

Bayblend[®] T65 and T85

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

Characterization

Bayblend[®] T65 and T85 are non-reinforced, amorphous thermoplastic polymer blends based on polycarbonate (PC) and acrylonitrile butadiene styrene copolymer (ABS). They are noted for their ideal combination of toughness, rigidity and flowability.

The Vicat softening temperature (VST/B 120) of T65 is in the region of 120 °C and that of T85 in the region of 131 °C.

Delivery form

Bayblend[®] T65 and T85 are available worldwide and supplied in the form of granules, packed in 25-kg polyethylene sacks, big bags, octatainer with a polyethylene inliner or in bulk. The products are available in their natural color or in a wide range of opaque shades.

The production plants for Bayblend[®] have been certificated to DIN ISO by the appropriate quality organizations.

The certificates can be found in the internet at <http://www.bayermaterialscience.com> (Customer Services / Certificates / Quality).

Applications

The main applications for Bayblend[®] T65 and T85 are in automotive interiors for parts requiring a high heat resistance in conjunction with very good low-temperature toughness, dimensional stability and suitability for secondary finishing.

Typical applications include trim components, such as instrument panels, central consoles, column trims, door sills, emblems, glove compartment lids, instrument frames, interior mirror housings, loudspeaker covers, steering column trims, ventilation systems, exterior mirror housings, grilles, headlamp housings,

rear light chassis, side protection moldings, spoilers, wheel covers.

Because of their outstanding property profiles, Bayblend[®] T65 and T85 are also used in the production of safety components such as airbag covers.

Further areas of application are to be found in

- Telecommunications:
Mobile telephone housings.
- Electrical/electronics industries:
Sockets, switches, covers.
- Household:
Top sections of irons, hairdryers, coffee machines, shaver housings, time-switch housings.

Properties (see also table)

Thanks to their exceptionally well-balanced and beneficial property profiles, components made from Bayblend[®] T65 and T85 can be produced cost-effectively and to a very high quality.

Mechanical properties

T65 and T85 display a very high impact and notched impact strength over a broad range of temperatures. The toughness at low temperatures is outstanding. The material demonstrates ductile fracture behavior in the notched flexural impact test at temperatures down to minus 35 °C.

The property values from the tensile test increase slightly from T65 to T85 (see stress-strain curves in the Appendix).

Thermal properties

Bayblend® grades T65 and T85 differ primarily in terms of their heat resistance. T65 covers the medium heat resistance range with a Vicat temperature of about 120 °C while T85 covers the upper end of the range at about 131 °C.

When parts are subject to a low level of mechanical loading, short-term exposure to temperatures of up to 110 °C in the case of T65 and 120 °C in the case of T85 will not lead to any essential dimensional changes. The maximum continuous service temperature depends on the molded part geometry, the type of loading and the requirements.

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

The coefficient of linear thermal expansion (ISO 11359-1,-2, 23 °C – 55 °C) is only influenced to a small extent by the melt flow direction and is in the range of about 0.8 to 0.85x10⁻⁴/K for T65 and in the range of about 0.75 to 0.8x10⁻⁴/K for T85.

Rheological properties

Bayblend® T65 displays better flowability than Bayblend® T85 (see viscosity curves in the Appendix).

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

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

Burning behaviour

Bayblend® T65 and T85 have a UL 94 HB recognition (all colors) at a wall thickness of 0.85 mm.

In addition, at a wall thickness of 1.0 mm or more, both products satisfy the requirements of FMVSS 302 with regard to the permissible burning rate (max. 101.6 mm/min).

Chemical resistance

At room temperature, Bayblend® molded parts are resistant to mineral acids, a large number of organic acids, and 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 determined by among other things the temperature, loading duration and the internal and external stress status of the molded part. In case of doubt, compatibility should be checked in a stress cracking test.

Weatherability

As with most thermoplastics, weathering leads to color changes and to an impairment of the product's mechanical properties. This reduction in properties, however, is not so pronounced, and the release specifications of the automotive industry, for example, can still be met. For more demanding requirements, a UV-stabilized variant with the designation BBS910 is available. Painting is recommended for parts that are required to satisfy highly stringent demands.

Emissions characteristics

Bayblend® T65 and T85 have low emission values, which means that they generally satisfy the emissions requirements of the European automotive industry for components used in vehicle interiors. Since the automotive industry requires the emissions rating to be determined on the component rather than the material, it is important to remember that the emission characteristics are substantially influenced by the injection molding process and the design of the part and the mold (especially the gating system). In order to obtain the best possible emission values it is advisable to follow our design and processing recommendations.

Processing

Processing is generally performed by injection molding. All modern injection molding machines may be used.

Bayblend® T65 and T85 can basically be extruded. In the case of extrusion applications, version BBS904 of the products should be used where more stringent requirements are imposed on surface finish.

Pre-treatment/drying

It is essential for Bayblend® T65 and T85 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 is best conducted in dry-air dryers.

Drying conditions: 2-4 h at 110 °C (dry-air dryer)

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

Melt temperature¹⁾ injection molding

The optimum processing temperature must be established as a function of the molded part and should be between 250 and 280 °C. It is advisable to check the actual melt temperature on the ejected press cake using a thermometer. 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, excessively high emission values or to surface defects in the form of streaks on the injection molded part.

Thermal decomposition of the material commences at around 300 °C.

1) see also disclaimer at the end of this Technical Information

Mold temperature control

The mold should be kept at a uniform temperature in the recommended range of between 70 and 100 °C. While lower temperatures result in shorter cycle times, they also lead to poorer molded part quality. The degree of orientation, inherent stress and post-shrinkage increases, while the surface finish deteriorates.

Screw speed

The screw speed should be controlled in such a way that the circumferential velocity of the screw is between 0.1 and 0.3 m/s.

Shrinkage

Molding shrinkage is virtually identical in all axes, in between a range of about 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.

Postshrinkage depends essentially on the storage temperature and time and is generally less than 0.1 %.

Further literature

Information on processing can also be found in the following technical publications:

"Processing Data for the Injection Molder",
"The Injection Molding of High-Quality Molded Parts".

Finishing

- Forming:
hot-forming processes, such as thermoforming, bending, stamping.
- Machining:
sawing, drilling, milling, filing, punching. The use of carbide-tipped tools is recommended.
- Joining:
Screw connections, gluing, welding.
- Post-treatment:
Painting, printing, foam-coating, metallization (high vacuum vapor metallization).

Safety Notice

The information given in Safety Data Sheet No. 112000008466 (for T65) and 112000008467 (for T85) must be observed.

The safety data sheets are available to registered customers on the internet at <http://www.bayerone.bayer.com> or can be sent out by request.

They contain details of labeling, handling and storage, as well as information on composition, product safety and toxicological/ecological profiles.

Recycling

Single-sort moldings made of Bayblend® 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® T65 and T85 is as follows:



>PC+ABS<

Further details can be found in our Technical Information brochure TI PCS1164en (Identification of Thermoplastics Parts for Recycling).



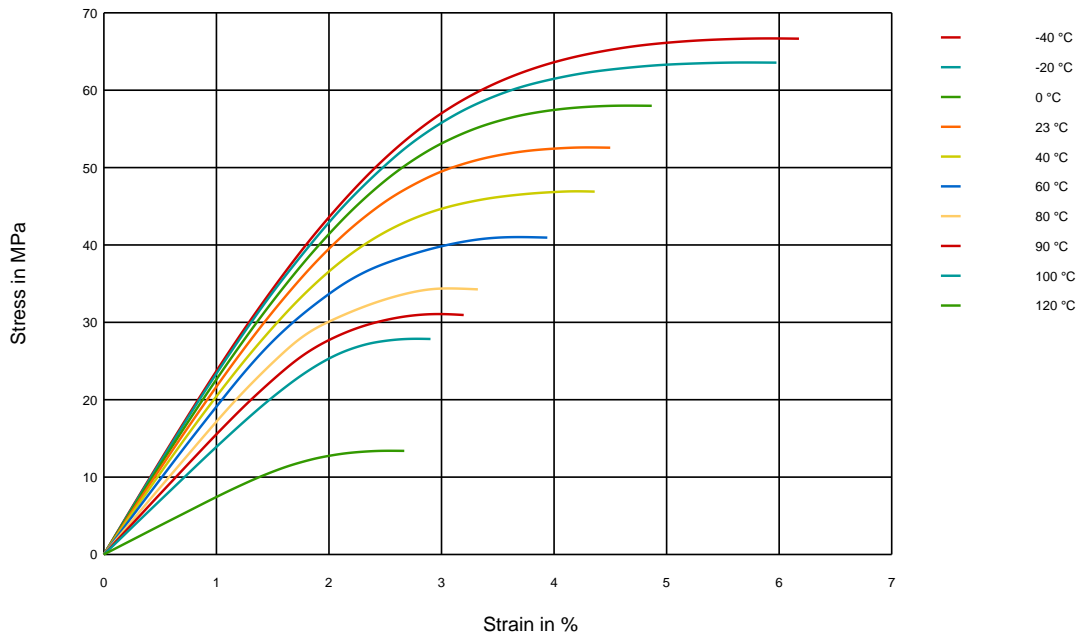


Figure 1: Isothermal stress-strain curves up to yield stress from the short-time tensile test to ISO 527-1,-2 of Bayblend® T65.

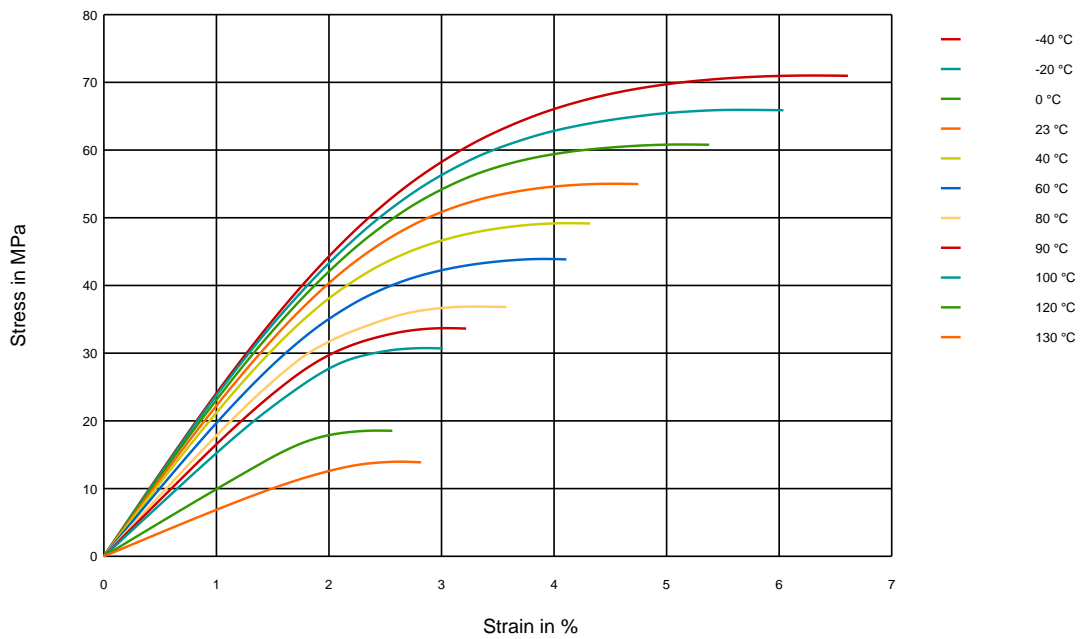


Figure 2: Isothermal stress-strain curves up to yield stress from the short-time tensile test to ISO 527-1,-2 of Bayblend® T85.

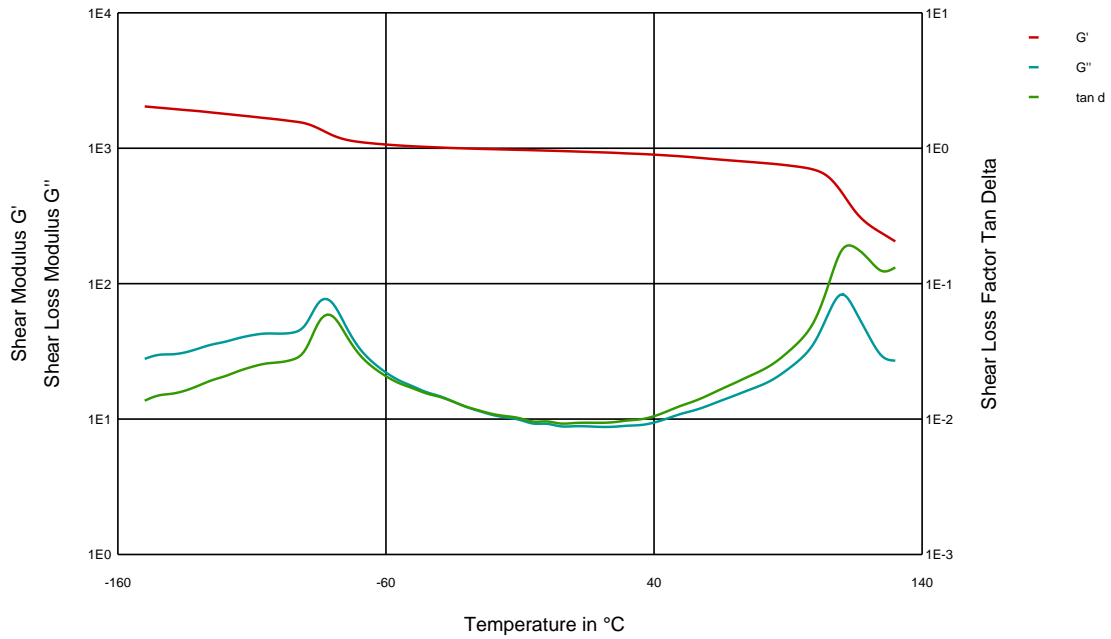


Figure 3: Shear modulus as a function of temperature to ISO 6721-7 of Bayblend® T65.

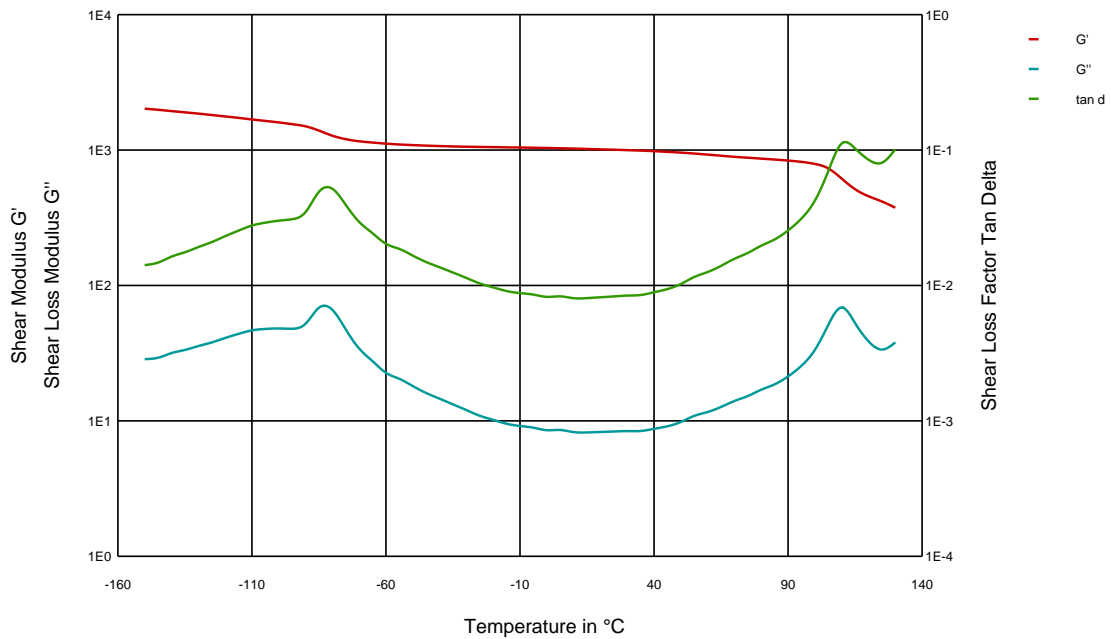


Figure 4: Shear modulus as a function of temperature to ISO 6721-7 of Bayblend® T85.

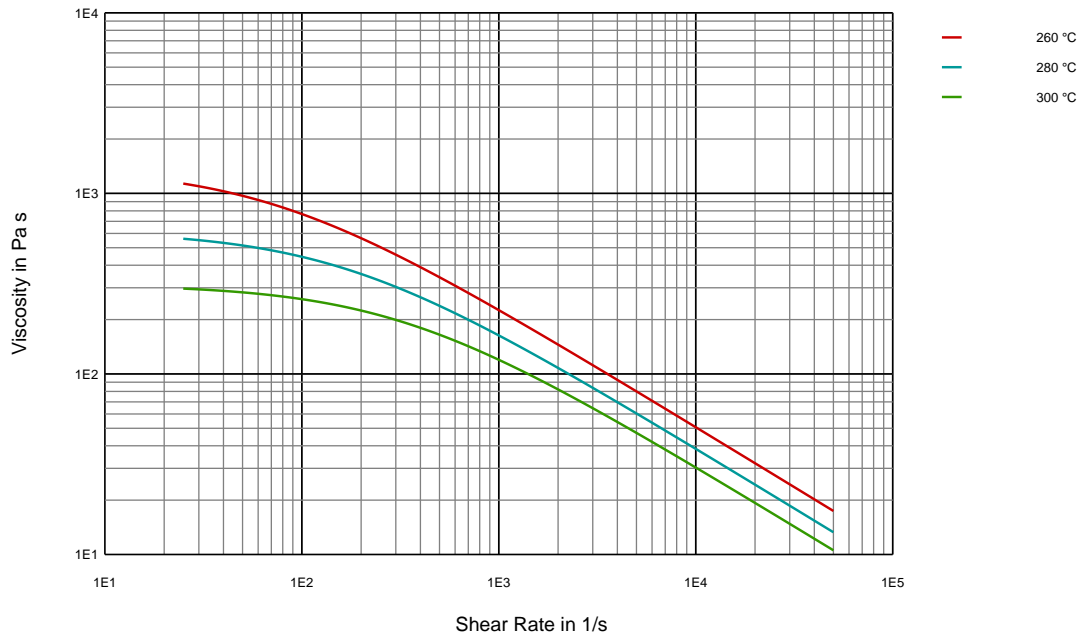


Figure 5: Melt viscosity as a function of shear rate b. o. ISO 11443-A of Bayblend[®] T65.

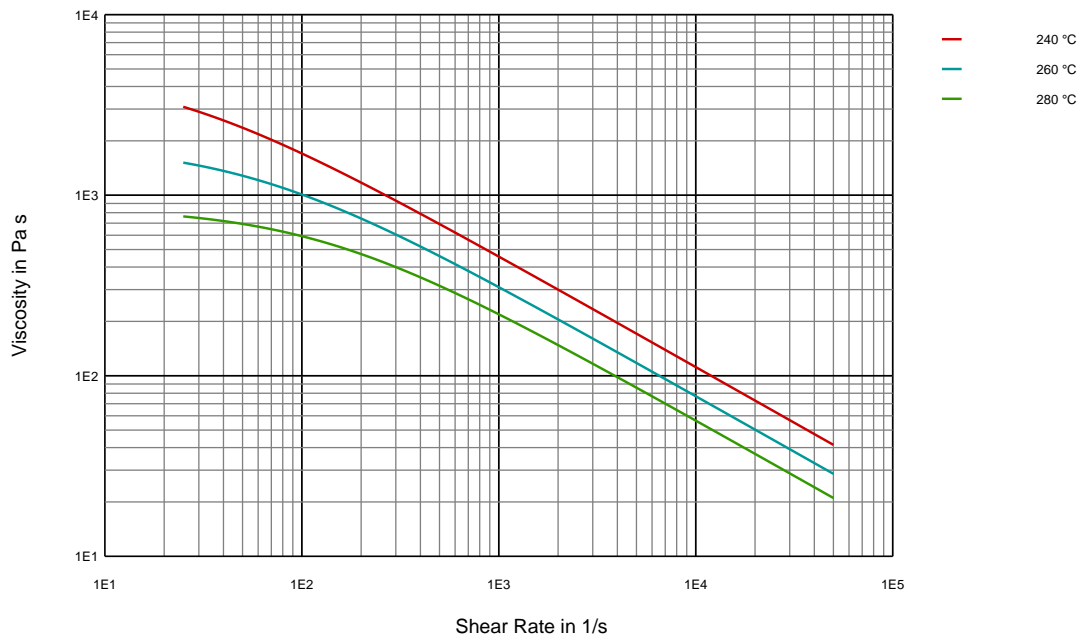


Figure 6: Melt viscosity as a function of shear rate b. o. ISO 11443-A of Bayblend[®] T85.

Typical Values

Property	Test Condition	Unit	Standard	Bayblend®	
				T65	T85
Rheological properties					
C Melt volume-flow rate	260 °C; 5 kg	cm ³ /10 min	ISO 1133	12	12
Molding shrinkage, parallel	150x105x3; 260 °C / MT 80 °C	%	b.o. ISO 2577	0.55 - 0.75	0.55 - 0.75
Molding shrinkage, normal	150x105x3; 260 °C / MT 80 °C	%	b.o. ISO 2577	0.55 - 0.75	0.55 - 0.75
Melt viscosity	1000 s ⁻¹ ; 260 °C	Pa·s	b.o. ISO 11443-A	230	290
Mechanical properties (23 °C/50 % r. h.)					
C Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2200	2300
C Yield stress	50 mm/min	MPa	ISO 527-1,-2	52	55
C Yield strain	50 mm/min	%	ISO 527-1,-2	4.2	4.7
Stress at break	50 mm/min	MPa	ISO 527-1,-2	45	48
Strain at break	50 mm/min	%	b.o. ISO 527-1,-2	> 50	> 50
Izod impact strength	23 °C	kJ/m ²	ISO 180-U	N	N
Izod impact strength	-30 °C	kJ/m ²	ISO 180-U	N	N
Izod notched impact strength	23 °C	kJ/m ²	ISO 180-A	45	48
Izod notched impact strength	-30 °C	kJ/m ²	ISO 180-A	41	38
Thermal properties					
C Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	100	109
C Temperature of deflection under load	0.45 MPa	°C	ISO 75-1,-2	122	127
C Vicat softening temperature	50 N; 50 °C/h	°C	ISO 306	118	129
Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	120	131
C Coefficient of linear thermal expansion, parallel	23 to 55 °C	10 ⁻⁴ /K	ISO 11359-1,-2	0.8	0.75
C Coefficient of linear thermal expansion, transverse	23 to 55 °C	10 ⁻⁴ /K	ISO 11359-1,-2	0.85	0.8
C Burning behavior UL 94	0.85 mm	Class	UL 94	HB	HB
Electrical properties (23 °C/50 % r. h.)					
C Relative permittivity	100 Hz	-	IEC 60250	3.1	3.1
C Relative permittivity	1 MHz	-	IEC 60250	3.0	3.0
C Dissipation factor	100 Hz	10 ⁻⁴	IEC 60250	30	20
C Dissipation factor	1 MHz	10 ⁻⁴	IEC 60250	85	85
C Volume resistivity		Ohm·m	IEC 60093	1E14	1E14
C Surface resistivity		Ohm	IEC 60093	1E16	1E16
C Electrical strength	1 mm	kV/mm	IEC 60243-1	35	35
C Comparative tracking index CTI	Solution A	Rating	IEC 60112	250	225
Other properties (23 °C)					
C Water absorption (saturation value)	Water at 23 °C	%	ISO 62	0.7	0.7
C Water absorption (equilibrium value)	23 °C; 50 % r. h.	%	ISO 62	0.2	0.2
C Density		kg/m ³	ISO 1183-1	1130	1150
Processing conditions for test specimens					
C Injection molding-Melt temperature		°C	ISO 294	260	260
C Injection molding-Mold temperature		°C	ISO 294	80	80
C Injection molding-Injection velocity		mm/s	ISO 294	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.

Impact properties: N = non-break, P = partial break, C = complete break

colored fields = UL recognition



This information and our technical advice - whether verbal, in writing or by way of trials - are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to check its validity and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Conditions of Sale and Delivery.

Unless specified to the contrary, the values given have been established on standardized test specimens at room temperature. The figures should be regarded as guide values only and not as binding minimum values. Please note that, under certain conditions, the properties can be affected to a considerable extent by the design of the mold/die, the processing conditions and coloring.

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.

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