BAYBLEND® FR2000 and FR2010

Polycarbonate/ABS Blends

Flame-Retardant Grades

Bayer MaterialScience

Product Information

Description

Bayblend FR2000 and FR2010 resins are easy-flow flame-retardant blends of Makrolon® polycarbonate and Lustran® acrylonitrile butadiene styrene (ABS) resins. The flame-retardant additive in these grades is antimony/bromine/chlorine-free. Bayblend FR2000 and FR2010 offer improved processability over Bayblend FR90 and FR110 resins. FR2000 is the higher-flow grade and is suitable for demanding applications, such as thin-wall parts. FR2010 exhibits higher heat resistance and higher impact strength. These resins are supplied in pellet form for injection molding applications. They are naturally opaque and are available in custom colors and with special visual effects.

Applications

Bayblend FR2000 and FR2010 resins combine stiffness, toughness, and excellent color stability to fluorescent light or filtered sunlight in an office environment. These resins are used chiefly in the business machine market in housings for computers, printers, copiers, and general office equipment and in the electrical/electronic market. These grades can also be used for consumer products, including personal care items (such as hair dryers), household appliances, and vacuum cleaners. As with any product, use of Bayblend FR2000 or FR2010 resin in a given application must be tested (including but not limited to field testing) in advance by the user to determine suitability.

Drying

Drying prior to processing is essential to ensure desired appearance and property performance. A desiccant dehumidifying hopper dryer with a hopper inlet air temperature of 175°F (80°C) for FR2000 and 195°F (90°C) for FR2010 is recommended. To achieve the recommended moisture content of less than 0.02%, inlet air dew point should be -20°F (-29°C) or lower. The hopper capacity should be sufficient to provide a minimum of 4 hours' residence time. Additional information on drying is available in the Bayer publication, *General Drying Guide*.

Processing

Bayblend FR2000 and FR2010 resins may be easily processed on conventional injection molding equipment. Typical processing parameters are noted below. Actual processing conditions will depend on machine size, mold design, material residence time, and shot size.

Typical Injection Molding Conditions

Barrel Temperature:	
Rear	430°–445°F (221°–229°C)
Middle	435°–455°F (224°–235°C)
Front	445°–465°F (229°–241°C)
Nozzle	485°–505°F (252°–263°C)
Melt Temperature, FR2000	430v–520°F (221°–271°C)
Melt Temperature, FR2010	465°–520°F (241°–271°C)
Mold Temperature	140°–175°F (60°–80°C)
Injection Pressure	10,000–16,000 psi
Hold Pressure	50–75% Injection Pressure
Back Pressure	50–100 psi
Screw Speed	40–70 rpm
Injection Speed	Slow to Moderate
Cushion	1/8–1/4 in
Clamp	3–5 ton/in^2

Additional information on processing may be obtained by consulting the Bayer publication, *Bayblend Polycarbonate/ABS Blend — Injection Molding Guidelines*, or by contacting a Bayer technical service representative.

Regrind Usage

Where end-use requirements permit, up to 20% Bayblend resin regrind may be used with virgin material, provided that the material is kept free of contamination and is properly dried (see section on Drying). Any regrind used must be generated from properly molded parts, sprues, and/or runners. All regrind used must be clean, uncontaminated, and thoroughly blended with virgin resin prior to drying and processing. Under no circumstances should degraded, discolored, or contaminated material be used for regrind. Material of this type should be properly discarded.

Improperly mixed and/or dried regrind may diminish the desired properties of Bayblend resin. It is critical that you test finished parts produced with any amount of regrind to ensure that your end-use performance requirements are fully met. Regulatory or testing organizations (e.g., UL) may have specific requirements limiting the allowable amount of regrind. Because third party regrind generally does not have a traceable heat history, or offer any assurance that proper temperatures, conditions, and/or materials were used in processing, extreme caution must be exercised in buying and using regrind from third parties.

The use of regrind material should be avoided entirely in those applications where resin properties equivalent to virgin material are required, including but not limited to color quality, impact strength, resin purity, and/or load-bearing performance.

Health and Safety Information

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling Bayblend FR2000 and FR2010 resins. Before working with these products, you must read and become familiar with the available information on their hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult your Bayer representative or contact Bayer's Product Safety and Regulatory Affairs Department in Pittsburgh, Pa.

Note: The information contained in this bulletin is current as of November 2003. Please contact Bayer MaterialScience to determine whether this publication has been revised.

Typical Properties* for Natural Resin	ASTM Test Method (Other)	Bayblend® FR2000 Resin		Bayblend® FR2010 Resin	
		U.S. Conventional	SI Metric	U.S. Conventional	SI Metric
General					
Specific Gravity	D 792	1.18		1.18	
Density	D 792	0.043 lb/in^3	1.18 g/cm^3	0.043 lb/in^3	1.18 g/cm^3
Specific Volume	D 792	23.5 in^3/lb	0.85 cm^3/g	23.5 in^3/lb	0.85 cm^3/g
Mold Shrinkage	D 955	0.004 – 0.006[a] in/in	0.004–0.006[a] mm/mm	0.004 – 0.006[a] in/in	0.004–0.006[a] mm/mm
Water Absorption, Immersion at 73°F (23°C) to Saturation	D 570	0.5%		0.5%	
Melt Flow Rate at 240°C/5-kg Load	D 1238	26 g/10 min		25 g/10 min	
Spiral Flow Length: 0.100-in (2.54-mm) Thickness 490°F (254°C) Melt Temperature	(Bayer)	30 in	762 mm	24 in	610 mm
Mechanical					
Tensile Stress at Yield	D 638	8,700 lb/in^2	60 MPa	8,700 lb/in^2	60 MPa
Tensile Stress at Break	D 638	6,500 lb/in^2	45 MPa	7,200 lb/in^2	50 MPa
Tensile Elongation at Yield	D 638	4%		4%	
Tensile Elongation at Break	D 638	>50%		>50%	
Tensile Modulus	D 638	400,000 lb/in^2	2.8 GPa	390,000 lb/in^2	2.7 GPa
Flexural Stress at 5% Strain	D 790	13,800 lb/in^2	95 MPa	13,800 lb/in^2	95 MPa
Flexural Modulus	D 790	390,000 lb/in^2	2.7 GPa	390,000 lb/in^2	2.7 GPa
Impact Strength, Notched Izod: 0.125-in (3.2-mm) Thickness 73°F (23°C)	D 256	8 ft·lb/in	430 J/m	10 ft·lb/in	530 J/m
Instrumented Impact, Total Energy:[b] 73°F (23°C)	D 3763	36 ft·lb	49 J	38 ft·lb	52 J
Thermal					
Deflection Temperature, Unannealed: 0.250-in (6.4-mm) Thickness 264-psi (1.82-MPa) Load	D 648	180°F	82°C	200°F	93°C
Coefficient of Linear Thermal Expansion	D 696	4.3 E-05 in/in/°F	7.7 E-05 mm/mm/°C	4.3 E-05 in/in/°F	7.7 E-05 mm/mm/°C
Relative Temperature Index: (UL746B) 1.5-mm (0.059-in) Thickness					
Electrical		194°F	90°C	203°F	95°C
Mechanical with Impact		167°F	75°C	185°F	85°C
Mechanical without Impact		185°F	85°C	185°F	85°C
Vicat Softening Temperature, B/120	(ISO 306)	201°F	94°C	226°F	108°C
Flammability**					
Oxygen Index	D 2863	34%		34%	
UL94 Flame Class:	(UL94)				
1.5-mm (0.059-in) Thickness		V-0 Rating		V-0 Rating	
2.0-mm (0.079-in) Thickness		5VB Rating			
2.2-mm (0.087-in) Thickness				5VB Rating	
3.0-mm (0.118-in) Thickness		5VA Rating		5VA Rating	
Electrical					
Volume Resistivity	D 3638	> 1.0 E+14 ohm·cm		> 1.0 E+13 ohm·cm	
Surface Resistivity	(IEC 60093)	> 1.0 E+14 ohm		> 1.0 E+14 ohm	
Dielectric Strength	(IEC 60243-1)	760 V/mil	30 kV/mm	760 V/mil	30 kV/mm
Relative Permittivity: 100 Hz	(IEC 60250)	3.2		3.2	
1 MHz		3.1		3.1	
Dissipation Factor: 100 Hz	(IEC 60250)	0.005		0.004	
1 MHz		0.007		0.007	
Comparative Tracking Index	(IEC 60112)	500 V		350 V	

** These items are provided as general information only. They are approximate values and are not part of the product specifications. Type and quantity of pigments or additives used to obtain opaque colors and special effects can affect material properties.*

*** Flammability results are based on small-scale laboratory tests for purposes of relative comparison and are not intended to reflect the hazards presented by this or any other material under actual fire conditions.*

[a] Mold shrinkage of 0.003–0.005 in/in also has been measured on injection molded parts, depending on part design and gating.

[b] 0.125-in thickness, 0.5-in dart, 3-in clamp, 15 mph.

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