Ultrason® E, S, P (PESU, PSU, PPSU)

Product Range

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® E, S, P

Ultrason® E, S, P

Main features

- Temperature independent properties
- Very high long-term service temperatures
- Good dimensional stability
- High modulus
- High mechanical strength
- Good electrical insulation properties
- Good dielectrical properties
- Very good fire behaviour
- Superior hydrolysis resistance

Headlight bezel

Firefighter's helmet

Unreinforced grades

Ultrason® E 1010	Injection-molding grade of very low viscosity and good flowability
Ultrason® E 2010	Standard injection-molding grade of medium viscosity
Ultrason® E 2020 P	Polyethersulfone flakes of medium molecular weight, for solvent based processes
Ultrason® E 3010	High viscosity injection-molding and extrusion grade with improved toughness and chemical resistance (stress crack resistance)
Ultrason® E 6020 P	Polyethersulfone flakes of very high molecular weight and good solubility in typical solvents used, e.g., in the production of membranes or coatings
Ultrason® S 2010	Injection-molding grade of low viscosity and good flowability
Ultrason® S 3010	Medium viscosity injection-molding and extrusion grade with improved toughness and chemical resistance (stress crack resistance); with reduced oligomer content
Ultrason® S 6010	High viscosity injection-molding and extrusion grade with excellent chemical resistance (stress crack resistance) and good solubility in typical solvents (N-Methylpyrrolidone, Dimethyl-acetamide) used, e. g., in the production of membranes or coatings, with reduced oligomer content
Ultrason® P 2010	Low viscosity injection-molding and extrusion grade with superior toughness and chemical resistance, resistant against superheated steam
Ultrason® P 3010	High viscosity injection-molding and extrusion grade with superior toughness and chemical resistance (stress crack resistance), resistant against superheated steam

Reinforced grades

Ultrason® E 2010 G4	Medium viscosity injection-molding grade of high modulus and strength, reinforced with 20 % glass fiber
Ultrason® E 2010 G6	Medium viscosity injection-molding grade of high modulus and strength, reinforced with 30 % glass fiber
Ultrason® E 2010 C6	Medium viscosity injection-molding grade of extreme high modulus also at temperatures up to 200 °C
Ultrason® S 2010 G4	Low viscosity injection-molding grade of high modulus and strength, reinforced with 20 % glass fiber
Ultrason® S 2010 G6	Low viscosity injection-molding grade of high modulus and strength, reinforced with 30 % glass fiber

Table 1: Ultrason® commercial products

Bundle of hollow fibers

Ultrason® Grades

Unreinforced Ultrason® S grades

Typical values at 23 °C for uncolored products		Unit	Test method
Features			
Symbol		–	ISO 1043
Density, apparent density*		g/cm³	ISO 1183
Viscosity number [1]		cm³/g	ISO 1628
Water absorption, equilibrium in water at 23 °C		%	similar ISO 62
Moisture absorption, equilibrium 23 °C/50% r.H.		%	similar ISO 62
Processing			
Injection Molding (M), Extrusion (E), Blow Molding (B)		–	–
Glass transition temperature, DSC (10 °C/min)		°C	ISO 11357-1/-2
Melt volume rate MVR 360 °C/10 kg		cm³/10 min	ISO 1133
Melt temperature, injection molding		°C	–
Mold temperature, injection molding		°C	–
Molding shrinkage, in direction of flow		%	ISO 294
Molding shrinkage, perpendicular to flow		%	ISO 294
Fire behavior			
Burning behavior at 1.6 mm thickness		class	UL 94
Burning behavior at 3.2 mm thickness		class	UL 94
Mechanical properties			
Tensile modulus		MPa	ISO 527-2
Tensile stress at yield (v = 50 mm/min), stress at break* (v = 5 mm/min)		MPa	ISO 527-2
Elongation at yield (v = 50 mm/min), elongation at break* (v = 5 mm/min)		%	ISO 527-2
Charpy impact strength [2]	+23 °C	kJ/m²	ISO 179/1eU
Charpy impact strength [2]	-30 °C	kJ/m²	ISO 179/1eU
Charpy notched impact strength	+23 °C	kJ/m²	ISO 179/1eA
Charpy notched impact strength	-30 °C	kJ/m²	ISO 179/1eA
Izod notched impact strength	+23 °C	kJ/m²	ISO 180/A
Izod notched impact strength	-30 °C	kJ/m²	ISO 180/A
Ball intendation hardness H 358/30		MPa	ISO 2039-1
Ball intendation hardness H 961/30		MPa	ISO 2039-1
Thermal properties			
Heat deflection temperature 1.8 MPa (HDT/A)		°C	ISO 75-2
Temperature index (short cycle operations) [3]		°C	–
Relative temperature index related to 50% decrease of tensile strength after 20,000 h		°C	UL 746B
Coefficient of linear thermal expansion, longitudinal (23-80) °C		10^{-4}/K	ISO 11359-1/-2
Coefficient of linear thermal expansion, longitudinal 140/180 °C		10^{-4}/K	ISO 11359-1/-2
Electrical properties			
Relative permittivity (100 Hz/1 MHz)		–	IEC 62631-2-1
Dissipation factor (100 Hz/1 MHz)		E-4	IEC 62631-2-1
Volume resistivity		Ω · cm	IEC 62631-3-1
Surface resistivity		Ω	IEC 62631-3-2
Dielectric strength K20/K20		kV/mm	IEC 60243-1 3
Comparative tracking index, CTI, test liquid A		V	IEC 60112
Optical properties			
Refractive index (specimen thickness = 1 mm)		–	ISO 498
Light transmission (specimen thickness = 2 mm)		%	ASTM D 1003

Footnotes

[1] Viscosity number, solution 0.01 g/ml phenol/1,2-dichloro benzene (1:1)

[2] N = no break

[3] Empirical values determined on articles repeatedly subjected to the temperature concerned for several hours at a time over a period of several years on condition that the articles were properly designed and processed according to BASF recommendations.

[4] 4-point method, acc. ISO 3915

[5] BASF measurement

[6] Flakes with good solubility for coatings and membranes. This grade is not suitable for injection molding and extrusion.

S 2010	S 3010	S 6010
PSU	PSU	PSU
1.23	1.23	1.23
63	72	81
0.8	0.8	0.8
0.3	0.3	0.3
M, E, B	M, E, B	M, E
187	187	187
95	55	30
330-390	330-390	330-390
120-160	120-160	120-160
0.68	0.70	0.72
0.72	0.74	0.77
HB	HB	–
V-2	V-2	–
2,550	2,550	2,560
75	75	74
5.5	5.5	5.7
N	N	N
N	N	N
5.5	5.5	6
6	6	6.5
5.5	6	6
6	6.5	6.5
135	135	135
–	–	–
176	176	177
180	180	180
160	160	–
0.53	0.53	0.53
0.6/–	0.6/–	0.6/–
3.1/3.1	3.1/3.1	3.5/3.4
8/64	8/64	11/71
$> 10^{15}$	$> 10^{15}$	$> 10^{15}$
$> 10^{15}$	$> 10^{15}$	$> 10^{15}$
40	37	37
125	125	125
1.63	1.63	1.61
89	89	87

Ultrason® Grades

Unreinforced Ultrason® E grades

Typical values at 23 °C for uncolored products		Unit	Test method
Features			
Symbol		–	ISO 1043
Density, apparent density*		g/cm³	ISO 1183, ISO 60*
Viscosity number [1]		cm³/g	ISO 1628
Water absorption, equilibrium in water at 23 °C		%	similar ISO 62
Moisture absorption, equilibrium 23 °C/50% r.H.		%	similar ISO 62
Processing			
Injection Molding (M), Extrusion (E), Blow Molding (B)		–	–
Glass transition temperature, DSC (10 °C/min)		°C	ISO 11357-1/-2
Melt volume rate MVR 360 °C/10 kg		cm³/10 min	ISO 1133
Melt temperature, injection molding		°C	–
Mold temperature, injection molding		°C	–
Molding shrinkage, in direction of flow		%	ISO 294
Molding shrinkage, perpendicular to flow		%	ISO 294
Fire behavior			
Burning behavior at 1.6 mm thickness		class	UL 94
Burning behavior at 3.2 mm thickness		class	UL 94
Mechanical properties			
Tensile modulus		MPa	ISO 527-2
Tensile stress at yield (v = 50 mm/min), stress at break* (v = 5 mm/min)		MPa	ISO 527-2
Elongation at yield (v = 50 mm/min), elongation at break* (v = 5 mm/min)		%	ISO 527-2
Charpy impact strength [2]	+23 °C	kJ/m²	ISO 179/1eU
Charpy impact strength [2]	-30 °C	kJ/m²	ISO 179/1eU
Charpy notched impact strength	+23 °C	kJ/m²	ISO 179/1eA
Charpy notched impact strength	-30 °C	kJ/m²	ISO 179/1eA
Izod notched impact strength	+23 °C	kJ/m²	ISO 180/A
Izod notched impact strength	-30 °C	kJ/m²	ISO 180/A
Ball intendation hardness H 358/30		MPa	ISO 2039-1
Ball intendation hardness H 961/30		MPa	ISO 2039-1
Thermal properties			
Heat deflection temperature 1.8 MPa (HDT/A)		°C	ISO 75-2
Temperature index (short cycle operations) [3]		°C	–
Relative temperature index related to 50% decrease of tensile strength after 20,000 h		°C	UL 746B
Coefficient of linear thermal expansion, longitudinal (23-80) °C		10^{-4}/K	ISO 11359-1/-2
Coefficient of linear thermal expansion, longitudinal 140/180 °C		10^{-4}/K	ISO 11359-1/-2
Electrical properties			
Relative permittivity (100 Hz/1 MHz)		–	IEC 62631-2-1
Dissipation factor (100 Hz/1 MHz)		E-4	IEC 62631-2-1
Volume resistivity		Ω · cm	IEC 62631-3-1
Surface resistivity		Ω	IEC 62631-3-2
Dielectric strength K20/K20		kV/mm	IEC 60243-1 3
Comparative tracking index, CTI, test liquid A		V	IEC 60112
Optical properties			
Refractive index (specimen thickness = 1 mm)		–	–
Light transmission (specimen thickness = 2 mm)		%	ASTM D 1003

Footnotes

[1] Viscosity number, solution 0.01 g/ml phenol/1,2-dichloro benzene (1:1)

[2] N = no break

[3] Empirical values determined on articles repeatedly subjected to the temperature concerned for several hours at a time over a period of several years on condition that the articles were properly designed and processed according to BASF recommendations.

[4] 4-point method, acc. ISO 3915

[5] BASF measurement

[6] Flakes with good solubility for coatings and membranes. This grade is not suitable for injection molding and extrusion.

E 1010	E 2010	E 2020 P	E 3010	E 6020 P
PESU	PESU	PESU	PESU	PESU
1.37	1.37	0.23*	1.37	0.25*
48	56	56	66	81
2.2	2.2	–	2.2	–
0.8	0.8	1.0	0.8	1.0
M, E	M, E, B	[6]	M, E, B	[6]
222	225	225	228	228
150	70	–	34	–
340-390	340-390	–	350-390	–
140-180	140-180	–	140-180	–
0.79	0.82	–	0.85	–
0.82	0.86	–	0.90	–
V-1	V-0	–	V-0	–
V-0	V-0	–	V-0	–
2,650	2,640	2,650	2,630	2,650
85	86	85	85	85
6.8	6.9	6.9	6.9	6.9
N	N	–	N	–
N	N	–	N	–
6.5	7.5	–	8	–
6.5	8	–	8	–
6.5	7.5	–	8	–
7	8	–	8	–
154	154	–	154	–
–	–	–	–	–
203	205	205	208	207
220	220	–	220	–
190	180	–	180	–
0.52	0.52	–	0.52	–
–/0.59	–/0.59	–	–/0.59	–
3.9/3.8	3.9/3.8	–	3.9/3.8	–
17/140	17/140	–	17/140	–
$> 10^{15}$	$> 10^{15}$	–	$> 10^{15}$	–
$> 10^{15}$	$> 10^{15}$	–	$> 10^{15}$	–
37	37	–	34	–
125	125	–	125	–
1.65	1.63	–	1.65	–
88	88	–	88	–

Ultrason® Grades

Unreinforced Ultrason® P grades

Typical values at 23 °C for uncolored products		Unit	Test method
Features			
Symbol		–	ISO 1043
Density, apparent density*		g/cm³	ISO 1183
Viscosity number [1]		cm³/g	ISO 1628
Water absorption, equilibrium in water at 23 °C		%	similar ISO 62
Moisture absorption, equilibrium 23 °C/50% r.H.		%	similar ISO 62
Processing			
Injection Molding (M), Extrusion (E), Blow Molding (B)		–	–
Glass transition temperature, DSC (10 °C/min)		°C	ISO 11357-1/-2
Melt volume rate MVR 360 °C/10 kg		cm³/10 min	ISO 1133
Melt temperature, injection molding		°C	–
Mold temperature, injection molding		°C	–
Molding shrinkage, in direction of flow		%	ISO 294
Molding shrinkage, perpendicular to flow		%	ISO 294
Fire behavior			
Burning behavior at 1.6 mm thickness		class	UL 94
Burning behavior at 3.2 mm thickness		class	UL 94
Mechanical properties			
Tensile modulus		MPa	ISO 527-2
Tensile stress at yield (v = 50 mm/min), stress at break* (v = 5 mm/min)		MPa	ISO 527-2
Elongation at yield (v = 50 mm/min), elongation at break* (v = 5 mm/min)		%	ISO 527-2
Charpy impact strength [2]	+23 °C	kJ/m²	ISO 179/1eU
Charpy impact strength [2]	-30 °C	kJ/m²	ISO 179/1eU
Charpy notched impact strength	+23 °C	kJ/m²	ISO 179/1eA
Charpy notched impact strength	-30 °C	kJ/m²	ISO 179/1eA
Izod notched impact strength	+23 °C	kJ/m²	ISO 180/A
Izod notched impact strength	-30 °C	kJ/m²	ISO 180/A
Ball intendation hardness H 358/30		MPa	ISO 2039-1
Ball intendation hardness H 961/30		MPa	ISO 2039-1
Thermal properties			
Heat deflection temperature 1.8 MPa (HDT/A)		°C	ISO 75-2
Temperature index (short cycle operations) [3]		°C	–
Relative temperature index related to 50% decrease of tensile strength after 20,000 h		°C	UL 746B
Coefficient of linear thermal expansion, longitudinal (23-80) °C		10^{-4}/K	ISO 11359-1/-2
Coefficient of linear thermal expansion, longitudinal 140/180 °C		10^{-4}/K	ISO 11359-1/-2
Electrical properties			
Relative permittivity (100 Hz/1 MHz)		–	IEC 62631-2-1
Dissipation factor (100 Hz/1 MHz)		E-4	IEC 62631-2-1
Volume resistivity		Ω · cm	IEC 62631-3-1
Surface resistivity		Ω	IEC 62631-3-2
Dielectric strength K20/K20		kV/mm	IEC 60243-1 3
Comparative tracking index, CTI, test liquid A		V	IEC 60112
Optical properties			
Refractive index (specimen thickness = 1 mm)		–	–
Light transmission (specimen thickness = 2 mm)		%	ASTM D 1003

Footnotes

[1] Viscosity number, solution 0.01 g/ml phenol/1,2-dichloro benzene (1:1)

[2] N = no break

[3] Empirical values determined on articles repeatedly subjected to the temperature concerned for several hours at a time over a period of several years on condition that the articles were properly designed and processed according to BASF recommendations.

[4] 4-point method, acc. ISO 3915

[5] BASF measurement

[6] Flakes with good solubility for coatings and membranes. This grade is not suitable for injection molding and extrusion.

P 2010	P 3010
PPSU	PPSU
1.29	1.29
60	71
1.2	1.2
0.6	0.6
M, E, B	M, E
216	220
84	34
350-390	350-390
140-180	140-180
0.90	0.90
1.00	1.00
V-0	V-0[5)]
–	V-0[5)]
2,300	2,250
74	74
7.5	7.8
N	N
N	N
65	70
25	50
50	58
23	45
135	124
–	–
194	197
–	–
–	–
0.54	0.55
–/0.59	–/0.63
5.7/5.6	3.8/3.7
6/55	17/89
$> 10^{13}$	$> 10^{15}$
$> 10^{14}$	$> 10^{15}$
44	44
150	150
–	–
–	–

Ultrason® Grades

Reinforced grades

Typical values at 23 °C for uncolored products		Unit	Test method
Features			
Symbol		–	ISO 1043
Density, apparent density*		g/cm³	ISO 1183
Viscosity number [1]		cm³/g	ISO 1628
Water absorption, equilibrium in water at 23 °C		%	similar ISO 62
Moisture absorption, equilibrium 23 °C/50 % r. H.		%	similar ISO 62
Processing			
Injection Molding (M), Extrusion (E), Blow Molding (B)		–	–
Glass transition temperature, DSC (10 °C/min)		°C	ISO 11357-1/-2
Melt volume rate MVR 360 °C/10 kg		cm³/10 min	ISO 1133
Melt temperature, injection molding		°C	–
Mold temperature, injection molding		°C	–
Molding shrinkage, in direction of flow		%	ISO 294
Molding shrinkage, perpendicular to flow		%	ISO 294
Fire behavior			
Burning behavior at 1.6 mm thickness		class	UL 94
Burning behavior at 3.2 mm thickness		class	UL 94
Mechanical properties			
Tensile modulus		MPa	ISO 527-2
Tensile stress at yield (v = 50 mm/min), stress at break* (v = 5 mm/min)		MPa	ISO 527-2
Elongation at yield (v = 50 mm/min), elongation at break* (v = 5 mm/min)		%	ISO 527-2
Charpy impact strength [2]	+23 °C	kJ/m²	ISO 179/1eU
Charpy impact strength [2]	-30 °C	kJ/m²	ISO 179/1eU
Charpy notched impact strength	+23 °C	kJ/m²	ISO 179/1eA
Charpy notched impact strength	-30 °C	kJ/m²	ISO 179/1eA
Izod notched impact strength	+23 °C	kJ/m²	ISO 180/A
Izod notched impact strength	-30 °C	kJ/m²	ISO 180/A
Ball intendation hardness H 358/30		MPa	ISO 2039-1
Ball intendation hardness H 961/30		MPa	ISO 2039-1
Thermal properties			
Heat deflection temperature 1.8 MPa (HDT/A)		°C	ISO 75-2
Temperature index (short cycle operations) [3]		°C	–
Relative temperature index related to 50 % decrease of tensile strength after 20,000 h		°C	UL 746B
Coefficient of linear thermal expansion, longitudinal (23-80) °C		10^{-4}/K	ISO 11359-1/-2
Coefficient of linear thermal expansion, longitudinal 140/180 °C		10^{-4}/K	ISO 11359-1/-2
Electrical properties			
Relative permittivity (100 Hz/1 MHz)		–	IEC 62631-2-1
Dissipation factor (100 Hz/1 MHz)		E-4	IEC 62631-2-1
Volume resistivity		Ω · cm	IEC 62631-3-1
Surface resistivity		Ω	IEC 62631-3-2
Dielectric strength K20/K20		kV/mm	IEC 60243-1 3
Comparative tracking index, CTI, test liquid A		V	IEC 60112
Optical properties			
Refractive index (specimen thickness = 1 mm)		–	ISO 489
Light transmission (specimen thickness = 2 mm)		%	ASTM D 1003

Footnotes

[1] Viscosity number, solution 0.01 g/ml phenol/1,2-dichloro benzene (1:1)

[2] N = no break

[3] Empirical values determined on articles repeatedly subjected to the temperature concerned for several hours at a time over a period of several years on condition that the articles were properly designed and processed according to BASF recommendations.

[4] 4-point method, acc. ISO 3915

[5] BASF measurement

[6] Flakes with good solubility for coatings and membranes. This grade is not suitable for injection molding and extrusion.

S 2010 G4	S 2010 G6	E 2010 G4	E 2010 G6	E 2010 C6
PSU-GF20	PSU-GF30	PESU-GF20	PESU-GF30	PESU-CF30
1.38	1.46	1.50	1.59	1.47
63	63	56	56	56
0.7	0.6	1.6	1.6	1.7
0.2	0.2	0.6	0.6	0.6
M, E	M, E	M, E	M, E	M, E
187	187	225	225	225
47	35	29	25	15
350-390	350-390	350-390	350-390	350-390
130-180	130-180	150-190	150-190	150-190
0.31	0.29	0.36	0.28	0.15
0.52	0.46	0.61	0.58	0.35
V-1	V-1	V-0	V-0	V-0[5)]
V-0	V-0	V-0	V-0	V-0[5)]
6,600	9,000	6,900	9,800	21.200
115*	130*	130*	155*	180*
2.9*	3.0*	3.2*	2.3*	1.4*
50	45	60	60	39
60	50	65	65	39
9	9	8	10	7
8	9	8	9.5	6
8.5	9	8	10	8.5
8.5	9	8	9.5	7.5
–	–	–	–	–
170	193	205	224	227
184	184	222	222	225
180	180	220	220	220
160	160	180	190	–
0.26	0.20	0.20	0.15	0.04
0.28/–	0.25/–	–/0.23	–/0.17	–/0.04
3.5/3.5	3.7/3.7	4.2/4.2	4.3/4.3	–
10/60	10/60	20/100	20/100	–
$> 10^{15}$	$> 10^{15}$	$> 10^{15}$	$> 10^{15}$	1.9[4)]
$> 10^{15}$	$> 10^{15}$	$> 10^{15}$	$> 10^{15}$	10^{3}
46	45	37	37	–
125	125	125	125	–
–	–	–	–	–
–	–	–	–	–

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.

1st digit (letter):
type of polymer
E = Polyethersulfone (PESU)
S = Polysulfone (PSU)
P = Polyphenylensulfone (PPSU)

2nd digit (number):
viscosity class
1 … = low viscosity
6 … = high viscosity

6th digit (letter):
reinforcements
G = glass fibers
C = carbon fibers

7th digit (number):
proportion of additives
2 = mass fraction of 10 %
4 = mass fraction of 20 %
6 = mass fraction of 30 %

Example

E	2	0	1	0	G	6
1st digit	2nd digit	3rd digit	4th digit	5th digit	6th digit	7th 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

Membranes

Selected Product Literature for Ultrason®:

- Ultrason® E, S, P – Product Brochure
- Ultrason® – Injection molding
- Ultrason® – Resistance to Chemicals
- Ultrason® – Products for the automotive industry
- Ultrason® – Special Products
- Ultrason® – Membrane Applications
- From the Idea to Production – The Aqua® Plastics Portfolio for the Sanitary and Water Industries
- Stylish, durabel 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

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. (September 2025)

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:
plas.com@basf.com

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