

# Ultrason®

## Special Products



 **BASF**  
We create chemistry

## Ultrason® E, S, P

The Ultrason® resins are amorphous thermoplastics based on polyethersulfone (PESU), polysulfone (PSU) and polyphenylsulfone (PPSU) and offer very high resistance to heat. Their wide spectrum of beneficial properties allows them to be molded into high-quality engineering parts and high-load mass-produced articles. They can be processed by almost all the techniques adopted for thermoplastics. Ultrason® can be successfully used for applications in which other plastics, e.g., polyamide, polycarbonate, polyoxymethylene and polyalkylene terephthalates, fail to meet the requirements. By virtue of their extraordinary versatility, Ultrason® resins can substitute thermosets, metals and ceramics.

## Ultrason® – Special products

The following products present an extension to the Ultrason® product line. You will find a variety of innovative Ultrason® products tailor-made for special applications offering intelligent solutions for manufacturing and answering the latest trends in design and technology.

|   |    |
|---|----|
| <b>ULTRASON® E 2010 MR BLACK HM</b><br>PESU with optimized heat management  | 04 |
| <b>ULTRASON® DIMENSION E 0510 G9 BLACK 10112</b><br>Flowable PESU blend with outstanding dimensional stability                | 05 |
| <b>ULTRASON® E 0510 C2TR AND ULTRASON® KR 4113</b><br>PESU with optimized tribological properties                             | 06 |
| <b>ULTRASON® E 2010 C6</b><br>PESU with 30% carbon fibers for better mechanical properties                                    | 08 |
| <b>ULTRASON® P 3010 AND ULTRASON® P 2010</b><br>Polyphenylsulfone (PPSU) with outstanding impact and stress cracking behavior | 09 |
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# Ultrason® E 2010 MR black HM

PESU with optimized heat management

## Typical applications

- Reflectors
- Housings
- Bezels for fog lamps

## Requirements

- Black or opaque color
- High surface quality
- Direct metallization possible

## Challenge

- Reduction of heat accumulation in small housings, reflectors or electronic devices

## Solution

- New black color with improved transparency to infrared and heat radiation
  - ▶ Ultrason® E 2010 MR black HM

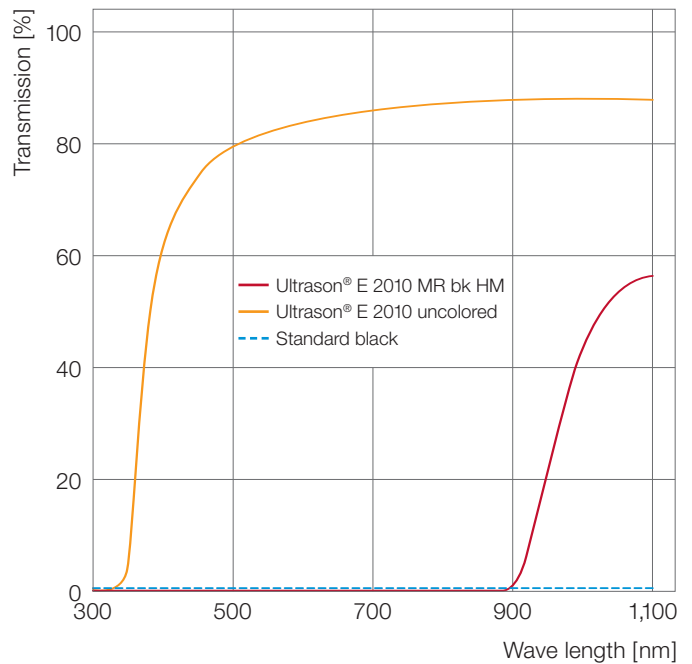


Fig. 1: Transmission of different color types

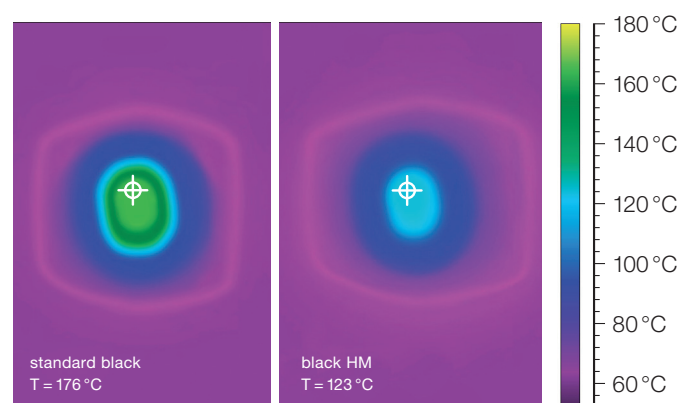
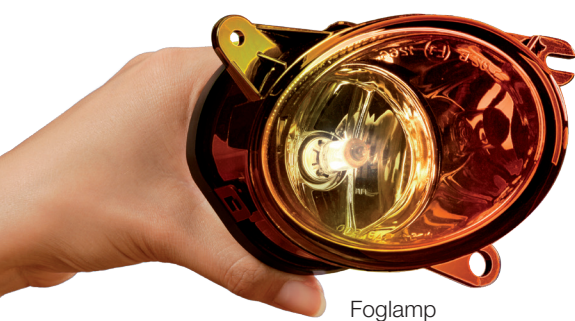


Fig. 2: Under equal test conditions, a significant lower heating-up effect is observed with Ultrason® E 2010 MR black HM than with standard black types. Plates: 2 mm thick; 20-watt halogen light bulb: heated up for 2 minutes; infrared temperature measurement: 10 seconds after removal of the heat source

# Ultrason® Dimension E 0510 G9 black 10112

Flowable PESU blend with outstanding dimensional stability

## Properties

- Outstanding stiffness due to 45% glass fibers
- Very good dimensional stability (Fig. 3)
- Ease of processing
- Inherent flame retardance  
(UL 94 rating of V0 acc. to own measurements)
- FDA approval (please contact [plastics.safety@basf.com](mailto:plastics.safety@basf.com) for further details)

## Potential applications

- Substitution of metal
- Substitution of expensive high-temperature thermoplastics (PEEK) for applications up to 200°C
- Parts in contact with hot oil

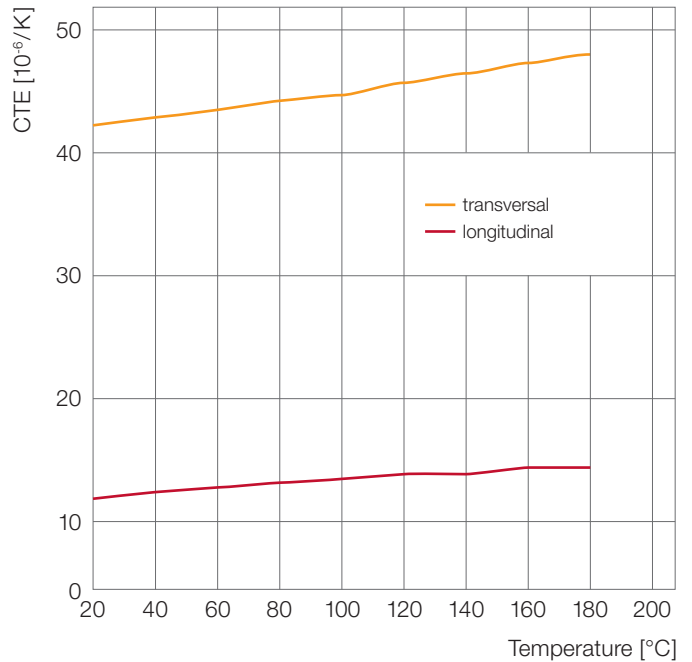


Fig. 3: The CTE (coefficient of thermal expansion) of Ultrason® Dimension is around the same as that of aluminum.

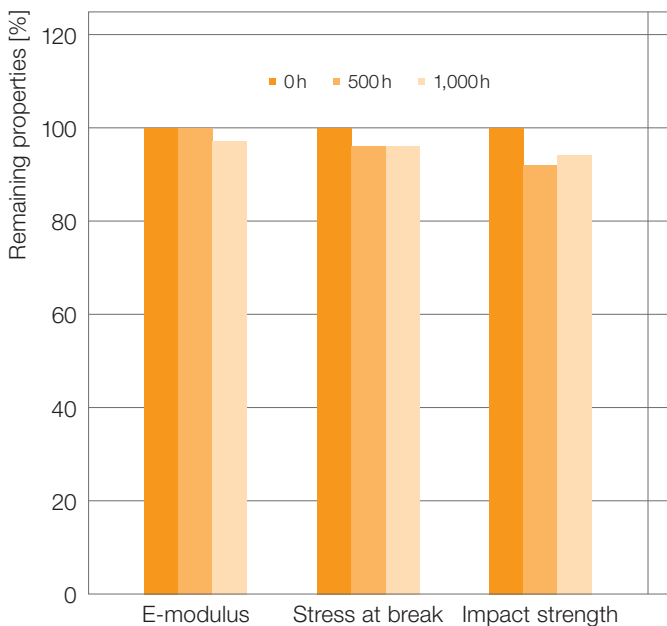


Fig. 4: Mechanical properties of Ultrason® Dimension after immersion in oil (ATF) at 140°C.

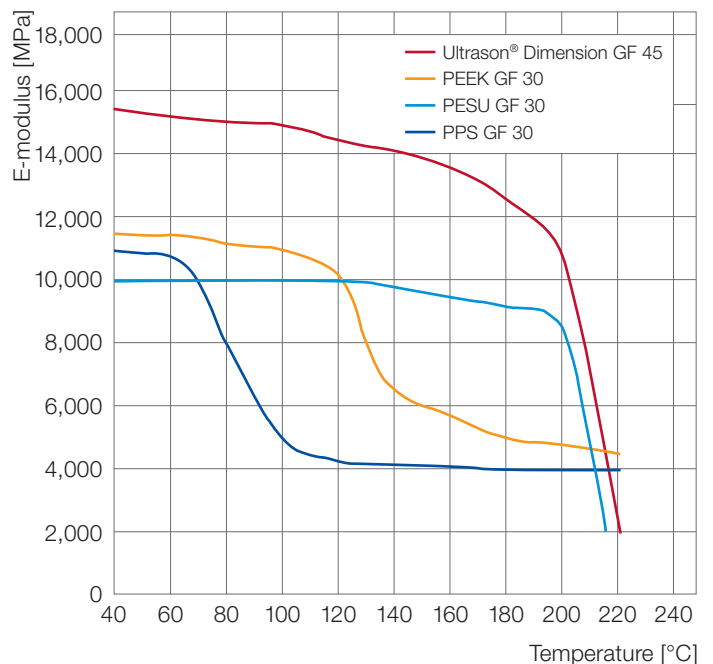


Fig. 5: The E-modulus of Ultrason® Dimension is above 10 GPa at 120°C.

# Ultrason® E 0510 C2TR and Ultrason® KR 4113

PESU with optimized tribological properties

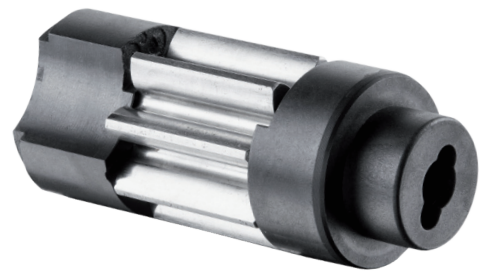
## Typical applications

- Oil control piston in standard automotive oil pumps
- Oil control piston in volume controlled automotive oil pumps

In competition with BMC and metal, the combination of

- superior tribological behavior
- excellent oil resistance
- low coefficient of thermal expansion

over the temperature range from -30 °C to 150 °C is the key factor for choosing Ultrason® with optimized tribological properties for this application.



Oil control piston

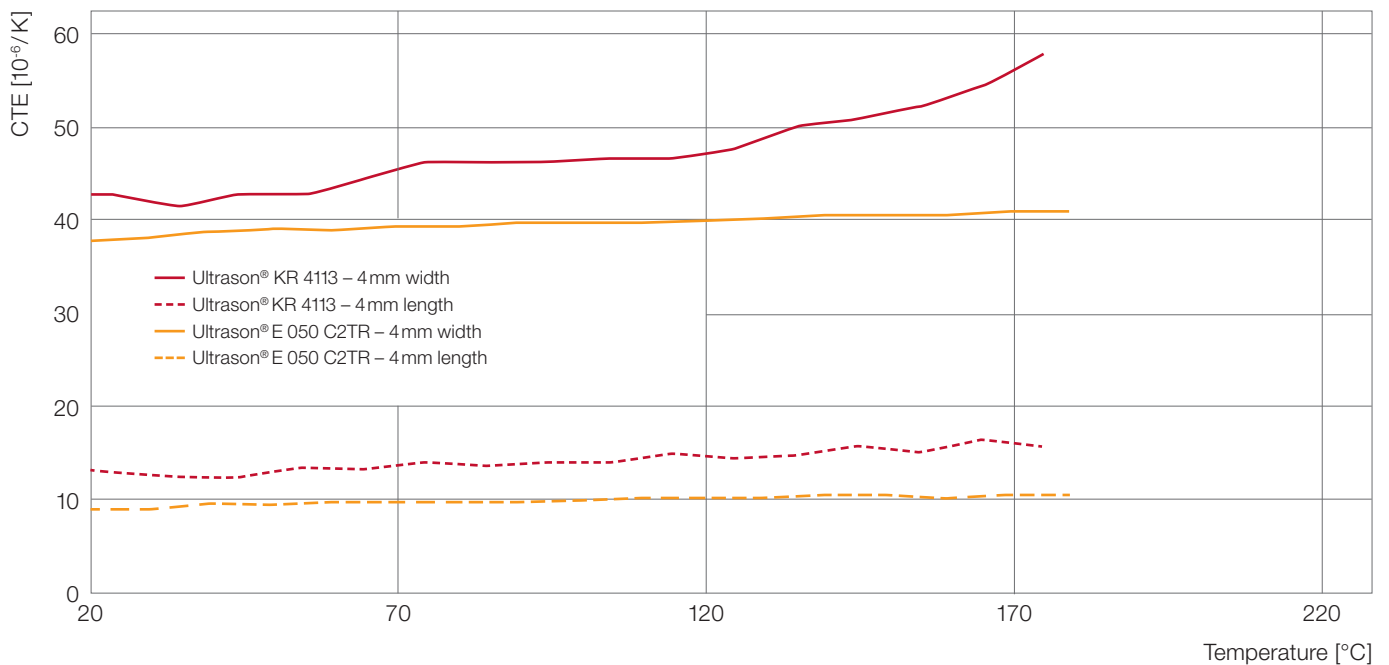
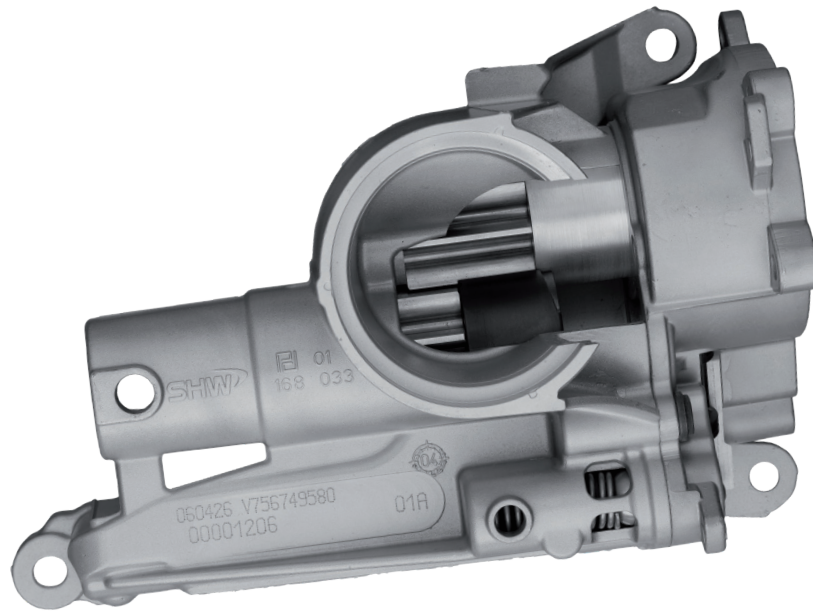


Fig. 6: Coefficient of thermal expansion for Ultrason® KR 4113 and Ultrason® E 0510 C2TR



Oil pump

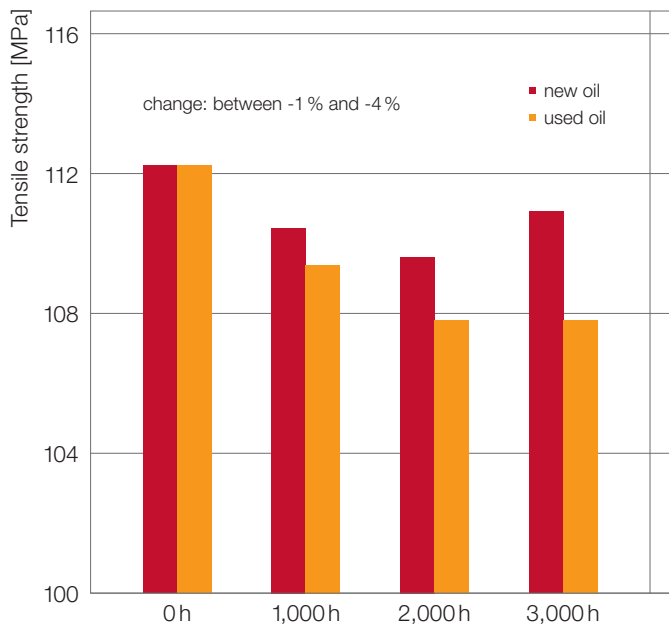


Fig. 7: Aging of Ultrason® KR 4113 at 150 °C in new and used oil

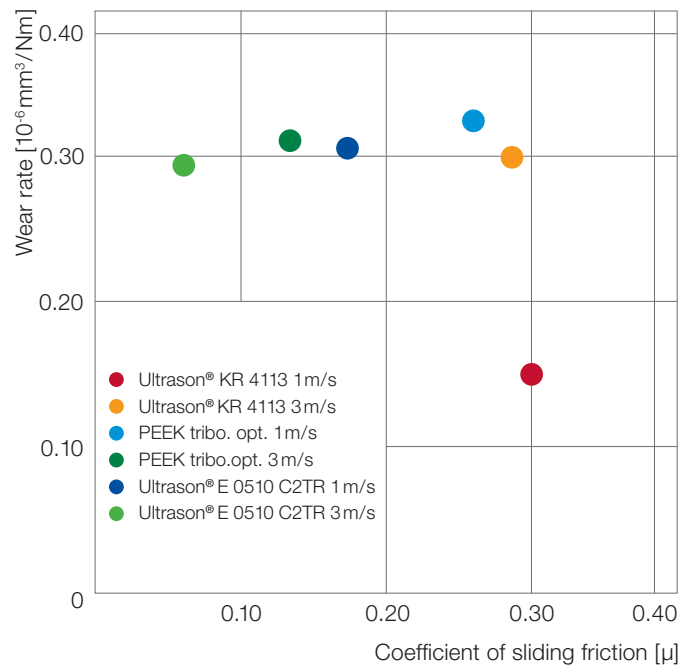


Fig. 8: Wear rate and coefficient of friction; block on ring (ASTM G137); contact pressure 6 MPa, counter body: 100Cr6 (1.3505), 60 HRC; dry sliding

# Ultrason® E 2010 C6

PESU with 30 % carbon fibers for better mechanical properties

## Carbon fibers and Ultrason® – two partners with outstanding properties

The combination of carbon fibers with the amorphous high-temperature plastic Ultrason® guarantees extraordinary mechanical properties for temperatures of up to 200 °C.

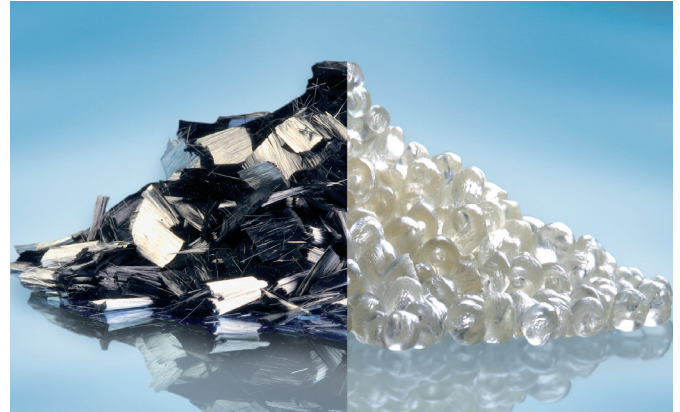
### Excellent properties

From -100 °C to +200 °C

- Very high stiffness
- Very constant mechanical properties
- Low and constant thermal expansion = dimensionally stable
- Excellent creep behavior

### Potential applications

- Substitution of metal, using the advantages of thermoplastic materials (e.g. realization of complex designs by injection molding)
- Substitution of PEEK for applications with a maximum use temperature of 200 °C (Fig. 9)
- Parts with antistatic requirements
- Parts with electrically conductive requirements



Carbon fibers (left) and Ultrason® granules (right)

| Features                                    | Ultrason® E 2010 C6 | PEEK CF 30 % |
|---|---------------------|--------------|
| Tensile modulus [GPa]                       | 22.0                | 24           |
| Stress at break [MPa]                       | 185                 | 232          |
| Charpy impact strength [kJ/m <sup>2</sup> ] | 40                  | 51.2         |
| Charpy impact notched [kJ/m <sup>2</sup> ]  | 7.5                 | 9.2          |
| HDT/A [°C]                                  | 225                 | > 250        |
| MVR 360 °C, 10 kg [cm <sup>3</sup> /10 min] | 15                  | 2.2          |
| MVR 400 °C, 10 kg [cm <sup>3</sup> /10 min] | 45                  | 5            |
| Volume resistance [Ω · cm]                  | 1.9                 | 160          |
| Surface resistance [Ω]                      | 10 <sup>3</sup>     | 40,000       |

Table 1: Characteristic features of Ultrason® E 2010 C6

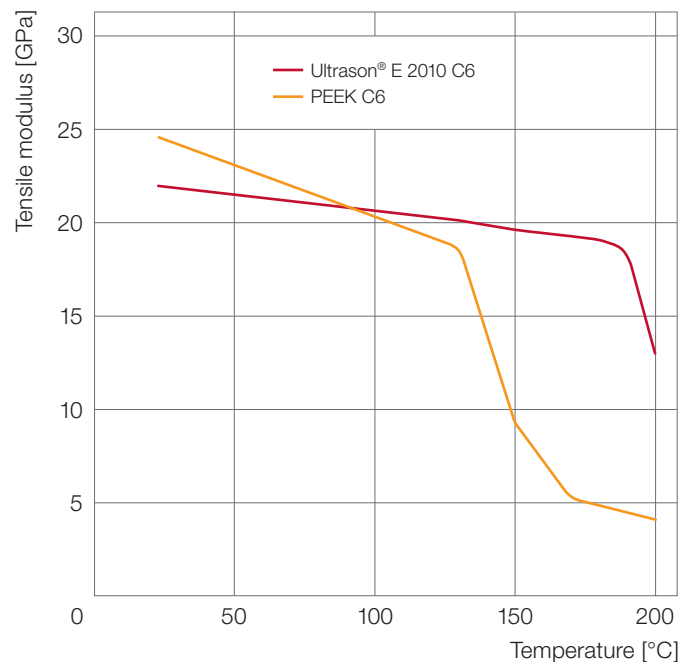


Fig. 9: Stiffness of Ultrason® E 2010 C6 in comparison to PEEK



# Ultrason® P 3010 and Ultrason® P 2010

Polyphenylsulfone (PPSU) with outstanding impact and stress cracking behavior

Extension to the Ultrason® product line: the amorphous high-temperature polymer PPSU, a polymer with outstanding impact and stress cracking behavior.

### Typical applications

- Sanitary and plumbing (e.g. fittings)
- Aviation (e.g. overhead bins, aircraft interior covering, trolley components)
- Catering (e.g. food trays, dairy farming)

### Requirements for these applications

- Compliancy with FDA and EU food contact regulations
- Approvals for drinking water contact
- Excellent resistance to superheated steam (134 °C)
- High toughness
- Excellent flame resistance
- Excellent heat resistance

| Features                                    | Ultrason® P 2010 | Ultrason® P 3010 |
|---|------------------|------------------|
| Tensile modulus [MPa]                       | 2,250            | 2,270            |
| Stress at yield [MPa]                       | 74               | 74               |
| Charpy impact strength [kJ/m <sup>2</sup> ] | n.b.             | n.b.             |
| Charpy impact notched [kJ/m <sup>2</sup> ]  | 65               | 70               |
| HDT/A [°C]                                  | 195              | 198              |
| MVR 360°C, 10 kg [cm <sup>3</sup> /10 min]  | 80               | 35               |

Table 2: Characteristic features of Ultrason® P 2010 and Ultrason® P 3010

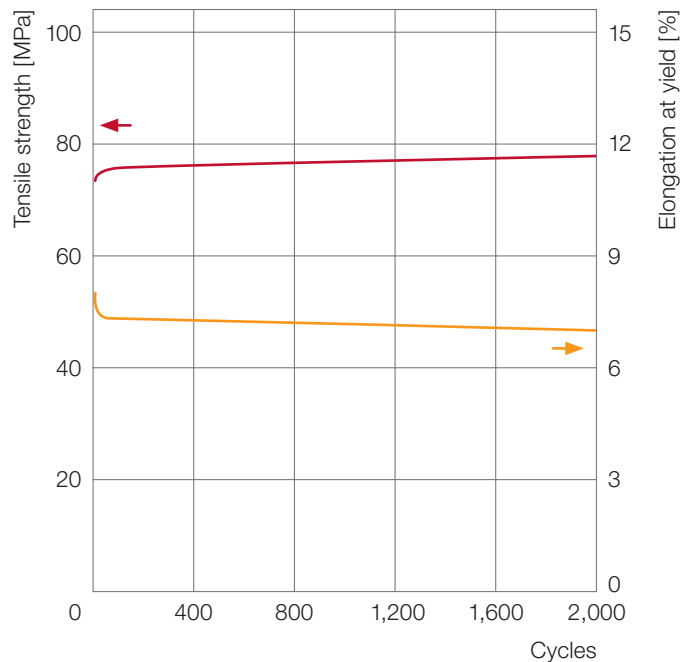


Fig. 10: Mechanical properties of Ultrason® P 3010 after steam sterilisation at 134 °C

# Ultrason® E 2020 P and Ultrason® E 2020 P SR

PESU for non-stick applications and structural resins



To enable faster and easier solving, Ultrason® E 2020 P SR is sold as small flakes

## Typical applications

### In non-stick applications and coatings as

- binder (e. g. for PTFE)
- coupling agent to metal surfaces
- chemically resistant coating component

### In composite applications as

- impact modifier: up to 30 % higher impact resistance
- viscosity adjustment (e. g. of epoxy resins)
- improved flame resistance

## Required property profile

- High Tg of 225 °C
- Limiting oxygen index (LOI): 38 %
- Soluble in NMP, DMAc, DMF etc.
- SR: OH-groups of total end groups > 50 % (typically >70 %)



Ultrason® E 2020 P and Ultrason®  
E 2020 P SR for non-stick coatings

# Ultrason® E 2010 HC

PESU with high clarity

## Properties

- Lower yellowness and higher optical purity in comparison to standard PESU
- Higher level of optical properties
- All other typical properties like standard Ultrason® E 2010

## Application fields

- Extruded films, e.g. as glass substitute for displays
- Transparent parts for in-process control, safety equipments and optical applications (e.g. visors, inspection glasses, lenses)



Visor of firefighter's helmet made of Ultrason® E 2010 HC

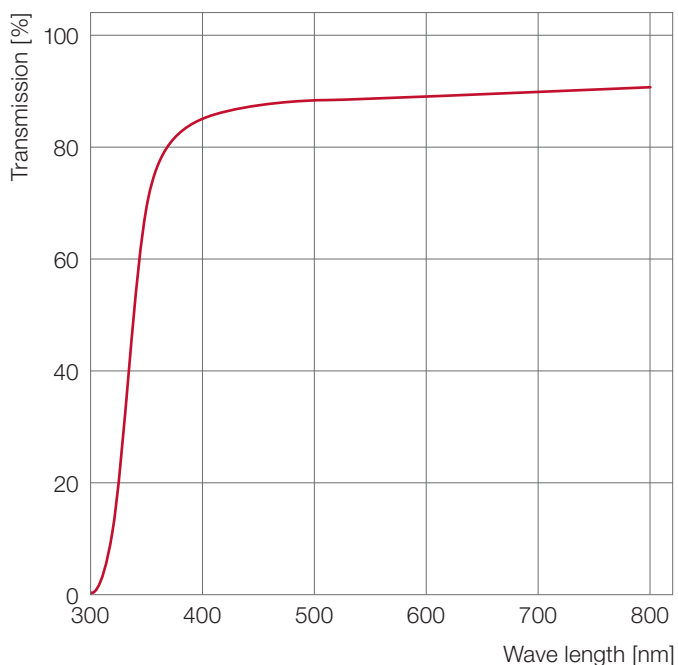


Fig. 11: Visible light transmission of Ultrason® E 2010 HC (film with 200 micron thickness)

# Nomenclature

## Structure

The nomenclature adopted for the products consists of an alphanumeric code, the key to which is given below. An appended "P" signifies that the product concerned is a specialty intended for the preparation of solutions.

### 1<sup>st</sup> digit (letter):

#### type of polymer

E = Polyethersulfone (PESU)

S = Polysulfone (PSU)

P = Polyphenylsulfone (PPSU)

### 2<sup>nd</sup> digit (number):

#### viscosity class

1 ... = low viscosity

6 ... = high viscosity

### 6<sup>th</sup> digit (letter):

#### reinforcements

G = glass fibers

C = carbon fibers

### 7<sup>th</sup> digit (number):

#### proportion of additives

2 = mass fraction of 10%

4 = mass fraction of 20%

6 = mass fraction of 30%

## Example

|                       |                       |                       |                       |                       |                       |                       |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>E</b>              | <b>2</b>              | <b>0</b>              | <b>1</b>              | <b>0</b>              | <b>G</b>              | <b>6</b>              |
| 1 <sup>st</sup> digit | 2 <sup>nd</sup> digit | 3 <sup>rd</sup> digit | 4 <sup>th</sup> digit | 5 <sup>th</sup> digit | 6 <sup>th</sup> digit | 7 <sup>th</sup> digit |

e. g. Ultrason® E 2010 G6

E = Polyethersulfon (PESU)

2 = of medium viscosity (standard injection-molding grade)

G6 = 30% by weight of glass fibers

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# For your notes

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## Selected Product Literature for Ultrason®:

- Ultrason® E, S, P – Product Brochure
- Ultrason® E, S, P – Product Range
- Ultrason® – Resistance to Chemicals
- Ultrason® – Products for the Automotive Industry
- Ultrason® – Injection Molding
- 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](http://www.ultrason.basf.com)**

### 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. (June 2022)

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[www.ultrason.basf.com](http://www.ultrason.basf.com)

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[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:**

