Bayblend® T45, T65, T85

- **(PC+ABS) blends**
- **Non-reinforced**
- **General-purpose injection molding grades**

Product description

Bayblend® T45, T65 and T85 are non-reinforced, amorphous thermoplastic polymer blends based on polycarbonate (PC) and acrylonitrile butadiene styrene (ABS). They are noted for their ideal combination of toughness, rigidity and flowability.
Their heat resistance to Vicat VST/B 120 is between 112 and 131 °C.

Characterisation

Bayblend® T45, T65 and T85 are the successor products to the general-purpose Bayblend® grades T44, T64, T84 ("4" series) and T45 MN, T65 MN, T85 MN ("MN" series). They combine the advantages of the "4" series (very good flowability) and those of the "MN" series (very good toughness, even at low temperatures) in an ideal manner. Alongside improved flowability, T45, T65 and T85 also display greater rigidity and weathering resistance than the individual MN grades.

Delivery form

The products are supplied as oval or cylindrically cut granules in 25-kg polyethylene sacks, in large cartons with a polyethylene inliner or in bulk.

Bayblend® T45, T65 and T85 are available in their natural color or in a large number of opaque color shades.

The production plants for Bayblend® in Europe and those in Asia have been certified to DIN EN ISO 9001:2000 by the DQS (DQS = German Association for the Certification of Quality Systems, Berlin).

Applications

- **Automotive:**
  Instrument panels, exterior mirror housings, ventilation systems, emblems, side protection moldings, grilles, glove compartment lids, interior mirror housings, instrument frames, loudspeaker covers, steering column trims, central consoles, wheel covers, rear light chassis, column trims, headlamp housings, spoilers, door sills.
- **Data systems engineering:**
  Mobile telephone housings.
- **Electrical/electronics industries:**
  Sockets, switches, covers.
- **Household:**
  Top sections of irons, hairdryers, coffee machines, shaver housings, time-switch housings.

Properties

Bayblend® T45, T65 and T85 are noted for their favourable combination of heat resistance, toughness, rigidity and flowability.

Mechanical properties

T45, T65 and T85 display a very high impact and notched impact strength over a broad range of temperatures. The excellent low-temperature toughness of these products is even more pronounced with T65 and T85 than with T45. The property values from the tensile test increase slightly from T45 through T65 to T85.

Thermal properties

Bayblend® grades T45, T65 and T85 differ primarily in terms of their heat resistance. T45 covers the

lower end of the heat-resistance range with a Vicat temperature of 112 °C while T65 covers the middle of the range at 120 °C and T85 the upper end of the range at 131 °C.

The melting range begins at approx. 200 °C, with thermal decomposition setting in at approx. 300 °C.

The linear coefficient of thermal expansion only correlates to a small extent with the melt flow direction and is in the range 0.75 to 0.90x10^{-4}/K.

Rheological properties

Flowability decreases in the order T45→ T65 → T85 (see flow path/wall thickness diagrams page 4 + 5).

The melt volume-flow rate (MVR) is identical for all three products and is thus not suitable for assessing the flow behavior of Bayblend®.

The favorable combination of very good flowability and sound mechanical properties means that Bayblend® grades T45, T65 and T85 are also frequently used for the thin-wall technique.

Resistance to chemicals

At room temperature, molded parts in Bayblend® are resistant to mineral acids, a large number of organic acids and also aqueous saline solutions. Bayblend® parts are not resistant to bases, aromatics, ketones, esters, chlorinated hydrocarbons and a number of greases and oils. Their resistance to chemicals is conditioned inter alia by the temperature, loading duration and the internal and external stress status of the molded part.

Resistance to light aging and weathering

As with most thermoplastics, light aging and weathering leads to color changes and to an impairment of the mechanical properties. This reduction in properties, however, is not so pronounced, and the release specifications of the automotive industry for interior parts, for example, can still be met. Painting is recommended for parts that are required to satisfy stringent demands.

Processing

Processing is generally by injection molding, but extrusion and extrusion blow molding are also possible.

Pre-treatment/drying

It is essential for Bayblend® to be dried prior to processing. For injection molding, there must be less than 0.02 % residual moisture in the granules. Moisture in the plastic melt can lead to surface defects in the form of streaks and also to hydrolytic degradation (reduction in mechanical properties).

Drying conditions:

T45: 2-4 h at 100 °C (dry-air dryer)

T65 and T85: 2-4 h at 110 °C (dry-air dryer)

Drying is best conducted in dry-air dryers.

Excessively long drying times should be avoided, since color changes cannot otherwise be ruled out.

Melt temperature[1]: 240 to 280 °C

The optimum processing temperature must be established as a function of the molded part.

Overheating, and also excessively long residence times for the melt in the barrel must be avoided, since this can lead to material damage, i.e. to a reduction in toughness, or to surface defects in the form of streaks on the injection-molded part.

[1]Under the recommended processing conditions small quantities of decomposition product may be given off during processing. To preclude any risk to the health and well-being of the machine operatives, tolerance limits for the work environment must be ensured by the provision of efficient exhaust ventilation and fresh air at the workplace in accordance with the Safety Data Sheet.

In order to prevent the partial decomposition of the polymer and the generation of volatile decomposition products, the prescribed processing temperatures should not be substantially exceeded. Since excessively high temperatures are generally the result of operator error or defects in the heating system, special care and controls are essential in these areas.

Mold temperature: 70 to 100 °C.

With a uniform mold temperature, this is the optimum temperature range for the production of low-stress parts with a very good surface quality.

While low temperatures permit shorter cycle times, they lead to poorer molded part qualities. The level of orientation, inherent stress and post-shrinkage increases, while the surface quality deteriorates.

Screw speed

The screw speed should be controlled in such a way that the circumferential velocity of the screw is between 0.05 and 0.2 m/s.

Shrinkage

Molding shrinkage is virtually identical in all axes, in between a range of 0.55 to 0.75 %. In addition to the geometry of the part, shrinkage is primarily dependent on the level of holding pressure and the time for which this acts, as well as on the temperature of the melt and the mold and on the cooling conditions prevailing in the mold.

Finishing

- Machining:
  sawing, drilling, milling, turning, planing, filing, stamping
- Joining:
  screwed connections, gluing, welding
- Post-treatment:
  painting, printing, foam-coating, metallisation laser inscription

Recycling

Single-sort moldings in Bayblend® T45, T65, and T85 which do not contain any harmful substances can be mechanically recycled after use. Molded parts containing harmful substances can be chemically or thermally recycled.

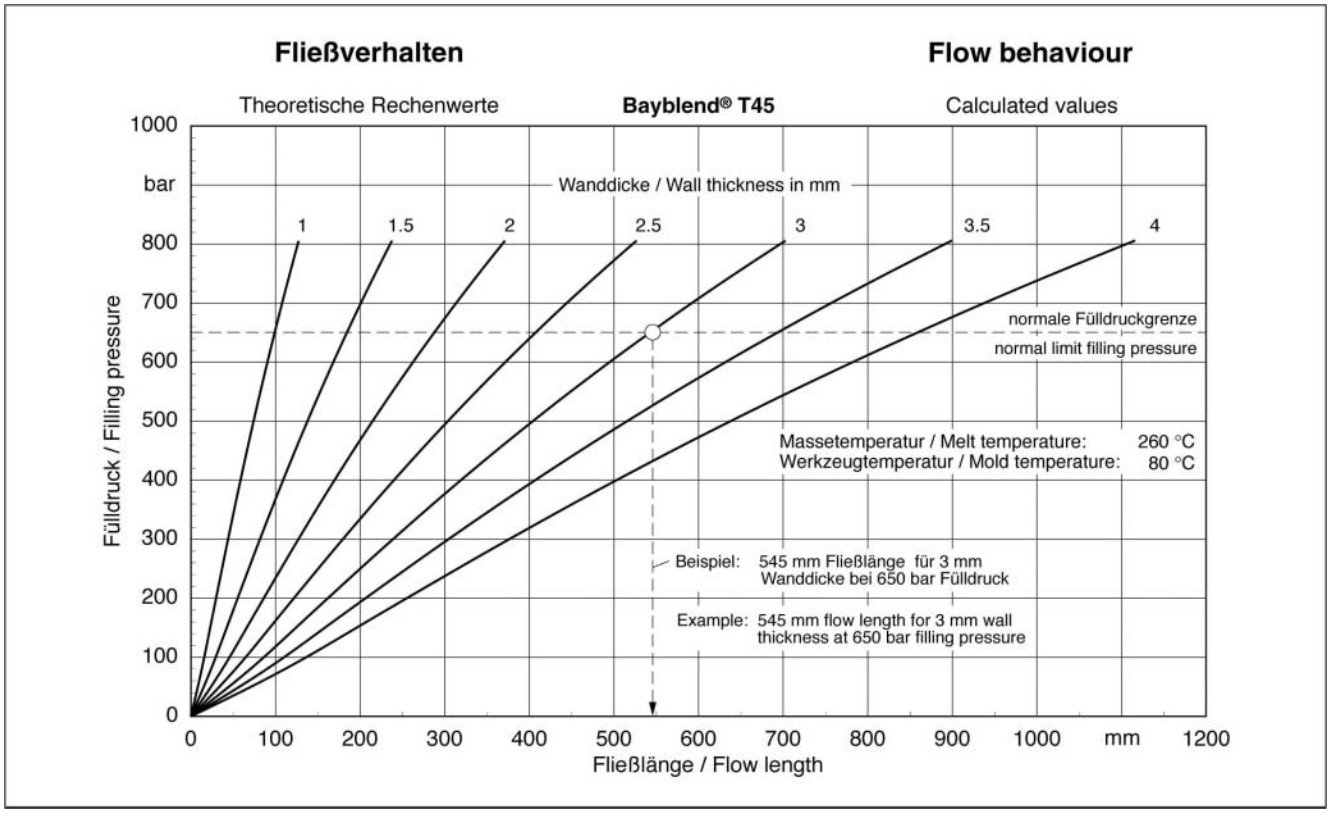
Parts should be marked in accordance with DIN ISO 11469. The identification mark for parts made of Bayblend® T45, T65 and T85 is as follows:

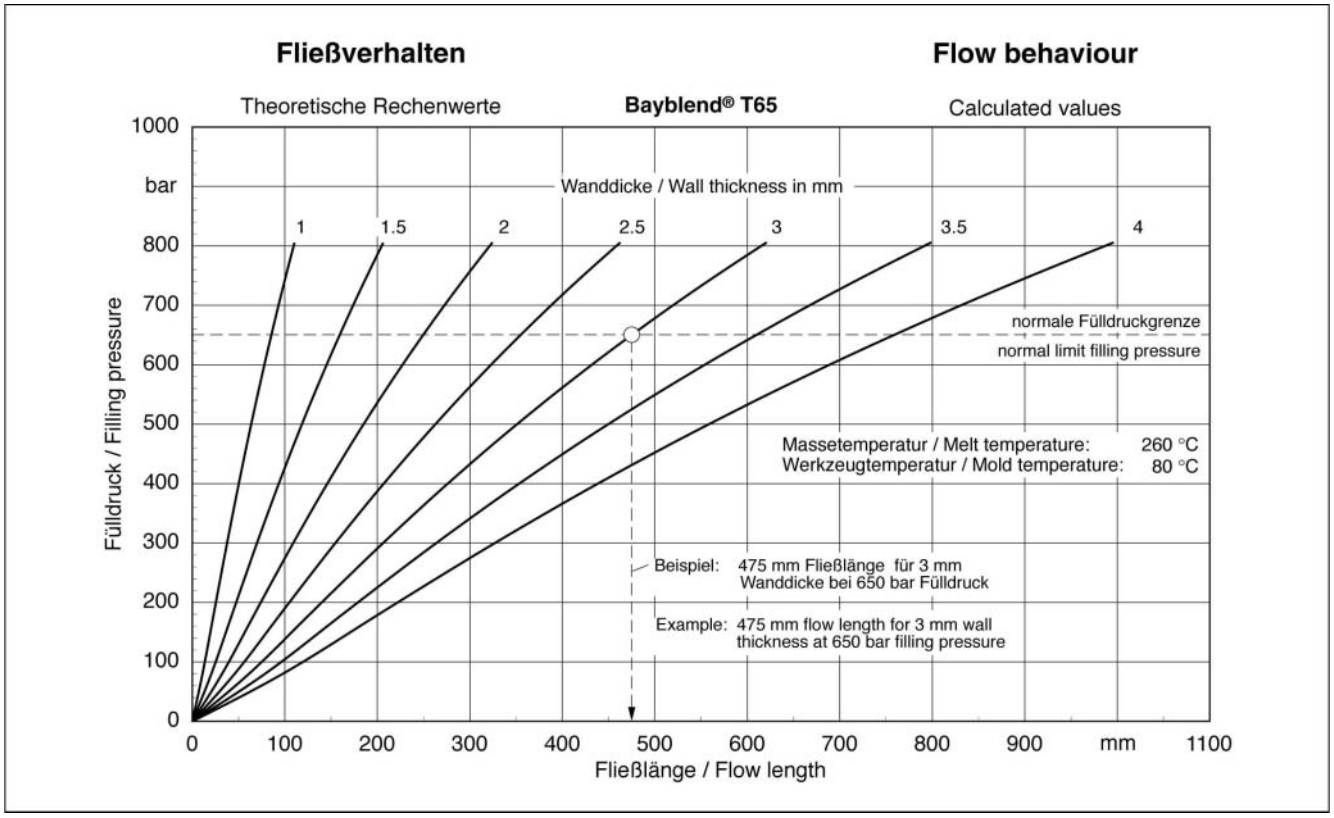
>PC+ABS<

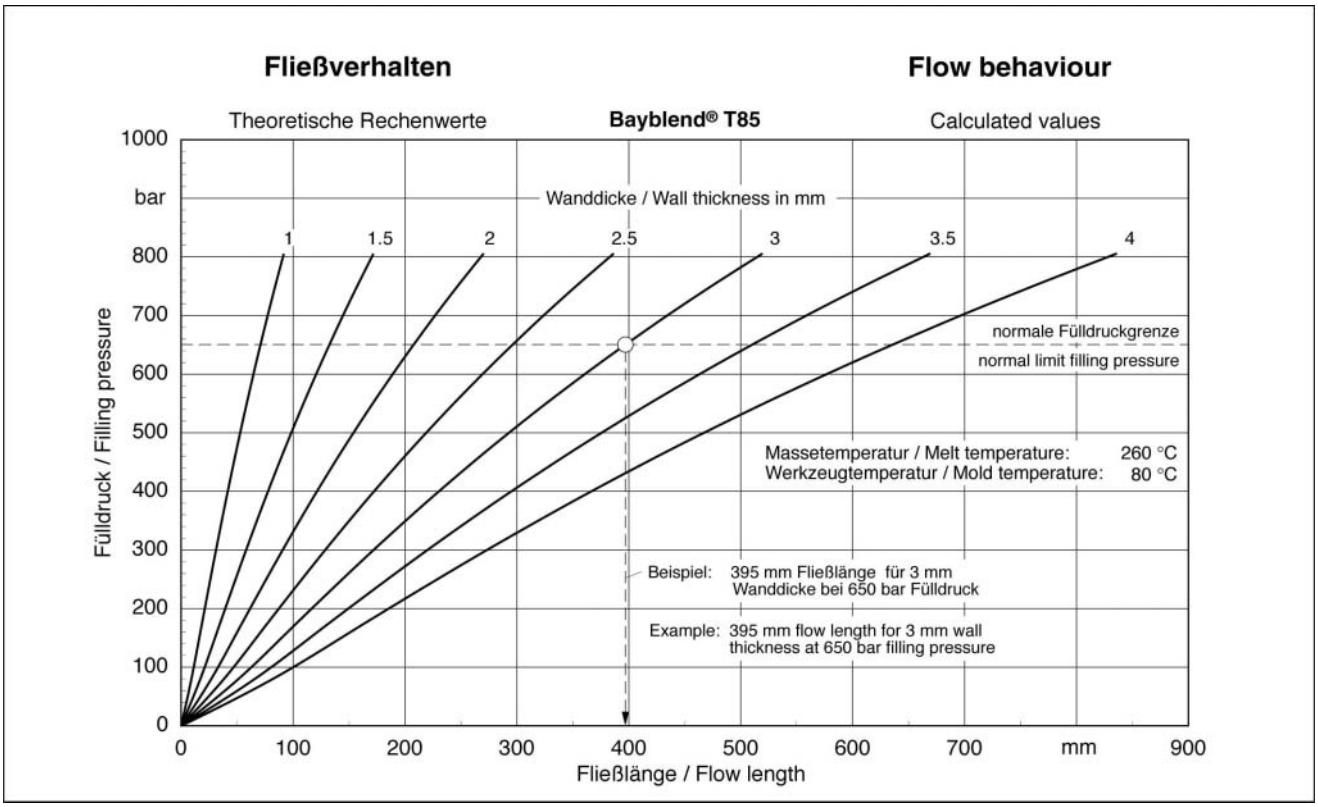
Further details may be found in our Technical Information TI KU21164en.

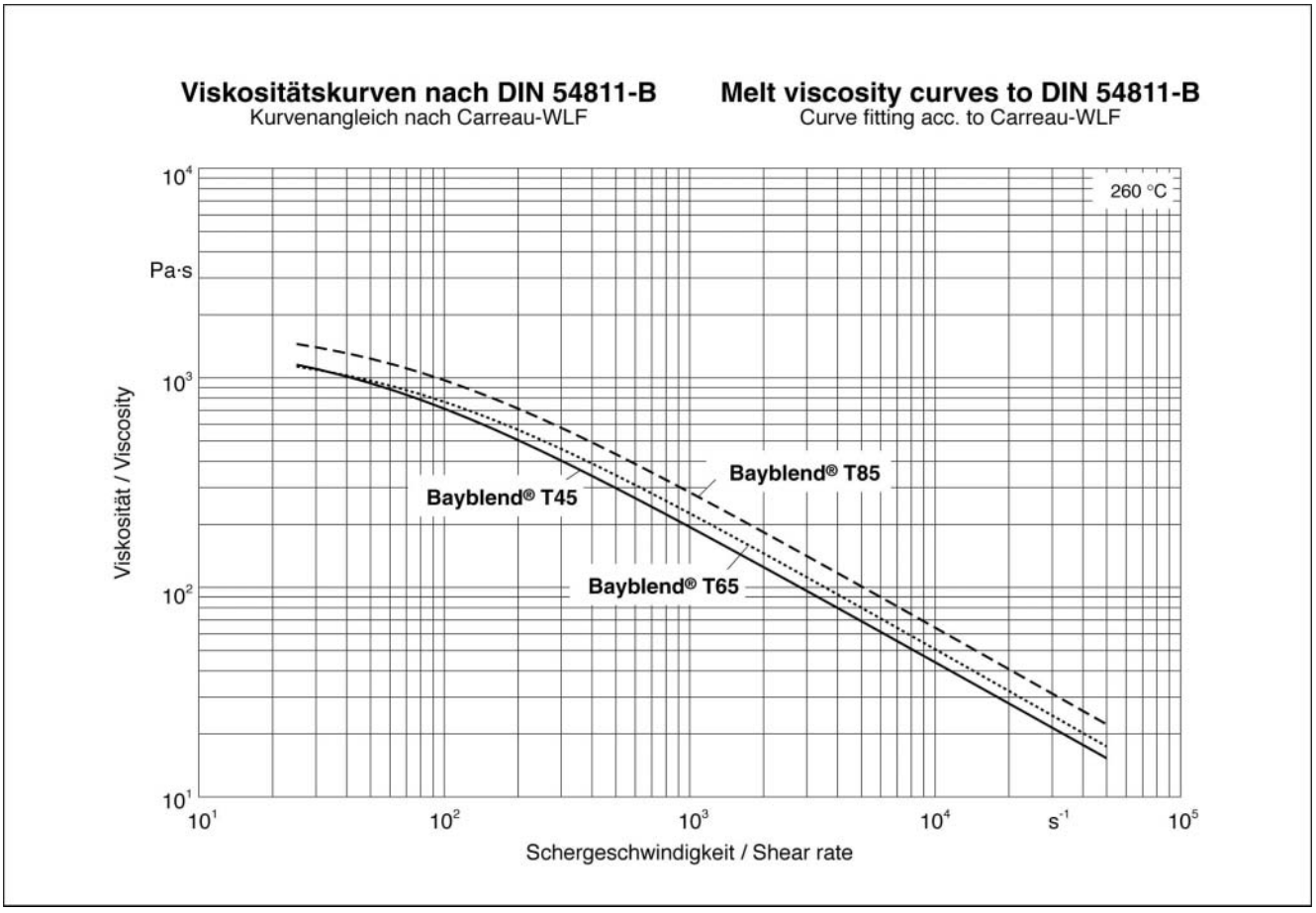
Further literature on the subject:

Brochure: "Bayblend® - Properties and Processing", Order no.: KU13002 e.


Fließverhalten
Flow behaviour
Theoretische Rechenwerte
Bayblend® T45
Calculated values
Wanddicke / Wall thickness in mm
1
1.5
2
2.5
3
3.5
4
normale Fülldruckgrenze
normal limit filling pressure
Massetemperatur / Melt temperature: 260 °C
Werkzeugtemperatur / Mold temperature: 80 °C
Beispiel: 545 mm Fließlänge für 3 mm Wanddicke bei 650 bar Fülldruck
Example: 545 mm flow length for 3 mm wall thickness at 650 bar filling pressure
Fülldruck / Filling pressure
1000 bar 800 700 600 500 400 300 200 100 0
0 100 200 300 400 500 600 700 800 900 1000 mm 1200
Fließlänge / Flow length


Fließverhalten
Flow behaviour
Theoretische Rechenwerte
Bayblend® T65
Calculated values
Wanddicke / Wall thickness in mm
1
1.5
2
2.5
3
3.5
4
normale Fülldruckgrenze
normal limit filling pressure
Massetemperatur / Melt temperature: 260 °C
Werkzeugtemperatur / Mold temperature: 80 °C
Beispiel: 475 mm Fließlänge für 3 mm Wanddicke bei 650 bar Fülldruck
Example: 475 mm flow length for 3 mm wall thickness at 650 bar filling pressure
Fülldruck / Filling pressure
1000 bar 800 700 600 500 400 300 200 100 0
0 100 200 300 400 500 600 700 800 900 mm 1100
Fließlänge / Flow length


Fließverhalten
Flow behaviour
Theoretische Rechenwerte
Bayblend® T85
Calculated values
Wanddicke / Wall thickness in mm
1
1.5
2
2.5
3
3.5
4
normale Fülldruckgrenze
normal limit filling pressure
Massetemperatur / Melt temperature: 260 °C
Werkzeugtemperatur / Mold temperature: 80 °C
Beispiel: 395 mm Fließlänge für 3 mm Wanddicke bei 650 bar Fülldruck
Example: 395 mm flow length for 3 mm wall thickness at 650 bar filling pressure
Fülldruck / Filling pressure
1000
bar
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700
mm
900
Fließlänge / Flow length


Viskositätskurven nach DIN 54811-B
Kurvenangleich nach Carreau-WLF
Melt viscosity curves to DIN 54811-B
Curve fitting acc. to Carreau-WLF
260 °C
Pa·s
Viskosität / Viscosity
Bayblend® T85
Bayblend® T45
Bayblend® T65
Schergeschwindigkeit / Shear rate
s-1

Reference Data

	Typical Properties	Test Conditions	Units	Standards	Bayblend® T45	Bayblend® T65	Bayblend® T85
	Rheological properties						
	Spiral flow length	260 °C; 2 x 8.7 mm	mm	Bayer test	**450**	**410**	**345**
C	Melt volume-flow rate (MVR)	260 °C; 5 kg	cm³/(10 min)	ISO 1133	**12**	**12**	**12**
	Molding shrinkage, parallel	150x105x3; 260 °C /	%	based on ISO 2577	**0.55 - 0.75**	**0.55 - 0.75**	**0.55 - 0.75**
	Molding shrinkage, normal	150x105x3; 260 °C / MT 80 °C; 500 bar	%	based on ISO 2577	**0.55 - 0.75**	**0.55 - 0.75**	**0.55 - 0.75**
	Mechanical properties (23 °C/50 % r. h.)						
C	Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	**2100**	**2200**	**2300**
C	Yield stress	50 mm/min	MPa	ISO 527-1,-2	**49**	**52**	**55**
C	Yield strain	50 mm/min	%	ISO 527-1,-2	**3.7**	**4.2**	**4.7**
	Stress at break	50 mm/min	MPa	ISO 527-1,-2	**40**	**45**	**48**
	Strain at break	50 mm/min	%	based on ISO 527-1,-2	**> 50**	**> 50**	**> 50**
	Izod impact strength	23 °C	kJ/m²	ISO 180-1U	**N**	**N**	**N**
	Izod impact strength	-30 °C	kJ/m²	ISO 180-1U	**N**	**N**	**N**
	Izod notched impact strength	23 °C	kJ/m²	ISO 180-1A	**40**	**45**	**48**
	Izod notched impact strength	-30 °C	kJ/m²	ISO 180-1A	**36**	**41**	**38**
	Thermal properties						
C	Temperature of deflection under load, HDT, method Af	1.80 MPa	°C	ISO 75-1,-2	**95**	**100**	**109**
C	Temperature of deflection under load, HDT, method Bf	0.45 MPa	°C	ISO 75-1,-2	**112**	**122**	**127**
	Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	**112**	**120**	**131**
C	Coefficient of linear thermal expansion, parallel	23 to 55 °C	10^{-4}/K	ISO 11359-1,-2	**0.85**	**0.8**	**0.75**
C	Coefficient of linear thermal expansion, transverse	23 to 55 °C	10^{-4}/K	ISO 11359-1,-2	**0.9**	**0.85**	**0.8**
C	Burning behavior UL 94	0.85 mm	Class	UL 94	**HB**	**HB**	**HB**
	Electrical properties (23 °C/50 % r. h.)						
C	Relative permittivity	100 Hz	-	IEC 60250	**3.1**	**3.1**	**3.1**
C	Relative permittivity	1 MHz	-	IEC 60250	**3.0**	**3.0**	**3.0**
C	Dissipation factor	100 Hz	10^{-4}	IEC 60250	**35**	**30**	**20**
C	Dissipation factor	1 MHz	10^{-4}	IEC 60250	**85**	**85**	**85**
C	Volume resistivity		Ohm·m	IEC 60093	**1E14**	**1E14**	**1E14**
C	Surface resistivity		Ohm	IEC 60093	**1E16**	**1E16**	**1E16**
C	Electric strength	1 mm	kV/mm	IEC 60243-1	**35**	**35**	**35**
C	Comparative tracking index CTI	Solution A	Rating	IEC 60112	**275**	**250**	**225**
	Other properties (23 °C)						
C	Water absorption, saturation value	in water at 23 °C	%	ISO 62	**0.7**	**0.7**	**0.7**
C	Water absorption, equilibrium value	at 23 °C; 50 % r. h.	%	ISO 62	**0.2**	**0.2**	**0.2**
C	Density	-	kg/m³	ISO 1183	**1100**	**1130**	**1150**
	Processing conditions for test specimens						
C	Injection molding-Melt temperature	-	°C	ISO 294	**260**	**260**	**260**
C	Injection molding-Mold temperature	-	°C	ISO 294	**80**	**80**	**80**
C	Injection molding-Injection velocity	-	mm/s	ISO 294	**240**	**240**	**240**

C These property characteristics are taken from the CAMPUS® plastics data bank and are based on the international catalogue of basic data for plastics according to ISO 10350 (Plastics Acquisation and Presentaton of Comparable Single-Point Data, 1993).

Impact properties: N = non-break

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