



Crastin® SK645FR 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, DuPont recommends, 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® SK645FR is a flame retardant, 30% glass reinforced polybutylene terephthalate moulding resin. It is recognized as UL94V-0 at 0.75mm.

Product information

Resin Identification	PBT-GF30FR(17)	ISO 1043
Part Marking Code	>PBT-GF30FR(17)<	ISO 11469

Rheological properties

Melt volume-flow rate	11 cm ³ /10min	ISO 1133
Melt mass-flow rate	9 g/10min	ISO 1133
Temperature	250 °C	ISO 1133
Load	5 kg	ISO 1133
Melt mass-flow rate, Temperature	250 °C	ISO 1133
Melt mass-flow rate, Load	2.16 kg	ISO 1133
Viscosity number	100 cm ³ /g	ISO 307, 1157, 1628
Moulding shrinkage, parallel	0.4 %	ISO 294-4, 2577
Moulding shrinkage, normal	1.3 %	ISO 294-4, 2577
Moulding shrinkage, parallel, annealed	0.5 %	ISO 294-4
Moulding shrinkage, normal, annealed	1.5 %	ISO 294-4
Postmoulding shrinkage, normal, 48h at 80°C	0.25 %	ISO 294-4
Postmoulding shrinkage, parallel, 48h at 80°C	0.1 %	ISO 294-4



Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Typical mechanical properties

Tensile Modulus	11000 MPa	ISO 527-1/-2
Stress at break	120 MPa	ISO 527-1/-2
Strain at break	2.4 %	ISO 527-1/-2
Flexural Modulus	9500 MPa	ISO 178
Flexural Strength	215 MPa	ISO 178
Tensile creep modulus, 1h	11000 MPa	ISO 899-1
Tensile creep modulus, 1000h	8000 MPa	ISO 899-1
Charpy impact strength, 23°C	55 kJ/m ²	ISO 179/1eU
Charpy impact strength, -30°C	55 kJ/m ²	ISO 179/1eU
Charpy notched impact strength, 23°C	9 kJ/m ²	ISO 179/1eA
Charpy notched impact strength, -30°C	9 kJ/m ²	ISO 179/1eA
Izod notched impact strength, 23°C	9 kJ/m ²	ISO 180/1A
Izod notched impact strength, -30°C	8 kJ/m ²	ISO 180/1A
Izod impact strength, 23°C	40 kJ/m ²	ISO 180/1U
Izod impact strength, -30°C	40 kJ/m ²	ISO 180/1U
Poisson's ratio	0.34 -	

Thermal properties

Melting temperature, 10°C/min	225 °C	ISO 11357-1/-3
Temp. of deflection under load, 1.8 MPa	210 °C	ISO 75-1/-2
Temp. of deflection under load, 0.45 MPa	220 °C	ISO 75-1/-2
Vicat softening temperature, 50°C/h, 50N	212 °C	ISO 306
Coeff. of linear therm. expansion, parallel	30 E-6/K	ISO 11359-1/-2
Coeff. of linear therm. expansion, normal	90 E-6/K	ISO 11359-1/-2
Thermal conductivity of melt	0.26 W/(m K)	
Spec. heat capacity of melt	1600 J/(kg K)	
RTI, electrical, 0.75mm	140 °C	UL 746B
RTI, electrical, 1.5mm	140 °C	UL 746B
RTI, electrical, 3mm	140 °C	UL 746B
RTI, electrical, 6mm	140 °C	UL 746B
RTI, impact, 0.75mm	125 °C	UL 746B
RTI, impact, 1.5mm	125 °C	UL 746B
RTI, impact, 3mm	130 °C	UL 746B
RTI, impact, 6mm	130 °C	UL 746B
RTI, strength, 0.75mm	140 °C	UL 746B
RTI, strength, 1.5mm	140 °C	UL 746B
RTI, strength, 3mm	140 °C	UL 746B
RTI, strength, 6mm	140 °C	UL 746B

Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Flammability

Burning Behav. at 1.5mm nom. thickn.	V-0 class	IEC 60695-11-10
Thickness tested	1.5 mm	IEC 60695-11-10
UL recognition	yes -	UL 94
Burning Behav. at thickness h	V-0 class	IEC 60695-11-10
Thickness tested	0.75 mm	IEC 60695-11-10
UL recognition	yes -	UL 94
Oxygen index	31 %	ISO 4589-1/-2
Glow Wire Flammability Index, 0.4mm	960 °C	IEC 60695-2-12
Glow Wire Flammability Index, 0.75mm	960 °C	IEC 60695-2-12
Glow Wire Flammability Index, 1mm	960 °C	IEC 60695-2-12
Glow Wire Flammability Index, 1.5mm	960 °C	IEC 60695-2-12
Glow Wire Flammability Index, 2mm	960 °C	IEC 60695-2-12
Glow Wire Flammability Index, 3mm	960 °C	IEC 60695-2-12
Glow Wire Ignition Temperature, 0.75mm	675 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 0.4mm	675 °C	IEC 60695-2-12
Glow Wire Ignition Temperature, 1mm	675 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 1.5mm	675 °C	IEC 60695-2-13
Glow Wire Ignition Temperature, 3mm	775 °C	IEC 60695-2-13
Glow Wire Temperature, No Flame, 1mm	650 °C	IEC 60335-1
FMVSS Class	DNI -	ISO 3795 (FMVSS 302)
Railway classification	R23 -	EN 45545-2
Railway classification rating	HL1 -	EN 45545-2

Electrical properties

Relative permittivity, 100Hz	4.5 -	IEC 62631-2-1
Relative permittivity, 1MHz	3.8 -	IEC 62631-2-1
Dissipation factor, 100Hz	30 E-4	IEC 62631-2-1
Dissipation factor, 1MHz	160 E-4	IEC 62631-2-1
Volume resistivity	>1E13 Ohm.m	IEC 62631-3-1
Surface resistivity	1E15 Ohm	IEC 62631-3-2
Electric strength	39 kV/mm	IEC 60243-1
Comparative tracking index	250 -	IEC 60112
Electric Strength, Short Time, 2mm	17 kV/mm	IEC 60243-1

Other properties

Humidity absorption, 2mm	0.1 %	Sim. to ISO 62
Water absorption, 2mm	0.3 %	Sim. to ISO 62
Density	1710 kg/m ³	ISO 1183
Density of melt	1490 kg/m ³	



Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

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	170 °C

Characteristics

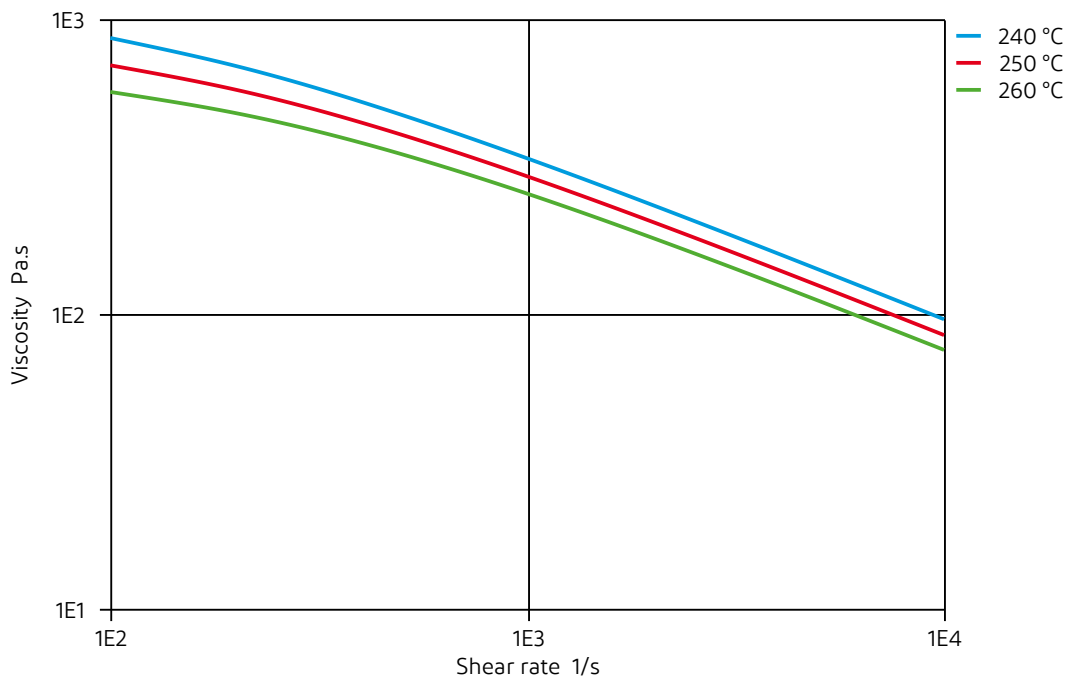
Additives	Flame retardant
-----------	-----------------



Crastin[®] SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Viscosity-shear rate

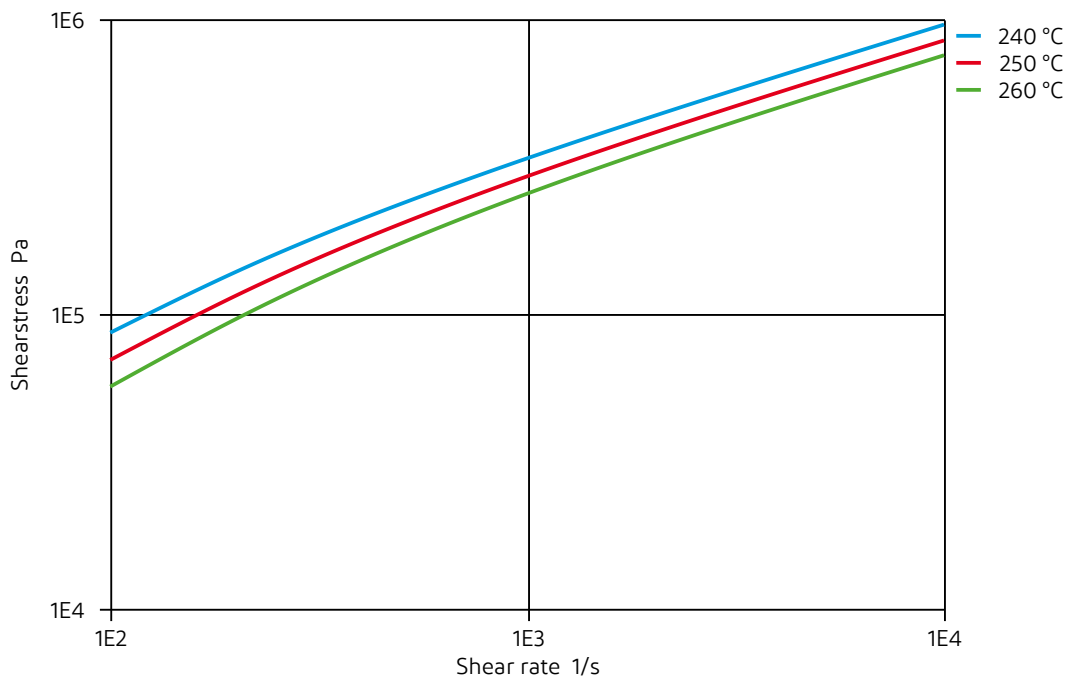




Crastin[®] SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Shearstress-shear rate

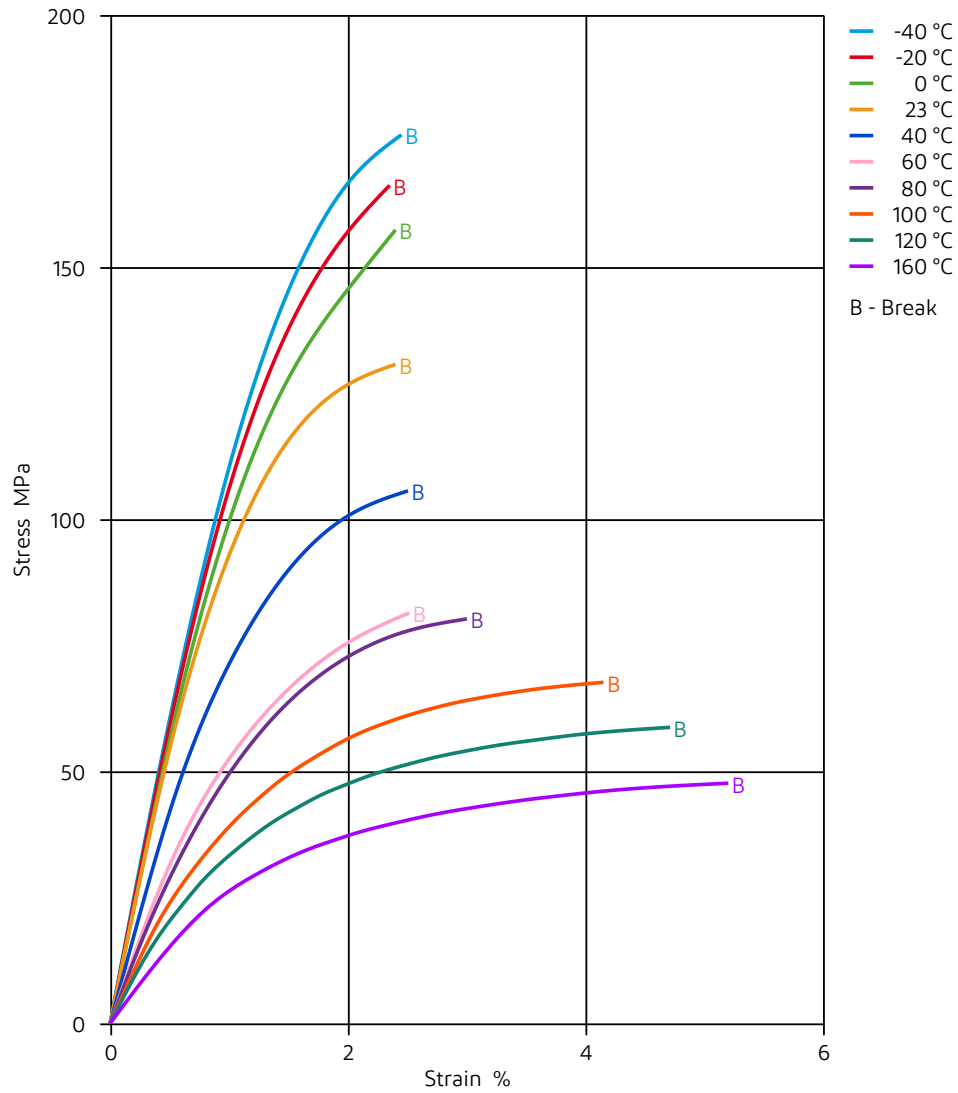




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Stress-strain

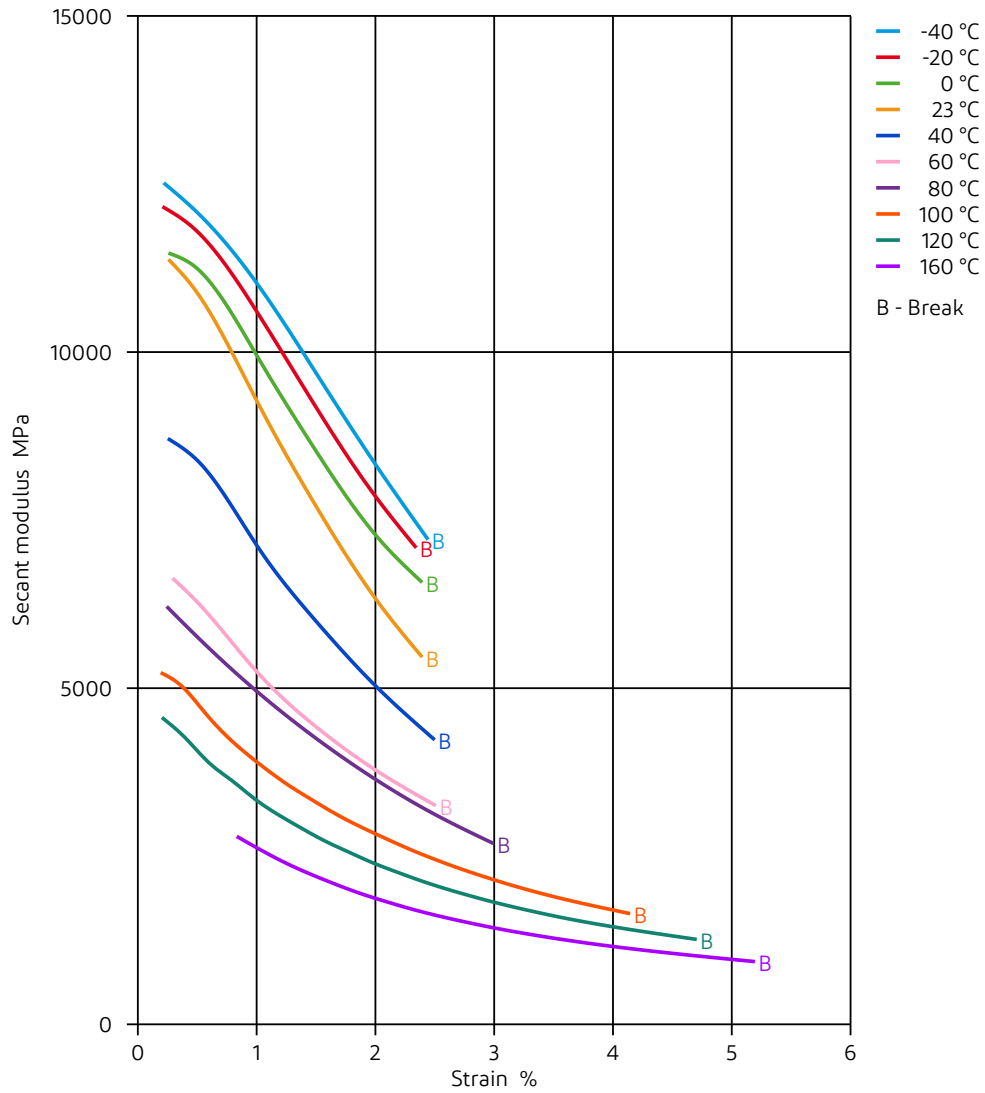




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Secant modulus-strain

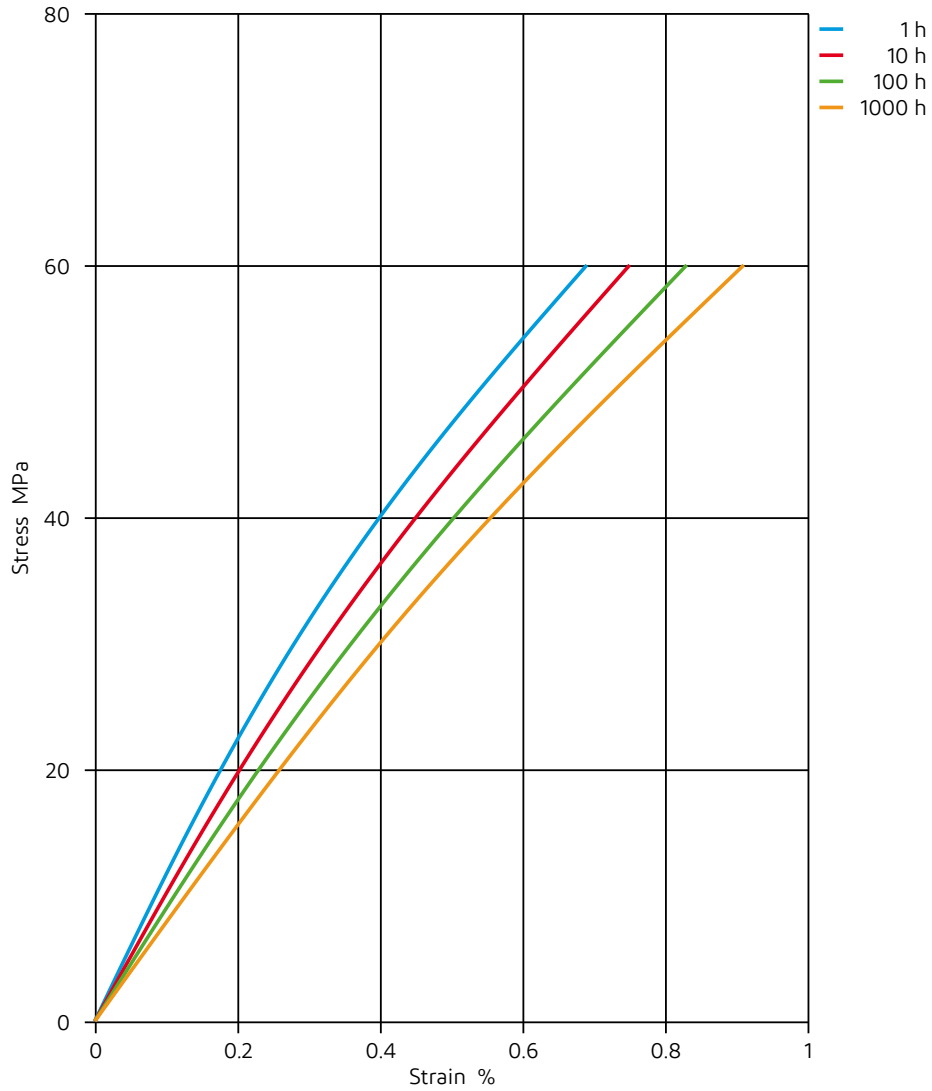




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

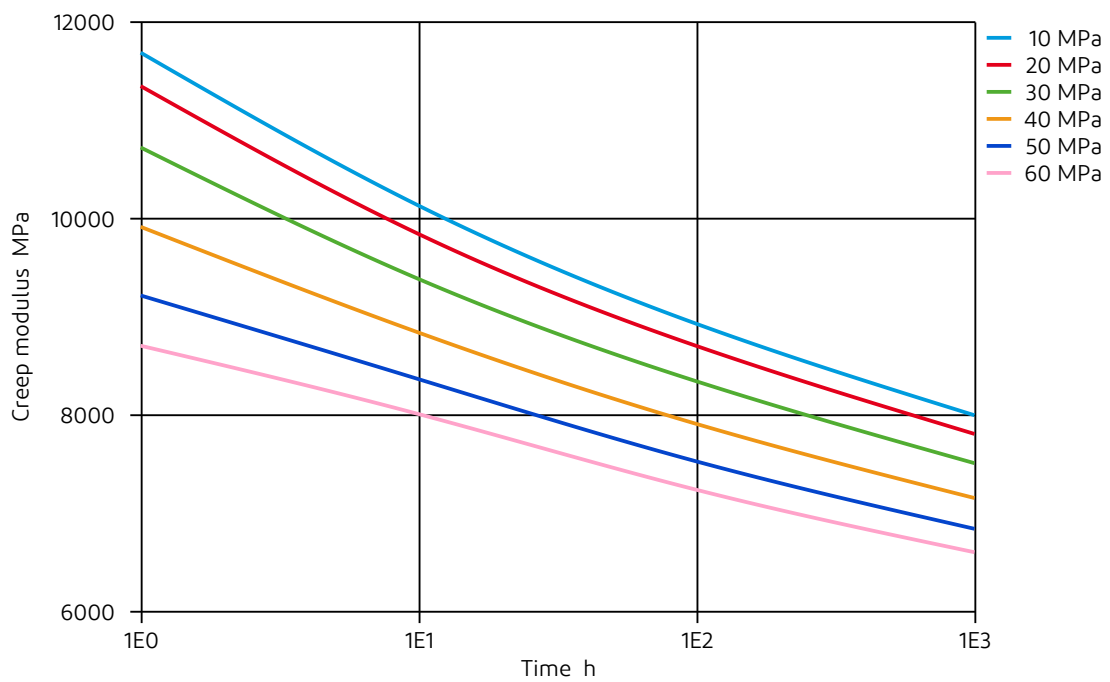
Stress-strain (isochronous) 23°C



Crastin[®] SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Creep modulus-time 23°C

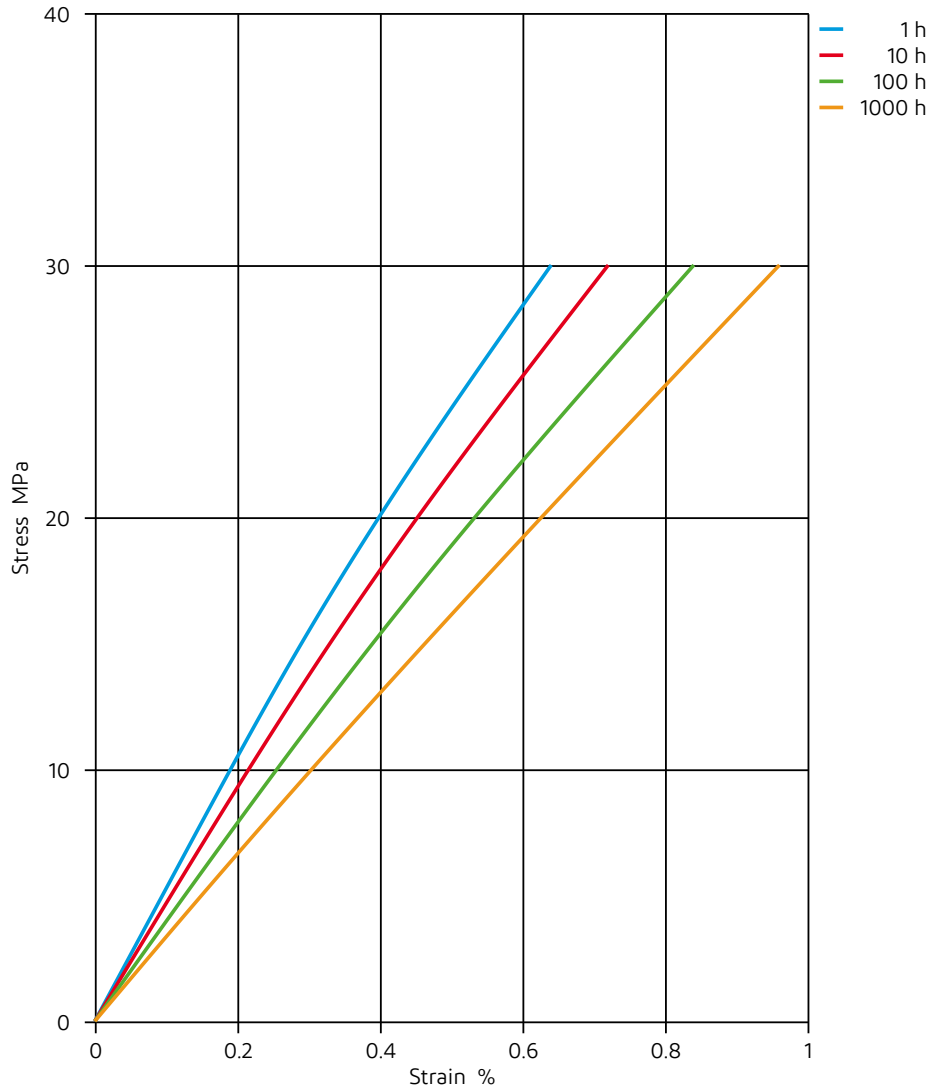




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Stress-strain (isochronous) 100°C

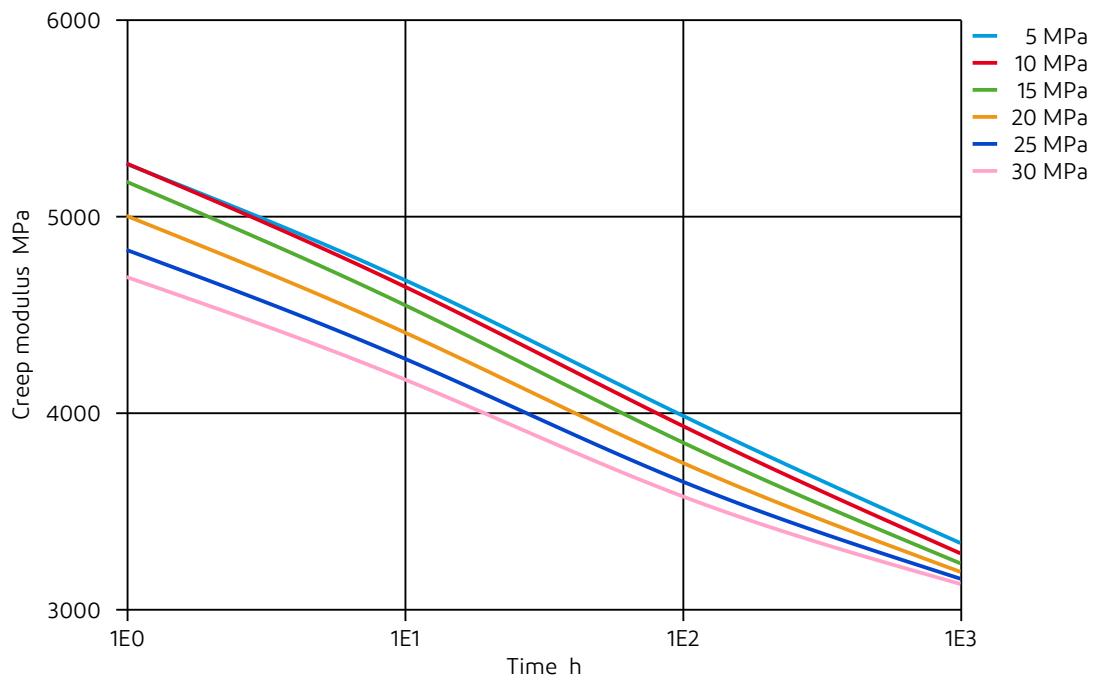




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Creep modulus-time 100°C

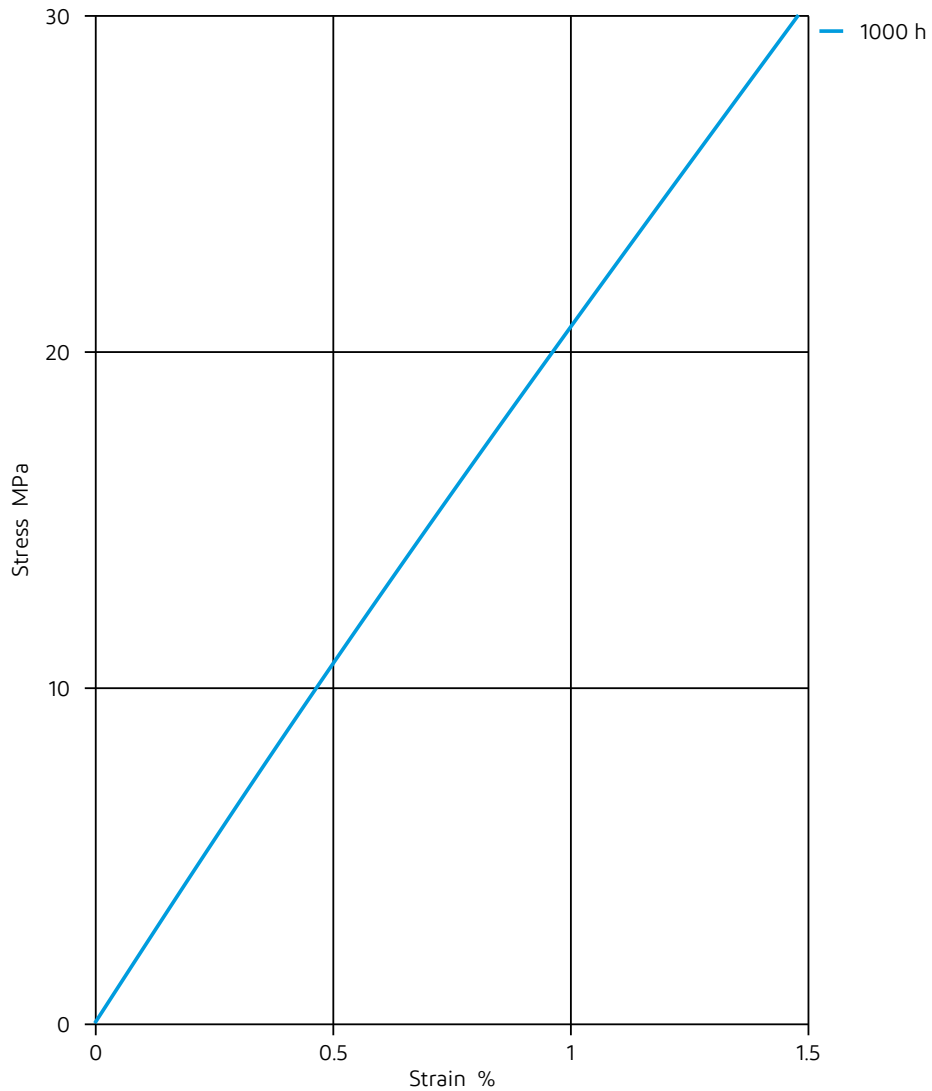




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

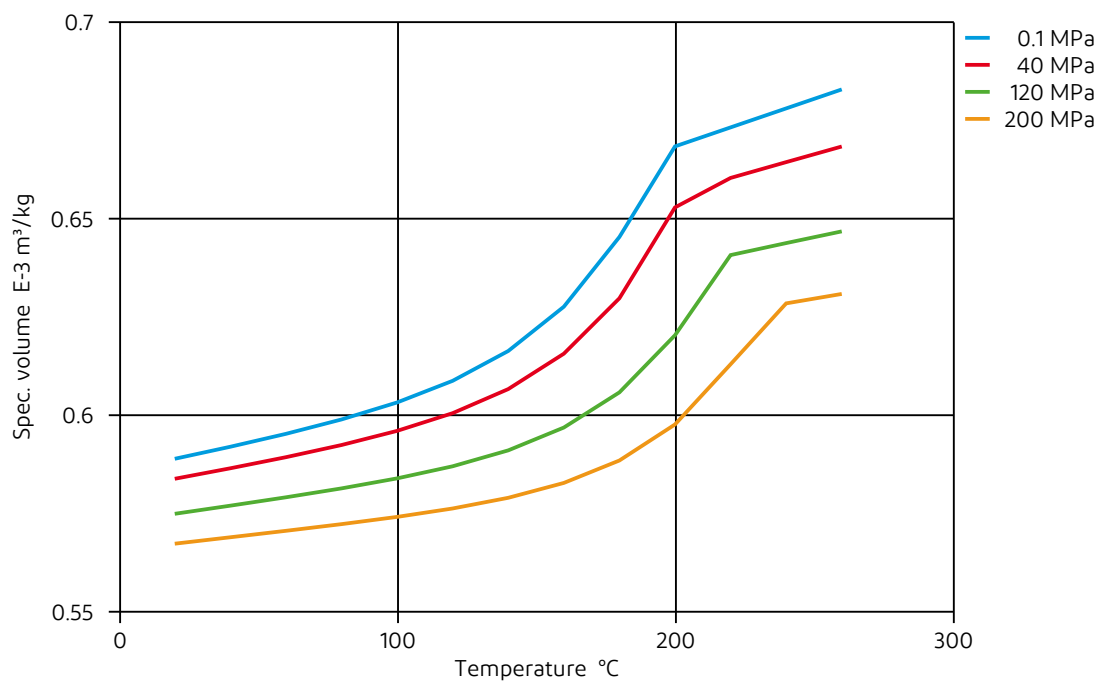
Stress-strain (isochronous) 120°C



Crastin[®] SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Specific volume-temperature (pvT)

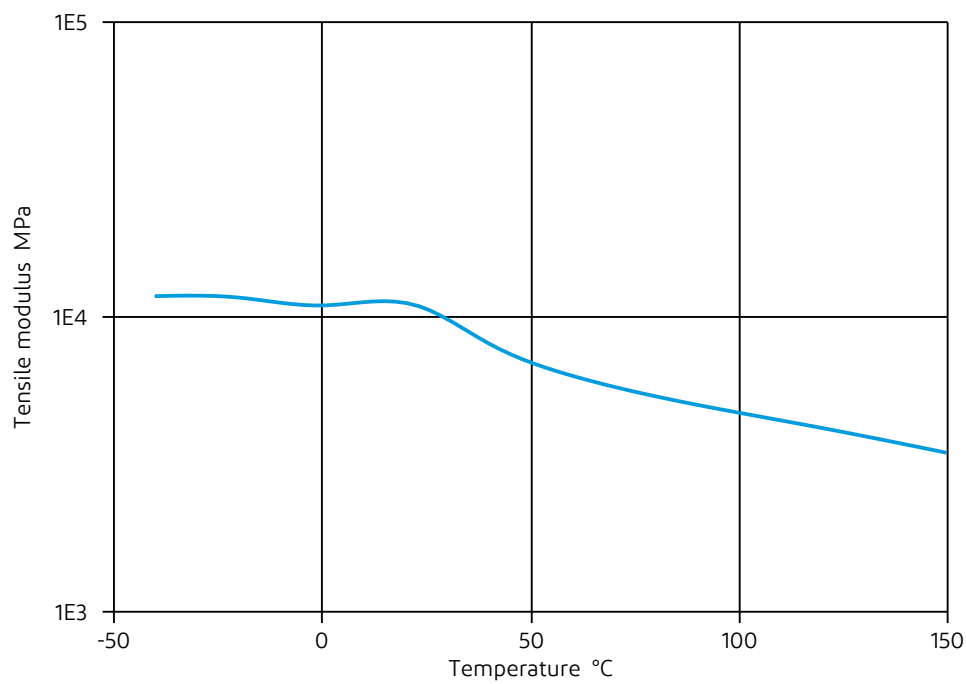




Crastin® SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Tensile modulus-temperature



Crastin[®] SK645FR NC010

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
- ✗ 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

Crastin[®] SK645FR NC010

THERMOPLASTIC POLYESTER RESIN

Salt solutions

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

The information set forth herein is furnished free of charge, is based on technical data that DuPont believes to be reliable, and represents typical values that fall within the normal range of properties. This information relates only to the specific material designated and may not be valid for such material used in combination with other materials or in other processes. It is intended for use by persons having technical skill, at their own discretion and risk. This information should not be used to establish specification limits nor used alone as the basis of design. Handling precaution information is given with the understanding that those using it will satisfy themselves that their particular conditions of use present no health or safety hazards and comply with applicable law. Since conditions of product use and disposal are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. As with any product, evaluation under end-use conditions prior to specification is essential. Nothing herein is to be taken as a license to operate or a recommendation to infringe on patents.

CAUTION: Do not use DuPont materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless the material has been provided from DuPont under a written contract or other acknowledgement that is consistent with the DuPont policy regarding medical applications and expressly acknowledges the contemplated use. For further information, please contact your DuPont representative.

DuPont's sole warranty is that our products will meet our standard sales specifications in effect at the time of shipment. Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted. TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, DUPONT SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR NON-INFRINGEMENT. DUPONT DISCLAIMS LIABILITY FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.