car | bon | | |
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm³ | ASTM D792 | 3,75 - 3,85 | |
| Hardness - Shore D | 1 | ASTM D2240 | 62 | |
| Tensile Strength - CD | N/mm² | ISO 527 v = 50mm/min microtensile die | 15 | |
| Elongation at break - CD | % | ISO 527 v = 50mm/min microtensile die | 100 | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | 10 - 11 | |
| Deformation under load at room temperature after 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 6 | |
| Permanent deformation as above after 24 hours of rest at room temperature - CD | % | ASTM D621 | ≤ 2,5 | |
| TRIBO | LOGICAL | | | |
| Dynamic coefficient of friction | | ASTM D1894 ASTM D3702 | 0,15 - 0,30 | |
| Wear factor K | 3.0 | ASTM D3702 | 0,010 - 0,030 | |
| THERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 7 - 8 | |
| ELECTRICAL | | | | |
| Surface Resistivity | Ω | ASTM D257 | <10 ¹¹ | |

CD=Cross Direction

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| TF400 PTFE+ 25% Carbon-Graphite | | | | |
|---|------------------------------|--------------------------|-------------------|--|
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm³ | ASTM D792 | 2,05 - 2,11 | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 64 | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 14 | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 90 | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | ≥7 | |
| Deformation under load at room temperature after 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤7 | |
| Permanent deformation as above after 24 hours of rest at room temperature - CD | % | ASTM D621 | ≤ 5 | |
| TRIBC | LOGICAL | | | |
| Dynamic coefficient of friction | 61 5 | ASTM D1894 ASTM D3702 | 0,12 - 0,25 | |
| Wear factor K | 7 | ASTM D3702 | 0,010 - 0,020 | |
| THERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 10 - 12 | |
| ELECTRICAL | | | | |
| Volume Resistivity | $\Omega ullet $ cm | ASTM D257 | ≤ 10 ⁴ | |
| Surface Resistivity | Ω | ASTM D257 | ≤ 10 ⁴ | |

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| TF401 | | | | | |
|---|--------------------|--------------------------|-----------------|--|--|
| | | | | | |
| Properties | | Method | Dala | | |
| PHISICAL - | WIECHANICAL | | | | |
| Density | g/cm ³ | ASTM D792 | 2,05 - 2,11 | | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 60 | | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 15 | | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 150 | | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | 7 - 9 | | |
| Deformation under load at room temperature after 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 6,5 | | |
| Permanent deformation as above after 24 hours of rest at room temperature - CD | % | ASTM D621 | ≤ 4 | | |
| TRIBC | LOGICAL | | | | |
| Dynamic coefficient of friction | 61 5 | ASTM D1894 ASTM D3702 | 0,13 | | |
| Wear factor K | 1 | ASTM D3702 | 20 - 30 | | |
| тн | ERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10⁻⁵(mm/mm)/ °C | Similar to ASTM D696 | 9 - 12 | | |
| ELECTRICAL | | | | | |
| Volume Resistivity | $\Omega ullet $ cm | ASTM D257 | 10 ³ | | |
| Surface Resistivity | Ω | ASTM D257 | 10 ³ | | |

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| TF402 | | | |
|---|------------------------------|---|---------------|
| PTFE+ 10% | Carbon Fiber | r | |
| Properties | Unit | Method | Data |
| PHYSICAL - | MECHANICAL | | |
| Density | g/cm³ | ASTM D792 | 2,03 - 2,08 |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 60 |
| Tensile Strength - CD | N/mm² | ISO 527 v = 50mm/min microtensile die | ≥ 20 |
| Elongation at break - CD | % | ISO 527 v = 50mm/min microtensile die | ≥ 250 |
| Deformation under load at room temperature after 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 8 |
| TRIBO | LOGICAL | | |
| Dynamic coefficient of friction | | ASTM D1894 ASTM D3702 | 0,26 - 0,30 |
| THERMAL | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 8,5 - 10 |

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| TF411 | | | |
|--|-------------|-------|-------------------|
| PTFE +15% | Soft Carbon | | |
| Properties | Norm | Value | Unit |
| MECHANICAL | | | |
| Hardness - Shore D | - | 59 | Sh. D. |
| Tensile Strength (23C°) | ASTM D1457 | 21,9 | N/mm ² |
| Elongation at break (23C°) | ASTM D1457 | 321,5 | %min |
| Diametric shrinkage | - | 2,61 | % |
| PH | /SICAL | | |
| Specific gravity | ASTM D1457 | 2,12 | g/cm³ |
| THERMAL | | | |
| Maximum Continuous operating temperature | | 250 | °C |
| Minimum Continuous operating temperature | | -200 | °C |

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| TF412 PTFE + 10% Carbon Fiber | | | | |
|---|------------|---------|--------|--|
| Properties Norm Value Unit | | | | |
| MECHANICAL | | | | |
| Hardness - Shore D | DIN 53 505 | 59-65 | Sh. D. | |
| Tensile Strength (23C°) | DIN 53 455 | 15-21 | N/mm² | |
| Elongation at break (23C°) | DIN 53 455 | 190-290 | %min | |

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| TF500 | | | | | |
|--|------------------------------|---|---------------|--|--|
| PTFE+ 20% Eko | nol FDA appr | oved | | | |
| Properties Unit Method | | | | | |
| PHYSICAL - | MECHANICAL | | | | |
| Density | g/cm ³ | ASTM D792 | 1,92 - 2,06 | | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 55 | | |
| Tensile Strength - CD | N/mm² | ISO 527 v = 50mm/min microtensile die | ≥ 14 | | |
| Elongation at break - CD | % | ISO 527 v = 50mm/min microtensile die | ≥ 220 | | |
| Compressive strength at 1% deformation - CD | N/mm² | ASTM D695 | 5 - 7 | | |
| Deformation under load at room tempera <mark>ture af</mark> ter 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 13 | | |
| Permanent deformation as above after 24 hours of rest at room temperature - CD | % | ASTM D621 | ≤ 9 | | |
| TRIBOLOGICAL | | | | | |
| Dynamic coefficient of friction | 2 | ASTM D1894 ASTM D3702 | 0,10 - 0,20 | | |
| Wear factor K | 1 | ASTM D3702 | 0,011 - 0,018 | | |
| THERMAL | | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 9 - 12 | | |

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| TF501 | | | | |
|---|------------------------------|--------------------------|---------------|--|
| PIFE+ 50% Sta | iniess Steel (I | -DA) | | |
| Properties | Unit | Method | Data | |
| PHYSICAL - | MECHANICAL | | | |
| Density | g/cm ³ | ASTM D792 | 3,35 - 3,45 | |
| Hardness - Shore D | 1 | ASTM D2240 | ≥ 60 | |
| Tensile Strength - CD | N/mm² | ISO 12086 ISO 527 | ≥ 20 | |
| Elongation at break - CD | % | ISO 12086 ISO 527 | ≥ 230 | |
| Compressive strength (offset 1%) - CD | N/mm² | ASTM D695 | > 13 | |
| Deformation under load at room temperature after 24 hours at 13,7 N/mm² - CD | % | ASTM D621 | ≤ 6 | |
| Permanent deformation as above after 24 hours of rest at room temperature - CD | % | ASTM D621 | ≤ 3 | |
| TRIBO | LOGICAL | | | |
| Dynamic coefficient of friction * | 61 5 | ASTM D1894 ASTM D3702 | 0,25 - 0,35 | |
| Wear factor K * | 10 ⁻⁷ mm³/N*m | ASTM D3702 | 30 - 40 | |
| THERMAL | | | | |
| Service Temperature (min - max) | °C | / | - 200 / + 260 | |
| Thermal expansion coefficient (linear) 25 - 100°C | 10 ⁻⁵ (mm/mm)/ °C | Similar to ASTM D696 | 10 - 12 | |

CD=Cross Direction

*PV=0,35 MPA m/s Counterface Cast Iron

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TopPlast Materials & Others

In this brochure, our most commonly used sealing materials. If you can't find what you're looking for, ask about our other options.



TOPTAL (POM)

Polyoxymethylene (POM) - also known as polyacetal or polyformaldehyde is a group of engineering thermoplastic materials with high stiffness, low friction and excellent dimensional stability.

TOPTAL is a semi-crystalline polyacetal-copolymer (POM), which is used for anti-extrusion rings, guide ring bushes, scrapers and for precision-machined parts with tight tolerances. TOPTAL is one of the most important engineering thermoplastics with good physical properties, low water absorption and good chemical resistance. TOPTAL can be used in mineral oils, in water-based fire-resistant hydraulic fluids (HFA, HFB and HFC fluids). In direct contact with acids and bases limited chemical resistance must be taken into consideration.

| Property | Unit | Value | Standard |
|--|---------------------|---------------------------|--|
| Standard color | _ } | Black | |
| Durometer hardness | Shore D | 82 | ISO 868 |
| Density | g/cm ³ | 1,41 | DIN EN ISO 1183-1 |
| Yield stress Elongation at yield Elongation at break Tensile modulus | MPa % MPa | 65 8–10 25 2 900 | ISO 527-1/2 ISO 527-1/2 ISO 527-1/2 ISO 527-1/2 |
| Impact resistance, charpy at +23 °C at –30 °C Water absorption, 23 °C, saturation | kJ/m² kJ/m² % | 10 8 0,65 | ISO 179-1 ISO 179-1 ISO 62 |
| Coefficient of sliding | - | 0,25–0,32 | - |
| Minimum service temperature Maximum service temperature | °C °C | -50 +100 | Ξ |

IMPORTANT NOTE: The values shown above are only valid for material samples prepared for test purposes according to the stated standards.

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TOPMID (PA)

TOPMID (PA) is a cast polyamide with good sliding properties and is used for back-up rings, guide rings and bearing components for diameters above 260 mm. TOPMID can be used in mineral oils and water-based fire-resistant hydraulic fluids. When designing components using TOPMID for an application in water or water-based fluids, the swelling of the material must be taken into account.

| Property | Unit | Value | Standard |
|--|-------------------|------------------------|---|
| Standard color | - | Black/natural | |
| Durometer hardness | Shore D | 77 | ISO 868 |
| Density | g/cm ³ | 1,15 | DIN EN ISO 1183-1 |
| Yield stress, saturated Elongation at break, saturated Tensile modulus, saturated | MPa % MPa | 55 100 1 800 | ISO 527-1/2 ISO 527-1/2 ISO 527-1/2 |
| Impact resistance, charpy, 23 °C, saturated Water absorption, 23 °C, saturation Moisture absorption, 23 °C, saturation | kJ/m² % % | no break 8,5 2,2 | ISO 179-1 ISO 62 - |
| Coefficient of sliding | - / / | 0,35–0,42 | _ |
| Minimum service temperature Maximum service temperature | 2° 2° | -40 +110 | - |

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UHMWPE (PE1000)

UHMWPE is a semi crystalline thermoplastic material based on ultrahigh molecular weight polyethylene with the following properties:

- Low coefficient of friction
- Excellent wear resistance
- High impact strength (also at low temperature down to -200 °C)
- Very high creep resistance
- Water-repellent
- No swelling

UHMWPE is suitable for applications where outstanding sliding, wear or dry running properties

| Property | Unit | Value | Standard |
|--|-------------------|---------------------|-------------------------------------|
| Standard color | - | Nature | |
| Hardness | Shore D | 61 | ISO 868 |
| Density | g/cm ³ | 0,93 | ISO 1183 |
| Yield stress Elongation at break Modulus of elasticity in tension | MPa % MPa | 20 ≥350 600 | ISO 527-1 ISO 527-1 ISO 527-1 |
| Coefficient of linear expansion 20–80 °C | K-1 | 1,7×10-4 | ASTM E831 |
| Minimum service temperature Maximum service temperature (permanent) Maximum service temperature (short time) | °C °C °C | -200 +90 +125 | - - - |
| | | | |

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PEEK

PEEK is a polymer with high tensile strength, stiffness, high heat distortion temperature and good sliding and friction properties. As far as strength and stiffness are concerned, PEEK exceeds most technical plastics, especially at high temperatures.

| Property | Unit | Value | Standard |
|--|-------------------|--------------------|-------------------------------|
| Standard color | - } | Cream | |
| Durometer hardness | Shore D | 87 | ISO 868 |
| Density | g/cm ³ | 1,30 | DIN EN ISO 1183-1 |
| Yield stress Elongation at break Tensile modulus | MPa % MPa | 100 45 3 700 | ISO 527 ISO 527 ISO 527 |
| Impact resistance notched, charpy, 23 °C | kJ/m² | 7,0 | ISO 179/1eA |
| Dimensional stability at high temperature HDT/A | °C | 152 | ISO R 75-f |
| Water absorption 24 h, 23 °C | % | 0,07 | ISO 62-1 |
| Minimum service temperature Maximum service temperature | °C °C | -100 +260 | - |

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ΤΟΡΤΕΧ

Toptex is a high load composite bearing material constructed from a synthetic fabric reinforced thermoset resinand incorporating lubricating additives. The material features excellent mechanical strength and low friction.

| Property | Unit | Value | |
|--|-----------------------|-----------|--|
| Compressive strength | | | |
| Flat wise (normal to laminate) | MPa | 375 | |
| Edgewise (parallel to laminate) | MPa | 150 | |
| Compressive modulus | MPa | 2,750 | |
| Impact Strength | kJm⁻² | 100 | |
| Density | g cm ⁻³ | 1.30 | |
| Hardness | Rockwell M | 100 | |
| Water swell (at 20 °C) | % | < 0.15 | |
| Coefficient of friction (dry sliding against stainless steel, 15 MPa) | | 0.18-0.21 | |
| Thermal Properties | | | |
| Operating temperature | | | |
| Minimum | °C | -40 | |
| Continuous | °C 70 | | |
| Maximum | °C 130 | | |
| Linear expansion coefficients | | | |
| Flat wise (normal to laminate) | 10 ⁻⁵ / °C | 10 | |
| Edgewise (parallel to laminate) | 10 ⁻⁵ / °C | 5 | |

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HIGH QUALITY CUSTOM-MADE SEALS



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Made in Tampere

- Multiply different materials to choose from and diameter starting from few millimeters upwards.
- Seals are manufactured with special CNC-lathes, which were designed for seal manufacturing. By using latest technology and software available, seals are manufactured quickly and precisely.

| Materials | COLOUR | SHORE A/D | TEMF | PERATURE |
|----------------------|----------|-------------------|------|----------|
| | | | | |
| POLYURETHANES | | | min. | max. |
| PU | | 95/48 | -30 | 110 |
| HPU | | 95/48 | -20 | 110 |
| SPU | | 95/48 | -20 | 110 |
| TPU | | 95/48 | -50 | 100 |
| GPU | | 95/47 | -30 | 110 |
| XPU | | 97/57 | -30 | 115 |
| XHPU | | 97/60 | -20 | 115 |
| XSPU | | 97/58 | -20 | 115 |
| GPU54D | | 97/54 | -30 | 110 |
| PUSOFT | | 86/- | -30 | 95 |
| PUHOT | | 96/- | -30 | 135 |
| PU C-RED | | 95/- | -30 | 125 |
| ELASTOMERS | | | min. | max. |
| NBR | | 85/- | -30 | 100 |
| NBRSOFT | | 73/- | -35 | 110 |
| NBRCOLD | | 82/- | -50 | 105 |
| NBRHARD | | 95/- | -25 | 100 |
| FPM BLACK | | 80/- | -20 | 220 |
| FPM BROWN | | 85/- | -25 | 220 |
| FPM SOFT | | σ ₃ /- | -25 | 220 |
| FPDM | | 25/- | -50 | 150 |
| HNBR | | 85/- | -20 | 150 |
| MVO | | 8 ₄ /- | -60 | 210 |
| TOPFLAS (TFE/P/FEPM) | | 83/- | -10 | 200 |
| | | | min | |
| | | / | min. | max. |
| TFICO | | -/5/ | -200 | 260 |
| TF200 | | -/60 | -200 | 260 |
| 1F201 | | -/55 | -200 | 260 |
| 1F300 | | -/58 | -200 | 260 |
| 1 F301 | | -/62 | -200 | 260 |
| 1F400 | | -/64 | -200 | 260 |
| F401 | _ | -/60 | -200 | 260 |
| TF402 | | -/60 | -200 | 260 |
| TF411 | | -/59 | -200 | 250 |
| TF412 | | -/59 | -200 | 260 |
| TF500 | | -/55 | -200 | 260 |
| TF501 | | -/64 | -200 | 250 |
| TOPPLAST MATERIALS | & OTHERS | | min. | max. |
| TOPTAL (POM) | | -/82 | -50 | 100 |
| TOPMID (PA) | | -/77 | -40 | 110 |
| UHMWPE (PE1000) | | -/61 | -200 | 90 |
| PEEK | | -/87 | -100 | 260 |
| TOPTEX | | - | -40 | 130 |

MUISTIINPANOJA

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Tiivistävä tekijä



