

# Crastin® HR5315HFS NC010

## THERMOPLASTIC POLYESTER RESIN

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 terephthalate for injection moulding.

### Product information

Resin Identification	PBT-IGF15	ISO 1043
Part Marking Code	>PBT-IGF15<	ISO 11469

### 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 <sup>-1</sup> , 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/m <sup>2</sup>	ISO 179/1eU
Charpy impact strength, -30 °C	30 kJ/m <sup>2</sup>	ISO 179/1eU
Charpy notched impact strength, 23 °C	11 kJ/m <sup>2</sup>	ISO 179/1eA
Charpy notched impact strength, -40 °C	7 kJ/m <sup>2</sup>	ISO 179/1eA
Poisson's ratio	0.35	

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### Thermal properties

Melting temperature, 10 °C/min	225 °C	ISO 11357-1/-3
Glass transition temperature, 10 °C/min	60 °C	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	200 °C	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa	220 °C	ISO 75-1/-2
Coefficient of linear thermal expansion (CLTE), parallel	38 E-6/K	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), normal	160 E-6/K	ISO 11359-1/-2
Temperature index, tensile strength, 20 000h	152 °C	IEC 60216-1
Temperature index, tensile strength, 5000h	186 °C	IEC 60216-1
TGA curve	available	ISO 11359-1/-2

### Flammability

Burning Behav. at 1.5mm nom. thickn.	HB class	IEC 60695-11-10
Thickness tested	1.5 mm	IEC 60695-11-10
Oxygen index	20 %	ISO 4589-1/-2
Glow Wire Flammability Index, 0.4mm	775 °C	IEC 60695-2-12
Glow Wire Flammability Index, 0.75mm	750 °C	IEC 60695-2-12
Glow Wire Flammability Index, 1.0mm	750 °C	IEC 60695-2-12
Glow Wire Flammability Index, 1.5mm	775 °C	IEC 60695-2-12
Glow Wire Flammability Index, 2.0mm	775 °C	IEC 60695-2-12
Glow Wire Flammability Index, 3.0mm	775 °C	IEC 60695-2-12
Glow Wire Ignition Temperature, 0.75mm	775 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 0.4mm	800 °C	IEC 60695-2-12
Glow Wire Ignition Temperature, 1.0mm	775 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 1.5mm	800 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 2.0mm	800 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 3.0mm	800 °C	IEC 60695-2-13
FMVSS Class	B	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	32 mm/min	ISO 3795 (FMVSS 302)

### Electrical properties

Relative permittivity, 100Hz	3.6	IEC 62631-2-1
Relative permittivity, 1MHz	3.5	IEC 62631-2-1
Dissipation factor, 100Hz	100 E-4	IEC 62631-2-1
Dissipation factor, 1MHz	100 E-4	IEC 62631-2-1
Volume resistivity	>1E13 Ohm.m	IEC 62631-3-1
Surface resistivity	1E14 Ohm	IEC 62631-3-2
Electric strength	42 kV/mm	IEC 60243-1
Comparative tracking index	600 <sup>[1]</sup>	IEC 60112

[1]: PTI = 600V

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### Physical/Other properties

Humidity absorption, 2mm	0.15 %	Sim. to ISO 62
Water absorption, 2mm	0.4 %	Sim. to ISO 62
Density	1380 kg/m <sup>3</sup>	ISO 1183
Density of melt	1140 kg/m <sup>3</sup>	

### VDA Properties

Emission of organic compounds	40 µgC/g	VDA 277
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### 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
Ejection temperature	188 °C

### Characteristics

Additives	Release agent
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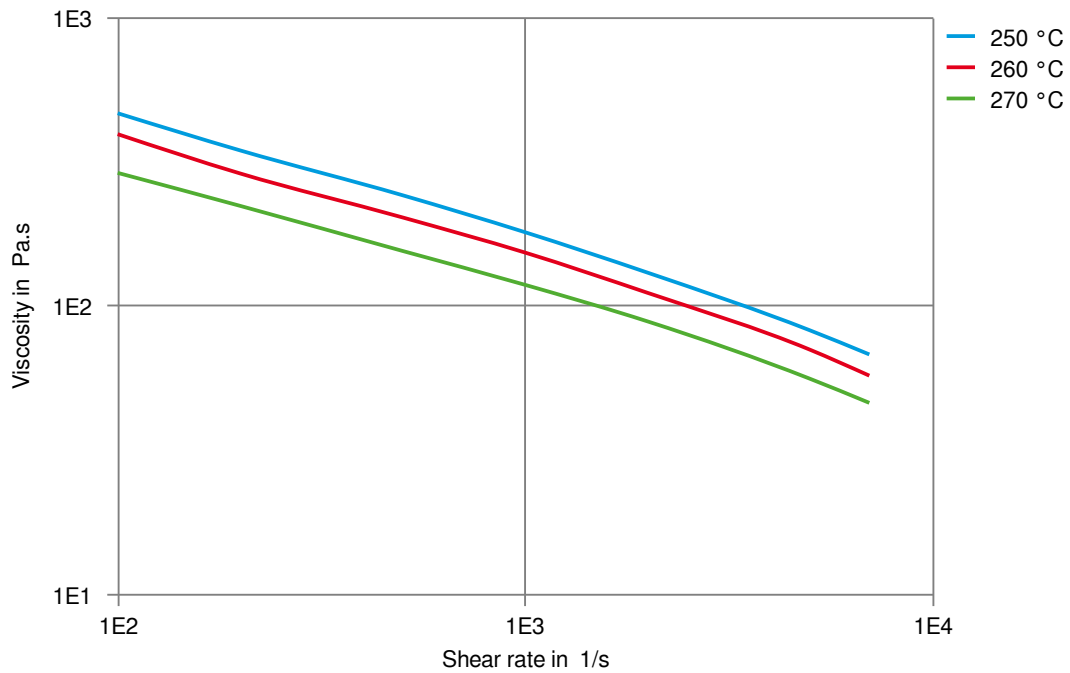
### Additional information

Injection molding	<p>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 shut-down, 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.</p>
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THERMOPLASTIC POLYESTER RESIN

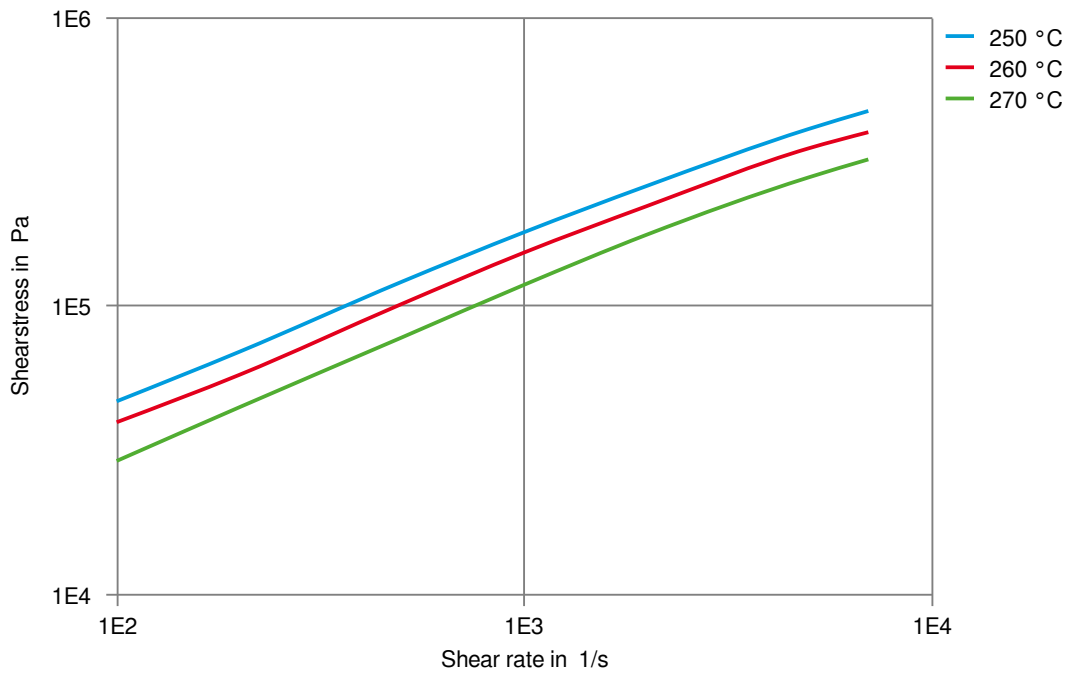
## Viscosity-shear rate



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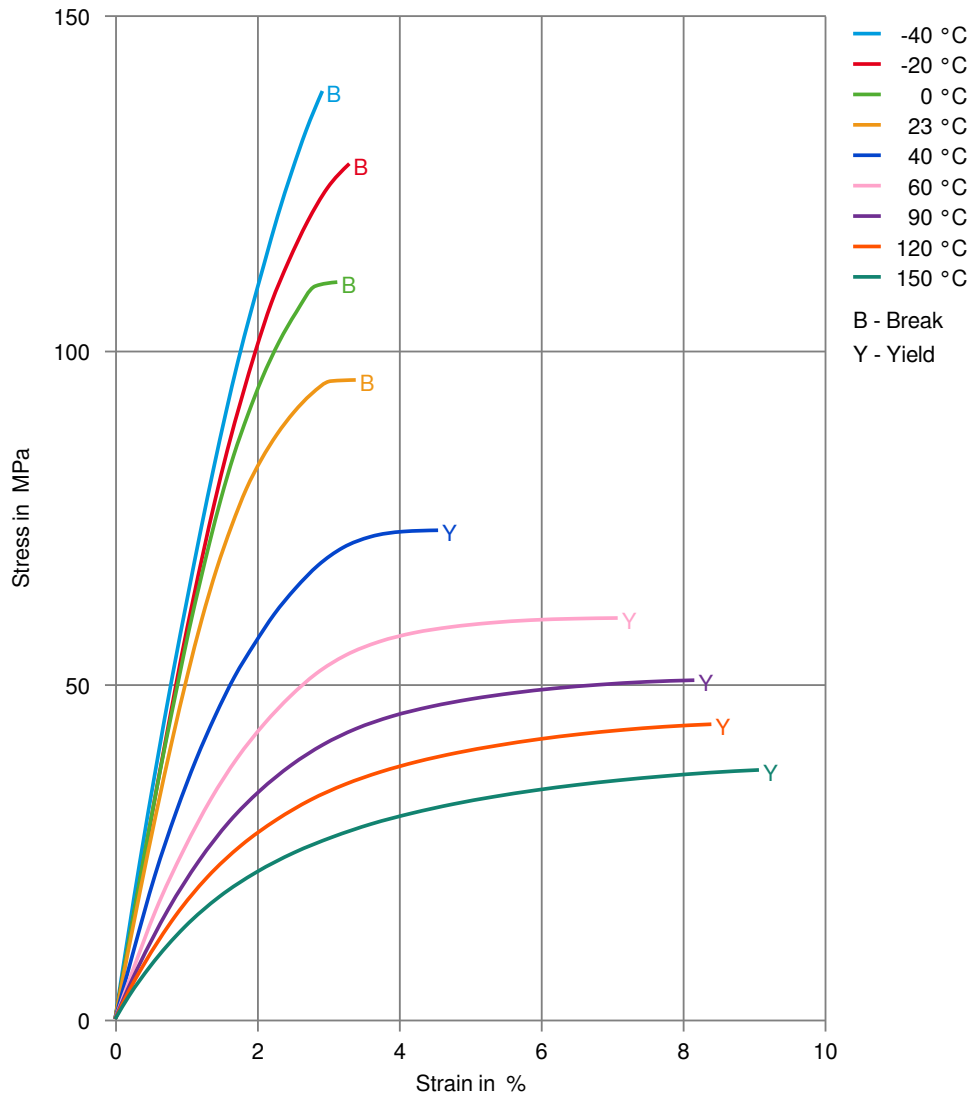
## Shearstress-shear rate



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## THERMOPLASTIC POLYESTER RESIN

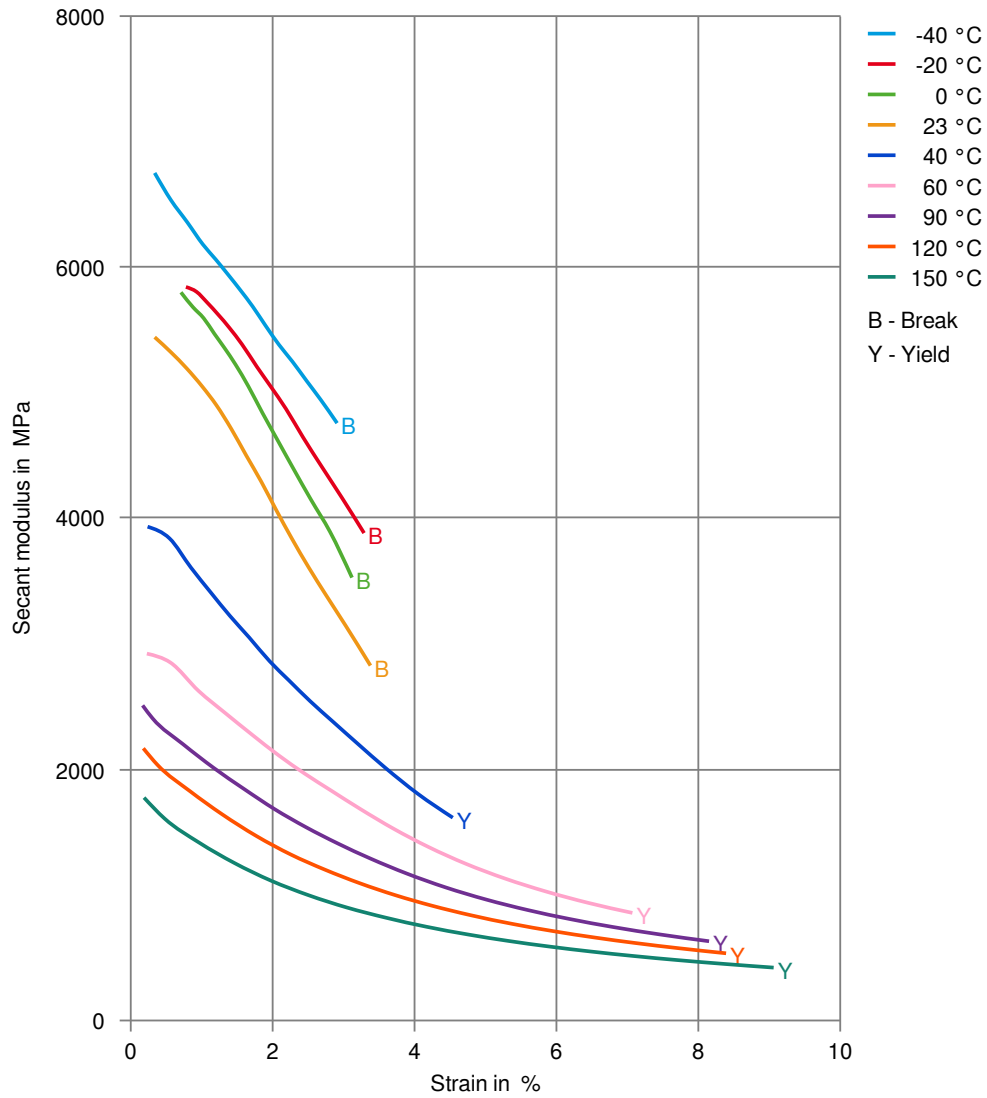
### Stress-strain



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### Secant modulus-strain



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### 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
- ✗ Nitric Acid (40% by mass), 23°C
- ✗ Sulfuric Acid (38% by mass), 23°C
- ✗ Sulfuric Acid (5% by mass), 23°C
- ✗ 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
- ✗ SAE 10W40 multigrade motor oil, 130°C
- ✗ SAE 80/90 hypoid-gear oil, 130°C
- ✓ Insulating Oil, 23°C

#### Standard Fuels

- ✗ ISO 1817 Liquid 1 - E5, 60°C
- ✗ ISO 1817 Liquid 2 - M15E4, 60°C
- ✗ ISO 1817 Liquid 3 - M3E7, 60°C
- ✗ 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
- ✗ 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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- ✓ 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
- ✗ Hydrogen peroxide, 23 °C
- ✗ 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:

- ✓ 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).
- ✗ 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).