

## S-1000

MINDEL® S-1000 resin is a modified polysulfone engineering thermoplastic. This resin offers a unique combination of high heat deflection temperature, steam and hot water resistance, autoclavability, outstanding electrical properties and excellent dimensional stability. MINDEL S-1000 resin retains its mechanical and impact properties throughout 100 autoclave cycles [30 minutes each at 270°F (132°C)]. This resin is classified V0 in the UL 94 flammability test at a thickness of 0.13 inch (3.4 mm), is recognized by the FDA for repeated food contact, and is approved by the NSF for use with potable water.

MINDEL S-1000 resin offers excellent weld line strength and is available in black, white and light opaque colors.

### Drying

MINDEL S-1000 resin must be dried prior to processing. Drying for 3 hours at 275°F (135°C) outlet temperature in a dehumidifying hopper dryer is recommended. Processing at moisture levels greater than 0.03% will cause property degradation.

Tray drying is less efficient and therefore four hours drying at 275°F (135°C) is recommended. The depth of granules in the tray should be 1 inch (25 mm) or less. Because dried resin can quickly re-absorb moisture, it should be processed soon after drying.

### TYPICAL PROPERTIES OF MINDEL S-1000 RESIN

Property	ASTM Test Method	Typical Values <sup>(1)</sup>			
		U.S. Customary Units		SI Units	
		Value	Units	Value	Units
<b>Mechanical</b>					
Tensile Strength at Yield	D 638	9.5	kpsi	65	MPa
Elongation at Yield	D 638	5-6	%	5-6	%
Tensile Strength at Break	D 638	8.3	kpsi	57	MPa
Elongation at Break	D 638	100	%	100	%
Tensile Modulus	D 638	350	kpsi	2.41	GPa
Flexural Strength	D 790	14.1	kpsi	97	MPa
Flexural Modulus	D 790	381	kpsi	2.63	GPa
Izod Impact Strength, Notched	D 256	1.6	ft-lbs/in	85	J/m
<b>Thermal</b>					
Deflection Temperature at 264 psi (1.8 MPa)	D 648	300	°F	149	°C
Coefficient of Linear Thermal Expansion	D 696	57	ppm/°F	103	ppm/°C
Flammability <sup>(2)</sup>	UL 94	V0	at 0.130 in	V0	at 3.3 mm
<b>Electrical</b>					
Dielectric Strength	D 149	500	V/mil	20	kV/mm
Volume Resistivity	D 257	6.0 x 10 <sup>15</sup>	ohm-in	1.5 x 10 <sup>16</sup>	ohm-cm
Arc Resistance	D 495	130	sec	130	sec
Dielectric Constant at 60 Hz	D 150	3.12		3.12	
Dissipation Factor at 60 Hz	D 150	0.003		0.003	
Hot Wire Ignition	D 3874	103	sec	103	sec
High Current Arc Ignition	UL 746A-43.1	200+	arcs	200+	arcs
High Voltage Arc Tracking	UL 746A-25.1	1.6	in/min	4.1	cm/min
Comparative Tracking Index	D 3638	175	volts	175	volts
<b>General</b>					
Specific Gravity	D 792	1.23		1.23	
Water Absorption, 24 hours	D 570	0.20	%	0.20	%
Mold Shrinkage	D 955	0.7	%	0.7	%

<sup>(1)</sup> Properties of individual batches will vary within specification limits.

<sup>(2)</sup> The flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

## MINDEL S-1000

### Injection Molding

MINDEL S-1000 resin can be readily injection molded on standard reciprocating-screw injection molding machines. A general-purpose, low-compression-ratio screw (2.0-2.2:1) is recommended. Stock temperature requirements will generally range from 600° to 650°F (315° to 345°C).

Mold temperatures of 190° to 280°F (90° to 140°C) are suggested. Higher mold temperatures will produce the optimum part surface and lowest stress level in the finished parts.

Extrusion viscometer measurements show only a small decrease in viscosity is obtained with increasing shear rate, indicating the need for generous gates. The relatively low viscosity of the resin, over its useful temperature molding range, indicates that thin-walled parts can be filled easily.

### Extrusion and Thermoforming

MINDEL S-1000 resin can be extruded into sheet, pipe and profiles. Most equipment suitable for other amorphous engineering plastics (such as polysulfone and polycarbonate) will be satisfactory.

The surface of the extruded sheet, the general handling characteristics, thermal conditions, take-off equipment, and embossing roll usage are similar to those used for other engineering polymers.

MINDEL S-1000 sheet must be dried before thermoforming, to avoid bubbles or streaks on the surface and/or reduction in the physical properties.

MINDEL S-1000 sheet at 0.020 inch (0.5 mm) thickness can be oven dried at 260° to 270°F (127° to 132°C) for approximately three hours. Thicker sheet will require proportionally more time.

Typical thermoforming methods such as vacuum forming, pressure forming, plug-assist, and snap-back can be used. Molds should be metal and cored for heating up to 250°F (121°C). Mold design should follow the usual requirements for thermoforming, such as suitable draft for part release and no undercuts or sharp corners.

Suggested processing conditions are listed in the following table.

### Extrusion Conditions

Region	Temperature Settings	
	°F	°C
Extruder Zone 1 (hopper)	580°	305°
Extruder Zone 2	580°	305°
Extruder Zone 3	520°	270°
Extruder Zone 4	510°	265°
Adapter	525°	275°
Die	550°	290°
Stock Temperature	550°	290°
Chill Rolls	285° to 345°	140° to 175°

### Standard Packaging and Labeling

MINDEL S-1000 resin is packaged in foil lined, multiwall paper bags containing 55.115 pounds (25 kg) of material. Special packaging can be supplied upon request. Individual packages will be plainly marked with the product number, the color, the lot number, and the net weight.

### Precautionary Labeling

On the basis of the toxicological, physical, and chemical properties of MINDEL S-1000 resin, labeling used on containers is as follows:

*Caution! Handling and/or processing this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose, and throat.*

### Product Safety and Emergency Service

For product safety information or a Material Safety Data Sheet on a product of Solvay Advanced Polymers

**1 (800) 621-4557**

**1 (770) 772-8880 outside of U.S.**

For information or help in an emergency such as a spill, leak, fire or explosion, call day or night:

Emergency Health Information

**1 (800) 621-4590**

**1 (770) 772-5177 outside of U.S.**

Emergency Spill Information

**CHEMTREC 1 (800) 424-9300**

**1 (703) 527-3887 outside of U.S.  
collect calls accepted**

### For Additional Information

Technical Service

**1 (800) 621-4557**

Customer Service

**1 (800) 848-9744**

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