

# Delrin® 500AF

## ACETAL RESIN

Common features of Delrin® acetal resins include mechanical and physical properties such as high mechanical strength and rigidity, excellent fatigue and impact resistance, as well as resistance to moisture, gasoline, lubricants, solvents, and many other neutral chemicals. Delrin® acetal resins also have excellent dimensional stability and good electrical insulating characteristics. They are naturally resilient, self-lubricating, and available in a variety of colors and speciality grades.

Delrin® acetal resin typically is used in demanding applications in the automotive, domestic appliances, sports, industrial engineering, electronics, and consumer goods industries.

Delrin® 500AF is a medium viscosity acetal homopolymer containing 20% PTFE fibers. It is designed for applications requiring low wear and/or low friction against steel, itself, or other plastics.

Due to the color of the PTFE fibers, the natural color of this material is brown.

### Product information

|                      |            |           |
|----------------------|------------|-----------|
| Resin Identification | POM-SF20   | ISO 1043  |
| Part Marking Code    | >POM-SF20< | ISO 11469 |

### Rheological properties

|                                  |           |                 |
|----------------------------------|-----------|-----------------|
| Melt mass-flow rate              | 5 g/10min | ISO 1133        |
| Melt mass-flow rate, Temperature | 190 °C    | ISO 1133        |
| Melt mass-flow rate, Load        | 2.16 kg   | ISO 1133        |
| Moulding shrinkage, parallel     | 2.0 %     | ISO 294-4, 2577 |
| Moulding shrinkage, normal       | 1.4 %     | ISO 294-4, 2577 |

### Typical mechanical properties

|                                       |          |              |
|---------------------------------------|----------|--------------|
| Tensile Modulus                       | 2800 MPa | ISO 527-1/-2 |
| Stress at break                       | 50 MPa   | ISO 527-1/-2 |
| Strain at break                       | 10 %     | ISO 527-1/-2 |
| Flexural Modulus                      | 2500 MPa | ISO 178      |
| Compressive strength                  | 110 MPa  | ISO 604      |
| Charpy impact strength, 23°C          | 40 kJ/m² | ISO 179/1eU  |
| Charpy impact strength, -30°C         | 35 kJ/m² | ISO 179/1eU  |
| Charpy notched impact strength, 23°C  | 3 kJ/m²  | ISO 179/1eA  |
| Charpy notched impact strength, -30°C | 3 kJ/m²  | ISO 179/1eA  |
| Izod notched impact strength, 23°C    | 3 kJ/m²  | ISO 180/1A   |
| Hardness, Rockwell, M-scale           | 74       | ISO 2039-2   |
| Hardness, Rockwell, R-scale           | 119      | ISO 2039-2   |
| Poisson's ratio                       | 0.37     |              |

### Thermal properties

|   |           |                |
|---|-----------|----------------|
| Melting temperature, 10°C/min               | 178 °C    | ISO 11357-1/-3 |
| Temp. of deflection under load, 1.8 MPa     | 92 °C     | ISO 75-1/-2    |
| Temp. of deflection under load, 0.45 MPa    | 160 °C    | ISO 75-1/-2    |
| Coeff. of linear therm. expansion, parallel | 110 E-6/K | ISO 11359-1/-2 |

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|   |           |                |
|---|-----------|----------------|
| Coeff. of linear therm. expansion, normal | 100 E-6/K | ISO 11359-1/-2 |
| RTI, electrical, 1.5mm                    | 105 °C    | UL 746B        |
| RTI, electrical, 3mm                      | 105 °C    | UL 746B        |
| RTI, impact, 1.5mm                        | 85 °C     | UL 746B        |
| RTI, impact, 3mm                          | 85 °C     | UL 746B        |
| RTI, strength, 1.5mm                      | 90 °C     | UL 746B        |
| RTI, strength, 3mm                        | 90 °C     | UL 746B        |
| 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      |
| UL recognition                       | yes        | UL 94                |
| Burning Behav. at thickness h        | HB class   | IEC 60695-11-10      |
| Thickness tested                     | 3 mm       | IEC 60695-11-10      |
| UL recognition                       | yes        | UL 94                |
| Glow Wire Flammability Index, 3mm    | 600 °C     | IEC 60695-2-12       |
| FMVSS Class                          | B          | ISO 3795 (FMVSS 302) |
| Burning rate, Thickness 1 mm         | <80 mm/min | ISO 3795 (FMVSS 302) |

## Electrical properties

|                             |           |               |
|-----------------------------|-----------|---------------|
| Relative permittivity, 1MHz | 3.1       | IEC 62631-2-1 |
| Dissipation factor, 1MHz    | 90 E-4    | IEC 62631-2-1 |
| Surface resistivity         | >1E15 Ohm | IEC 62631-3-2 |
| Comparative tracking index  | 600       | IEC 60112     |

## Other properties

|                                 |            |                |
|---------------------------------|------------|----------------|
| Humidity absorption, 2mm        | 0.2 %      | Sim. to ISO 62 |
| Water absorption, 2mm           | 1 %        | Sim. to ISO 62 |
| Water absorption, Immersion 24h | 0.25 %     | Sim. to ISO 62 |
| Density                         | 1530 kg/m³ | ISO 1183       |
| Density of melt                 | 1280 kg/m³ |                |

## Injection

|                                 |         |
|---------------------------------|---------|
| Drying Recommended              | yes     |
| Drying Temperature              | 80 °C   |
| Drying Time, Dehumidified Dryer | 2 - 4 h |
| Processing Moisture Content     | ≤0.2 %  |
| Melt Temperature Optimum        | 215 °C  |
| Min. melt temperature           | 210 °C  |
| Max. melt temperature           | 220 °C  |
| Max. screw tangential speed     | 0.3 m/s |

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|                          |              |
|--------------------------|--------------|
| Mold Temperature Optimum | 90 °C        |
| Min. mould temperature   | 80 °C        |
| Max. mould temperature   | 100 °C       |
| Hold pressure range      | 80 - 100 MPa |
| Hold pressure time       | 8 s/mm       |
| Annealing time, optional | 30 min/mm    |
| Annealing temperature    | 160 °C       |

## Extrusion

|                                 |              |
|---------------------------------|--------------|
| Drying Temperature              | 75 - 85 °C   |
| Drying Time, Dehumidified Dryer | 2 - 4 h      |
| Processing Moisture Content     | ≤0.2 %       |
| Melt Temperature Optimum        | 200 °C       |
| Melt Temperature Range          | 195 - 205 °C |

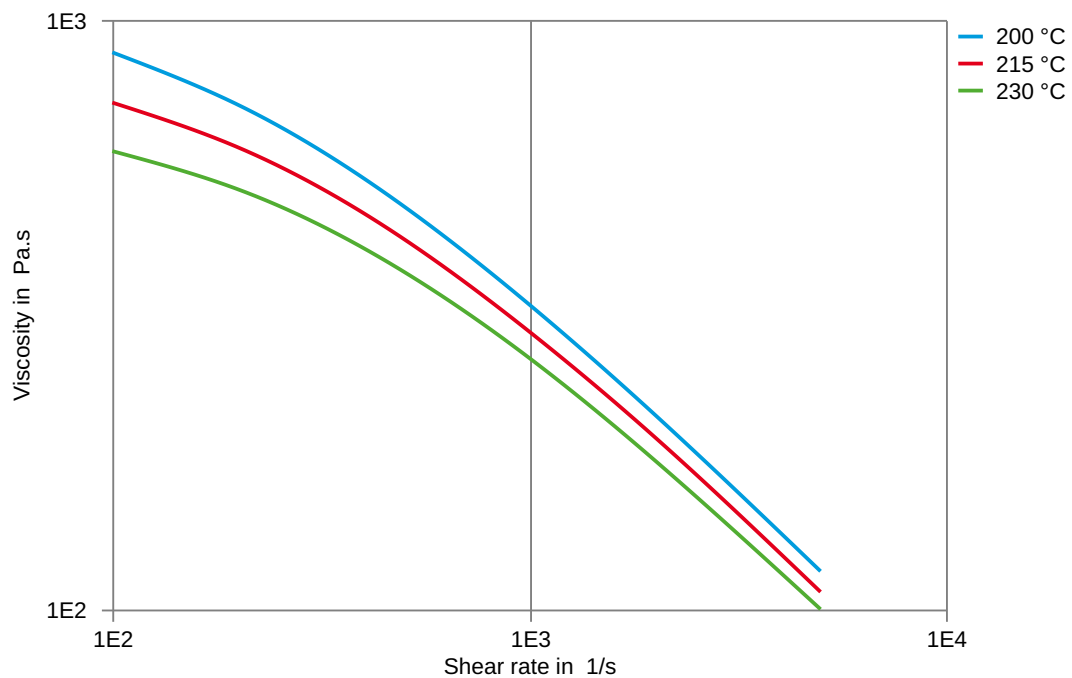
## Characteristics

|           |               |
|-----------|---------------|
| Additives | Release agent |
|-----------|---------------|

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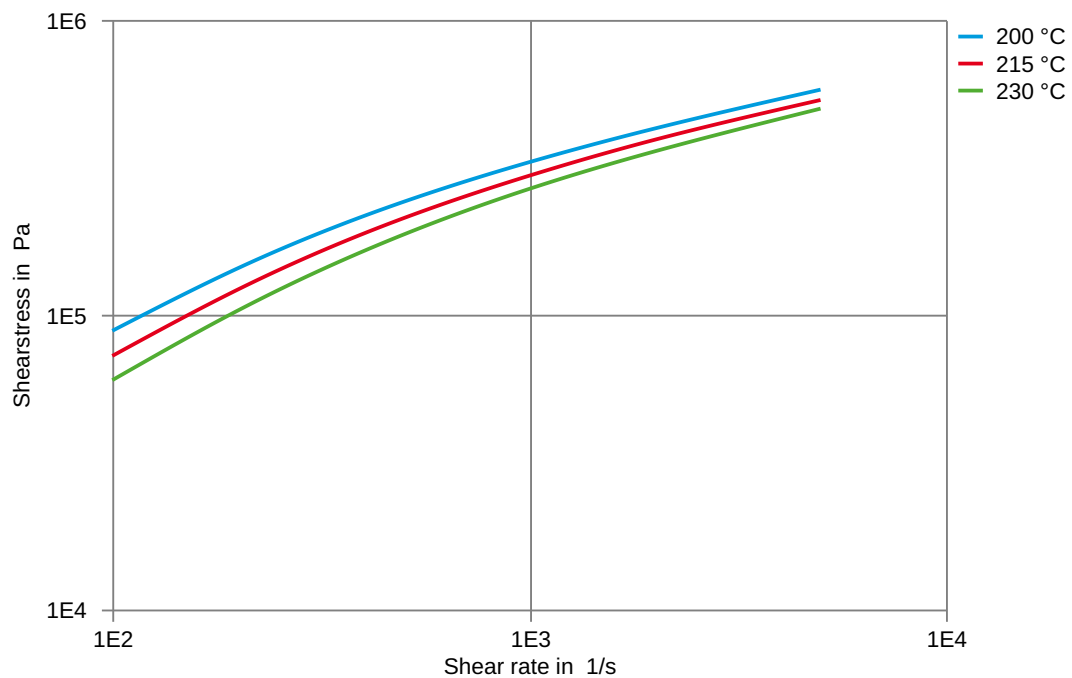
Viscosity-shear rate



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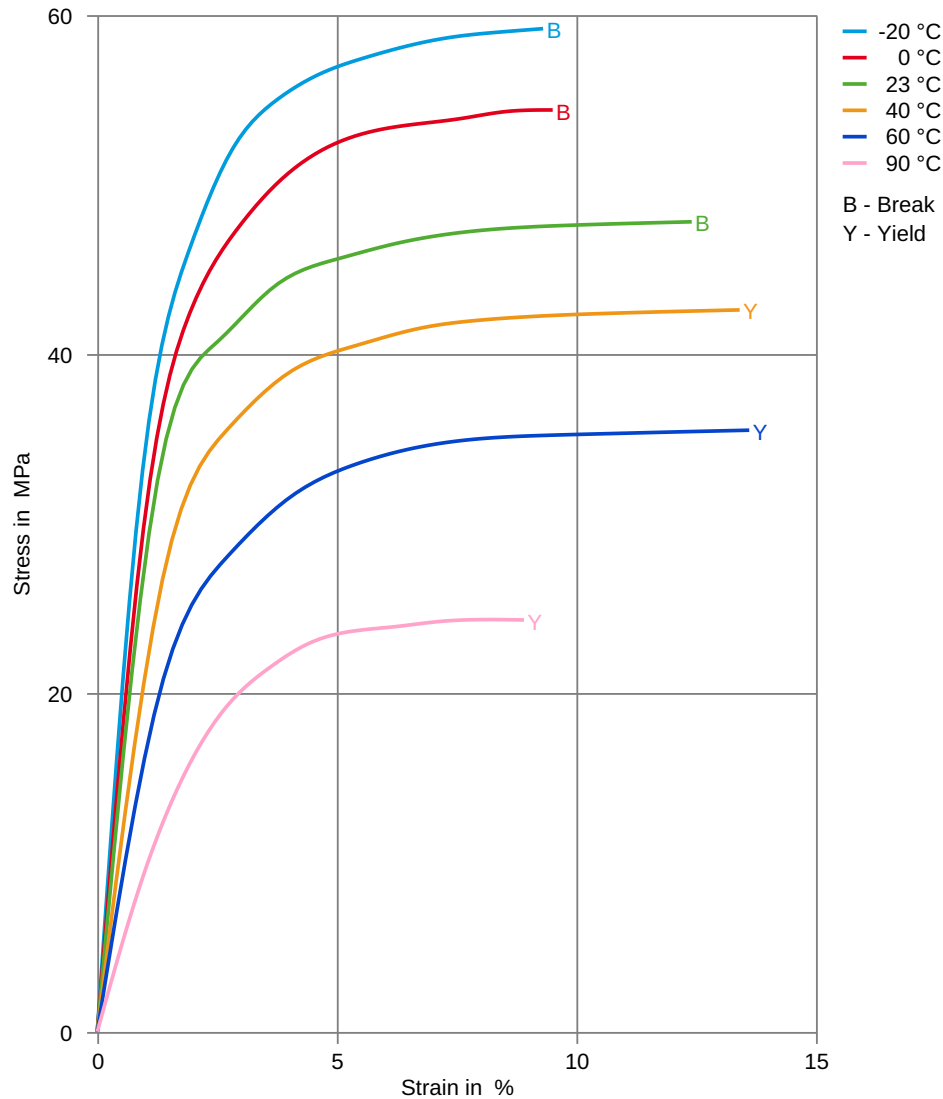
Shearstress-shear rate



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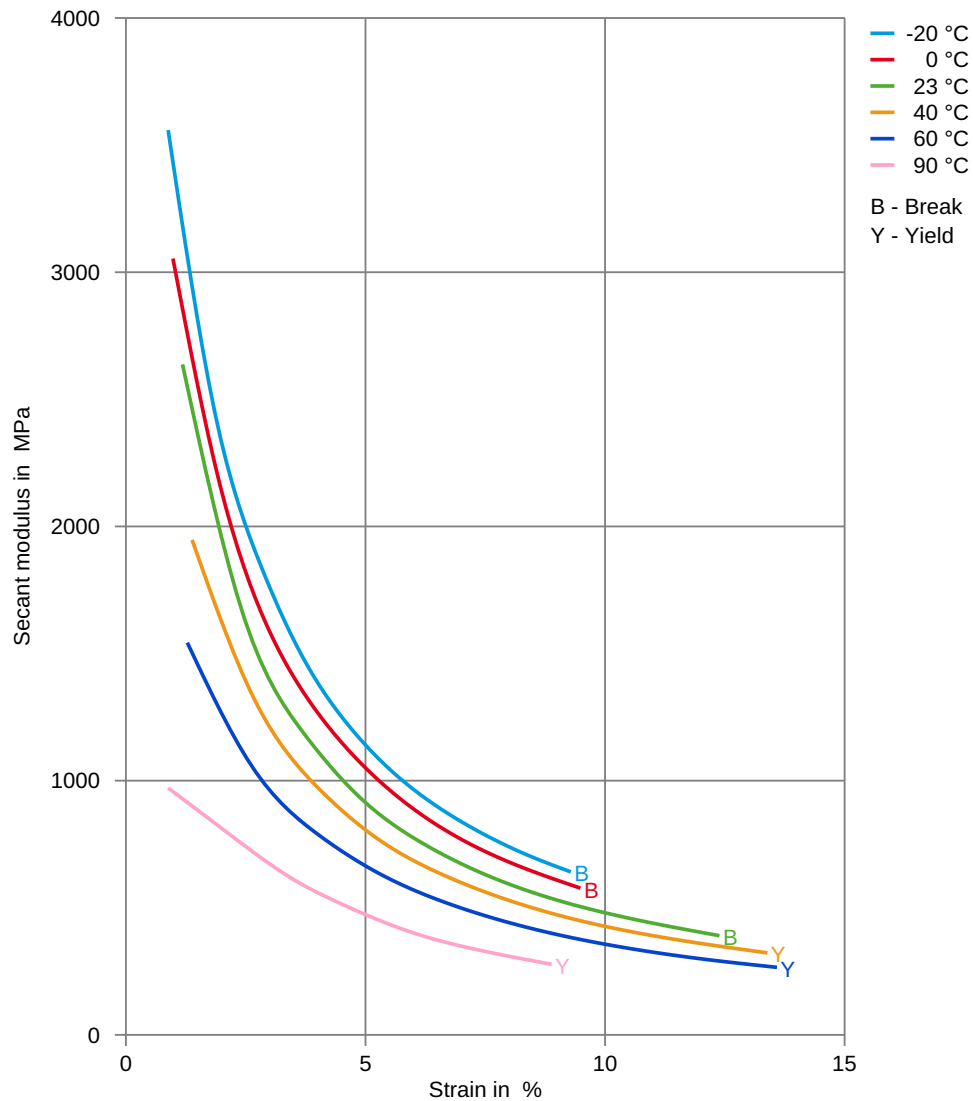
## Stress-strain



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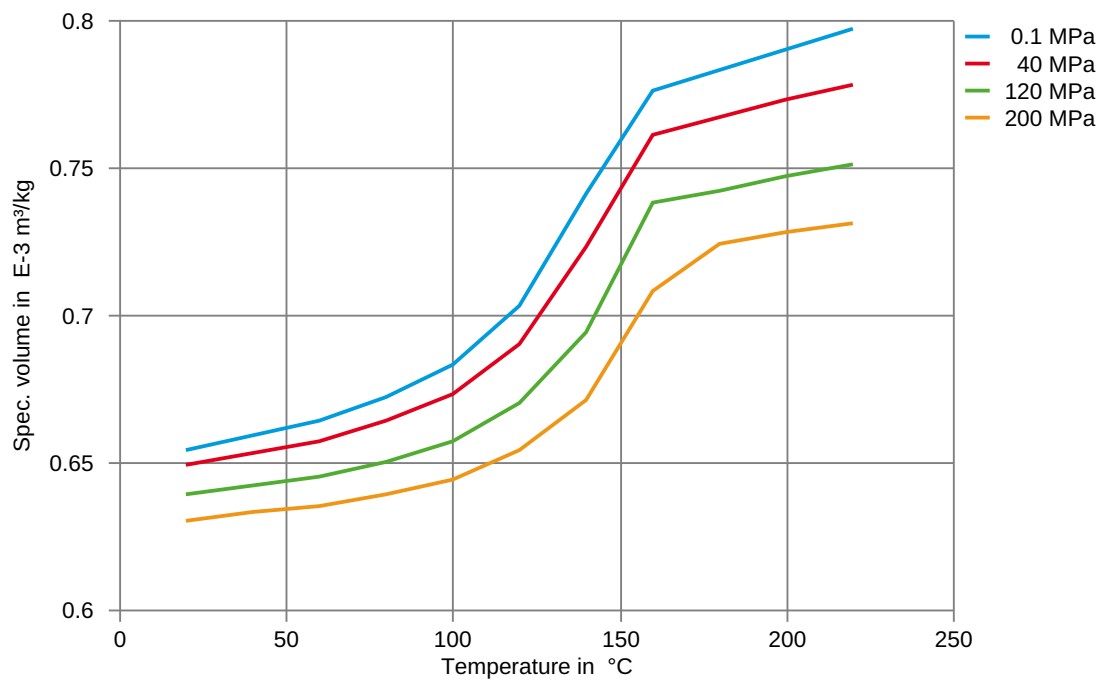
## Secant modulus-strain



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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

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### 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).

### Delrin

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