



The Chemical Company

Product Information

Ultrason[®] E and P

High Temperature Thermoplastics

BASF's Ultrason E and P resins are amorphous, high temperature-resistant, transparent thermoplastics based on polyethersulfone (PESU) and polyphenylsulfone (PPSU), respectively.

Ultrason polysulfones' key features are good dimensional stability over a wide temperature range, high stiffness, high mechanical strength, excellent hydrolysis resistance and very good fire, smoke, and toxicity (FST) behavior. Their extraordinary property spectrum allows them to be used in high-quality technical components and heavy-duty products. Ultrason E and P polysulfones can substitute for thermosets, such as epoxy and phenolic resins, other non-recyclable duromers, metals and ceramics. Ultrason resins can be processed with all the methods known for thermoplastics.

Features

- High long term use temperatures
- Chemical, fuel, and oil resistant at high temperatures
- Excellent surface quality
- High mechanical and dimensional stability
- Wear and impact resistance
- Excellent FST behavior

Available forms

- Unreinforced grades
- Micronized/functionalized powder
- Reinforced grades
- Foamed core material
- Sheet

Unique property spectrum

Ultrason P and E polysulfones exhibit a set of material properties which makes them unique among all thermoplastic polymers. They feature very high glass transition temperature (T_g) and heat deflection temperature (HDT) as well as very low coefficients of linear thermal expansion (CLTE). Their short term temperature resistances and long term usage temperatures are the highest among the amorphous high temperature thermoplastics. Due to inherent flame retardancy, materials made from Ultrason E and P polysulfones are in compliance with the stringent global regulatory requirements requiring low heat release, smoke generation, and toxic gas emissions.

While Ultrason E polyethersulfone exhibits the higher HDT and stiffness, Ultrason P PPSU excels in terms of low humidity uptake and balanced mechanical properties. Its toughness is best-in-class of all high temperature thermoplastics.

Physical and Chemical Properties of Unreinforced Ultrason E and P Polysulfones

Grade range	Ultrason E	Ultrason P
T _g , °C (°F)	225 (440)	220 (430)
HDT/B °C (°F)	218 (425)	214 (415)
CLTE, 10 ⁻⁴ /K (10 ⁻⁴ /°F)	0.52 (0.29)	0.55 (0.31)
Humidity Uptake, %	0.8	0.6
Limiting Oxygen Index (LOI), %	38 %	-
UL 94, B .../mm	V-0/1.6	V-0/1.6 ²
Tensile modulus, MPa (ksi)	2,700 (385)	2,270 (330)
Tensile strength @ yield, MPa (ksi)	90 (13.1)	75 (10.9)
Charpy impact notched, kJ/m ² (ft·lb/in ²)	7 (3.3)	65 (31)

Processing

Common processing methods for Ultrason polysulfones include, but are not limited to injection molding, extrusion, and thermoforming. Typical machining and postprocessing methods, such as laser, ultrasonic, and vibration welding, can also be utilized.

Use in aerospace applications

By virtue of their thermo-mechanical characteristics and favorable FST behavior, Ultrason E and P polysulfones are particularly suitable for aircraft applications. A broad selection of unreinforced and reinforced grades is available.

Ultrason E and P Unreinforced and Reinforced Grades

Unreinforced grades	Characteristics	Applications
Ultrason E 1010	Low (1010) and standard viscosity, easy flow grades for thin wall components	Injection molding components, foam, binder for tapes, rapid prototype parts
Ultrason E 2010		
Ultrason E 3010	Higher viscosity extrusion grade	Wall panels, seating components, electronic housings, skin for sandwich panels, meal cart components
Ultrason P 3010	Higher viscosity extrusion grade w/ superior toughness	
Ultrason E 2020 PSR Micro	Medium viscosity OH-terminated grade	Impact modifier for epoxy/carbon prepegs and coatings
Reinforced grades	Characteristics	Applications
Ultrason E 2010 G4 Ultrason E 2010 G6	Medium viscosity injection molding grades, 20% (G4) and 30% glass reinforced	Structural components, food service equipment
Ultrason E 2010 C6	30% short carbon filled injection molding grade	Seating and structural components
Ultrason LCF C6	30% long carbon filled grades	
Ultrason KR 4113	Low wear grades	Structural components

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Unreinforced Ultrason polysulfone grades are available with different viscosities for injection molding and extrusion processing. They cater to a variety of applications such as injection molded components, sidewall panels, galley cart components and skins for sandwich materials. They also are being used for rapid prototyping.

Due to its inherent heat resistance, Ultrason E PESU is suited as an impact modifier for high temperature epoxy resin. For ease of incorporation and compatibility, it is available as a micronized, hydroxy-terminated grade.

Reinforced grades are based on Ultrason E PESU and excel through their very high stiffness. Glass fiber and long carbon fiber reinforced sheets are materials of choice for seating and structural components.

A product line of foamed core materials has been developed based on Ultrason E PESU. The combination of lightweight characteristics, excellent mechanical properties and regulatory FST and heat release compliance predestines Ultrason foam for aircraft interior applications, in particular as a honeycomb replacement.

Regulatory Compliance

Ultrason polysulfones meet the strict requirements of the aerospace industry. For example, test panels made from Ultrason P 3010 PPSU are compliant with the heat release requirements as defined in JAR/FAR 25, App. F, Part IV & AITM 2.0006. Ultrason E 2010 PESU passes the criteria of the BSS 7230 F2 flammability test. Details are available upon request.

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