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Sealing Materials

ECONOMOS

quality sealing solutions

table

G-Ecopur

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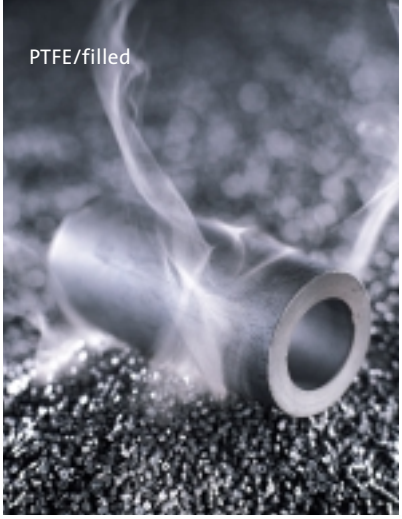
Ecopur



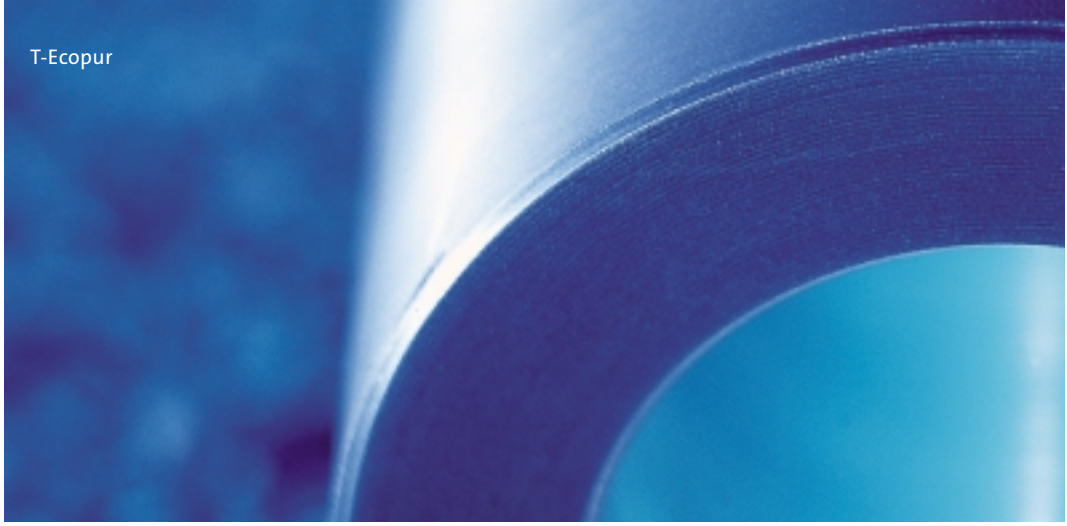
Sealing Materials– Introduction

Due to increasing requirements in the sealing technology, materials are gaining more and more importance. Sealing materials are facing higher temperatures and pressures, higher sliding speeds and poorer lubricating fluids. The new generation of fluids like synthetic hydrocarbons and ester, biological degradable pressure fluids and pressure fluids with a water basis present new challenges to develop new sealing materials.

We at Economos acknowledged this with the transfer of our R&D from a standard solution provider to a developer of special, tailor-made solution. We also accepted, that those projects with close client co-operation succeeded best in achieving the optimal sealing solution.

Economos has recognised all the advantages of Polyurethane in sealing technology. From our point of view, all the superior characteristics of these materials are under utilised. We expect in the future a much stronger trend in this direction.

We are offering 15 standard materials in our product range. These materials are featured in this brochure. All materials have been developed by ECONOMOS and are satisfying standard customer needs. In addition, we supply special materials like AFLAS, thermoplastics like mineral re-inforced Polyamides, high temperature plastics like Polyphenylsulfide, etc..


T-Ecopur

Classification of sealing materials

In sealing technology, mainly representatives of two groups of macromolecular (polymer) substances are used, i.e. substances of the groups of **elastomers** and **thermoplastics**.

Macromolecular substances are organic compounds whose molecules exist of several thousands, often even millions, of atoms which are known as macro, giant, string or chain molecules. They can be created either by modification of highly molecular natural materials (e.g. natural rubber) or by depositing low-molecular elements (so called monomers) through various chemical reactions (synthetic materials, plastics).

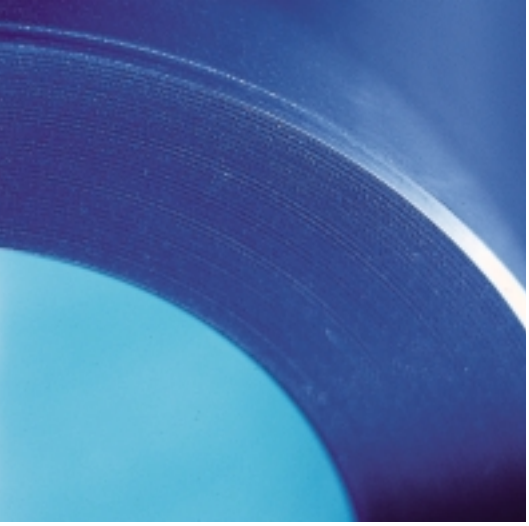
Elastomers

ECORUBBER, ECOPUR, ECOSIL,...

Elastomers are materials that can be highly expanded by exerting relatively little power. Because of their structure, elastomers have a high retractibility, which means the remaining deformation is very small. There are two main groups of elastomers, the chemically cross-linked materials (rubber materials) and thermoplastic elastomers.

The **rubber materials** are polymers, which are formed by cross-linked macromolecules with various vulcanization additives. Due to their chemical bonds they do not melt and they begin to decompose at high temperatures. In addition the cross-link ensures that rubber materials do not dissolve and, depending on the medium, do suffer more or less intensive swell or shrinkage.

The **thermoplastic elastomers** demonstrate the characteristic properties of elastomers over a wide temperature range. They are physically but not chemically cross-linked, therefore they can be melted at higher temperature and can be processed with traditional thermoplastic processing techniques. Thermoplastic elastomers are soluble, generally, they swell less in comparison to their chemically cross-linked equivalents.



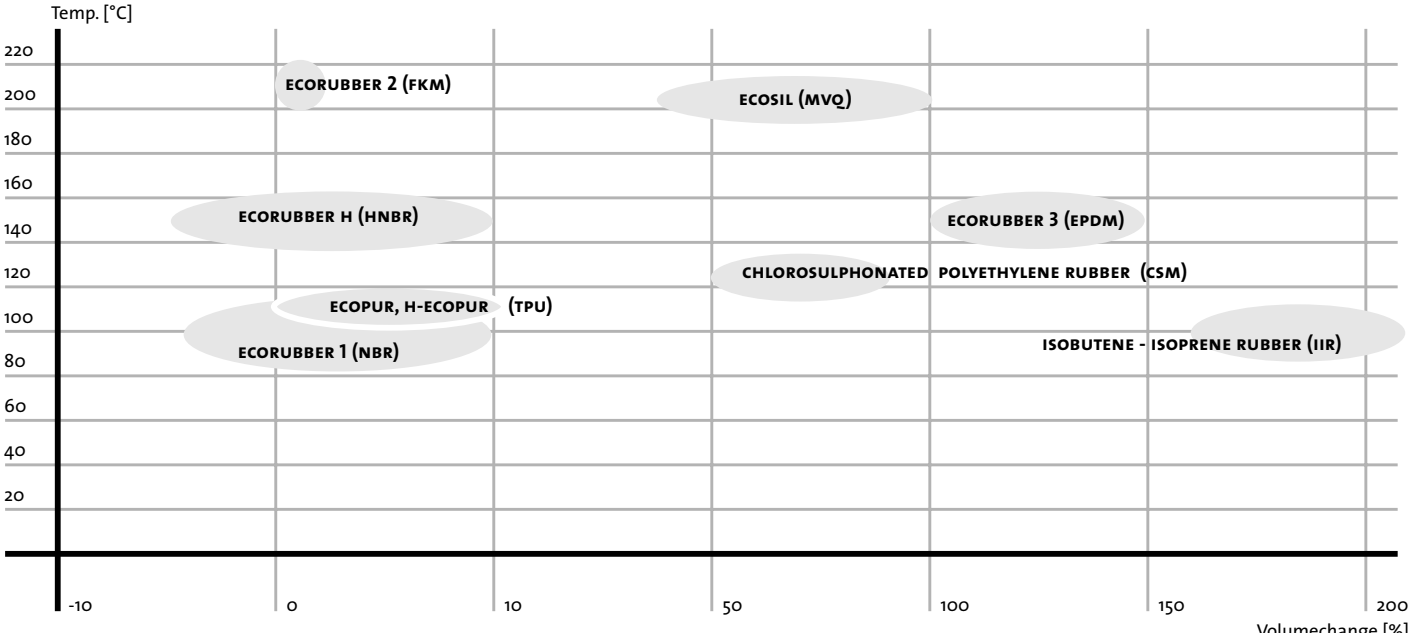
Thermoplastics

ECOTAL, ECOMID, ECOFLON, ECOPAEK,...

Thermoplastics can be melted. They are polymer materials, which are essentially harder and rigid at their application temperature compared to elastomers. Depending on the chemical structure, the properties vary from hard, to stiff, to ductile and flexible. Due to the morphological structure, extensive stretching is non-reversible and moulded parts remain in the deformed state. Thermoplastics are therefore called Plastomers.

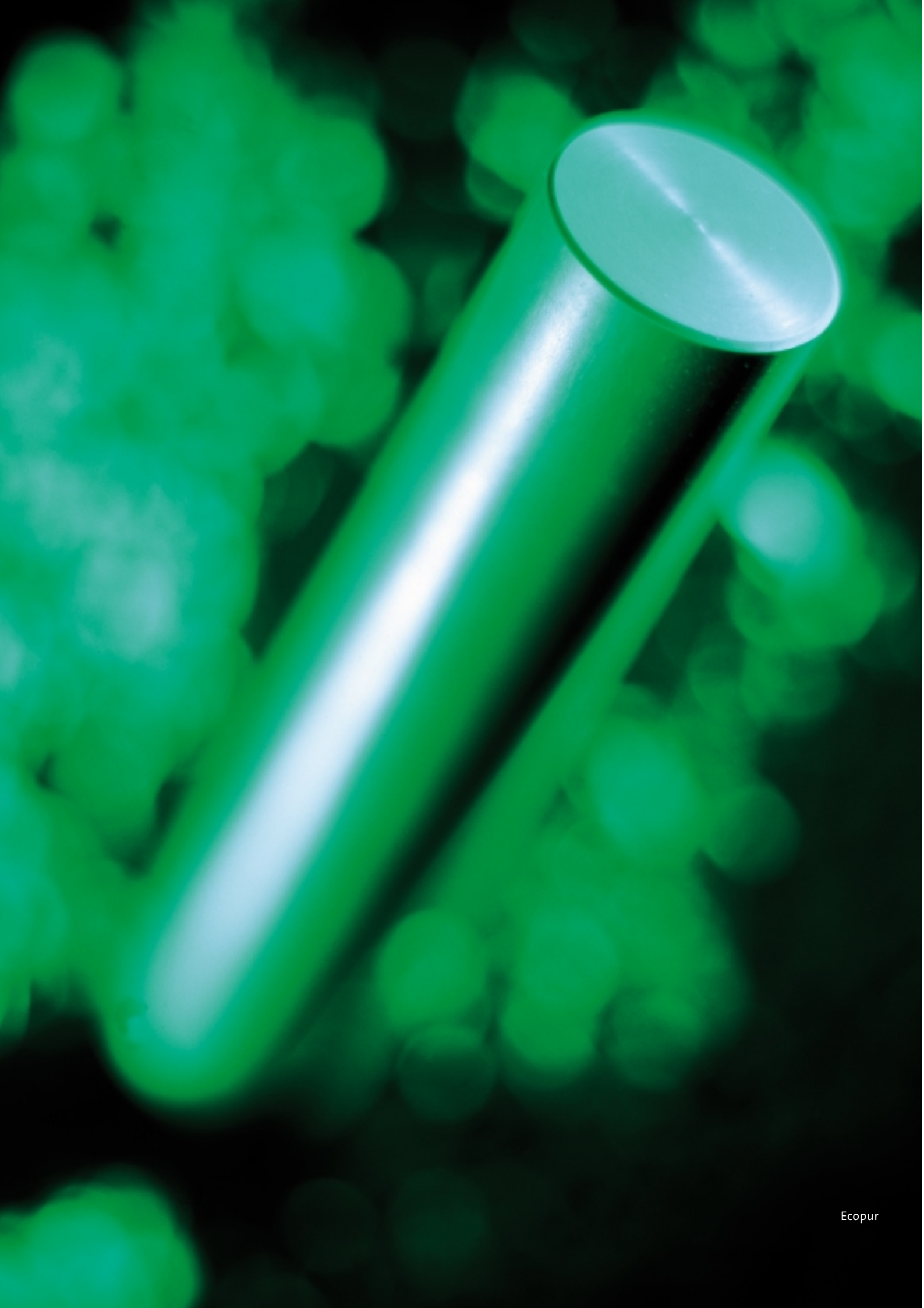
Plastomers are applied in the sealing technology for back-up rings, guide rings, bearing bushes, etc..

Application temperature limits and resistance in mineral oil



FKM, FPM	Fluororubber
H-NBR	Hydrogenated nitrile rubber
NBR	Acrylonitrile-butadiene rubber
TPU	Thermoplastic polyurethane elastomer
MVQ	Vinyl-methyl silicone rubber
EPDM	Ethylene-propylene diene rubber

In the following chapter “Landmark Sealing Material Technology” we will describe in detail all our standard materials.



PTFE filled with Bronce

Landmark Sealing Material Technology

ECOPUR (TPU) green

Ecopur is a thermoplastic polyurethane elastomer, which has an unusually high abrasive resistance, low compression set, high physical properties and tear strength. In sealing technology Ecopur is mostly used for U-rings, lip seals, wipers and chevron packings, but it may also be used for dampers and other machined parts. Products made 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 (in these hydraulic fluids its better to use H-Ecopur instead of Ecopur). Depending on the seal design and the installation housing seals made of Ecopur can be used up to 400 bar (for higher pressure anti-extrusion-rings are necessary).

H-ECOPUR (TPU) red

H-Ecopur is a hydrolysis-resistant thermoplastic polyurethane elastomer. It combines the engineering properties of Ecopur with a high resistance to hydrolysis (hydrolysis is degradation in water) which is otherwise rarely found in polyurethane's. 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, tunnelling and manufacturing of 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 is KTW approved and meets the FDA standards.

G-ECOPUR (CPU) red

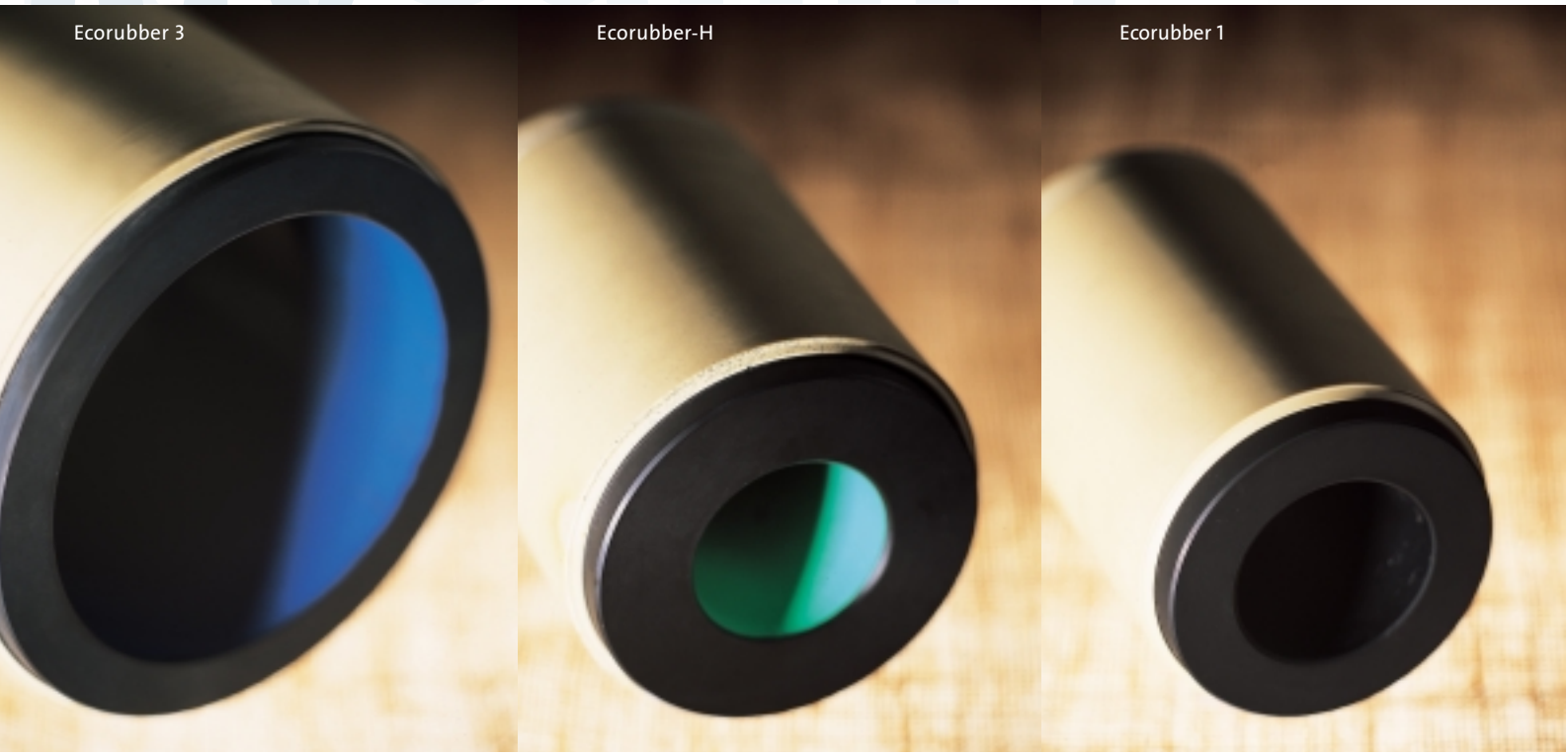
G-Ecopur is a cast hydrolysis-resistant polyurethane-elastomer with similar properties to H-Ecopur especially regarding its chemical stability. G-Ecopur can be used in the same hydraulic fluids as H-Ecopur. Generally, G-Ecopur is used for seals with a diameter from 540mm up to 4000 mm.

T-ECOPUR (TPU) blue

T-Ecopur is a thermoplastic polyurethane-elastomer, which is modified for deep 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-Ecopur should be used under severe climatic conditions and for applications in freezing plants.

S-ECOPUR (TPU) grey

The new polyurethane brand has been optimised in regard of the tribological characteristics (friction and wear), achieved by an addition of a synergetic combination of solid lubricants. This special material is therefore best suited for most severe applications in the water hydraulics as well as in the oil-free pneumatics.



ECORUBBER 1 (NBR) black

Ecorubber 1 is an elastomer based on acrylonitrile-butadiene rubber which is used for U-rings, chevron packings, special seals and various components. This material has a good resistance to mineral oils and greases and HFA, HFB and HFC pressure fluids. However, the material is not resistant to glycol-based brake fluids, HFD fluids, aromatic fluids (such as benzene), esters, ketones and amines or concentrated acids and bases.

ECORUBBER-H (H-NBR) black

Ecorubber-H is a hydrogenated or saturated acrylonitrile-butadiene rubber, which is suitable for applications in aliphatic hydrocarbons like propane or butane and mineral oils and greases (for short times up to 170°C) and also for sulfonated crude oil. Furthermore, it can be used in many diluted acids and bases and salt solutions even at elevated temperatures and in glycol-water mixtures. Ecorubber-H is not compatible with fuels with a high content of aromatic hydrocarbons (premium blend petrol), gasoline's (petrol / alcohol blends) ketones, esters, ethers and chlorinated hydrocarbons like trichloroethylene and tetrachloroethy-lene.

H-Ecopur

ECORUBBER 2 (FPM,FKM) brown

Ecorubber 2 is an elastomer based on fluororubber (VITON: registered trade name of Du Pont) which can be used for U-rings, lip seals, chevron packings, wipers and special seals. Its outstanding properties are high resistance against heat, weathering, ozone and many chemical ingredients. Ecorubber 2 is compatible with mineral oils and greases containing sulphur, HFD pressure fluids (nearly all phosphate esters and chlorinated hydrocarbons), crude oil and sour gas. Ecorubber 2 is not resistant against anhydrous ammonia, amines, ketones, esters, hot water and low molecular weight organic acids.

ECORUBBER 3 (EPDM) black

Ecorubber 3 is an elastomer based on ethylene-propylene rubber, which can be used for U-seals, lip seals and chevron packings. Ecorubber 3 has an outstanding stability against hot water, steam, washing agents and polar organic solvents. Ecorubber 3 is not resistant against mineral oil and other unpolar media. The stability to weathering, ozone and ageing is good. If it is intended to use Ecorubber 3 in glycol-based brake fluids, national regulations have to be adhered to.

ECOSIL (MVQ) reddish brown

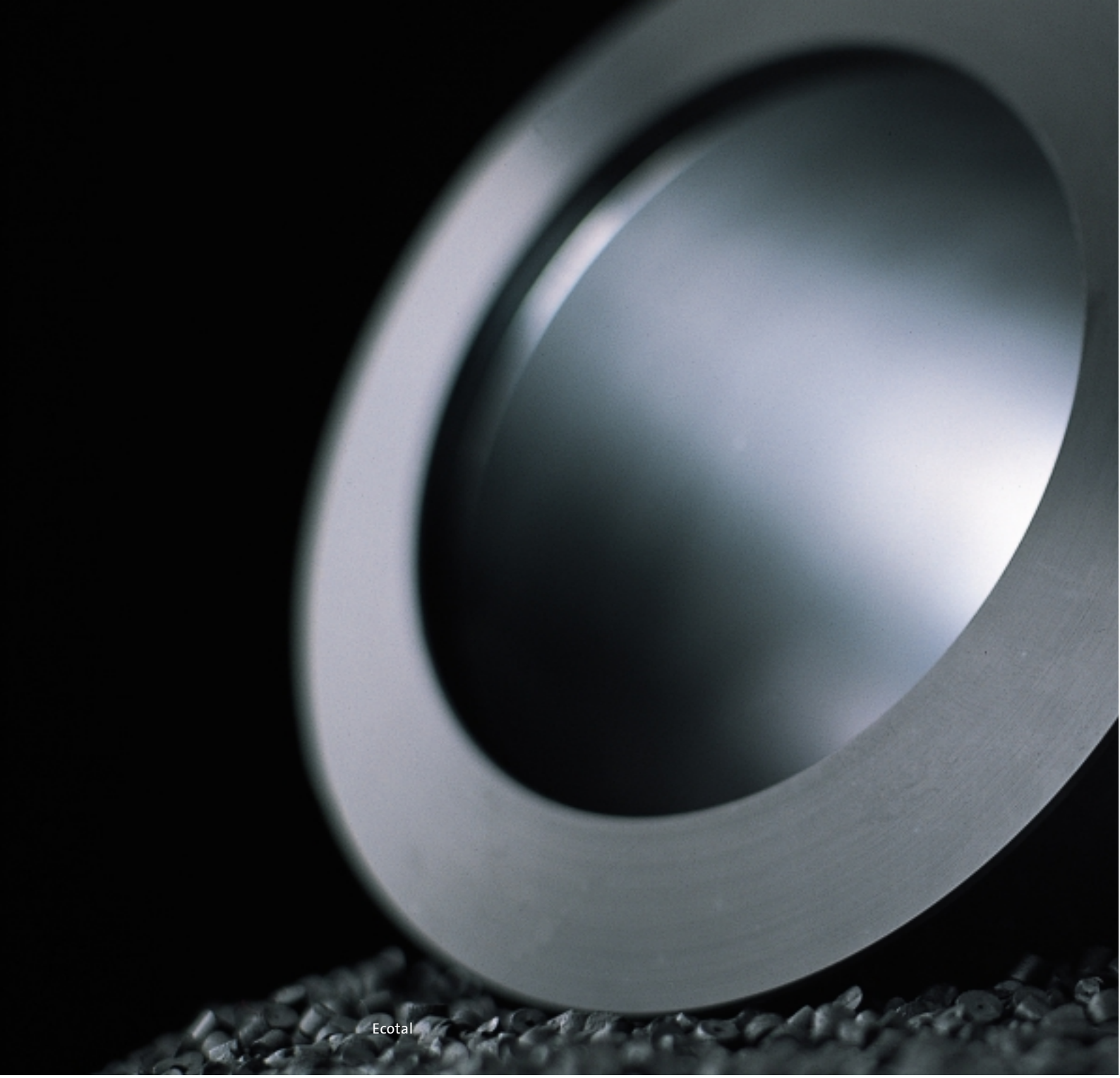
Ecosil is a silicone rubber, which can be used for O-rings, gaskets and special seals. Owing to the poor mechanical properties, which are noticeably lower in comparison to other rubbers, Ecosil is mostly used for static (non-moving) applications. Ecosil is highly resistant against weathering, ozone and ageing. The compatibility with mineral oils depends on the content of aromatic hydrocarbons in the oil.

ECOFLON 1 (PTFE-virgin) white

Ecoflon 1 is a thermoplastic on the basis of polytetrafluoroethylene that is used for back-up rings, chevron packings, O-rings, rotary seals and gaskets. Ecoflon 1 has the widest application range of all sealing materials. Seals made of Ecoflon 1 will only be attacked by molten alkali metals and elementary Fluor at high temperatures. Using PTFE seals, it should be noted that creeping occurs at relative low loads (pressures).

ECOFLON 2 (PTFE-with fillers) grey

Ecoflon 2 is a polytetrafluoroethylene filled with glass fibres and molybdenum disulphide and can be used for U-rings, glide (slide) rings, anti-extrusion rings, back-ups, for chevron packings and guide rings. Because of its special composition, Ecoflon 2 has good physical properties and distinctly better creep behaviour than virgin PTFE. The chemical resistance is similar to virgin PTFE; some ingredients can cause destruction of the fillers.



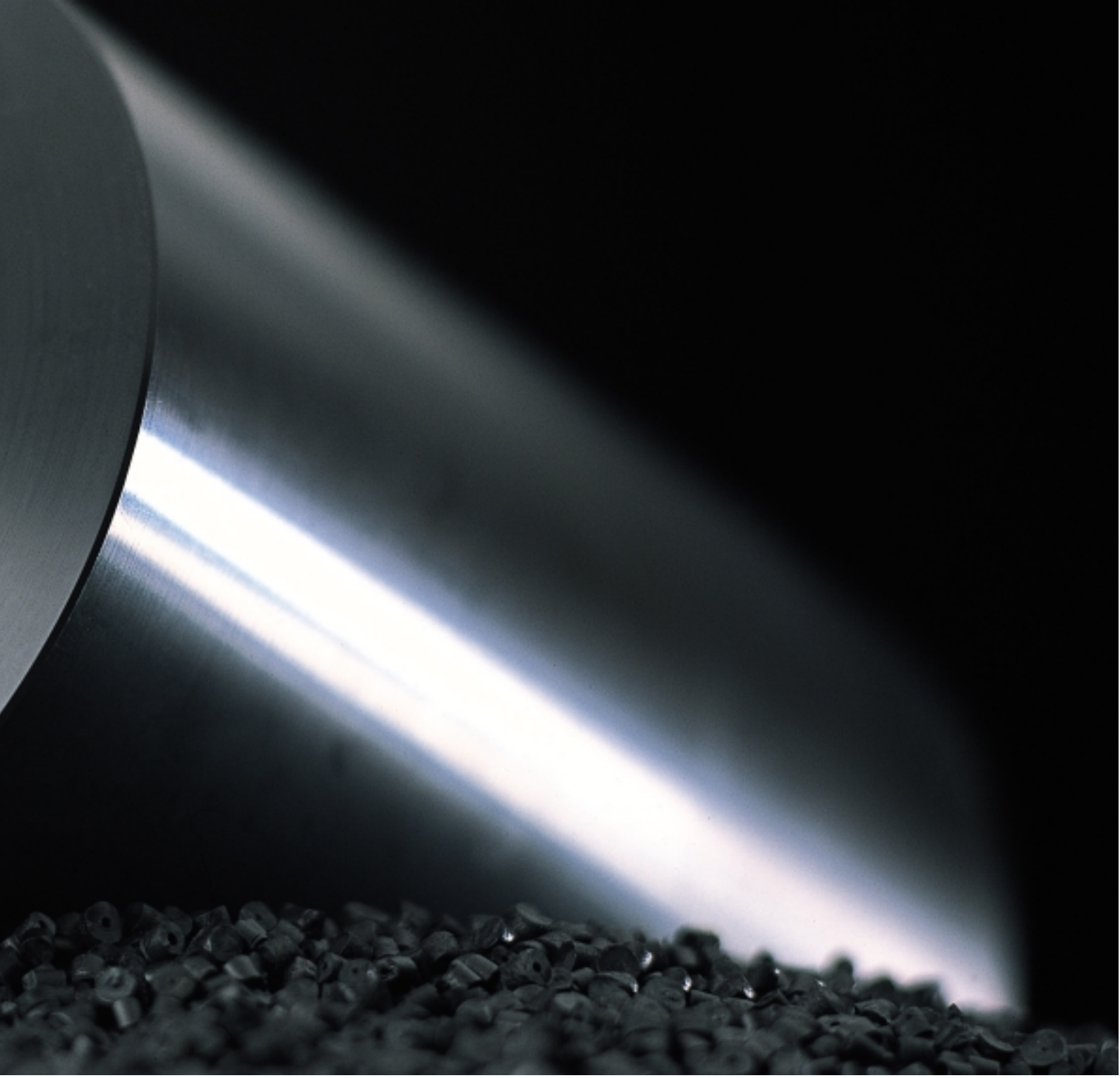
Ecotal

ECOTAL (POM) black

Ecotal is a semi-crystalline polyacetal-copolymer which is used for anti-extrusion rings, guide ring bushes, scrapers and for precision-machined parts with tight tolerances. Ecotal is one of the most important engineering thermoplastics with good physical properties, low water absorption and good chemical resistance. Ecotal can be used in mineral oils, in water-based fire-resistant hydraulic fluids (HFA, HFB and HFC fluids). Concentrated acids and bases will attack and destroy it.

ECOMID (PA) black

Ecomid is a cast polyamide with good sliding properties and is used for back-up rings, guide rings and bearing components instead of Ecotal for a diameters above 260 mm. Ecomid can be used in mineral oils and water-based fire-resistant hydraulic fluids. When designing parts out of Ecomid for an application in water or water-based fluids, the swelling of the material (Ecomid absorbs water up to eight weight percent) must be taken into account.



ECOPAEK (PEEK)

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

SPECIAL MATERIALS

AFLAS, any thermoplastic with mineral-reinforced polyamides, high temperature plastics like Polyphenylsulfide, etc..
All standard materials can be modified by Economos to achieve tailor-made and optimised sealing solutions.

Material data overview

properties	DIN-standard	unit	Ecopur TPU	H-Ecopur TPU	G-Ecopur CPU	T-Ecopur TPU	S-Ecopur TPU
colour			green	red	red	blue	grey-black
hardness	53505	Shore A	95±2	95±2	95±2	95±2	95±2
hardness	53505	Shore D	48±3	48±3	47±3	48±3	48±3
density	53479	g/cm³	1,20	1,20	1,20	1,17	1,24
100% modulus	53504	N/mm²	≥12	≥13	≥11	≥12	17
tensile strength / yield stress	53504 / 53455	N/mm²	≥40	≥50	≥45	≥50	50
elongation at break	53504 / 53455	%	≥430	≥330	≥280	≥450	380
modulus of elaticity – tensile test	53457	N/mm²					
compression set 70°C/24h 20%Def.		%	≤30	≤27	≤30	≤27	25
100°C/24h 20%Def.		%	≤35	≤33	≤40	≤33	30
100°C /22h	53517	%					
175°C /24h	53517	%					
rebound resilience	52512	%	42	29	43	50	
tear strength	53515	N/mm	≥100	≥100	≥40	≥80	120
abrasion	53516	mm³	18	17	25	15	17
minimum service temperature		°C	-30	-20	-30	-50	-20
maximum service temperature		°C	+110	+110	+110	+110	+110

Ecorubber 1 NBR	Ecorubber-H H-NBR	Ecorubber 2 FPM, FKM	Ecorubber 3 EPDM	Ecosil MVQ	Ecotal POM	Ecoflon 1 PTFE virgin	Ecoflon 2 PTFE +15%gf +5%MoS_2	Ecomid PA	Ecopaek PEEK
black	black	brown	black	reddish brown	black	white	grey	black	cream
85±5	85±5	83±5	85±5	85±5					
					82	57	60	77	86
1,31	1,22	2,30	1,22	1,52	1,41	2,17	2,25	1,15	1,32
≥11	≥10	≥5	≥9	≥5					
≥16	≥18	≥8	≥12	≥7	62	27	18	65	97
≥130	≥180	≥200	≥110	≥130	40	300	200	120	≥50
					2600			1800	3600
≤15	≤22	≤20	≤15	≤15					
28	29	7	38	44					
20	30	21	15	8					
90	90	150	120						
-30	-25	-20	-50	-60	-50	-200	-200	-40	
+100	+150	+200	+150	+200	+100	+260	+260	+100	260

Ecopeak

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