

Ultrason®

Products for the
automotive industry



 **BASF**

We create chemistry

Ultrason® – reliable, even when it's hot

Overview

Ultrason® E (PESU, polyethersulfone), Ultrason® S (PSU, polysulfone) and Ultrason® P (PPSU, polyphenylsulfone) are high performance materials having a property profile which is unique among engineering thermoplastics. Apart from their outstanding heat resistance these construction materials have a lot of characteristics which are applied in many automotive parts.

In the automotive industry especially Ultrason® E (PESU) is successfully used. The key features are:

- Heat distortion temperature up to 220°C
- Long-term service temperature of 180°C to 190°C
- Dimensional stability
- Creep strength even at high temperatures
- Resistance to hot water and coolants
- Resistance to oil, even at temperatures up to 170°C
- Resistance to fuels
- Resistance to fluorine
- Transparency for unreinforced grades

Apart from these characteristics Ultrason® offers all the typical advantages of plastics such as low weight, and good sound insulation in dynamically stressed parts. As in the case of other thermoplastics parts with complex shapes can be produced from Ultrason® by injection molding.

The Ultrason® E, S and P product line covers non-reinforced grades with different levels of viscosity or flowability for use in injection molding and extrusion. Also available are reinforced grades that show high strength, stiffness, dimensional stability, and an advantageous sliding friction behavior (tribology). The Ultrason® special grades Ultrason® KR 4113 and Ultrason® E 2010 C6 fulfill particularly high demands on thermal ex-pansion and tribological properties.

Products	Description
Ultrason® E 3010 natural	high viscosity grade for injection molding and extrusion, high impact and chemical resistance
Ultrason® E 2010 MR	injection-molding grades with improved demolding behavior for complex parts
Ultrason® E 2010 MR HM	standard grade for injection molding with improved demolding behavior, improved heat deflection
Ultrason® E 0510 C2 TR	low-viscosity injection molding grade, improved tribological and flow behavior
Ultrason® Dim E 0510 G9	blend with 45 % glass fiber reinforcement
Ultrason® E 2010 G6 uncolored	30 % glass fiber reinforcement
Ultrason® KR 4113	10 % CF, 10 % PTFE, 10 % graphite, improved tribological properties
Ultrason® E2010 SW Q31	Standard, unreinforced grade for injection molding with improved demolding for complex parts

Table 1: Selection of product portfolio

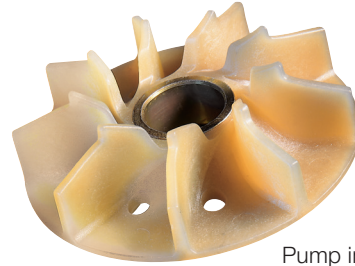
Selected Ultrason® grades and their properties

Properties	Test method	Unit	Ultrason® E 2010	Ultrason® E 2010 G6	Ultrason® KR 4113
Density	ISO 1183, IS 60	g/cm ³	1.37	1.59	1.48
Moisture absorption, saturation at 23°C, 50% rel. humidity	ISO 62	%	0.8	0.6	0.5
Melt volume rate MVR 360°C/10 kg	ISO 1133	cm ³ /10 min	70	25	10
Mechanical properties					
Tensile modulus of elasticity	ISO 527	MPa	2,650	9,800	11,000
Stress at yield (v=50 mm/min) Stress at break* (v=5 mm/min)	ISO 527	MPa	85	150*	115*
Elongation at yield (v=50 mm/min) Elongation at break* (v=5 mm/min)	ISO 527	%	6.9	2.3*	1.5*
Charpy impact strength 23°C/-30°C	ISO 179 1eU	kJ/m ²	N/N	55/60	24/20
Charpy notched impact strength at 23°C	ISO 179 1eA	kJ/m ²	7	10	6.5
Ball indentation hardness H358/30, H961/30*	ISO 2039/1	MPa	154	224*	180*
Thermal properties					
Heat deflection temperature under load 1.8 MPa (HDT A)	ISO 75	°C	205	223	223
Max. service temperature, for up to several hours		°C	220	220	220
Temperature limit for 50% loss in tensile strength after 20,000 h	UL 746b	°C	190	190	
Coefficient of thermal expansion, longitudinally 180°C	ISO 11359-1/-2	10 ⁻⁶ /K	59	17	13
Electrical properties					
Dielectric constant at 100Hz/1MHz	IEC 62631-2-1		3.9/3.8	4.3/4.3	
Dissipation factor 100Hz/1MHz	IEC 62631-2-1		0.0017/0.014	0.002/0.01	
Volume resistivity	IEC 62631-3-1	Ω·m	>10 ¹⁵	>10 ¹⁵	9·10 ³
Surface resistivity	IEC 62631-3-2	Ω	>10 ¹⁵	>10 ¹⁵	4·10 ³

Applications

Cooling water circuit

Ultrason® E 2010 G6 (30% glass fibers) can be used successfully in automobile cooling water circuits, e.g. in water pump impellers. The impellers pump the hot mixture of water and coolant (up to 50% glycol) at temperatures up to 110°C through the cooling water system. The most important criteria are resistance to hydrolysis, dimensional stability, and outstanding surface quality. Dimensional changes in the impellers would change the narrow clearance between the water pump housing and the impeller causing reduction in the throughput and efficiency of the pump. The high toughness of Ultrason® E prevents damage to the impeller due to cavitation effects and avoids parts failure.



Pump impeller

Automotive electrical systems

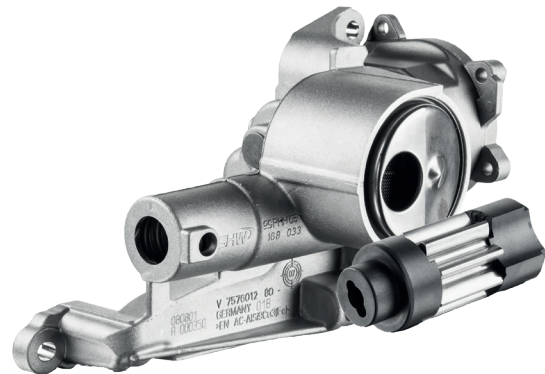
Outstanding resistance to thermal and chemical effects, combined with the electrical insulating properties that are typical of plastics, make Ultrason® E 2010 suitable, for example, as housings in highly stressed automotive fuse boxes or light bulb plugs. When used in fuse boxes the transparency of Ultrason® allows to find errors easily through a quick visual inspection. When Ultrason® is used for electric plugs, the decisive factors are its dimensional stability at high temperatures as well as the possibility of integrating functional elements that are typical of plastics, for instance, snap hooks for simple assembly.



Fuse encapsulation

Oil circuit

Thanks to its outstanding resistance to many motor oils, its high mechanical strength and its excellent dimensional stability within the temperature range from -50°C to +180°C, Ultrason® E can be used in control units for oil pressure and flow rate, rotors and housings in the oil circuit. The products used here are the glass fiber reinforced Ultrason® E 2010 G6, and in cases requiring special sliding friction properties and dimensional stability, the modified Ultrason® KR 4113, Ultrason® E0510 C2TR and Ultrason® Dimension E0510 G9 SW.



Oil pump

Headlights

When it comes to headlights and fog lights, new lighting technology as well as the growing use of the reflectors as design elements have raised the demands on materials. The high temperature resistance of Ultrason® E (up to 220°C) as well as its good dimensional stability (low and constant coefficient of expansion) over a wide temperature range ensure that the specifications for the light distribution of the headlight reflector can be observed. Ultrason® is suited for reflectors as well as bezels and housings with high temperature demands. Particularly important are the excellent surface quality of Ultrason® as well as its easy metallization immediately after the injection molding without a special pre-treatment or an extra coating step.

In addition to Ultrason® E 2010 natural the products used include black grades and grades with improved demolding behavior.

Fog lights

Especially in black fog lights heat can accumulate because of their compact construction. With Ultrason® E 2010 MR HM, a black, IR-transparent polyethersulfone, the heating-up of parts can be reduced.

Further information on special Ultrason® grades can be found in the brochure "Ultrason® – Special Products".



Brake light housing



Headlight bezel

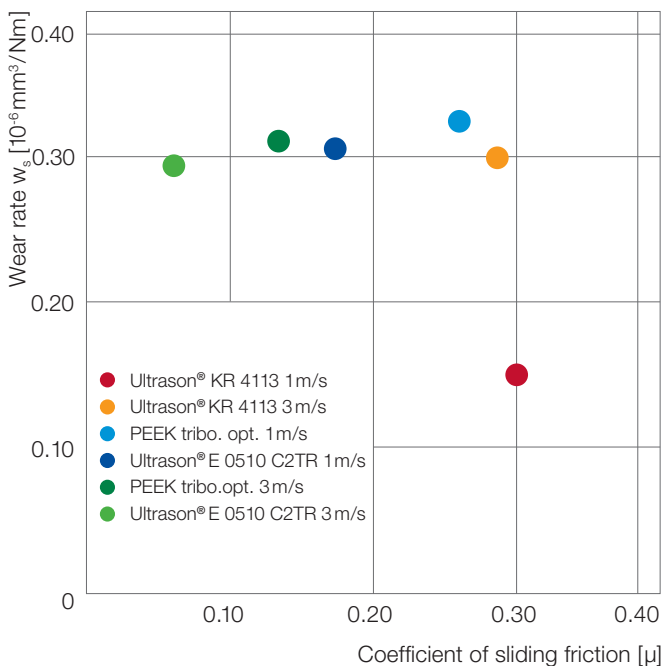


Fig. 1: Wear rate and coefficient of friction of different Ultrason® grades; unidirectional sliding wear test (ring-plate)

Electric drives

Ultrason® will make a decisive contribution to future drive concepts. Thus, Ultrason® E2010 G4 and Ultrason® E2010 G6 can be used as materials for rotors or stators. Ultrason® P3010 is already widely used as cable sheathing.



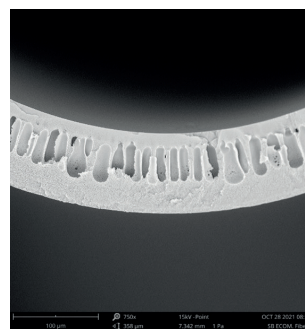
Rotor and stator in e-drive

Humidifier membrane

Because of the excellent chemical and hydrolysis resistance of Ultrason® combined with its high purity, the grades Ultrason® E6020 P and Ultrason® S6010 can be used as hollow or flat membranes in humidifier units.



Flat sheet membrane in humidifier



Membrane wall



Hollow membrane

For your notes

Selected Product Literature for Ultrason®:

- Ultrason® E, S, P – Product Brochure
- Ultrason® E, S, P – Product Range
- Ultrason® – Injection molding
- Ultrason® – Resistance to Chemicals
- Ultrason® – Special Products
- Ultrason® – Membrane Applications
- From the Idea to Production – The Aqua® Plastics Portfolio for the Sanitary and Water Industries
- Stylish, durable and safe: Ultrason® for household and catering
- High-performance and durable reverse osmosis (RO) membranes with BASF's polysulfone (PSU) Ultrason® S – Processing guide



Explore the full potential of Ultrason® and find the suitable grade for your application!

Ultrason® Product Selector on www.ultrason.basf.com

Note

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Further information on Ultrason® can be found on the internet:

www.ultrason.basf.com

Please visit our websites:

www.plastics.basf.com

Request of brochures:

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If you have technical questions on the products, please contact the Ultra-Infopoint:

