

Common features of Crastin® thermoplastic polyester resin include mechanical and physical properties such as stiffness and toughness, heat resistance, friction and wear resistance, excellent surface finishes and good colourability. Crastin® thermoplastic polyester resin has excellent electrical insulation characteristics and high arc-resistant grades are available. Many flame retardant grades have UL recognition (class V-0). Crastin® thermoplastic polyester resin typically has high chemical and heat ageing resistance.

The good melt stability of Crastin® thermoplastic polyester resin normally enables the recycling of properly handled production waste. If recycling is not possible, we recommend, as the preferred option, incineration with energy recovery (-24 kJ/g of base polymer) in appropriately equipped installations. For disposal, local regulations have to be observed.

Crastin® thermoplastic polyester resin typically is used in demanding applications in the electronics, electrical, automotive, mechanical engineering, chemical, domestic appliances and sporting goods industry.

Crastin® HR5315HFS is a 15% glass reinforced PBT with high flow, moderately toughened, hydrolysis resistant (HR) polybutylene terephtalate for injection moulding.

### Product information

Resin Identification Part Marking Code	PBT-IGF15 >PBT-IGF15<		ISO 1043 ISO 11469
			100 1 1403
Rheological properties			
Melt volume-flow rate	12	cm <sup>3</sup> /10min	ISO 1133
Melt mass-flow rate	17	g/10min	ISO 1133
Temperature	250	°C	
Load	2.16	kg	
Melt mass-flow rate, Temperature	250	°C	
Melt mass-flow rate, Load	2.16	kg	
Viscosity number	110	cm <sup>3</sup> /g	ISO 307, 1628
Intrinsic viscosity	0.9		ISO 307, 1628
Moulding shrinkage, parallel	0.5	%	ISO 294-4, 2577
Moulding shrinkage, normal	1.1	%	ISO 294-4, 2577
Flow length	400	mm	
Flow length - pressure	80	MPa	
Flow length - width/thickness	2	mm	
Melt viscosity, @ 1000 sec-1, 250°C	180	Pa.s	ISO 11443
Typical mechanical properties			
Tensile modulus	5000	MPa	ISO 527-1/-2
Tensile stress at break, 5mm/min	100	MPa	ISO 527-1/-2
Tensile strain at break, 5mm/min	3.4	%	ISO 527-1/-2
Flexural strength	140	MPa	ISO 178
Charpy impact strength, 23°C	60	kJ/m²	ISO 179/1eU
Charpy impact strength, -30°C	30	kJ/m²	ISO 179/1eU
Charpy notched impact strength, 23°C	11	kJ/m²	ISO 179/1eA
Charpy notched impact strength, -40°C	7	kJ/m²	ISO 179/1eA
Poisson's ratio	0.35		

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THERMOPLASTIC POLYESTER RESIN

# Thermal properties

Melting temperature, 10 °C/min Glass transition temperature, 10 °C/min Temperature of deflection under load, 1.8 MPa Temperature of deflection under load, 0.45 MPa Coefficient of linear thermal expansion (CLTE), parallel Coefficient of linear thermal expansion (CLTE), normal Temperature index, tensile strength, 20 000h Temperature index, tensile strength, 5000h TGA curve	200 220 38	°C °C E-6/K E-6/K	ISO 11357-1/-3 ISO 11357-1/-3 ISO 75-1/-2 ISO 75-1/-2 ISO 11359-1/-2 ISO 11359-1/-2 IEC 60216-1 IEC 60216-1 ISO 11359-1/-2
Flammability			
Burning Behav. at 1.5mm nom. thickn. Thickness tested Oxygen index Glow Wire Flammability Index, 0.4mm Glow Wire Flammability Index, 0.75mm Glow Wire Flammability Index, 1.0mm Glow Wire Flammability Index, 1.5mm Glow Wire Flammability Index, 2.0mm Glow Wire Flammability Index, 3.0mm Glow Wire Ignition Temperature, 0.75mm Glow Wire Ignition Temperature, 0.4mm Glow Wire Ignition Temperature, 1.0mm Glow Wire Ignition Temperature, 1.5mm Glow Wire Ignition Temperature, 3.0mm Glow Wire Ignition Temperature, 3.0mm FMVSS Class Burning rate, Thickness 1 mm	1.5 20 775 750 750 775 775 775 775 800 775 800 800 800 800 800	ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝံ ဝ	IEC 60695-11-10 IEC 60695-11-10 ISO 4589-1/-2 IEC 60695-2-12 IEC 60695-2-12 IEC 60695-2-12 IEC 60695-2-12 IEC 60695-2-12 IEC 60695-2-13 IEC 60695-2-13
Electrical properties Relative permittivity, 100Hz Relative permittivity, 1MHz Dissipation factor, 100Hz Dissipation factor, 1MHz Volume resistivity Surface resistivity Electric strength Comparative tracking index [1]: PTI = 600V	1E14	E-4 Ohm.m	IEC 62631-2-1 IEC 62631-2-1 IEC 62631-2-1 IEC 62631-2-1 IEC 62631-3-1 IEC 62631-3-2 IEC 60243-1 IEC 60112

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# THERMOPLASTIC POLYESTER RESIN

## Physical/Other properties

Humidity absorption, 2mm Water absorption, 2mm Density Density of melt			Sim. to ISO 62 Sim. to ISO 62 ISO 1183
VDA Properties			
Emission of organic compounds	40	µgC/g	VDA 277
Injection			
Drying Recommended	yes		
Drying Temperature	120	°C	
Drying Time, Dehumidified Dryer	2 - 4	h	
Processing Moisture Content	≤0.04	%	
Melt Temperature Optimum	250	°C	
Min. melt temperature	240	°C	
Max. melt temperature	260	°C	
Mold Temperature Optimum	80	°C	
Min. mould temperature	30	°C	
Max. mould temperature	130	°C	
Hold pressure range	≥60	MPa	
Hold pressure time	3	s/mm	
Back pressure	As low as possible	MPa	
Ejection temperature	188	°C	

## Characteristics

Additives

### Release agent

### Additional information

Injection molding

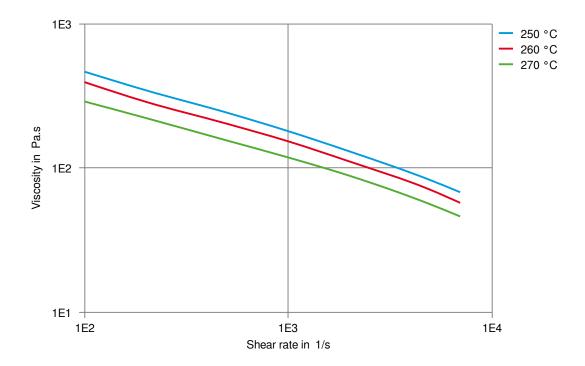
Use of hot-runners is possible with Crastin® HR resins. However we do not recommend temperature settings above 270°C and residence times at 265°C should be below 10 minutes. In case of longer residence times using hot-runners, for example after a shutdown, the complete system must be purged with glass reinforced Crastin® (type

SK602/605) before starting up again.

For successful processing of Crastin® HR with hot-runners, care should be taken to maintain a uniform temperature, avoid hot-spots and long residence times.

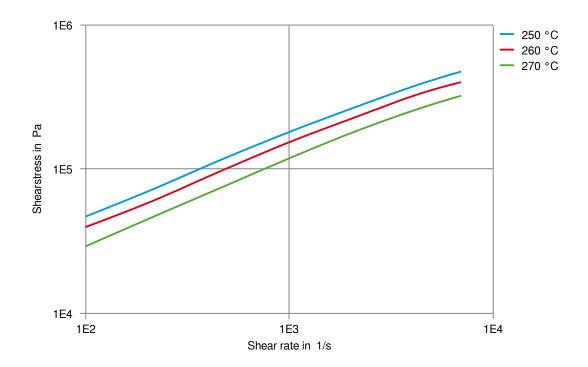


## Viscosity-shear rate



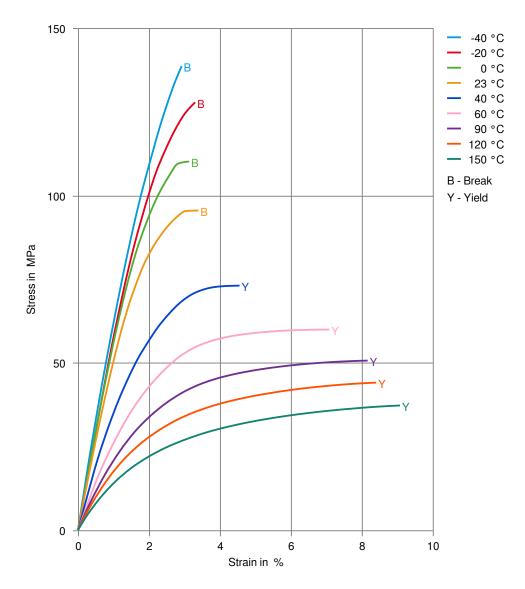


### Shearstress-shear rate



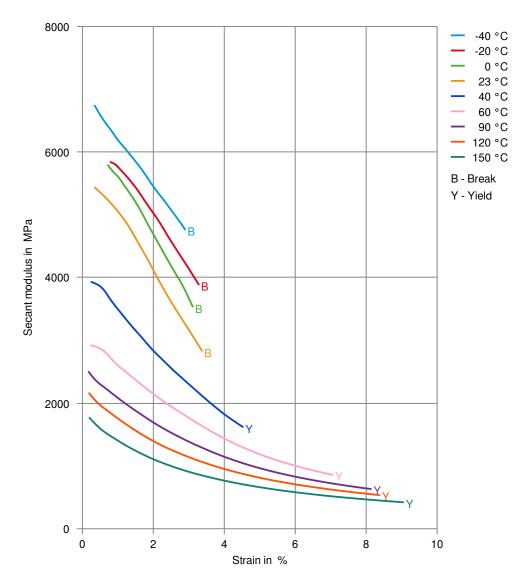


## Stress-strain





# Secant modulus-strain





THERMOPLASTIC POLYESTER RESIN

# **Chemical Media Resistance**

### Acids

- ✓ Acetic Acid (5% by mass), 23°C
- ✓ Citric Acid solution (10% by mass), 23°C
- ✓ Lactic Acid (10% by mass), 23°C
- ★ Hydrochloric Acid (36% by mass), 23°C
- X Nitric Acid (40% by mass), 23°C
- X Sulfuric Acid (38% by mass), 23°C
- X Sulfuric Acid (5% by mass), 23°C
- X Chromic Acid solution (40% by mass), 23°C

### Bases

- ✗ Sodium Hydroxide solution (35% by mass), 23°C
- ✓ Sodium Hydroxide solution (1% by mass), 23°C
- Ammonium Hydroxide solution (10% by mass), 23°C

### Alcohols

- ✓ Isopropyl alcohol, 23°C
- ✓ Methanol, 23°C
- ✓ Ethanol, 23°C

### Hydrocarbons

- ✓ n-Hexane, 23°C
- ✓ Toluene, 23°C
- ✓ iso-Octane, 23°C

### **Ketones**

✓ Acetone, 23°C

### Ethers

✓ Diethyl ether, 23°C

### Mineral oils

- ✓ SAE 10W40 multigrade motor oil, 23°C
- X SAE 10W40 multigrade motor oil, 130°C
- X SAE 80/90 hypoid-gear oil, 130 °C
- ✓ Insulating Oil, 23°C

### **Standard Fuels**

- X ISO 1817 Liquid 1 E5, 60°C
- ¥ ISO 1817 Liquid 2 M15E4, 60°C
- X ISO 1817 Liquid 3 M3E7, 60°C
- X ISO 1817 Liquid 4 M15, 60°C
- ✓ Standard fuel without alcohol (pref. ISO 1817 Liquid C), 23°C
- ✓ Standard fuel with alcohol (pref. ISO 1817 Liquid 4), 23 °C
- ✓ Diesel fuel (pref. ISO 1817 Liquid F), 23°C
- ✓ Diesel fuel (pref. ISO 1817 Liquid F), 90°C
- X Diesel fuel (pref. ISO 1817 Liquid F), >90°C

### Salt solutions

- ✓ Sodium Chloride solution (10% by mass), 23°C
- ✓ Sodium Hypochlorite solution (10% by mass), 23°C

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# THERMOPLASTIC POLYESTER RESIN

- Sodium Carbonate solution (20% by mass), 23°C
- Sodium Carbonate solution (2% by mass), 23°C
- Zinc Chloride solution (50% by mass), 23°C

### Other

- Ethyl Acetate, 23°C
- X Hydrogen peroxide, 23°C
- X DOT No. 4 Brake fluid, 130°C
- ✗ Ethylene Glycol (50% by mass) in water, 108°C
- 1% nonylphenoxy-polyethyleneoxy ethanol in water, 23°C
- ✓ 50% Oleic acid + 50% Olive Oil, 23°C
- ✓ Water, 23°C
- ✓ Water, 90°C
- ✓ Phenol solution (5% by mass), 23°C

#### Symbols used:

 $\checkmark$  possibly resistant

Defined as: Supplier has sufficient indication that contact with chemical can be potentially accepted under the intended use conditions and expected service life. Criteria for assessment have to be indicated (e.g. surface aspect, volume change, property change).

X not recommended - see explanation

Defined as: Not recommended for general use. However, short-term exposure under certain restricted conditions could be acceptable (e.g. fast cleaning with thorough rinsing, spills, wiping, vapor exposure).

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