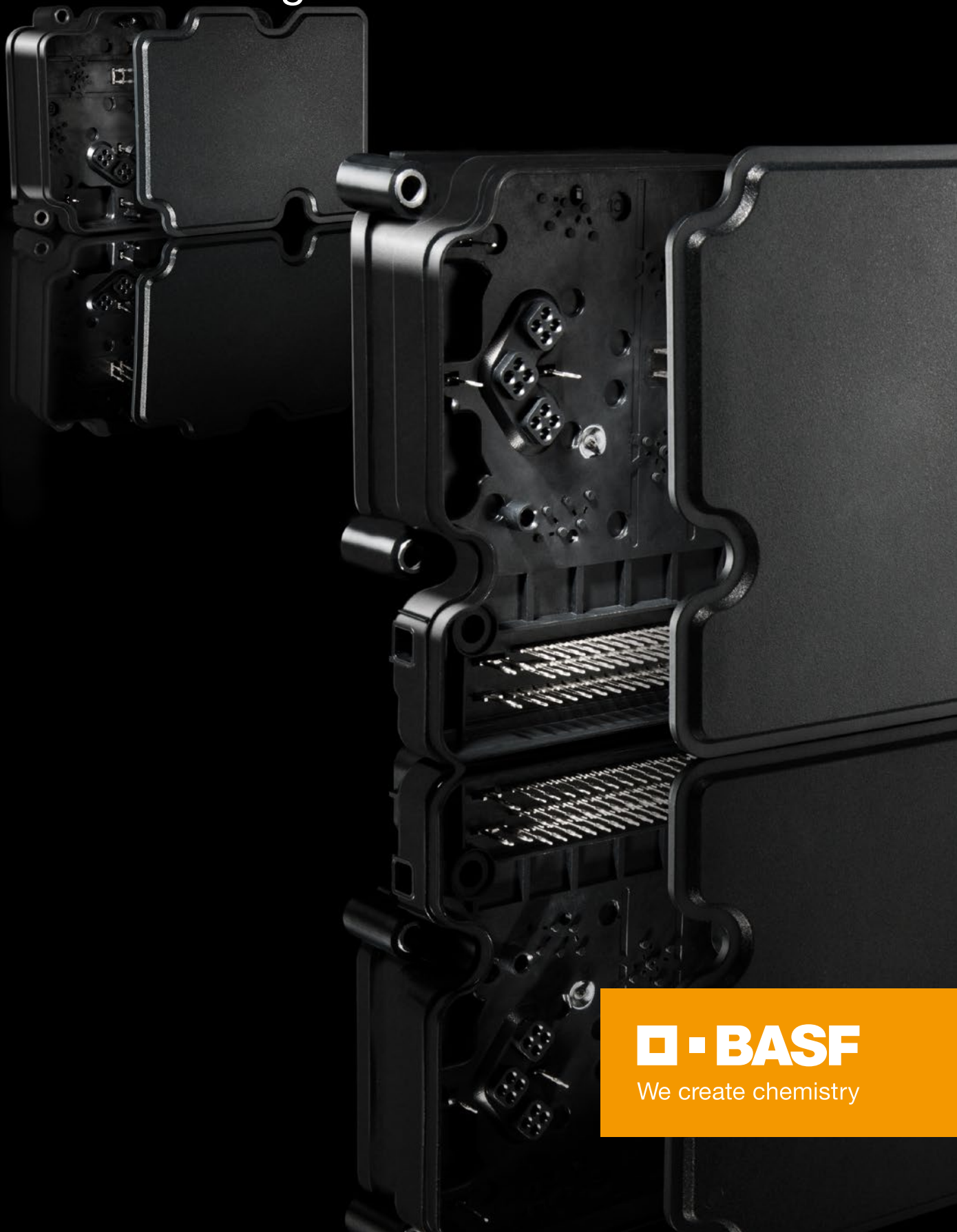


# Ultradur® (PBT)

Product Range



 **BASF**

We create chemistry

## Ultradur® (PBT)

Ultradur® is BASF's trade name for its line of partially crystalline saturated polyesters. This line is based on polybutylene terephthalate and is employed in applications demanding a high performance level such as load bearing parts in different industrial sectors. Ultradur® is outstanding for its high rigidity and strength, very good dimensional stability, low water absorption and high resistance to many chemicals. Moreover, Ultradur® exhibits exceptional resistance to weathering and excellent heat aging behavior.

# Ultradur® (PBT)

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# Overview Product Portfolio

## Unreinforced grades

B1520 FC R01 B1523 FC R01	Very easy-flowing injection-molding grade for thin-walled packaging with food contact and reduced THF emission.
B2550/B2550 FC	Easy-flowing grade for coating paper and board with high heat resistance, for example for packaging of frozen goods and ready-prepared meals. Also suitable for injection-molding applications with demands on the flowability and for the manufacture of fibers in the spinning process.
B4500/B4500 FC B4520 B4520 FC Aqua®	Medium-viscosity grade for manufacturing thin-walled profiles and pipes. The grade is also suitable for the manufacture of industrial functional parts in injection-molding.
B4560	Medium viscosity injection-molding grade with good processability for technical components in the automotive sector, such as headlamp housings. Suitable for direct metallizing.

## Grades with high viscosity

B6550/B6550 FC B6550 L/B6550 LN B6550 LNX B6551 LNI	Unreinforced, highly viscous grades for extrusion of jacketing of fiber optic cables as well as plates, semi-finished products for shape-cutting, profiles and tubes.
B6560M2 FC TF	Highly viscous grade with 10% mineral content, suitable for the production of films which can be processed via thermoforming.

## Reinforced grades

B4300 G2/G4/G6/G10	Injection-molding grades with 10% to 50% glass fibers, for industrial parts, rigid, tough and dimensionally stable, for example for thermostat parts, small-motor housings for vehicles, headlamp frames, cams, windshield wiper arms, plug-in connectors, housings, consoles, contact mounts and covers.
B4040G4/G6/G10	Injection-molding grades with 10% to 50% glass fibers for industrial parts with excellent surface quality, for example for door handles in vehicles, sunroof frames, oven door handles, toaster casings, exterior mirrors, rear screen wiper arms in vehicles and sunroof wind deflectors.
B4300C3	Injection-molding grade with 15% carbon fiber content, for technical components, durably antistatic, electrically conductive, e.g. for components of measurement and control devices, components in explosion-proof areas, automotive sensors.
S4090G2/G4/G6	Low-warpage, easy flowing injection-molding grades with 10% to 30% glass fibers for industrial parts with high dimensional stability requirements, for example for plug-in connectors and housings.
S4090GX/G4X/G6X	Low-warpage, easy-flowing injection-molding grades with very good processing properties, with 14% to 30% glass fibers, for industrial parts with high dimensional stability requirements, for example for internal applications for vehicles, plug-in connectors and housings.

## Grades with excellent flowability

B4520 High Speed B4300G2/G3/G4/G6 High Speed	Easy-flowing injection-molding grades with 10% to 30% glass fibers, for industrial parts, rigid, tough and dimensionally stable, for example for housings, consoles, plug-in connectors, contact carriers and covers.
S4090G4/G6 High Speed	Low-warpage, easy-flowing injection-molding grades with 20% or 30% glass fibers for industrial parts with high dimensional stability requirements, for example for internal applications for vehicles, plug-in connectors and housings.

## Impact-modified grades

B4340ZG2 High Speed B4340ZG3	Impact-modified injection-molding grade with 10% or 15% glass fibers and high creep resistance. For technical parts such as automotive connectors.
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## Grades with very low distortion

B4300K4/K6	Injection-molding grades with 20% to 30% glass beads for industrial parts with low warpage, for example precision parts for optical instruments, chassis, housings (including gas meter housings).
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B4300M5	Mineral-reinforced injection-molding grades for rigid parts with good surface quality and low warpage, for example central automotive door locks, housings and visible parts of domestic appliances.
B4300GM42	Mixed glass-fiber reinforced and mineral-reinforced injection-molding grade with good surface quality and rigidity and with low warpage for parts such as housings and printed circuit boards.
<b>Flame-retardant grades</b>	
B4406 unreinforced B4406G2/G4/G6	Flame-retardant injection-molding grades, unreinforced or with 10 % to 30 % glass fibers, for parts requiring enhanced flame-retardance, for example plug-in connectors and housings, coil formers and lighting components.
B4406G6 High Speed	Easy-flowing injection-molding grade with 30 % glass-fiber content, with flame-retardant properties, for components that require enhanced flame-retardance, e.g. plug-in connectors and housings, coil formers and lighting components.
B4441G5	Halogen-free flame-retardant injection-molding grade with 25 % of glass fibers for parts requiring enhanced flame-retardance. Specially optimized for the filament requirements of IEC 60335 for increased tracking resistance, for example for plug-in connectors, switch parts and housings for domestic appliances.
B4450G5	Halogen-free flame-retardant injection-molding grade with 25 % glass fibers for parts requiring enhanced flame-retardance as well as maximum tracking resistance, for example for plug-in connectors, switch parts or housings for power electronics.
B4450G5 HR	Halogen-free flame-retardant injection-molding grade with 25 % glass fibers for parts requiring enhanced flame-retardance as well as maximum tracking resistance and additionally meeting the requirements in terms of hydrolysis stability.
<b>Reinforced grades with outstanding hydrolysis resistance</b>	
B4330G3 HR B4335G3 HR High Speed B4330G6 HR B4330G6 HR High Speed	Impact-modified injection-molding grade with 15 % or 30 % glass fibers, for industrial parts with increased demands on the hydrolysis stability with increased resistance to alkaline solutions, for example for housings and plug-in connectors in the engine compartment.
B4331G6 HR	Impact-modified injection-molding grade with 30 % glass fibers and optimized processing behavior. For technical components with increased hydrolysis stability requirements and increased resistance to alkaline solutions, for example for housings and plug-in connectors in the engine compartment.
B4300G6 HR LT	Injection-molding grade with 30 % glass fibers, for industrial parts with increased demands on the hydrolysis stability, for example for housings and plug-in connectors in the engine compartment. Laser-weldable grades with 20 % or 30 % glass fibers; specified transparency for radiation in the near infrared area (800-1100 nm), e.g. of Nd:YAG or diode lasers.
B4331C3 HR	Impact-modified injection-molding grade with 15 % carbon fiber content, for technical components with increased hydrolysis-stability requirements, durably antistatic, electrically conductive, e.g. for components of measurement and control devices, components in explosion-proof areas, automotive sensors.
<b>Reinforced grades with particularly high laser transparency for laser welding</b>	
LUX B4300G4/G6	Highly laser-weldable grades with 20 % or 30 % glass fibers; particularly high specified transparency for radiation in the near infrared area (800-1100 nm), e.g. of Nd:YAG or diode lasers.
<b>Grades with special properties</b>	
LS	Laser-markable products; can be marked with a Nd:YAG laser (1064 nm).
LT	Laser-transparent grades with specified laser transparency; for radiation in the near infrared area (800-1100 nm), e.g. of Nd:YAG or diode lasers.
FC/FC Aqua®	Products suitable for use in drinking water and/or food contact. They meet the regulatory requirements for the corresponding areas of use.
PRO	Products which meet the regulatory requirements in particular in the area of medical devices, such as insulin pens or inhalers.

We also offer further products with special properties or for special applications. For more information on products with a special finish, please contact the Ultra-Infopoint.

# Ultradur® Grades

## Unreinforced grades

Typical values at 23 °C for uncolored products	Unit	Test method	B1520 FC R01
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT
Colors: uncolored (UN), black (BK)	–	–	UN
Density	kg/m <sup>3</sup>	ISO 1183	1,310
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	88
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.5
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.25
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250/2.16	cm <sup>3</sup> /10 min	ISO 1133	110
Melt volume rate MVR 275/2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 260/5	cm <sup>3</sup> /10 min	ISO 1133	
Melt temperature range, injection-molding	°C	–	260-280
Mold temperature range, injection-molding	°C	–	20-60
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	1.90/1.80
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	
Flammability (thickness)	class (mm)	IEC 60695-11-10	
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	2,500
Tensile stress at yield (v=50mm/min), stress at break* (v=5mm/min)	MPa	ISO 527-1/-2	58
Strain at yield (v=50mm/min)	%	ISO 527-1/-2	4
Nominal strain at break (v=50mm/min), strain at break* (v=5mm/min)	%	ISO 527-1/-2	12
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	
Flexural strength	MPa	ISO 178	
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	130
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	3
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	
Ball indentation hardness H 358 N/30 sec, H 961 N/30 sec*	MPa	ISO 2039-1	
<b>Thermal properties</b>			
Heat deflection temperature under 1.8MPa (HDT/A)	°C	ISO 75-1/-2	55
Heat deflection temperature under 0.45MPa (HDT/B)	°C	ISO 75-1/-2	150
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	
Specific heat capacity (23 °C)	J/(kg·K)		1,150
<b>Electrical properties</b>			
Dielectric constant at 100 Hz/1 MHz	–	IEC 60250	
Dissipation factor at 100 Hz/1 MHz	10 <sup>-4</sup>	IEC 60250	
Volume resistivity	Ω·m	IEC 60093	
Surface resistivity	Ω	IEC 60093	
Comparative tracking index CTI, test solution A	–	IEC 60112	
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

B1523 FC R01	B2500	B4500	B4520	B4560
PBT	PBT	PBT	PBT	PBT
UN	UN	UN	UN/SW	SW
1,300	1,300	1,300	1,300	1,300
100	107	130	130	112
	0.5	0.5	0.5	0.5
	0.25	0.25	0.25	0.25
224	223	223	223	223
90	45	21	21	35
260-280	245-275	250-275	250-275	230-275
20-60	40-70	40-70	40-70	40-70
		230-260		
2.04/2.22	1.60/1.90	1.60/1.90	1.50/1.70	1.31/1.64
		HB (≥ 0.8mm)	HB (≥ 0.8mm)	
	HB (≥ 0.8mm)			HB (≥ 1.5mm)
1,600	2,500	2,500	2,500	2,600
43	57	55	55	60
10	3.7	3.7	3.7	3.7
20	35	>50	>50	30
	1,100	1,200	1,200	
1,650		2,300	2,400	2,600
60		85	85	90
225	250	N	N	140
	120	180	180	85
5	4.1	5.2	5	3.8
	4	4	3	4.9
	130	130	130	
53	65	65	55	60
145	165	165	165	135
	200	200	200	160
			135/145	
	110/110		110/ –	115/115
	0.27	0.27	0.27	0.27
1,450	1,250	1,250	1,250	
	3.3/3.3	3.3/3.3	3.4/3.3	3.4/3.3
	13/200	10/200	20/200	20/200
	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>
	500	550	550	550

# Ultradur® Grades

## Grades with high viscosity

Typical values at 23 °C for uncolored products	Unit	Test method	B6550
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT
Colors: uncolored (UN), black (BK)	–	–	UN
Density	kg/m <sup>3</sup>	ISO 1183	1,300
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	160
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.5
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.25
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	9.5
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10 min	ISO 1133	
Melt temperature range, injection-molding	°C	–	250-275
Mold temperature range, injection-molding	°C	–	40-80
Melt temperature range, extrusion	°C	–	230-260
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	1.70/2.10
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	
Flammability (thickness)	class (mm)	IEC 60695-11-10	HB (≥ 0.8 mm)
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	2,400
Tensile stress at yield (v=50 mm/min), stress at break* (v=5 mm/min)	MPa	ISO 527-1/-2	54
Strain at yield (v=50 mm/min)	%	ISO 527-1/-2	3.5
Nominal strain at break (v=50 mm/min), strain at break* (v=5 mm/min)	%	ISO 527-1/-2	>50
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	1,100
Flexural modulus	MPa	ISO 178	2,500
Flexural strength	MPa	ISO 178	85
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	N
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	250
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	6.1
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	
Ball indentation hardness H 358 N/30 sec, H 961 N/30 sec*	MPa	ISO 2039-1	130
<b>Thermal properties</b>			
Heat deflection temperature under 1.8 MPa (HDT/A)	°C	ISO 75-1/-2	55
Heat deflection temperature under 0.45 MPa (HDT/B)	°C	ISO 75-1/-2	135
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	200
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	0.27
Specific heat capacity (23 °C)	J/(kg·K)		1,250
<b>Electrical properties</b>			
Dielectric constant at 100 Hz/1 MHz	–	IEC 60250	3.3/3.3
Dissipation factor at 100 Hz/1 MHz	10 <sup>-4</sup>	IEC 60250	10/200
Volume resistivity	Ω·m	IEC 60093	10 <sup>14</sup>
Surface resistivity	Ω	IEC 60093	10 <sup>13</sup>
Comparative tracking index CTI, test solution A	–	IEC 60112	600
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.



B6550 L	B6550 LN	B6550 LNX	B6550 LNI	B6560M2 FC TF
PBT	PBT	PBT	PBT	PBT M10
UN	UN	UN	UN	UN
1,300	1,300	1,300	1,300	1,360
160	160	144	180	150
0.5	0.4	0.4	0.4	
0.25	0.25	0.25	0.25	
223	223	222	223	223
9.5	9.5	8	90	8.5
250-275	260-270	260-270	260-270	
40-80	40-80	40-80		
230-260	250-270	250-270	250-270	250-280
				2.18 / 2.12
HB (≥ 0.8mm)	HB (≥ 0.8mm)		HB (≥ 1.5mm)	
2,500	2,600	2,600	2,600	2,000
55	56	53	55	40
3.5	3.5	3	3.2	10
>50	>50	>50	>50	33
2,030	2,700	2,500	2,500	2,000
76	85	80	80	60
N	N	N	N	N
220	220	215	280	
5.8	5.2	3.4	6	6.3
	5.3		4	
55	50	60	60	60
135	135	150	140	150
	135/145			
	110/110			
3.4/3.2	3.4/3.2			
13/221	19/219			
10 <sup>14</sup>	10 <sup>14</sup>		>10 <sup>14</sup>	
10 <sup>13</sup>	10 <sup>13</sup>		>10 <sup>15</sup>	
600	475			550

# Ultradur® Grades

## Reinforced grades

Typical values at 23 °C for uncolored products	Unit	Test method	B4300G2
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT GF10
Colors: uncolored (UN), black (BK)	–	–	UN/SW
Density	kg/m <sup>3</sup>	ISO 1183	1,370
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	115
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.4
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.2
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	16
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10 min	ISO 1133	
Melt temperature range, injection-molding	°C	–	250-275
Mold temperature range, injection-molding	°C	–	60-100
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	1.22/1.38
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	HB (≥ 0.8mm)
Flammability (thickness)	class (mm)	IEC 60695-11-10	
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	4,400
Tensile stress at yield (v=50mm/min), stress at break* (v=5 mm/min)	MPa	ISO 527-1/-2	80*
Strain at yield (v=50mm/min)	%	ISO 527-1/-2	
Nominal strain at break (v=50mm/min), strain at break* (v=5 mm/min)	%	ISO 527-1/-2	4.5*
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	4,100
Flexural strength	MPa	ISO 178	140
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	37
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	38
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	3.5
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	
Ball indentation hardness H 358 N/30 sec, H 961 N/30 sec*	MPa	ISO 2039-1	160*
<b>Thermal properties</b>			
Heat deflection temperature under 1.8MPa (HDT/A)	°C	ISO 75-1/-2	175
Heat deflection temperature under 0.45MPa (HDT/B)	°C	ISO 75-1/-2	210
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	210
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	130/150
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	60/125
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	0.23
Specific heat capacity (23 °C)	J/(kg·K)		1,200
<b>Electrical properties</b>			
Dielectric constant at 100 Hz/1 MHz	–	IEC 60250	3.6/3.6
Dissipation factor at 100Hz/1 MHz	10 <sup>-4</sup>	IEC 60250	12/150
Volume resistivity	Ω·m	IEC 60093	10 <sup>14</sup>
Surface resistivity	Ω	IEC 60093	10 <sup>13</sup>
Comparative tracking index CTI, test solution A	–	IEC 60112	300
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

B4300G4	B4300G6	B4300G10	B4040G4	B4040G6	B4040G10
PBT GF20	PBT GF30	PBT GF50	PBT+PET GF20	PBT+PET GF30	PBT+PET GF50
UN/SW	UN/SW	UN/SW	SW	SW	SW
1,450	1,530	1,730	1,470	1,550	1,730
107	105	97	105	105	90
0.4	0.4	0.4	0.4	0.4	0.4
0.2	0.2	0.2	0.2	0.2	0.2
223	223	223	223	223	223
15	11	3.5	22	15	1.8
250-275	250-275	260-275	250-280	250-280	250-280
60-100	60-100	80-120	60-100	60-100	60-100
0.43/1.16	0.34/1.07		0.40/0.90	0.30/0.90	0.24/0.77
HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)
7,000	9,800	16,500	7,500	10,500	18,000
115*	137*	160*	120*	145*	170*
3.5*	3*	1.7*	2.8*	2.6*	1.6*
	7,500				
6,570	9,460	15,000	7,010		17,700
170	210		190		270
54	70	60	40	60	60
50	68	70	40	55	70
6.5	9	11	5.5	8	10
6	8.5	10			
180*	190*	220*	190		
205	215	215	180	200	205
220	220	220	215	220	221
210	210	210	210	210	210
140/160	150/165	150/170			
35/125	25/115	20/95	35/105	25/110	15/80
0.25	0.27	0.36			
1,150	1,050	950	1,100	1,050	950
3.7/3.7	4/3.8	4/4	3.7/3.5	4/3.8	4.7/4.5
12/150	25/170	12/150	14/180	16/170	20/150
10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>
300	375	425	300	250	225
	LS/LT	LS			

# Ultradur® Grades

## Reinforced grades

Typical values at 23 °C for uncolored products	Unit	Test method	B4300C3
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT CF15
Colors: uncolored (UN), black (BK)	–	–	SW
Density	kg/m <sup>3</sup>	ISO 1183	1,360
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	118
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.4
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.2
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	9
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10 min	ISO 1133	
Melt temperature range, injection-molding	°C	–	250-275
Mold temperature range, injection-molding	°C	–	60-100
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	0.34/0.75
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	
Flammability (thickness)	class (mm)	IEC 60695-11-10	HB (≥ 0.8 mm)
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	12,900
Tensile stress at yield (v=50 mm/min), stress at break* (v=5 mm/min)	MPa	ISO 527-1/-2	150*
Strain at yield (v=50 mm/min)	%	ISO 527-1/-2	
Nominal strain at break (v=50 mm/min), strain at break* (v=5 mm/min)	%	ISO 527-1/-2	2.4*
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	12,000
Flexural strength	MPa	ISO 178	225
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	50
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	45
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	5.5
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	4.2
Ball indentation hardness H 358 N/30 sec, H 961 N/30 sec*	MPa	ISO 2039-1	
<b>Thermal properties</b>			
Heat deflection temperature under 1.8 MPa (HDT/A)	°C	ISO 75-1/-2	200
Heat deflection temperature under 0.45 MPa (HDT/B)	°C	ISO 75-1/-2	220
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	210
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	10/120
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	
Specific heat capacity (23 °C)	J/(kg·K)		
<b>Electrical properties</b>			
Dielectric constant at 100 Hz/1 MHz	–	IEC 60250	
Dissipation factor at 100 Hz/1 MHz	10 <sup>-4</sup>	IEC 60250	
Volume resistivity	Ω·m	IEC 60093	10 <sup>23</sup>
Surface resistivity	Ω	IEC 60093	10 <sup>25</sup>
Comparative tracking index CTI, test solution A	–	IEC 60112	
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	LS

<sup>1)</sup> yellow card available<sup>2)</sup> + = passed<sup>3)</sup> NB = no break<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

S4090G2	S4090G4	S4090G6	S4090GX	S4090G4X	S4090G6X
PBT+ASA+PET GF10	PBT+ASA+PET GF20	PBT+ASA+PET GF30	PBT+ASA GF14	PBT+ASA GF20	PBT+ASA GF30
SW	UN/SW	UN/SW	UN/SW	SW	SW
1,310	1,390	1,470	1,330	1,390	1,470
105	105	105	110	104	104
0.4	0.4	0.4	0.4	0.4	0.4
0.2	0.2	0.2	0.2	0.2	0.2
223	223	223	223	223	223
20	20	20	23	30	20
250-275	250-275	250-275	250-275	250-275	250-275
60-100	60-100	60-100	60-100	60-100	60-100
	0.43/0.74	0.29/0.75	0.54/0.83	0.46/0.91	0.29/0.82
HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)		HB (≥ 0.8mm)
4,500	6,900	9,700	5,500	6,600	9,600
75*	105*	125*	95*	100*	128*
2.9*	2.4*	2.2*	3.2*	2.6*	2.5*
3,300	4,700	6,700			
4,100	6,400	8,700			
119	151	183	140		190
37	50	58	52	49	61
24	40	50	43	–	52
4	5.5	7	7	5.5	7.5
3.2	5.3				
140*	153*	164*			
105	160	175	170	185	205
190	205	210	210	210	220
170	170	170			
		145/–			145/–
50/–	20/125	25/105	80/–		25/115
0.27	0.28	0.29			
1,200	1,150	1,100	1,070		1,150
3.6/3.4	3.7/3.6	3.8/3.7	3.6/ 3.4		3.9/3.7
31/205	30/190	30/180	39/208		46/202
10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
375	450	500	375		425
	LS	LS			LS

# Ultradur® Grades

Grades with excellent flowability

Typical values at 23 °C for uncolored products	Unit	Test method	B4520 High Speed
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT
Colors: uncolored (UN), black (BK)	–	–	UN/SW
Density	kg/m <sup>3</sup>	ISO 1183	1,300
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	115
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.5
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.25
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10min	ISO 1133	50
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10min	ISO 1133	
Melt temperature range, injection-molding	°C	–	250-275
Mold temperature range, injection-molding	°C	–	40-70
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	HB (≥ 0.8mm)
Flammability (thickness)	class (mm)	IEC 60695-11-10	
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	2,200
Tensile stress at yield (v=50mm/min), stress at break* (v=5mm/min)	MPa	ISO 527-1/-2	53
Strain at yield (v=50mm/min)	%	ISO 527-1/-2	3.5
Nominal strain at break (v=50mm/min), strain at break* (v=5mm/min)	%	ISO 527-1/-2	>50
Tensile creep modulus, 1.000h, elongation ≤0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	
Flexural strength	MPa	ISO 178	
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	190
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	4
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	
Ball indentation hardness H 358 N/30sec, H 961 N/30sec*	MPa	ISO 2039-1	
<b>Thermal properties</b>			
Heat deflection temperature under 1.8MPa (HDT/A)	°C	ISO 75-1/-2	55
Heat deflection temperature under 0.45MPa (HDT/B)	°C	ISO 75-1/-2	130
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	200
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	
Specific heat capacity (23 °C)	J/(kg·K)		
<b>Electrical properties</b>			
Dielectric constant at 100Hz/1MHz	–	IEC 60250	
Dissipation factor at 100Hz/1MHz	10 <sup>-4</sup>	IEC 60250	
Volume resistivity	Ω·m	IEC 60093	
Surface resistivity	Ω	IEC 60093	
Comparative tracking index CTI, test solution A	–	IEC 60112	
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

B4300G2 High Speed	B4300G3 High Speed	B4300G4 High Speed	B4300G6 High Speed	S4090G4 High Speed	S4090G6 High Speed
PBT GF10	PBT GF15	PBT GF20	PBT GF30	PBT+ASA+PET GF20	PBT+ASA+PET GF30
UN/SW	UN/SW	UN/SW	UN/SW	SW	SW
1,374	1,410	1,450	1,530	1,390	1,480
105	100	100	90	105	100
0.4	0.4	0.4	0.4	0.4	0.4
0.2	0.2	0.2	0.2	0.2	0.2
223	223	223	223	223	223
28	24	22	23	35	25
230-275	230-275	230-275	230-275	250-275	250-275
60-100	60-100	60-100	60-100	60-100	60-100
0.90/1.10	0.70/1.10	0.47/1.10	0.35/1.10	0.40/0.80	0.27/0.80
HB (≥ 1.5mm)	HB (≥ 0.8mm)	HB (≥ 0.8mm)	HB (≥ 1.5mm)	HB (≥ 1.5mm)	HB (≥ 1.5mm)
4,400	5,600	7,000	9,700	6,900	9,600
85*	100*	115*	140*	100*	120*
3.9*	3.7*	3.3*	2.7*	2.4*	2.1*
			10,000	6,800	
			210	155	
25	30	45	60	43	50
26	30	40	50	30	44
3.5	5	6	7.5	5.5	7
165	185	195	200	180	187
210	215	220	220	210	215
210	210	210	210	170	170
	140/160		150/170		
		30/145	25/110	35/120	25/115
3.6/3.6	3.7/3.7	3.7/3.7	4/3.8	3.7/3.6	3.8/3.7
12/150	12/150	12/150	25/170	30/190	30/180
10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>14</sup>	10 <sup>14</sup>
300	300	300	350	325	325
LS	LS	LS	LS	LS	LS

# Ultradur® Grades

Impact-modified grades/grades with very low distortion

Typical values at 23 °C for uncolored products	Unit	Test method	B4340ZG2 High Speed
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT-I GF10
Colors: uncolored (UN), black (BK)	–	–	UN/SW
Density	kg/m <sup>3</sup>	ISO 1183	1,335
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	100
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10min	ISO 1133	30
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10min	ISO 1133	
Melt temperature range, injection-molding	°C	–	250-275
Mold temperature range, injection-molding	°C	–	60-100
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	1.07/1.05
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	
Flammability (thickness)	class (mm)	IEC 60695-11-10	HB (≥ 0.8mm)
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	4,100
Tensile stress at yield (v=50mm/min), stress at break* (v=5mm/min)	MPa	ISO 527-1/-2	79*
Strain at yield (v=50mm/min)	%	ISO 527-1/-2	
Nominal strain at break (v=50mm/min), strain at break* (v=5mm/min)	%	ISO 527-1/-2	3.8*
Tensile creep modulus, 1.000h, elongation ≤0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	3,700
Flexural strength	MPa	ISO 178	128
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	49
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	30
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	8
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	5
Ball indentation hardness H 358 N/30sec, H 961 N/30sec*	MPa	ISO 2039-1	
<b>Thermal properties</b>			
Heat deflection temperature under 1.8MPa (HDT/A)	°C	ISO 75-1/-2	180
Heat deflection temperature under 0.45MPa (HDT/B)	°C	ISO 75-1/-2	218
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	55/175
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	
Specific heat capacity (23 °C)	J/(kg·K)		
<b>Electrical properties</b>			
Dielectric constant at 100Hz/1MHz	–	IEC 60250	
Dissipation factor at 100Hz/1MHz	10 <sup>-4</sup>	IEC 60250	
Volume resistivity	Ω·m	IEC 60093	
Surface resistivity	Ω	IEC 60093	
Comparative tracking index CTI, test solution A	–	IEC 60112	600
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	LS

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.



B4340ZG3	B4300K4	B4300K6	B4300M5	B4300GM42
PBT-I GF15	PBT GB20	PBT GB30	PBT M25	PBT (GF20+M10)
UN/SW	UN/SW	UN/SW	UN	UN
1,360	1,450	1,530	1,510	1,550
106	115	113	117	101
	0.4	0.4	0.4	0.4
	0.2	0.2	0.2	0.2
223	223	223	223	223
17	16	9	14	17
250-275	250-275	250-275	250-275	250-275
60-100	40-80	40-80	40-80	60-90
0.82/1.02	1.90/1.90		1.80/1.68	
			HB (≥ 0.8mm)	HB (≥ 0.8mm)
HB (≥ 0.8mm)	HB (≥ 1.5mm)	HB (≥ 1.5mm)		
5,300	3,500	4,000	4,000	7,900
90*	48*	50*	56*	105*
3.6*	6*	5*	7.5*	2.7*
	1,300	2,200	2,000	4,500
4,700	3,400			
145	100			
60	35	35	100	45
50	26	24	80	43
12	3	3	4	4.5
-	150	165	170	195*
186	70	95	90	210
219	170	200	195	220
	200	200	200	200
45/185	100/100			
	0.27	0.27		
	1,150	1,500	1,100	1,000
	4/3.7	3.8/3.8	3.6/3.6	3.8/3.8
	12/190	12/190	12/150	12/150
	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>
600	250	225	225	300
LS				

# Ultradur® Grades

## Flame-retardant grades

Typical values at 23 °C for uncolored products	Unit	Test method	B4406
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT FR(17)
Colors: uncolored (UN), black (BK)	–	–	UN
Density	kg/m <sup>3</sup>	ISO 1183	1,450
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	123
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.4
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.25
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	23
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10 min	ISO 1133	
Melt temperature range, injection-molding	°C	–	245-270
Mold temperature range, injection-molding	°C	–	40-70
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	V0 (≥ 0.4 mm)
Flammability (thickness)	class (mm)	IEC 60695-11-10	
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	3,000
Tensile stress at yield (v=50 mm/min), stress at break* (v=5 mm/min)	MPa	ISO 527-1/-2	65
Strain at yield (v=50 mm/min)	%	ISO 527-1/-2	3.9
Nominal strain at break (v=50 mm/min), strain at break* (v=5 mm/min)	%	ISO 527-1/-2	5.3
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	
Flexural strength	MPa	ISO 178	
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	50
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	4
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	4
Ball indentation hardness H 358 N/30 sec, H 961 N/30 sec*	MPa	ISO 2039-1	120
<b>Thermal properties</b>			
Heat deflection temperature under 1.8MPa (HDT/A)	°C	ISO 75-1/-2	60
Heat deflection temperature under 0.45MPa (HDT/B)	°C	ISO 75-1/-2	170
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	200
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	0.27
Specific heat capacity (23 °C)	J/(kg·K)		1,200
<b>Electrical properties</b>			
Dielectric constant at 100 Hz/1 MHz	–	IEC 60250	3.3/3.3
Dissipation factor at 100Hz/1 MHz	10 <sup>-4</sup>	IEC 60250	110/170
Volume resistivity	Ω·m	IEC 60093	10 <sup>14</sup>
Surface resistivity	Ω	IEC 60093	10 <sup>13</sup>
Comparative tracking index CTI, test solution A	–	IEC 60112	250
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	

<sup>1)</sup> yellow card available<sup>2)</sup> + = passed<sup>3)</sup> NB = no break<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

B4406G2	B4406G4	B4406G6	B4406G6 High Speed	B4441G5	B4450G5	B4450G5 HR
PBT FR(17)	PBT FR(17)	PBT FR(17)	PBT FR(17)	PBT FR(40)	PBT FR(5x)	PBT FR(5x)
UN	UN/SW	UN/SW	UN/SW	UN/SW	UN/SW	SW
1,520	1,600	1,650	1,700	1,530	1,600	1,580
120	116	108	90	105	100	110
0.4	0.4	0.4	0.4	0.4	0.4	0.4
0.2	0.2	0.2	0.2	0.2	0.2	0.2
223	223	223	223	223	223	223
15	11	8	12	15	17	10
250-275	250-275	250-275	250-280	260-280	250-280	250-270
60-100	60-100	60-100	60-100	60-100	60-100	60-100
			0.30/1.10	0.44/1.24	0.50/1.30	0.50/1.30
V0 (≥ 0.4 mm)	V0 (≥ 0.4 mm)	V0 (≥ 0.4 mm)	V0 (≥ 0.4 mm)	V0 (≥ 0.4 mm)	V0 (≥ 0.4 mm)	V0 (≥ 0.4 mm)
5,500	8,200	11,300	11,700	9,800	10,000	8,700
95*	125*	145*	140*	100*	110*	120*
3.3*	2.6*	2.3*	1.9*	2.3*	2.2*	2.6*
		7,500	11,300	10,000	9,700	8,700
			200	180	180	210
40	48	60	50	45	45	50
40	50	55		47	45	40
5	8	10	7	7	6	6
	190*	220*				
190	200	205	205	210	210	210
215	220	220	220	220	220	220
210	210	210		210		210
	30/100	25/95	20/100		35/120	30/160
		0.32				
1,100	1,000	900	900	1,000	1,000	1,000
3.5/3.5	3.8/3.6	3.9/3.9		3.7/3.6	4/3.8	4.1/3.9
80/150	70/170	20/150		35/137	40/140	90/150
10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>	>10 <sup>15</sup>	10 <sup>14</sup>	10 <sup>14</sup>	10 <sup>14</sup>
10 <sup>13</sup>	10 <sup>13</sup>	10 <sup>13</sup>	>10 <sup>15</sup>	>10 <sup>16</sup>	>10 <sup>16</sup>	10 <sup>15</sup>
225	200	200	175	525	600	600
				LS	LS	LS

# Ultradur® Grades

Reinforced grades with outstanding hydrolysis resistance

Typical values at 23 °C for uncolored products	Unit	Test method	B4330G3 HR
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT-I GF15
Colors: uncolored (UN), black (BK)	–	–	UN/SW
Density	kg/m <sup>3</sup>	ISO 1183	1,390
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	106
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.4
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.2
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	223
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10min	ISO 1133	12
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10min	ISO 1133	
Melt temperature range, injection-molding	°C	–	250-275
Mold temperature range, injection-molding	°C	–	60-100
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	0.90/1.15
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	
Flammability (thickness)	class (mm)	IEC 60695-11-10	HB (≥ 0.8mm)
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	5,300
Tensile stress at yield (v=50mm/min), stress at break* (v=5mm/min)	MPa	ISO 527-1/-2	100*
Strain at yield (v=50mm/min)	%	ISO 527-1/-2	
Nominal strain at break (v=50mm/min), strain at break* (v=5mm/min)	%	ISO 527-1/-2	3.5*
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	4,900
Flexural strength	MPa	ISO 178	160
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	62
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	35
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	10
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	6
Ball indentation hardness H 358 N/30sec, H 961 N/30sec*	MPa	ISO 2039-1	
<b>Thermal properties</b>			
Heat deflection temperature under 1.8MPa (HDT/A)	°C	ISO 75-1/-2	200
Heat deflection temperature under 0.45MPa (HDT/B)	°C	ISO 75-1/-2	220
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	210
Temperature index, at 50 % loss of tensile strength after 20,000h/5.000h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	50/225
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	
Specific heat capacity (23 °C)	J/(kg·K)		
<b>Electrical properties</b>			
Dielectric constant at 100Hz/1MHz	–	IEC 60250	
Dissipation factor at 100Hz/1MHz	10 <sup>-4</sup>	IEC 60250	
Volume resistivity	Ω·m	IEC 60093	10 <sup>14</sup>
Surface resistivity	Ω	IEC 60093	10 <sup>15</sup>
Comparative tracking index CTI, test solution A	–	IEC 60112	500
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	LS

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

B4335G3 HR High Speed	B4330G6 HR	B4330G6 HR High Speed	B4331G6 HR	B4300G6 HR	B4331C3 HR
PBT-I GF15	PBT-I GF30	PBT-I GF30	PBT-I GF30	PBT GF30	PBT-I CF15
SW	UN/SW	SW	UN/SW	UN/SW	SW
1,360	1,490	1,500	1,490	1,510	1,320
90	108	85	100	108	103
	0.4		0.4	0.4	0.4
	0.2		0.2	0.2	0.2
223	223	223	222	223	222
25	4	16	7	5.5	10
	19				
250-280	250-280	250-280	250-280	250-275	250-275
60-100	60-100	60-100	60-100	60-100	60-100
0.70/1.00	0.50/1.10	0.43/1.00	0.40/1.01	0.45/1.30	0.37/0.71
	HB (≥ 0.8mm)				
HB (≥ 0.8mm)		HB (≥ 0.8mm)	HB (≥ 0.8mm)		HB (≥ 0.8mm)
4,700	8,500	8,880	8,400	8,700	11,600
90*	120*	130*	115*	130*	130*
3.5*	3.4*	2.6*	3.6*	3.3*	3.2*
4,300	7,860	8,700	8,100		10,100
135	190	205	190		205
55	74	68	75	70	60
32	65		70		48
11	14	9	14	12	9
7	8		8.8		4.8
200	205	208	205	205	200
220	220	223	220	220	220
	210		210	210	
45/240	25/215	20/200	20/215		
	1,250				
	10 <sup>14</sup>				10 <sup>03</sup>
	10 <sup>15</sup>				10 <sup>05</sup>
	400		500	400	
LS	LS	LS	LS	LT	LS

# Ultradur® Grades

Reinforced grades with particularly high laser transparency for laser welding

Typical values at 23 °C for uncolored products	Unit	Test method	LUX B4300G4
<b>Product Features</b>			
Symbol	–	ISO 1043	PBT GF20
Colors: uncolored (UN), black (BK)	–	–	UN/SW
Density	kg/m <sup>3</sup>	ISO 1183	1,460
Viscosity number, solution 0.005g/ml phenol/1.2-dichloro benzene (1:1)	cm <sup>3</sup> /g	ISO 1628	100
Water absorption, saturation in water at 23 °C	%	similar to ISO 62	0.4
Moisture absorption, saturation in standard atmosphere 23 °C/50 % r.h.	%	similar to ISO 62	0.2
<b>Processing methods</b>			
Melting temperature, DSC	°C	ISO 11357-1/-3	220
Melt volume rate MVR 250 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 275 / 2.16	cm <sup>3</sup> /10 min	ISO 1133	
Melt volume rate MVR 260 / 5	cm <sup>3</sup> /10 min	ISO 1133	9
Melt temperature range, injection-molding	°C	–	250-270
Mold temperature range, injection-molding	°C	–	60-100
Melt temperature range, extrusion	°C	–	
Molding shrinkage, free, longitudinal/transversal	%	ISO 2577, 294-4	0.75/1.25
<b>Fire behavior</b>			
Flammability according to UL94 (thickness) <sup>1)</sup>	class (mm)	UL94	HB (≥ 0.8 mm)
Flammability (thickness)	class (mm)	IEC 60695-11-10	
Flammability of materials in cars at d ≥ 1 mm thickness <sup>2)</sup>	–	FMVSS 302	
<b>Mechanical properties</b>			
Tensile modulus of elasticity	MPa	ISO 527-1/-2	7,300
Tensile stress at yield (v=50 mm/min), stress at break* (v=5 mm/min)	MPa	ISO 527-1/-2	125*
Strain at yield (v=50 mm/min)	%	ISO 527-1/-2	
Nominal strain at break (v=50 mm/min), strain at break* (v=5 mm/min)	%	ISO 527-1/-2	3.5*
Tensile creep modulus, 1.000h, elongation ≤ 0.5 %, +23 °C	MPa	ISO 899-1	
Flexural modulus	MPa	ISO 178	6,800
Flexural strength	MPa	ISO 178	195
Charpy impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	40
Charpy impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eU	35
Charpy notched impact strength (23 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	6.5
Charpy notched impact strength (-30 °C) <sup>3)</sup>	kJ/m <sup>2</sup>	ISO 179/1eA	6.3
Ball indentation hardness H 358 N/30 sec, H 961 N/30 sec*	MPa	ISO 2039-1	
<b>Thermal properties</b>			
Heat deflection temperature under 1.8 MPa (HDT/A)	°C	ISO 75-1/-2	200
Heat deflection temperature under 0.45 MPa (HDT/B)	°C	ISO 75-1/-2	220
Max. service temperature (short cycle operation) <sup>4)</sup>	°C	–	210
Temperature index, at 50 % loss of tensile strength after 20,000 h/5.000 h	°C	IEC 60216-1	
Thermal coefficient of linear expansion, longitudinal (23-80) °C	10 <sup>-6</sup> /K	ISO 11359-1/-2	35/125
Thermal conductivity (23 °C)	W/(m·K)	DIN 52 612-1	
Specific heat capacity (23 °C)	J/(kg·K)		
<b>Electrical properties</b>			
Dielectric constant at 100 Hz/1 MHz	–	IEC 60250	
Dissipation factor at 100 Hz/1 MHz	10 <sup>-4</sup>	IEC 60250	
Volume resistivity	Ω·m	IEC 60093	10 <sup>14</sup>
Surface resistivity	Ω	IEC 60093	10 <sup>15</sup>
Comparative tracking index CTI, test solution A	–	IEC 60112	300
<b>Available versions</b>			
Laser-markable (LS)/Laser-transparent (LT)	–	–	LT

<sup>1)</sup> yellow card available

<sup>2)</sup> + = passed

<sup>3)</sup> NB = no break

<sup>4)</sup> Typical values for parts required to withstand repeated exposure to this temperature for several hours over years of use, assuming appropriate shaping and processing for the material.

**LUX B4300G6**

PBT GF30

UN/SW

1,540

105

0.4

0.2

220

7

250-270

60-100

0.55/1.20

HB (≥ 0.8mm)

10,000

145\*

3.2\*

9,300

235

65

45

8.5

7.5

205

220

210

25/125

3.8/3.6

27/170

10<sup>14</sup>

10<sup>15</sup>

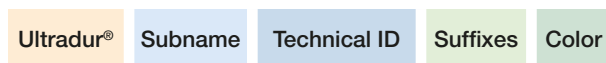
300

LT

# Nomenclature

## Structure

The name of Ultradur® commercial products generally follows the scheme below:



## Subnames

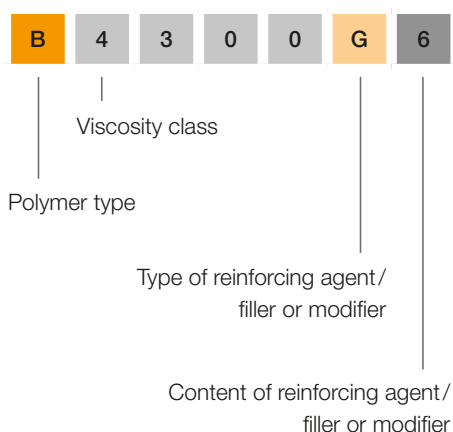
Subnames are optionally used in order to particularly emphasize a product feature that is characteristic of part of a range.

### Examples of subnames:

LUX Particularly high transparency to the radiation from Nd:YAG lasers and lasers of a similar wavelength, e.g. diode lasers

## Technical ID

The technical ID is made up of a series of letters and numbers which give hints about the polymer type, the melt viscosity and the finish with reinforcing agents, fillers or modifiers. The following classification scheme is found with most products:



### Letters for identifying polymer types

- B Polybutylene terephthalate (PBT) or polybutylene terephthalate + polyethylene terephthalate (PET)
- S Polybutylene terephthalate + acrylonitrile styrene acrylate polymer (ASA)

### Numbers for identifying viscosity classes

- 1 very low viscosity
- 2 Low viscosity
- 4 Medium viscosity
- 6 High viscosity

### Letters for identifying reinforcing agents, fillers and modifiers

- G Glass fibers
- C Carbon fibers
- K Glass beads
- M Minerals
- Z Impact modifiers
- GM Glass fibers in combination with minerals

### Key numbers for describing the content of reinforcing agents and fillers

- 2 approx. 10% by mass
- 3 approx. 15% by mass
- 4 approx. 20% by mass
- 6 approx. 30% by mass
- 10 approx. 50% by mass
- 12 approx. 60% by mass

In the case of combinations of glass fibers with minerals, the respective contents are indicated by two numbers, e.g.

- GM13 approx. 5% by mass of glass fibers and approx. 15% by mass of minerals



## Suffixes

Suffixes are optionally used in order to indicate specific processing or application-related properties. They are frequently acronyms whose letters are derived from the English term.

### Examples of suffixes:

Aqua®	suitable for drinking water applications
FC	Food Contact; meets specific regulatory requirements for applications in contact with food
High Speed	High flowability of the melt
HR	Hydrolysis Resistant, increased hydrolysis resistance
LS	Laser Sensitive, can be marked with Nd:YAG laser
LT	Laser Transparent, can be penetrated well with Nd:YAG lasers and lasers of a similar wavelength
PRO	Profile Covered Raw Materials Only; fulfill specific regulatory requirements and demands for medical device applications

## Color

The color is generally made up of a color name and a color number.

### Examples of colors:

Uncolored  
Black 00110  
Black 05110

# For your notes

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## Selected Product Literature for Ultradur®:

- Ultradur® – Product Brochure
- Ultradur® – Product Range
- Ultramid®, Ultradur® and Ultraform® – Resistance to Chemicals

### 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. (March 2020)

### Further information on Ultradur® (PBT)

Product Range can be found on the internet:

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

### Please visit our websites:

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

[www.plastics.basf.de](http://www.plastics.basf.de)

### Request of brochures:

[plas.com@basf.com](mailto:plas.com@basf.com)

If you have any technical questions about the products, please contact the Infopoints:

