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Zytel® 70K20HSL NC010

NYLON RESIN

Common features of Zytel® nylon resin include mechanical and physical properties such as high mechanical strength, excellent balance of stiffness and toughness, good high temperature performance, good electrical and flammability properties, good abrasion and chemical resistance. In addition, Zytel® nylon resins are available in different modified and reinforced grades to create a wide range of products with tailored properties for specific processes and end-uses. Zytel® nylon resin, including most flame retardant grades, offer the ability to be coloured.

The good melt stability of Zytel® nylon 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 (-31kJ/g of base polymer) in appropriately equipped installations. For disposal, local regulations have to be observed.

Zytel® nylon resin typically is used in demanding applications in the automotive, furniture, domestic appliances, sporting goods and construction industry.

Zytel® 70K20HSL NC010 is a heat stabilised PA66 resin modified with 20% Kevlar aramid fiber for excellent wear resistance.

Product information

Resin Identification PA66-RF20 ISO 1043 Part Marking Code >PA66-RF20 ISO 11469 ISO designation ISO 16396-PA66,AF20,M1GHNR,S14-050 Rheological properties Moulding shrinkage, parallel 0.9/0.7 % ISO 294-4, 2577 Moulding shrinkage, parallel, annealed 1.1/* % ISO 294-4, 2577 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Typical mechanical properties Tensile modulus 5300/3500 MPa ISO 527-1/-2 Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 4900/3300 MPa ISO 179/1eU Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, 30°C 6/9 kJ/m² ISO 179/1eA Charpy notched impact strength, -30°C 5/- <t< th=""><th>Product information</th><th></th><th></th><th></th></t<>	Product information				
ISO designation	Resin Identification	PA66-RF20		ISO 1043	
Rheological properties	Part Marking Code			ISO 11469	
Moulding shrinkage, parallel 0.9/0.7 % ISO 294-4, 2577 Moulding shrinkage, normal 1.4/0.9 % ISO 294-4, 2577 Moulding shrinkage, parallel, annealed 1.1/* % ISO 294-4 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Typical mechanical properties Tensile modulus 5300/3500 MPa ISO 527-1/-2 Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 179/1eU Charpy impact strength, 23°C 6.9 kJ/m² ISO 179/1eU </td <td>•</td> <td>ISO 16396-PA66</td> <td>6,AF20,M1GHNR,S14-050</td> <td></td>	•	ISO 16396-PA66	6,AF20,M1GHNR,S14-050		
Moulding shrinkage, normal 1.4/0.9 % ISO 294-4, 2577 Moulding shrinkage, parallel, annealed 1.1/* % ISO 294-4 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Typical mechanical properties Tensile modulus 5300/3500 MPa ISO 527-1/-2 Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 179/1e Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, 23°C 6/9 kJ/m² ISO 179/1eA Load notched impact strength, 23°C 5/- kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 ISO 180/1A <td cols<="" td=""><td>Rheological properties</td><td>dry/cond.</td><td></td><td></td></td>	<td>Rheological properties</td> <td>dry/cond.</td> <td></td> <td></td>	Rheological properties	dry/cond.		
Moulding shrinkage, normal 1.4/0.9 % ISO 294-4, 2577 Moulding shrinkage, parallel, annealed 1.1/* % ISO 294-4 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Typical mechanical properties Tensile modulus 5300/3500 MPa ISO 527-1/-2 Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 179/1-2 Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, 30°C 6/9 kJ/m² ISO 179/1eU Charpy notched impact strength, 23°C 6/9 kJ/m² ISO 179/1eA Lzod notched impact strength, 23°C 5/- kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 ISO 180/1A Tribological properties Coefficient of sliding friction, 1h against steel 0.55/- ASTM	Moulding shrinkage, parallel	0.9/0.7	%	ISO 294-4, 2577	
Moulding shrinkage, parallel, annealed 1.1/* % ISO 294-4 Moulding shrinkage, normal, annealed 1.5/* % ISO 294-4 Typical mechanical properties Tensile modulus 5300/3500 MPa ISO 527-1/-2 Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 179/1-2 Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, -30°C 40/- kJ/m² ISO 179/1eU Charpy notched impact strength, -30°C 5/- kJ/m² ISO 179/1eA Lod notched impact strength, -30°C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23°C 5/- kJ/m² ISO 179/1eA Poisson's ratio 0.35/0.37 ISO 180/1A Tribological properties Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties Melting temper	5 .	1.4/0.9	%		
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Tensile modulus 5300/3500 MPa ISO 527-1/-2 Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 179/1-2 Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, -30°C 40/- kJ/m² ISO 179/1eU Charpy notched impact strength, 23°C 6/9 kJ/m² ISO 179/1eA Charpy notched impact strength, -30°C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23°C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23°C 5/- kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 ISO 180/1A Tribological properties dry/cond. Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties Melting temperature, 10°C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10°C/min 80/20 <td>- · · · · · · · · · · · · · · · · · · ·</td> <td>1.5/*</td> <td>%</td> <td>ISO 294-4</td>	- · · · · · · · · · · · · · · · · · · ·	1.5/*	%	ISO 294-4	
Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 178 Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, -30°C 40/- kJ/m² ISO 179/1eU Charpy notched impact strength, 23°C 6/9 kJ/m² ISO 179/1eA Charpy notched impact strength, -30°C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23°C 5/7 kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 ISO 180/1A Tribological properties Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties Melting temperature, 10°C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10°C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 25	Typical mechanical properties	dry/cond.			
Tensile stress at break, 5mm/min 110/85 MPa ISO 527-1/-2 Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 178 Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, -30°C 40/- kJ/m² ISO 179/1eU Charpy notched impact strength, 23°C 6/9 kJ/m² ISO 179/1eA Charpy notched impact strength, -30°C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23°C 5/7 kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 ISO 180/1A Tribological properties Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties Melting temperature, 10°C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10°C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 25	Tensile modulus	5300/3500	MPa	ISO 527-1/-2	
Tensile strain at break, 5mm/min 5.2/7.2 % ISO 527-1/-2 Flexural modulus 4900/3300 MPa ISO 178 Charpy impact strength, 23°C 50/65 kJ/m² ISO 179/1eU Charpy impact strength, -30°C 40/- kJ/m² ISO 179/1eU Charpy notched impact strength, -30°C 6/9 kJ/m² ISO 179/1eA Charpy notched impact strength, -30°C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23°C 5/7 kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 ISO 180/1A Tribological properties Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties Melting temperature, 10°C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10°C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2					
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Charpy impact strength, -30 °C Charpy notched impact strength, 23 °C Charpy notched impact strength, 23 °C Charpy notched impact strength, -30 °C S/- kJ/m² ISO 179/1eA ISO 17	Charpy impact strength, 23°C	50/65	kJ/m²	ISO 179/1eU	
Charpy notched impact strength, -30 °C 5/- kJ/m² ISO 179/1eA Izod notched impact strength, 23 °C 5/7 kJ/m² ISO 180/1A Poisson's ratio 0.35/0.37 Tribological properties dry/cond. Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties dry/cond. Melting temperature, 10 °C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10 °C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2		40/-	kJ/m²	ISO 179/1eU	
Izod notched impact strength, 23 °C Poisson's ratio Tribological properties Coefficient of sliding friction, 1h against steel O.55/- 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 Solve the displace of the displace of the control	Charpy notched impact strength, 23°C	6/9	kJ/m²	ISO 179/1eA	
Poisson's ratio 0.35/0.37 Tribological properties dry/cond. Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties dry/cond. 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 255/* Coefficient of dry/cond. ASTM 1894 ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Coefficient of sliding friction, 1h against steel Coefficient of sliding friction friction friction friction friction friction fric	Charpy notched impact strength, -30°C	5/-	kJ/m²	ISO 179/1eA	
Tribological properties Coefficient of sliding friction, 1h against steel O.55/- ASTM 1894 Thermal properties dry/cond. 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 Temperature of deflection under load, 0.45 MPa dry/cond. SC ISO 11357-1/-3 ISO 75-1/-2 ISO 75-1/-2 ISO 75-1/-2	Izod notched impact strength, 23°C	5/7	kJ/m²	ISO 180/1A	
Coefficient of sliding friction, 1h against steel 0.55/- ASTM 1894 Thermal properties dry/cond. Melting temperature, 10°C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10°C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2	Poisson's ratio	0.35/0.37			
Thermal properties dry/cond. 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 Zest in the dry/cond. Solve in the dry/cond.	Tribological properties	dry/cond.			
Melting temperature, 10° C/min $263/^{*}$ °C ISO 11357-1/-3 Glass transition temperature, 10° C/min $80/20$ °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa $222/^{*}$ °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa $255/^{*}$ °C ISO 75-1/-2	Coefficient of sliding friction, 1h against steel	0.55/-		ASTM 1894	
Melting temperature, 10° C/min 263/* °C ISO 11357-1/-3 Glass transition temperature, 10° C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2	Thermal properties	dry/cond.			
Glass transition temperature, 10 °C/min 80/20 °C ISO 11357-1/-3 Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2	· ·	263/*	°C.	ISO 11357-1/-3	
Temperature of deflection under load, 1.8 MPa 222/* °C ISO 75-1/-2 Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2	•				
Temperature of deflection under load, 0.45 MPa 255/* °C ISO 75-1/-2	· · · · · · · · · · · · · · · · · · ·				
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NYLON RESIN

Coefficient of linear thermal expansion	47/*	E-6/K	ISO 11359-1/-2
(CLTE), parallel			
Coefficient of linear thermal expansion (CLTE),	75/*	E-6/K	ISO 11359-1/-2

normal

Flammability

FMVSS Class	В	ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm	<80 mm/min	ISO 3795 (FMVSS 302)

dry/cond.

dry/cond.

Electrical properties

Dissipation factor, 100Hz	140/-	E-4	IEC 62631-2-1
Dissipation factor, 1MHz	140/-	E-4	IEC 62631-2-1
Volume resistivity	1E9/-	Ohm.m	IEC 62631-3-1
Surface resistivity	*/>1E15	Ohm	IEC 62631-3-2
Electric strength	23/-	kV/mm	IEC 60243-1

Physical/Other properties

Humidity absorption, 2mm	2.7/*	%	Sim. to ISO 62
Water absorption, 2mm	6.8/*	%	Sim. to ISO 62
Density	1190/-	kg/m³	ISO 1183

VDA Properties

Emission of organic compounds	1.7 μgC/g	VDA 277
	[2] 3	

Injection

Drying Recommended	yes	
Drying Temperature	80	°C
Drying Time, Dehumidified Dryer	2 - 4	h
Processing Moisture Content	≤0.2	%
Melt Temperature Optimum	290	°C
Min. melt temperature	285	°C
Max. melt temperature	305	°C
Screw tangential speed	≤0.2	m/s
Mold Temperature Optimum	110	°C
Min. mould temperature	70	°C
Max. mould temperature	120	°C
Hold pressure range	50 - 100	MPa
Hold pressure time	3	s/mm
Ejection temperature	210	°C

Characteristics

Processing Injection Moulding

Delivery form Pellets

Additives Release agent

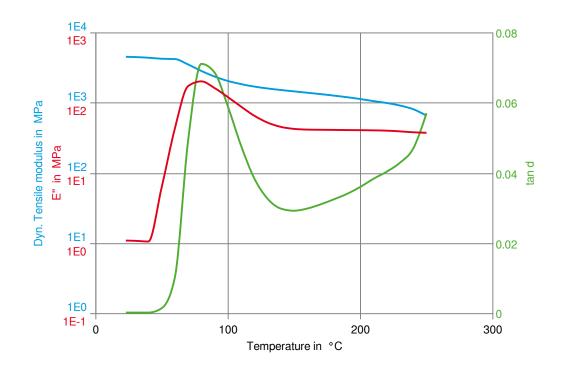
Special characteristics Heat stabilised or stable to heat, Low wear / Low friction

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Dynamic Tensile modulus-temperature (dry)

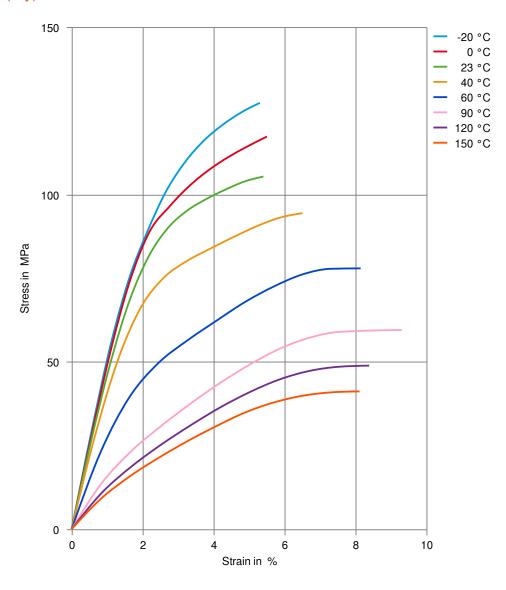


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Stress-strain (dry)

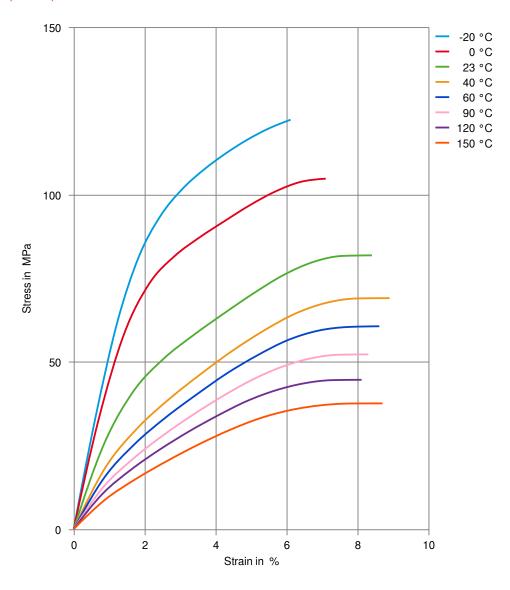


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Stress-strain (cond.)

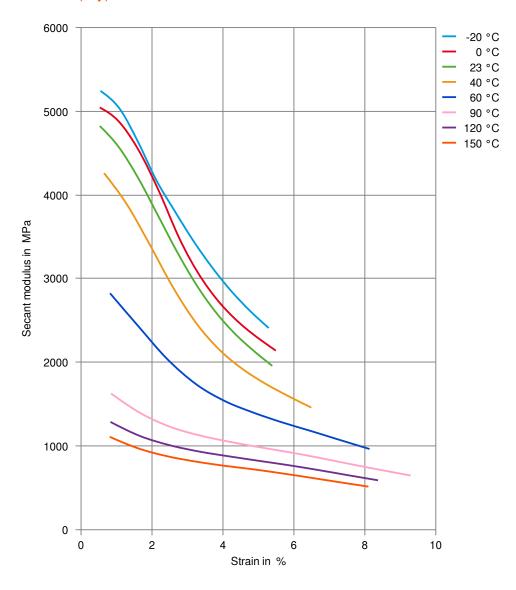


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Secant modulus-strain (dry)

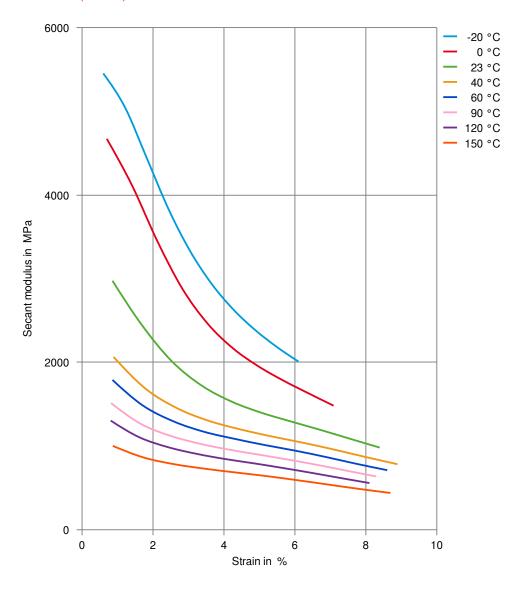


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Secant modulus-strain (cond.)



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Zytel® 70K20HSL NC010

NYLON 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
- X 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

- X 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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NYLON RESIN

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

Other

- ✓ Ethyl Acetate, 23°C
- X 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
- X 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).

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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NOTICE TO USERS: Values shown are based on testing of laboratory test specimens and represent data that fall within the standard range of properties for natural material. These values alone do not represent a sufficient basis for any part design and are not intended for use in establishing maximum, minimum, or ranges of values for specification purposes. Colourants or other additives may cause significant variations in data values. Properties of moulded parts can be influenced by a wide variety of factors including, but not limited to, material selection, additives, part design, processing conditions and environmental exposure. Other than those products expressly identified as medical grade (including by MT® product designation or otherwise), Celanese's products are not intended for use in medical or dental implants. Regardless of any such product designation, any determination of the suitability of a particular material and part design for any use contemplated by the users and the manner of such use is the sole responsibility of the users, who must assure themselves that the material as subsequently processed meets the needs of their particular product or use. To the best of our knowledge, the information contained in this publication is accurate; however, we do not assume any liability whatsoever for the accuracy and completeness of such information. The information contained in this publication should not be construed as a promise or guarantee of specific properties of our products. It is the sole responsibility of the users to investigate whether any existing patents are infringed by the use of the materials mentioned in this publication. Moreover, there is a need to reduce human exposure to many materials to the lowest practical limits in view of possible adverse effects. To the extent that any hazards may have been mentioned in this publication, we neither suggest nor guarantee that such hazards are the only ones that exist. We recommend that persons intending to rely on any recommendation or to use any e

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