Bayblend® T65 XF and T85 XF

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

Product description

Bayblend® T65 XF and T85 XF are non-reinforced, amorphous, thermoplastics polymer blends based on polycarbonate (PC) and acrylonitrile butadiene styrene (ABS). They are noted for their ideal combination of toughness, stiffness and flowability. Their heat resistance to Vicat VST/B 120 is in the region of 120 °C for T65 XF and 130 °C for T85 XF.

Characterization

Bayblend® T65 XF and T85 XF are the easy-flow variants of the general-purpose Bayblend® T65 and T85 grades. Their flowability has been improved by 10-15 % depending on the processing conditions. Alongside improved flowability, T65 XF and T85 XF also have the following advantages compared to T65 and T85:

- Greater low-temperature impact strength in the multiaxial penetration test over a broader processing window.
- Excellent resistance to stress cracking under the influence of media.
- Improved stability when stored in warm, humid conditions.

Delivery form

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

Bayblend® T65 XF and T85 XF 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).

The production plant for Bayblend® in the USA has been certified to ISO 9001:2000.

Applications

The main applications for Bayblend® T65 XF and T85 XF are in automotive interiors for parts requiring a high heat resistance in conjunction with very good low-temperature toughness and excellent flowability.

The high flowability of Bayblend® T65 XF and T85 XF also opens up additional applications in thin-wall technology, including housings for mobile phones.

- Automotive:
  Central consoles, upper door trim moldings, exterior mirror housings, glove compartment lids, grilles, headlamp housings, instrument frames, instrument panels, interior mirror housings, loudspeaker covers, rear light chassis, column trims, side protection moldings, spoilers, steering column trims, ventilation systems, wheel covers.
- 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.

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Properties (see also table)

Bayblend® T65 XF and T85 XF are noted for their favorable combination of heat resistance, toughness, stiffness and flowability.

Mechanical properties

T65 XF and T85 XF display a high impact and notched impact strength over a broad range of temperatures. The excellent low-temperature toughness of these products in the multiaxial penetration test is even more favorable than their notched impact strength. T65 XF has a tensile modulus some 200 MPa higher than that of T65.

Thermal properties

Bayblend® grades T65 XF and T85 XF differ primarily in terms of their heat resistance. T65 XF covers the medium heat resistance range with a Vicat temperature of 120 °C while T85 XF covers the upper end of the range at 130 °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 XF and 120 °C in the case of T85 XF 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 is only influenced to a small extent by the melt flow direction and is in the range of 0.75 to $0.85*10^{-4}$/K.

T65 XF and T85 XF have a UL 94 HB rating (all colors) at a wall thickness of 0.85 mm.

T65 XF and T85 XF attain the burning rate required for FMVSS 302 at a wall thickness of 1.0 mm and above.

Rheological properties

The flowability of T65 XF and T85 XF has been increased by some 10 - 15 % compared with the general-purpose grades of T65 und T85, depending on the processing conditions. The flowability of T65 XF is higher than that of T85 XF, as can be seen from the flow path/wall thickness diagrams in the Appendix.

The favorable combination of very good flowability and sound mechanical properties means that Bayblend® grades T65 XF und T85 XF are ideal for applications in thin-wall technology.

Chemical resistance

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. In case of doubt, compatibility should be checked in a stress cracking test.

A clear increase in resistance to chemicals has been achieved for T65 XF, in particular. This gives rise to very good stress cracking resistance under the influence of media. In cases where paints with particularly aggressive solvents are used, better adhesion can now be obtained to these materials.

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.

Emission behavior

Bayblend® T65 XF and T85 XF are low-emission grades, i.e. it is normally possible to comply with the emission requirements laid down by the European automotive industry for parts in vehicle interiors. Since most automotive manufacturers require the emissions to be evaluated on the finished part, it should be borne in mind that the emission behavior can be influenced to a considerable extent by the injection

molding process and by the design of the molded part (particularly the gating system). Optimum emission values can be obtained by following our design and processing advice.

Processing

Bayblend® T65 XF and T85 XF are generally processed by injection molding.

While they can basically be extruded, the higher-viscosity grades of Bayblend® T65 and T85 are more suited to extrusion. 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

Bayblend® T65 XF and T85 XF must 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 (a reduction in mechanical properties). A drying temperature of 110 °C is recommended for T65 XF and T85 XF. Dehumidifying/desiccant dryers have to be used exclusively. The drying time is 4 hours. Excessively long drying should be avoided, since this may lead to discoloration.

Processing temperature

The optimum processing temperature must be established as a function of the molded part and should be between 260 and 280 °C. Overheating, and also excessively long residence times for the melt in the cylinder 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.

Mold temperature control

The mould 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 in the range of 0.05 to 0.2 m/s.

Molding shrinkage is virtually identical in all axes at between 0.5 and 0.7 %. In addition to the part geometry, the shrinkage is conditioned primarily by the level of holding pressure and the time for which this acts, as well as by the temperature of the melt and the mold and the cooling conditions that prevail in the mold.

Finishing

- Machining:
  Sawing, drilling, milling, turning, planing, filing, stamping.
- Joining:
  Screw connections, gluing, welding.
- Post-treatment:
  Painting, printing, foam-coating, metallization (high vacuum vapor metallization), laser marking.

Safety Notice

The information provided in Safety Data Sheet No. 036270 should be observed. The Safety Data Sheet will be supplied on request.

Recycling

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

>PC+ABS<

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

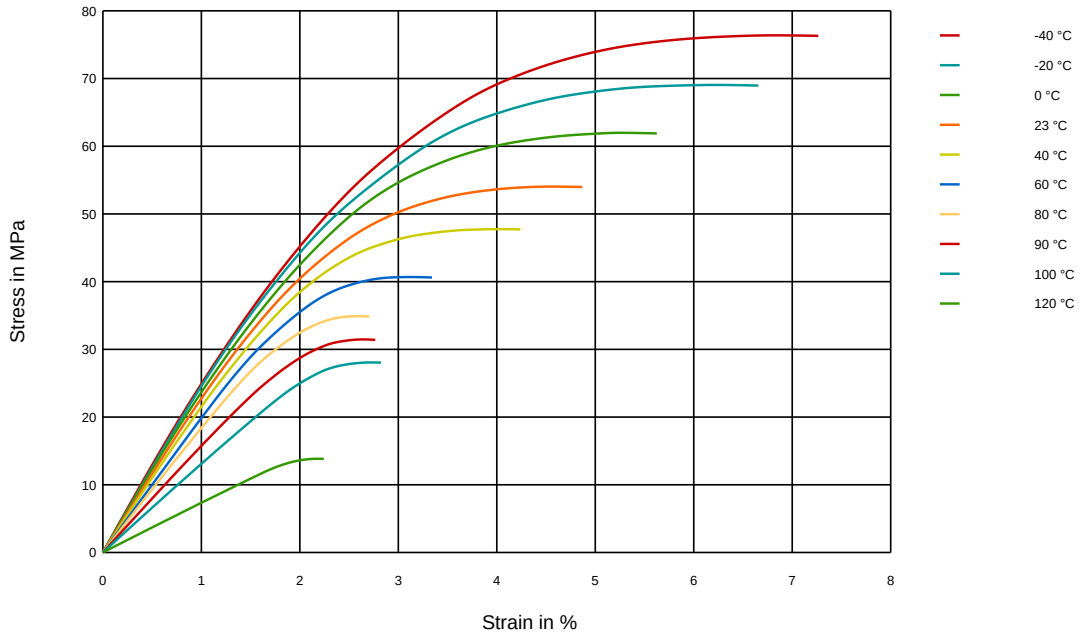

Figure 1: Isothermal stress-strain curves up to yield stress from the short-time tensile test to ISO 527-1, -2 (Bayblend® T65 XF).

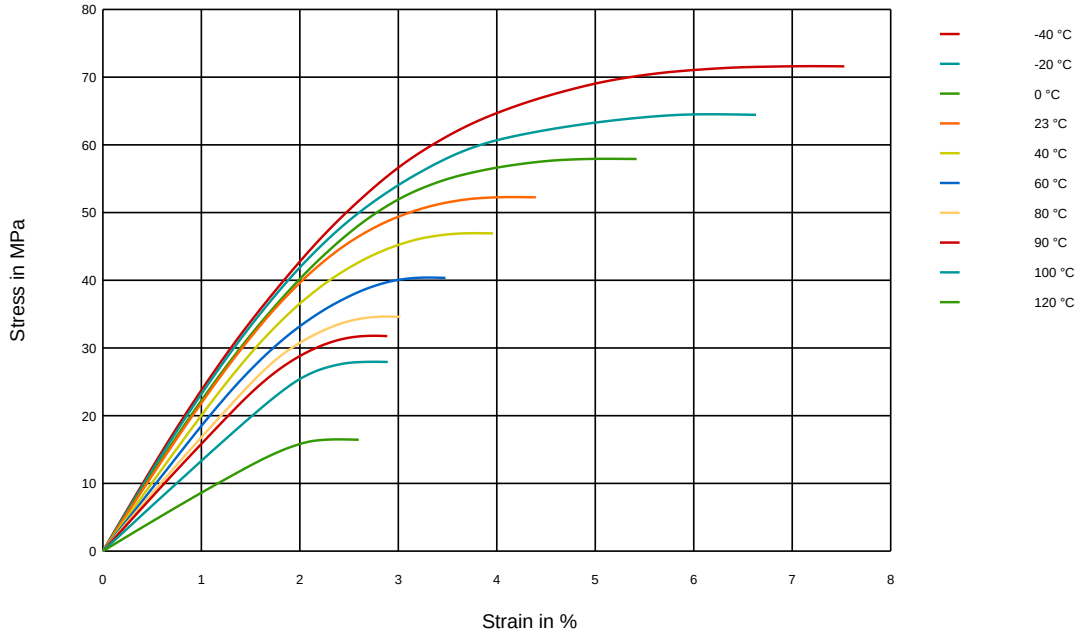

Figure 2: Isothermal stress-strain curves up to yield stress from the short-time tensile test to ISO 527-1, -2 (Bayblend® T85 XF).

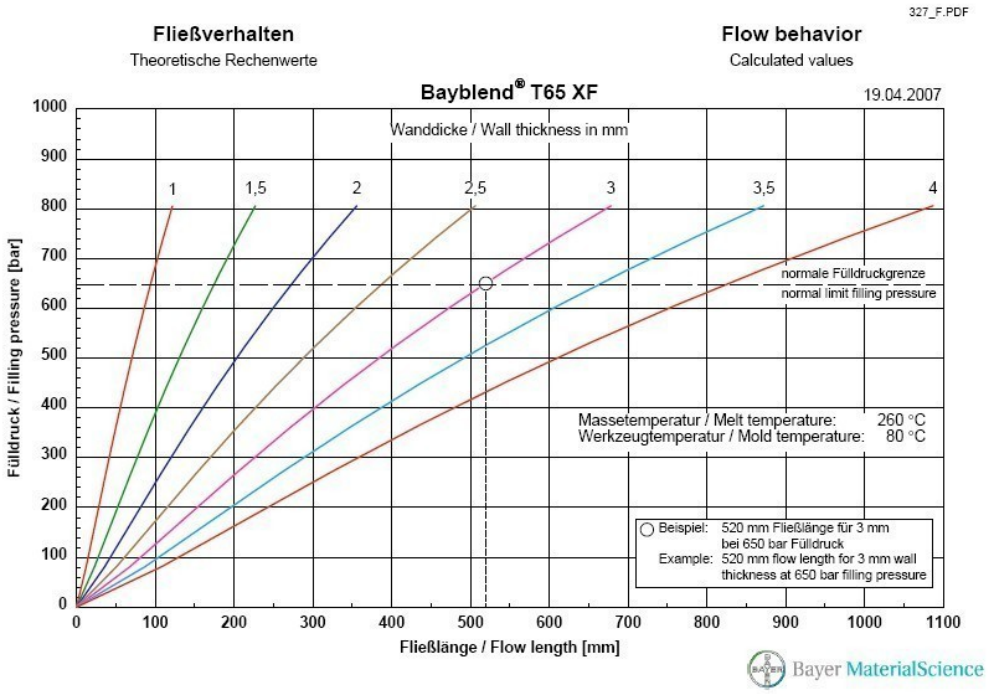

Figure 3: Flow behavior - Theoretical values Bayblend® T65 XF.

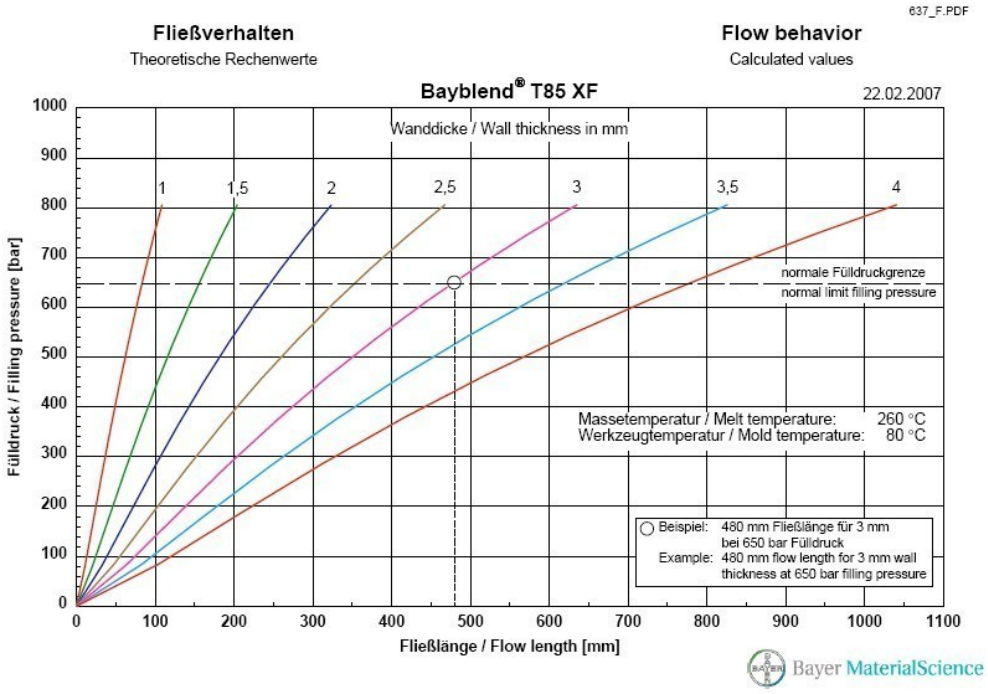

Figure 4: Flow behavior - Theoretical values Bayblend® T85 XF.

Typical Values

	Property	Test Condition	Unit	Standard	Bayblend® T65 XF	Bayblend® T85 XF
Rheological properties						
C	Melt volume-flow rate	260 °C; 5 kg	cm³/10 min	ISO 1133	18	19
	Molding shrinkage, parallel	150x105x3; 260 °C / MT 80 °C	%	b.o. ISO 2577	0.5 - 0.7	0.5 - 0.7
	Molding shrinkage, normal	150x105x3; 260 °C / MT 80 °C	%	b.o. ISO 2577	0.5 - 0.7	0.5 - 0.7
	Melt viscosity	1000 s^-1^; 260 °C	Pa·s	b.o. ISO 11443-A	200	250
Mechanical properties (23 °C/50 % r. h.)						
C	Tensile modulus	1 mm/min	MPa	ISO 527-1,-2	2400	2300
C	Yield stress	50 mm/min	MPa	ISO 527-1,-2	54	54
C	Yield strain	50 mm/min	%	ISO 527-1,-2	4.4	4.7
	Stress at break	50 mm/min	MPa	ISO 527-1,-2	47	50
	Strain at break	50 mm/min	%	b.o. ISO 527-1,-2	> 50	> 50
	Izod impact strength	23 °C	kJ/m²	ISO 180-U	N	N
	Izod impact strength	-30 °C	kJ/m²	ISO 180-U	N	N
	Izod notched impact strength	23 °C	kJ/m²	ISO 180-A	45	48
	Izod notched impact strength	-30 °C	kJ/m²	ISO 180-A	35	35
Thermal properties						
C	Temperature of deflection under load	1.80 MPa	°C	ISO 75-1,-2	102	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	128
	Vicat softening temperature	50 N; 120 °C/h	°C	ISO 306	120	130
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/m³	ISO 1183-1	1130	1140
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

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.

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.

Editor: Global Innovations - Polycarbonates
Bayer MaterialScience AG
D-51368 Leverkusen, Germany
www.bayermaterialscience.de
pcs-info@bayermaterialscience.com