Zytel® E51HSB 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® E51HSB NC010 is a high molecular weight, heat stabilized polyamide 66 resin for injection molding and extrusion.

Product information

Resin Identification	PA66	ISO 1043
Part Marking Code	>PA66<	ISO 11469
ISO designation	ISO 16396-PA66,,M1G1HNR,S32-030	
Infrared spectrum	available	

Rheological properties

	dry/cond.		
Viscosity number	8580[1]/*	in³/lb	ISO 307, 1628
Molding shrinkage, parallel	1.3 / -	%	ISO 294-4, 2577
Molding shrinkage, normal	1.3 / -	%	ISO 294-4, 2577

[1]: 90% formic acid

Typical mechanical properties

	dry/cond.		
Tensile modulus	450000 / 174000	psi	ISO 527-1/-2
Tensile stress at yield, 50mm/min	12000 / 8000	psi	ISO 527-1/-2
Tensile strain at yield, 50mm/min	4.3 / 29	%	ISO 527-1/-2
Nominal strain at break	35 / -	%	ISO 527-1/-2
Tensile strain at break, 50mm/min	>50 / -	%	ISO 527-1/-2
Flexural modulus	406000 / -	psi	ISO 178
Flexural stress at 3.5%	13800 / -	psi	ISO 178
Charpy impact strength, 23°C	N / -	ftlb/in²	ISO 179/1eU
Charpy notched impact strength, 23°C	2.62 / 9.99	ftlb/in²	ISO 179/1eA
Izod notched impact strength, 23°C	2.85 / -	ftlb/in²	ISO 180/1A

Thermal properties

	dry/cond.		
Melting temperature, 10°C/min	504 / *	°F	ISO 11357-1/-3
Glass transition temperature, 10°C/min	158 / 68	°F	ISO 11357-1/-3
Temperature of deflection under load, 1.8 MPa	153 / *	°F	ISO 75-1/-2
Temperature of deflection under load, 0.45 MPa	392 / *	°F	ISO 75-1/-2
Vicat softening temperature, 50°C/h 50N	430 / *	°F	ISO 306

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Coefficient of linear thermal expansion (CLTE), parallel	0.56 / *	E-4/°F	ISO 11359-1/-2
Coefficient of linear thermal expansion (CLTE), normal	0.556 / *	E-4/°F	ISO 11359-1/-2
Thermal conductivity of melt	0.16	W/(m K)	ISO 22007-2
Specific heat capacity of melt	2790	J/(kg K)	ISO 22007-4

Flammability

	dry/cond.		
Oxygen index	20 / *	%	ISO 4589-1/-2
FMVSS Class	DNI		ISO 3795 (FMVSS 302)
Burning rate, Thickness 1 mm		in/min	ISO 3795 (FMVSS 302)

Electrical properties

	dry/cond.		
Volume resistivity	>1E13 / 1E11	Ohm.m	IEC 62631-3-1
Comparative tracking index	600 / -		IEC 60112

Physical/Other properties

	dry/cond.		
Humidity absorption, 2mm	2.6 / *	%	Sim. to ISO 62
Water absorption, 2mm	8.5 / *	%	Sim. to ISO 62
Density	0.0412 / -	lb/in³	ISO 1183
Density of melt	61.2	lb/ft³	

Injection

Drying Recommended	yes	
Drying Temperature	176	°F
Drying Time, Dehumidified Dryer	2 - 4	h
Processing Moisture Content	≤0.05	%
Melt Temperature Optimum	554[2]	°F
Min. melt temperature	536	°F
Max. melt temperature	572	°F
Max. screw tangential speed	≤0.4	m/s
Mold Temperature Optimum	158	°F
Min. mold temperature	122	°F
Max. mold temperature	194	°F
Hold pressure range	7250 - 14500	psi
Hold pressure time	0.102	s/mil
Hold Pressure Time (h is the max. wall thickness of the part in mm)	h^2+2	s
Ejection temperature	392	°F

[2]: optimum 290 °C to 300 °C

Extrusion

Drying Temperature	176	°F
Drying Time, Dehumidified Dryer	4 - 6	h
Processing Moisture Content	≤0.05	%
Melt Temperature Optimum	545	°F
Melt Temperature Range	536 - 554	°F

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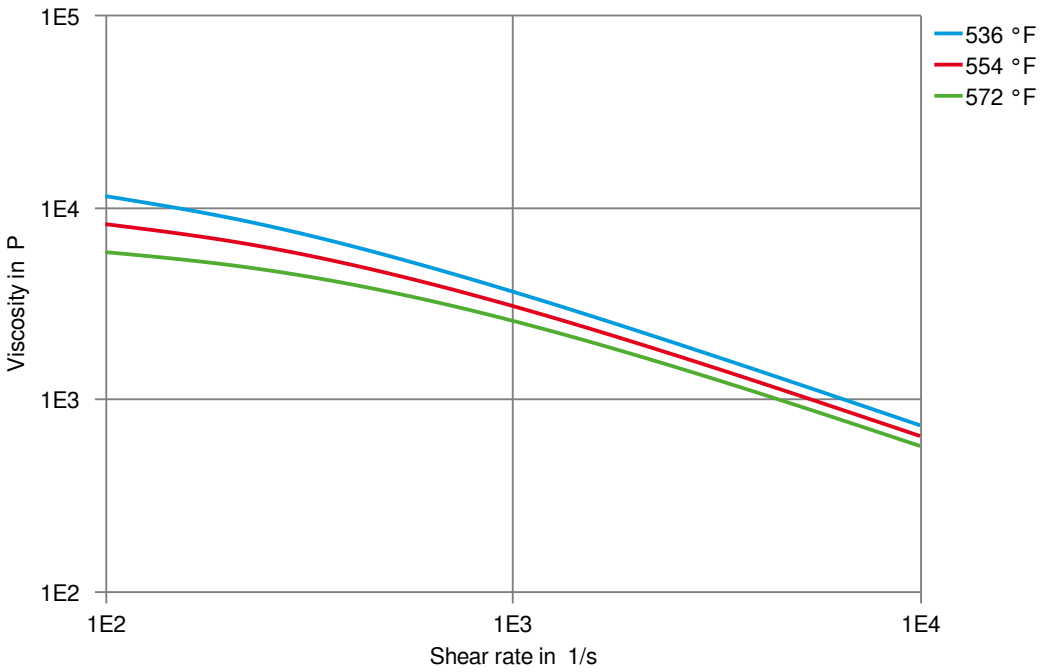
Automotive

OEM	STANDARD
VW Group	VW 50133 PA66-1-A

Characteristics

Processing	Injection Molding, Film Extrusion, Extrusion, Sheet Extrusion, Other Extrusion, Coating, Casting
Additives	Release agent
Special characteristics	Heat stabilized or stable to heat

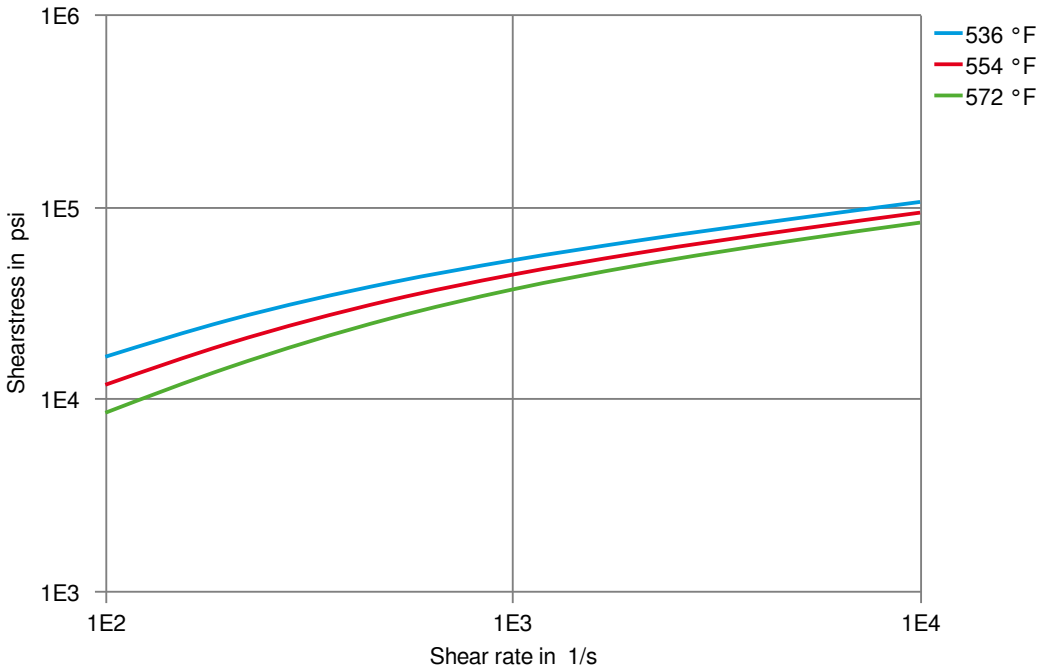
Viscosity-shear rate



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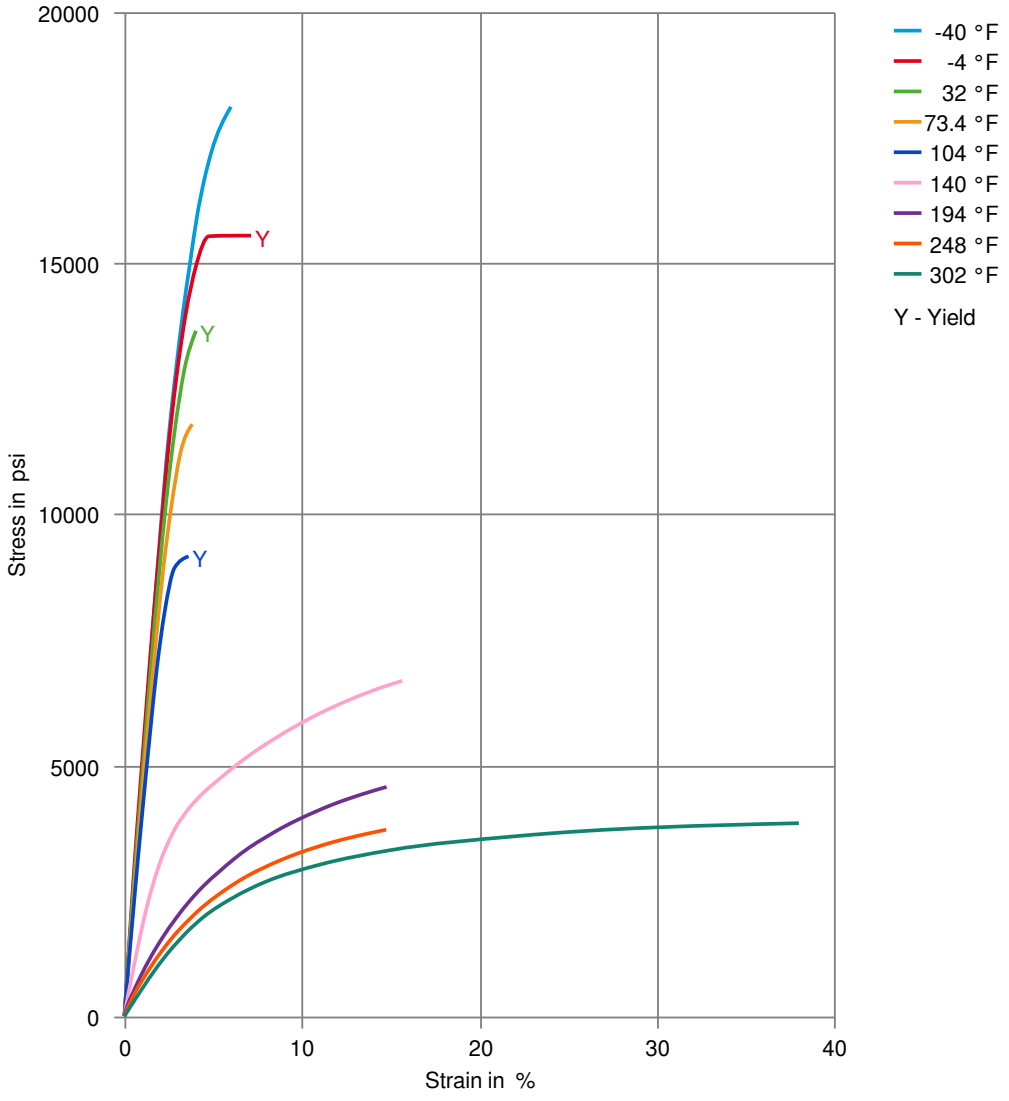
Shearstress-shear rate



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Stress-strain (dry)

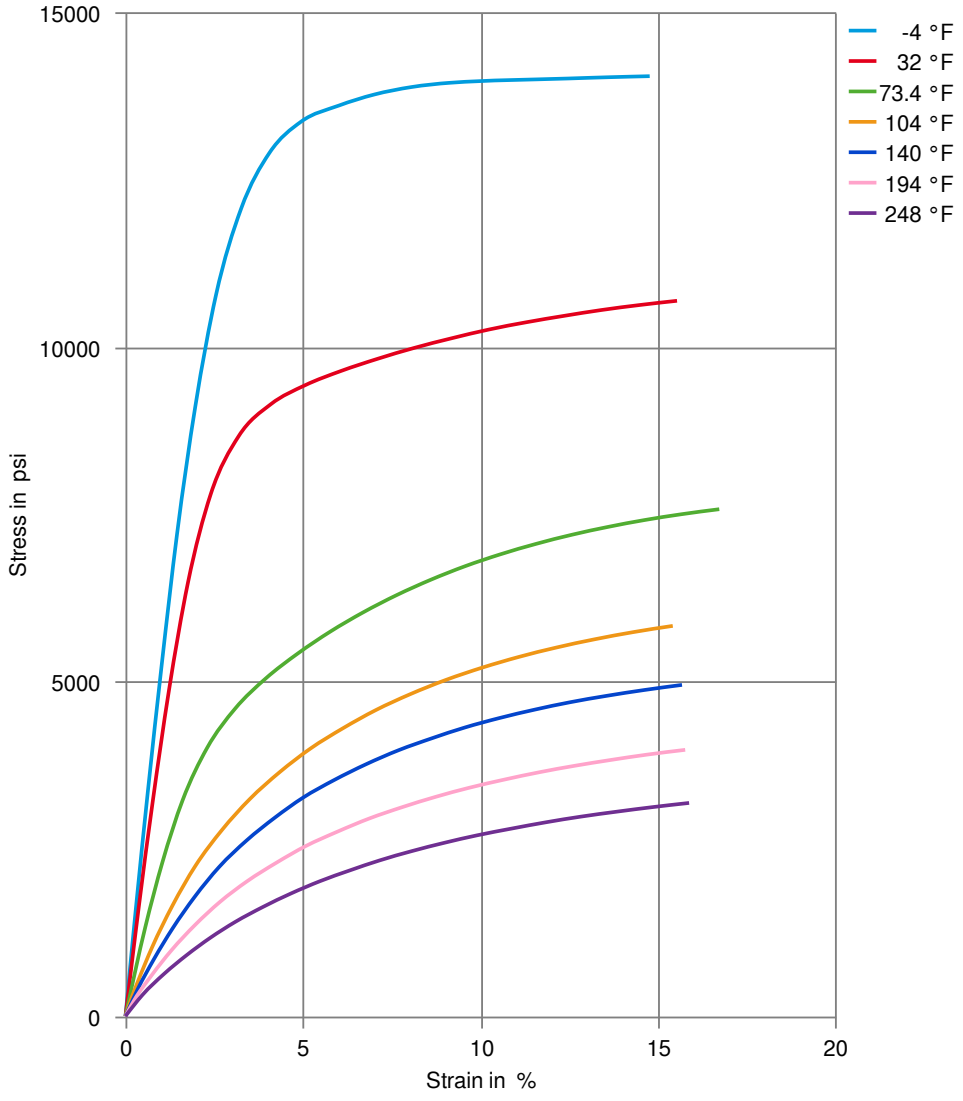


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NYLON RESIN

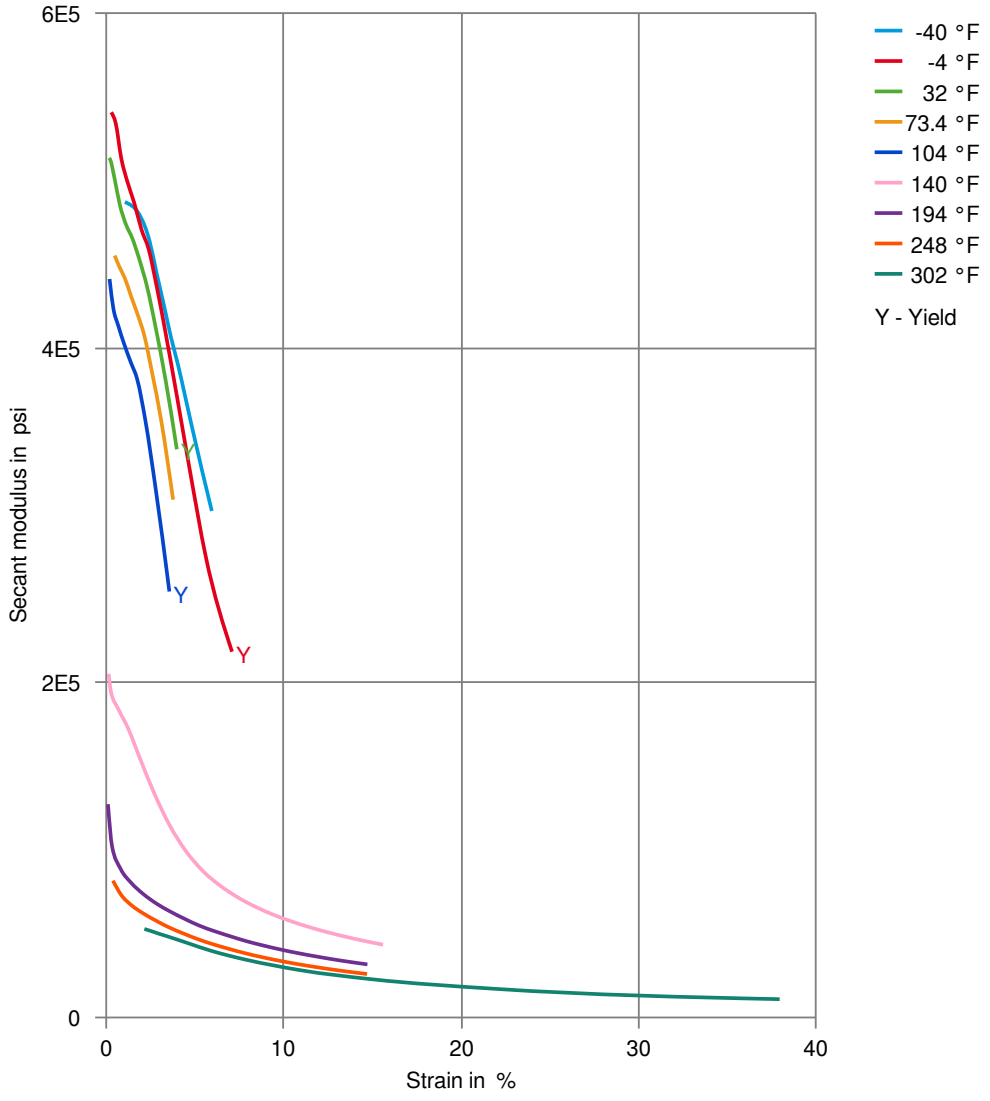
Stress-strain (cond.)



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Secant modulus-strain (dry)

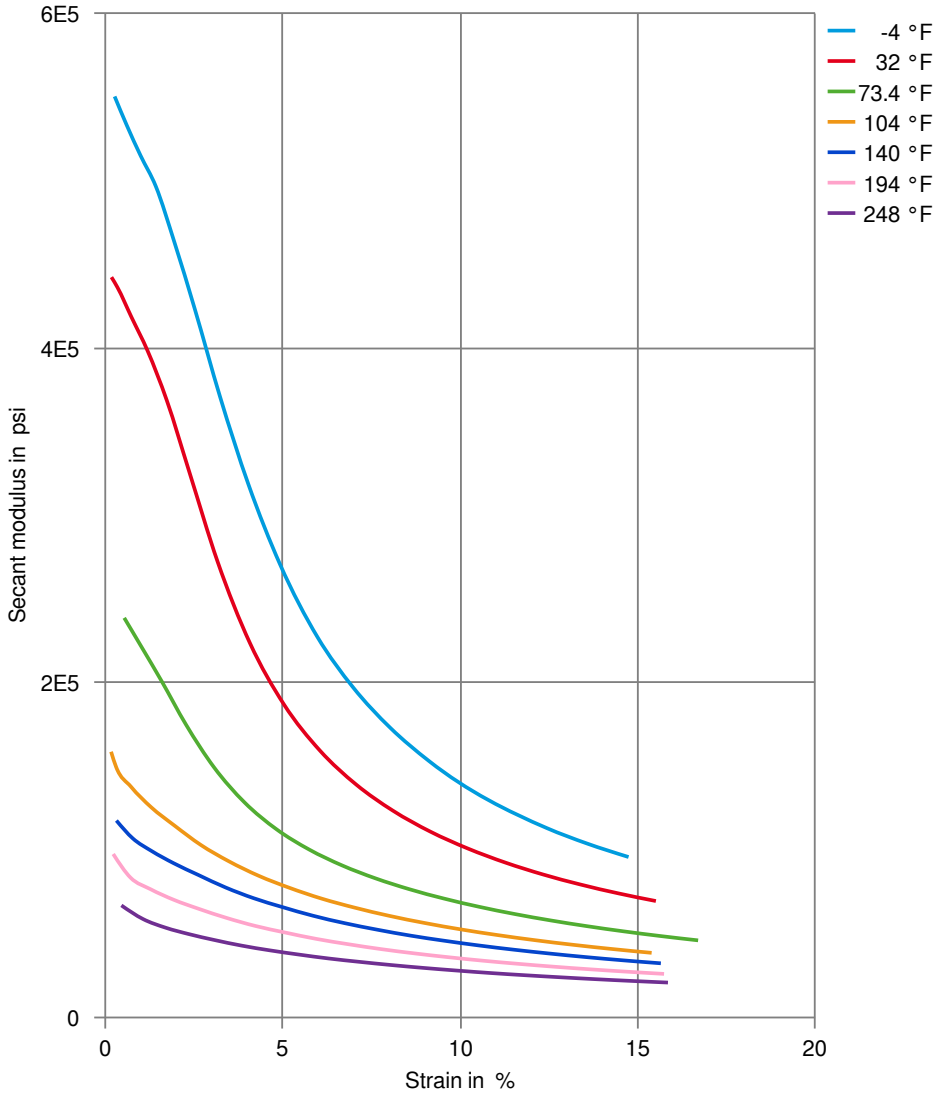


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Secant modulus-strain (cond.)



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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).

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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. Colorants or other additives may cause significant variations in data values. Properties of molded 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 equipment, processing technique or material mentioned in this publication should satisfy themselves that they can meet all applicable safety and health standards. We strongly recommend that users seek and adhere to the manufacturer's current instructions for handling each material they use, and entrust the handling of such material to adequately trained personnel only. Please call the telephone numbers listed for additional technical information. Call Customer Services for the appropriate Materials Safety Data Sheets (MSDS) before attempting to process our products.
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