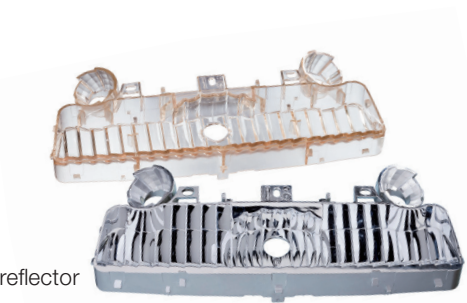


# Selected Ultrason® grades and their properties

| Properties   | Test method    | Unit                | Ultrason® E 2010  | Ultrason® E 2010 G6 | Ultrason® KR 4113   |
|--|----------------|---------------------|-------------------|---------------------|---------------------|
| Density  | ISO 1183       | g/cm³               | 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       | cm³/10 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)<br>Stress at break* (v=5 mm/min)         | ISO 527        | MPa                 | 85                | 150*                | 115*                |
| Elongation at yield (v=50 mm/min)<br>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/m²               | N/N               | 55/60               | 24/20               |
| Charpy notched impact strength at 23°C                                 | ISO 179 1eA    | kJ/m²               | 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 <sup>-6</sup> /K | 59                | 17                  | 13                  |
| Electrical properties  |                |                     |                   |                     |                     |
| Dielectric constant at 100 Hz/1 MHz                                    | ISO 250        |                     | 3.9/3.8           | 4.3/4.3             |                     |
| Dissipation factor 100 Hz/1 MHz  | ISO 250        |                     | 0.0017/0.014      | 0.002/0.01          |                     |
| Volume resistivity   | ISO 93         | Ω · m               | >10 <sup>13</sup> | >10 <sup>13</sup>   | 9 · 10 <sup>3</sup> |
| Surface resistivity  | ISO 93         | Ω                   | >10 <sup>14</sup> | >10 <sup>14</sup>   | 4 · 10 <sup>3</sup> |



Interior reflector

## Selected Product Literature for Ultrason®:

- Ultrason® E, S, P – Product Brochure
- Ultrason® E, S, P – Product Range
- Ultrason® – Resistance to Chemicals
- Ultrason® – Injection Molding
- Ultrason® – Special Products

### 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 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 legislation are observed. (July 2019)

Further information on Ultrason® can be found on the internet:  
[www.ultrason.basf.com](http://www.ultrason.basf.com)

Please visit our websites:  
[www.plastics.basf.com](http://www.plastics.basf.com)

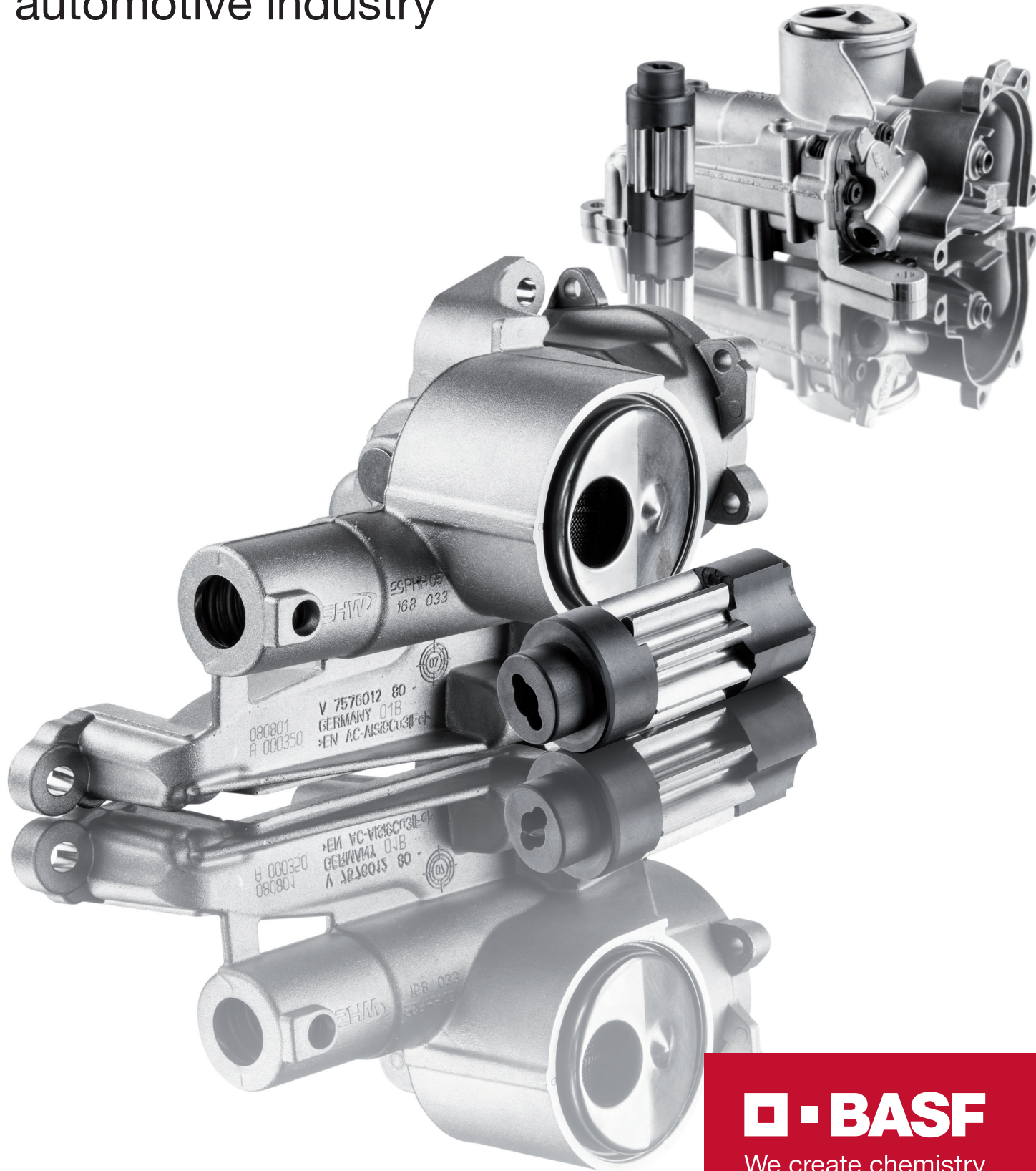
Request of brochures:  
[plas.com@basf.com](mailto:plas.com@basf.com)

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



# Ultrason®

Products for the automotive industry



® = registered trademark of BASF SE

PMPU1909 FE



# 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

| Products                      | Description   |
|-------------------------------|---|
| Ultrason® E 2010 natural      | standard grade for injection molding  |
| 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                             |

Table 1: Selection of product portfolio

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 expansion and tribological properties.

## Applications

### Cooling water circuit

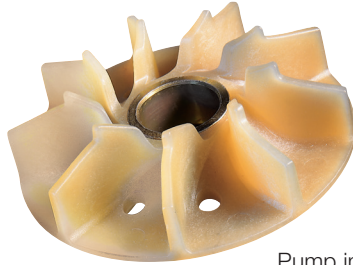
Ultrason® E 2010 G6 (30 % glass fibers) can be used successfully in automobile cooling water circuits, e.g. in water pump impellers. The impellers pump the hot mixture of water and coolant (up to 50 % glycol) at temperatures up to 110 °C through the cooling water system. The most important criteria are 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.

### Automotive electrical systems

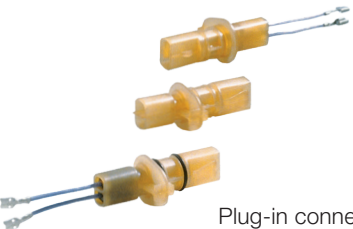
Outstanding resistance to thermal and chemical effects, combined with the electrical insulating properties that are typical of plastics, make Ultrason® E 2010 suitable, for example, as housings in highly stressed automotive fuse boxes or light bulb plugs. When used in fuse boxes the transparency of Ultrason® 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.

### 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 and Ultrason® Dimension E0510 G9 SW.



Pump impeller



Plug-in connectors



Oil control piston

## 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”.



Bezel for head lamp



Fog light

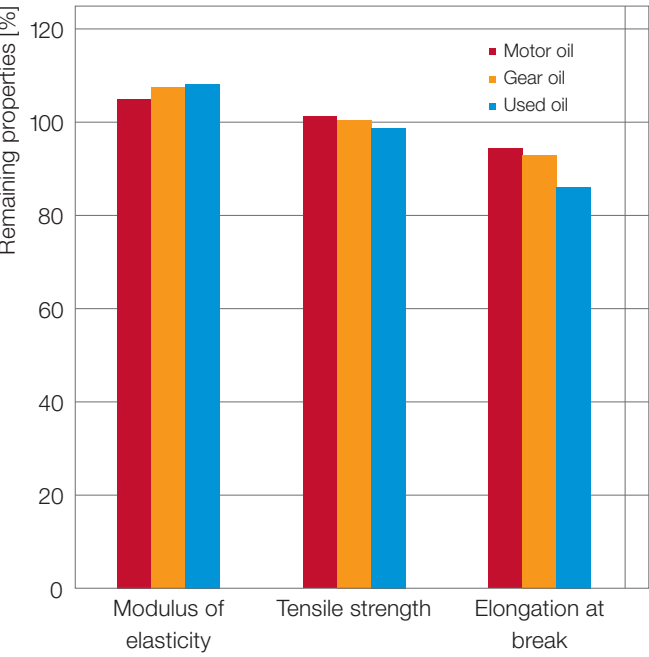


Fig. 1: Mechanical properties after immersion in different oils (1,000 h at 170 °C)

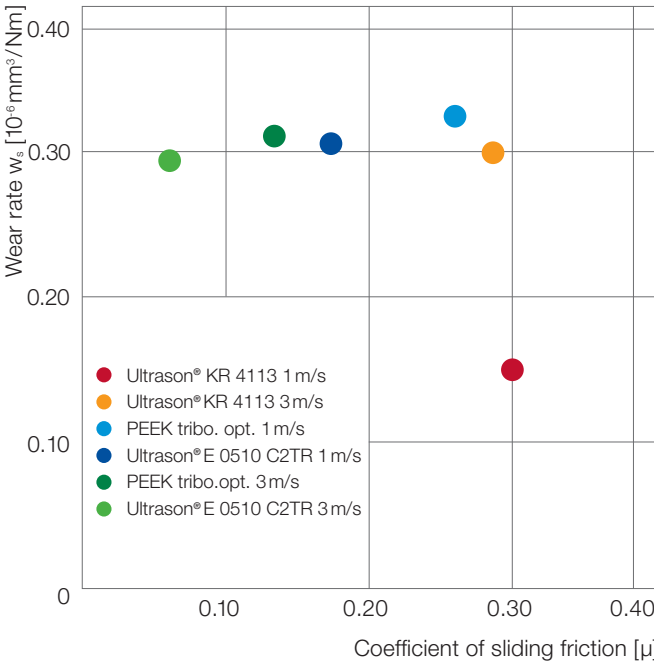


Fig. 2: Wear rate and coefficient of friction of different Ultrason® grades; unidirectional sliding wear test (ring-plate)