# Zytel® 70G13HS1L BK031

## 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® 70G13HS1L BK031 is a 13% glass fiber reinforced, heat stabilised polyamide 66 resin for injection moulding.

## Product information

| | | |
|---|---|---|
| Resin Identification | PA66-GF13 | ISO 1043 |
| Part Marking Code | >PA66-GF13< | ISO 11469 |
| ISO designation | ISO 16396-PA66,GF13,M1CGHR,S14-050 | |

## Rheological properties

| | dry/cond. | | |
|---|---|---|---|
| Viscosity number | 137[1]/* | cm³/g | ISO 307, 1628 |
| Moulding shrinkage, parallel | 0.5 / - | % | ISO 294-4, 2577 |
| Moulding shrinkage, normal | 1.0 / - | % | ISO 294-4, 2577 |

[1]: formic acid

## Typical mechanical properties

| | dry/cond. | | |
|---|---|---|---|
| Tensile modulus | 5500 / 3500 | MPa | ISO 527-1/-2 |
| Tensile stress at break, 5mm/min | 120 / 75 | MPa | ISO 527-1/-2 |
| Tensile strain at break, 5mm/min | 2.5 / 12 | % | ISO 527-1/-2 |
| Flexural modulus | 4900 / 2900 | MPa | ISO 178 |
| Flexural strength | 190 / 100 | MPa | ISO 178 |
| Flexural stress at 3.5% | 165 / 90 | MPa | ISO 178 |
| Charpy impact strength, 23°C | 32 / - | kJ/m² | ISO 179/1eU |
| Charpy notched impact strength, 23°C | 5 / 6 | kJ/m² | ISO 179/1eA |
| Charpy notched impact strength, -40°C | 4.5 / 4 | kJ/m² | ISO 179/1eA |
| Izod notched impact strength, 23°C | 4.5 / 6 | kJ/m² | ISO 180/1A |
| Izod notched impact strength, -40°C | 4.5 / 4.0 | kJ/m² | ISO 180/1A |
| Poisson's ratio | 0.35 / 0.37 | | |

## Thermal properties

| | dry/cond. | | |
|---|---|---|---|
| Melting temperature, 10°C/min | 262 / * | °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 | 238 / * | °C | ISO 75-1/-2 |
| Temperature of deflection under load, 0.45 MPa | 258 / * | °C | ISO 75-1/-2 |
| Ball pressure test | 220 / - | °C | IEC 60695-10-2 |
| Coeff. of linear therm. expansion, parallel, -40-23°C | 42 / * | E-6/K | ISO 11359-1/-2 |

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| Coefficient of linear thermal expansion (CLTE), parallel | 40 / * | E-6/K | ISO 11359-1/-2 |
| Coeff. of linear therm. expansion, parallel, 55-160 °C | 26 / * | E-6/K | ISO 11359-1/-2 |
| Coeff. of linear therm. expansion, normal, -40-23 °C | 77 / * | E-6/K | ISO 11359-1/-2 |
| Coefficient of linear thermal expansion (CLTE), normal | 93 / * | E-6/K | ISO 11359-1/-2 |
| Coefficient of linear thermal expansion (CLTE), normal, 55-160 °C | 149 / * | E-6/K | ISO 11359-1/-2 |
| RTI, electrical, 0.75mm | 140 | °C | UL 746B |
| RTI, electrical, 1.5mm | 140 | °C | UL 746B |
| RTI, electrical, 3.0mm | 140 | °C | UL 746B |
| RTI, impact, 0.75mm | 125 | °C | UL 746B |
| RTI, impact, 1.5mm | 125 | °C | UL 746B |
| RTI, impact, 3.0mm | 125 | °C | UL 746B |
| RTI, strength, 0.75mm | 140 | °C | UL 746B |
| RTI, strength, 1.5mm | 140 / * | °C | UL 746B |
| RTI, strength, 3.0mm | 140 | °C | UL 746B |

## Flammability

| | dry/cond. | | |
|---|---|---|---|
| Burning Behav. at 1.5mm nom. thickn. | HB / * | class | IEC 60695-11-10 |
| Thickness tested | 1.5 / * | mm | IEC 60695-11-10 |
| UL recognition | yes / * | | UL 94 |
| Burning Behav. at thickness h | HB / * | class | IEC 60695-11-10 |
| Thickness tested | 0.71 / * | mm | IEC 60695-11-10 |
| UL recognition | yes / * | | UL 94 |
| FMVSS Class | B | | ISO 3795 (FMVSS 302) |
| Burning rate, Thickness 1 mm | 26 | mm/min | ISO 3795 (FMVSS 302) |

## Physical/Other properties

| | dry/cond. | | |
|---|---|---|---|
| Humidity absorption, 2mm | 2.2 / * | % | Sim. to ISO 62 |
| Water absorption, 2mm | 7.6 / * | % | Sim. to ISO 62 |
| Water absorption, Immersion 24h | 1.7[2] / * | % | Sim. to ISO 62 |
| Density | 1230 / - | kg/m³ | ISO 1183 |

[2]: 3.2mm wall thickness

## VDA Properties

| | | | |
|---|---|---|---|
| Emission of organic compounds | 6 | µgC/g | VDA 277 |

## Injection

| | | |
|---|---|---|
| Drying Recommended | yes | |
| Drying Temperature | 80 | °C |
| Drying Time, Dehumidified Dryer | 2 - 4 | h |
| Processing Moisture Content | ≤0.2 | % |
| Melt Temperature Optimum | 295 | °C |
| Min. melt temperature | 285 | °C |
| Max. melt temperature | 305 | °C |
| Screw tangential speed | ≤0.2 | m/s |
| Mold Temperature Optimum | 100 | °C |

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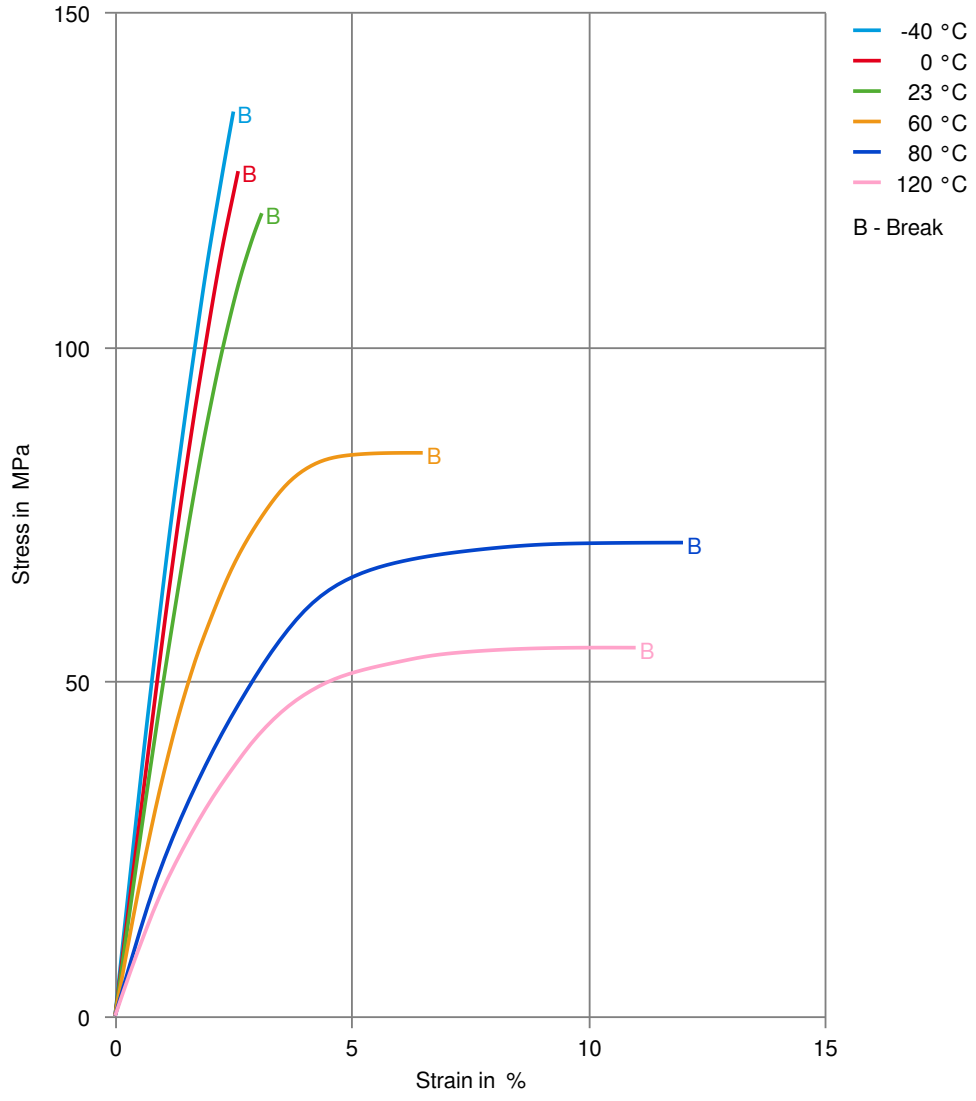
|---|---|
| Min. mould temperature | 70 °C |
| Max. mould temperature | 120 °C |
| Hold pressure range | 50 - 100 MPa |
| Hold pressure time | 3 s/mm |
| Ejection temperature | 210 °C |

## Stress-strain (dry)
## (measured on Zytel® 70G13L NC010)



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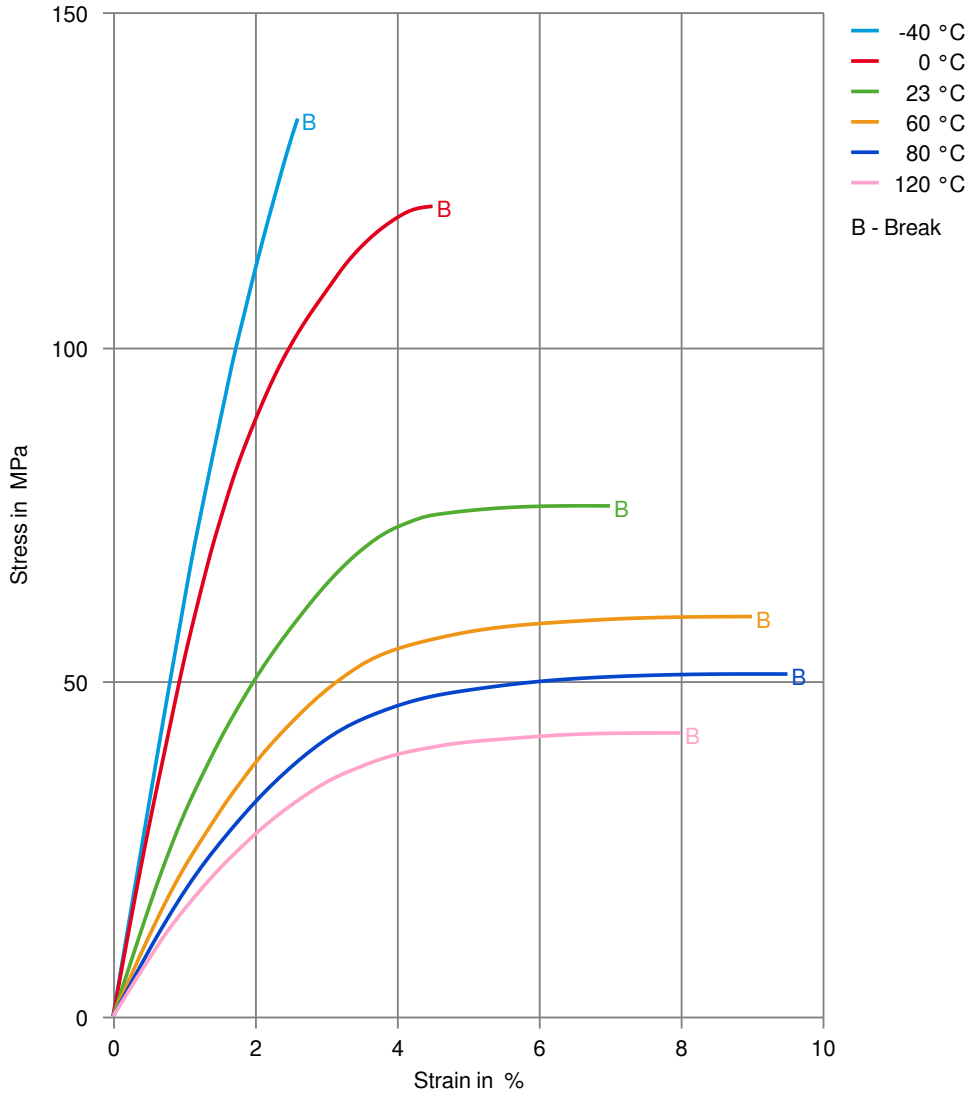
## Stress-strain (cond.)
(measured on Zytel® 70G13L NC010)



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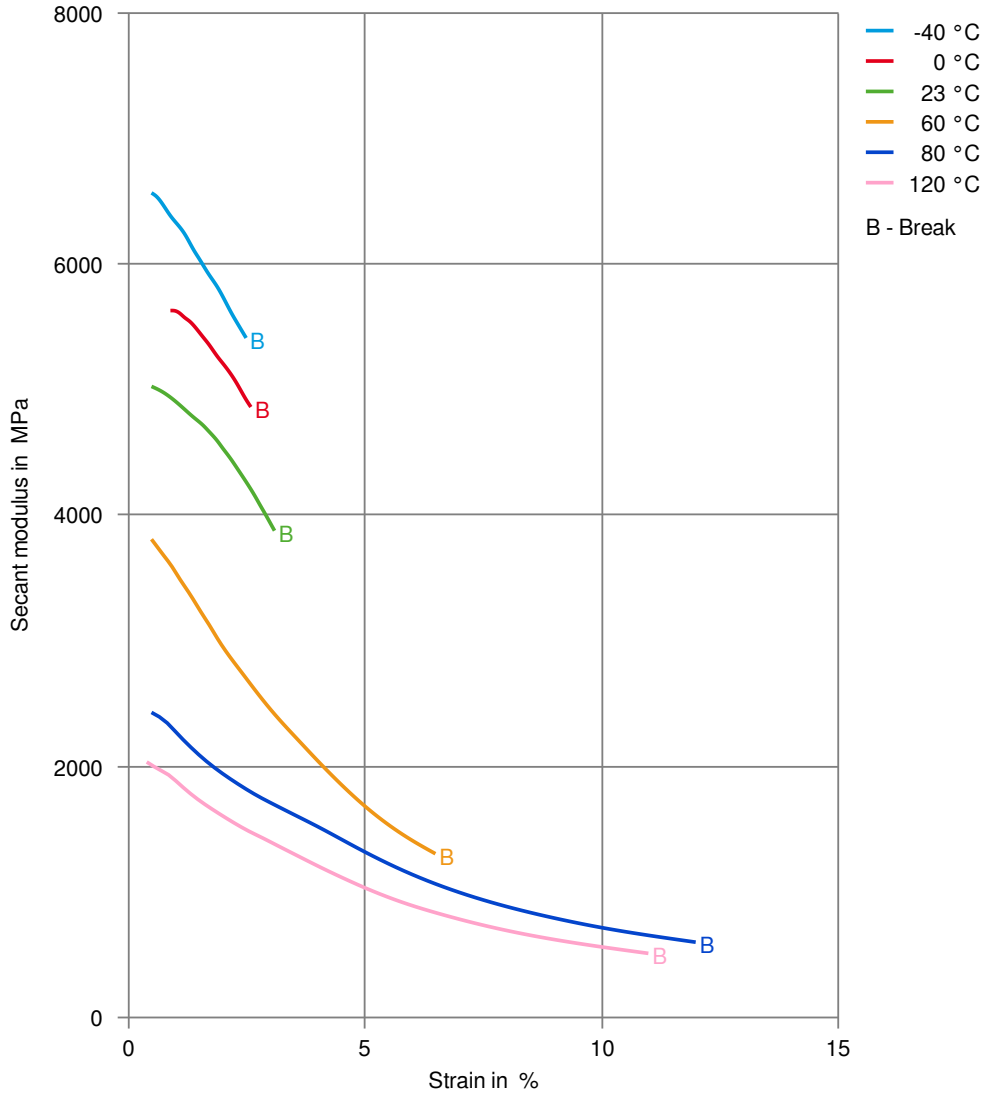
## Secant modulus-strain (dry)
(measured on Zytel® 70G13L NC010)



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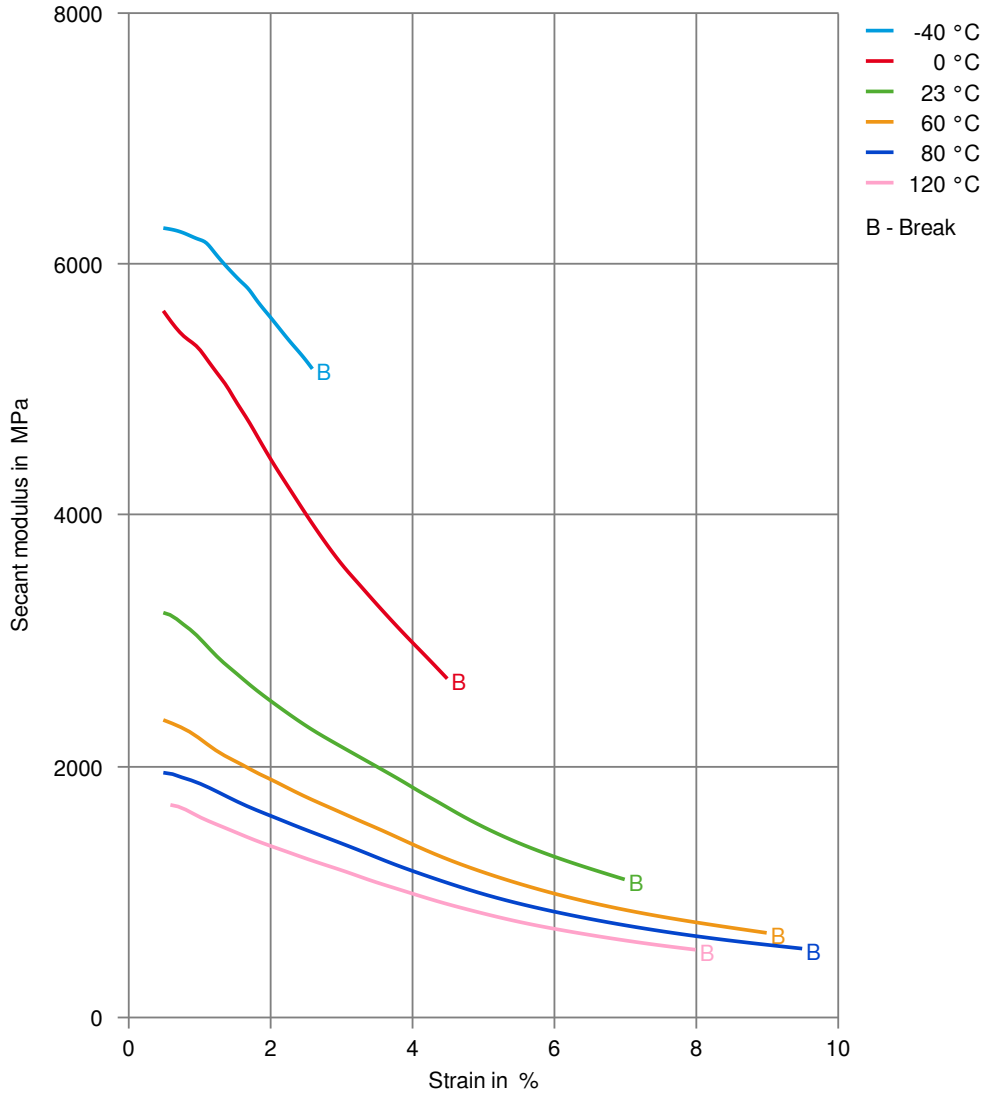
(measured on Zytel® 70G13L NC010)



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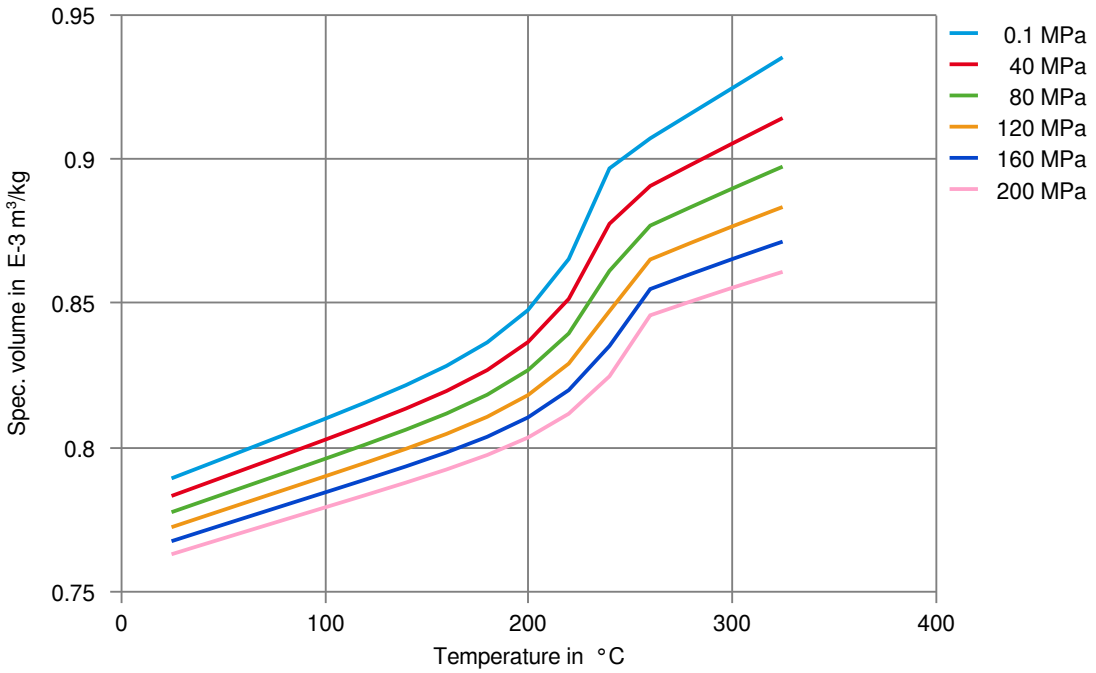
## Specific volume-temperature (pvT)



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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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