



# MELDIN<sup>®</sup>

## Polyimide and High-Performance Thermoplastic Materials

- Temperature from Cryogenic to 600°F (315°C)
- Intermittently up to 900°F (482°C)
- Self-lubricating properties

*Available as:*

- Machined part
- Stock shape
- Custom molded

# Principal Features of MELDIN® 2000

## Excellent Tensile Strength and Elongation

MELDIN® 2000 materials exhibit superior tensile strength and elongation properties, even at elevated temperatures, providing the mechanical integrity necessary for the most demanding applications.

## High Compressive Strength

With an ultimate compressive strength of over 40,000 psi and a usable limit of 34,000 psi at 10% strain, MELDIN® 2001 provides the highest resistance to compressive failure of any of the MELDIN® 2000 compositions. The additional formulations, however, also offer excellent compressive properties.

## High Modulus

MELDIN® 2000 materials have inherently high moduli and yield points in tension, compression, and flex. These combined features provide non-brittle materials for use in applications where extreme rigidity is essential.

## Superior Creep Resistance

These materials all display minimal deformation under load. MELDIN® 2030 provides additional ductility and conformability without sacrificing load carrying capacity when a sealing surface is required. These characteristics allow for dry-running bearing operation at high PVs and high-static loading without concern for deflection.

## Superb Dimensional Stability

MELDIN® 2000 products have no observable melting point. This feature, combined with an extremely low thermal expansion, high resistance to deformation under load, and low hysteresis, provides excellent dimensional stability. Even under the most severe conditions of harsh chemicals and temperature extremes, MELDIN® 2000 retains its dimensional quality and functionality.

## Balanced Electrical Properties

Both MELDIN® 2001 and MELDIN® 2030 have high dielectric strength, a stable dielectric constant, and very high volume and surface resistivity. MELDIN® 2001, with its balance of physical and electrical properties, is ideal for stationary electrical insulating applications. Bearings made of MELDIN® 2030 provide dry self-lubrication in addition to electrical insulation.

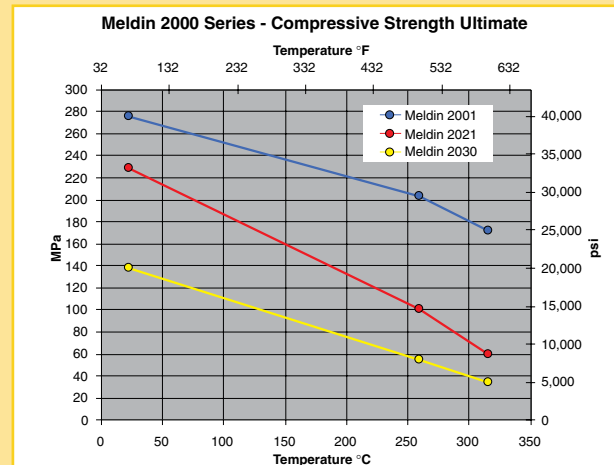
## Low Outgassing

In independent testing to ASTM R595, MELDIN® 2000 exhibited remarkably low outgassing. Other than absorbed water, MELDIN® 2000 materials showed negligible mass loss and collectible condensables. This feature allows for trouble-free, clean operation in ultra-high vacuum environments.

## Low Friction, High Resistance to Wear

MELDIN® 2021, MELDIN® 2211, and MELDIN® 2030 bearing grades are all capable of carrying high loads at temperature extremes. Specially designed for optimum friction and wear properties, these MELDIN® products provide smooth interaction and zero abrasion when operating against both ferrous and non-ferrous mating surfaces.

## Technical Graphs



# MELDIN® 2000 Compounds



## MELDIN® 2001

This material is best suited for thermal and electrical insulation and radiation resistance. MELDIN® 2001 has the highest compressive properties of any material in the series.

## MELDIN® 2021

A multi-purpose bearing grade for high temperature and high load applications, MELDIN® 2021 maintains its strength and rigidity at elevated temperatures.

## MELDIN® 2030

The MELDIN® 2030 bearing compound operates with extremely low friction in both dynamic and static applications, and provides thermal and electrical insulation.

## MELDIN® 2211

MELDIN® 2211 offers the balanced properties of low friction, high strength and resistance to compressive creep.

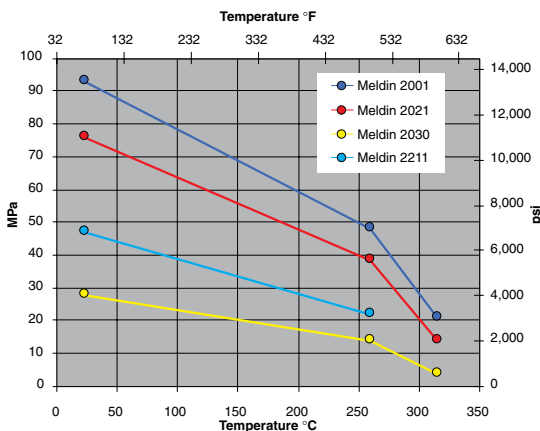
### Product availability:

- Basic shapes
- Finished parts

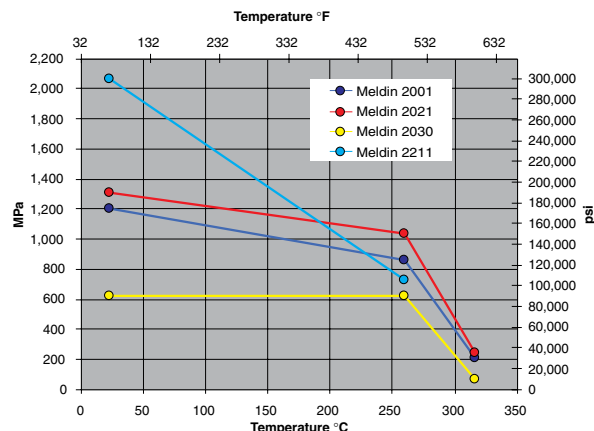
### Manufacturing processes:

- Compression molding
- Injection molding
- Direct forming
- Machined parts

Meldin 2000 Series - Tensile Strength



Meldin 2000 Series - Tensile Modulus

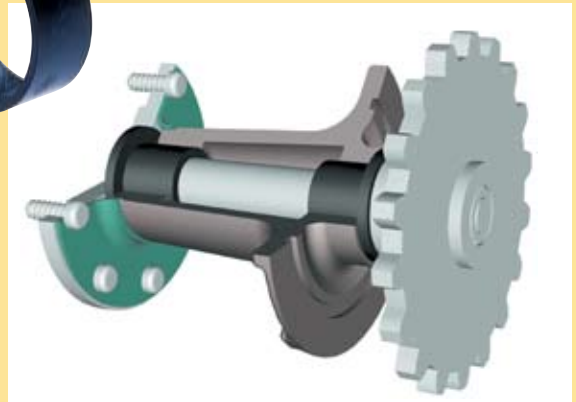


# Applications of MELDIN® 2000



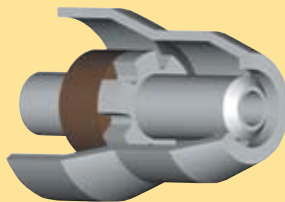
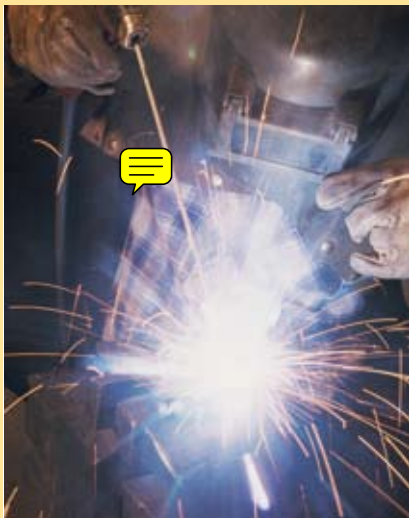
## Glass Handling Equipment

In glass bottle production, MELDIN® take-out inserts and grippers are used for mold removal and transfer of red-hot bottles. MELDIN® components improve bottle quality and production yield. Due to their low thermal conductivity, they reduce microcracking caused by rapid, non-uniform cooling.



## Bearing Applications

MELDIN® materials can be used for very demanding bearing applications in motors, general industrial equipment and machinery, and business machines.



## Welding or Plasma Cutting Equipment

Because of their high temperature capabilities, MELDIN® materials improve wear life of welding and plasma cutting equipment.

# Typical Properties of MELDIN® 2000

PROPERTY	TEST METHOD	ENGLISH (METRIC)	MELDIN® 2001	MELDIN® 2021	MELDIN® 2030	MELDIN® 2211
<b>MECHANICAL @ RT</b>						
Tensile Strength Ultimate	ASTM D638	psi (MPa)	13,500 (93)	11,000 (75.8)	4,000 (27.5)	6,800 (46.8)
Tensile Modulus	ASTM D638	psi x 10 <sup>5</sup> (GPa)	1.75 (1.2)	1.90 (1.3)	.90 (0.6)	3.00 (2.0)
Elongation Ultimate	ASTM D638	%	8.0	5.0	4.0	4.0
Flexural Strength Ultimate	ASTM D790	psi (MPa)	21,000 (144.7)	12,500 (86.1)	7,000 (48.2)	11,500 (79.2)
Flexural Modulus	ASTM D790	psi x 10 <sup>5</sup> (GPa)	6.50 (4.4)	5.75 (3.9)	3.90 (2.6)	5.50 (3.8)
Compressive Strength Ultimate	ASTM D695 modified	psi (MPa)	40,000 (275.7)	33,000 (227.5)	20,000 (137.8)	
Compressive Strength @ 10% Strain	ASTM D695 modified	psi (MPa)	34,000 (234.4)	30,000 (206.8)	17,000 (117.2)	
Compressive Modulus	ASTM D695 modified	psi x 10 <sup>5</sup> (GPa)	4.00 (2.7)	4.00 (2.7)	2.00 (1.3)	
Deformation @ 2000 psi, 24 hrs mold direction	ASTM D621	%	0.10	0.09	0.35	0.10
Izod Impact Strength (notched)	ASTM D256	Ft-lb/in (J/m)	0.53 (28.3)	0.38 (20.3)	0.34 (18.2)	0.37 (19.8)
<b>THERMAL</b>						
Coefficient of Thermal Expansion	ASTM E831-93	in/in/°F (m/m/°C) x 10 <sup>-5</sup>	2.95 (5.3)	2.7 (4.9)	3.3 (5.9)	3.2 (5.8)
Thermal Conductivity	C518/C177	BTU in/hr ft² °F (W/m°C)	3.0 (0.43)	4.3 (0.62)	2.4 (0.35)	2.8 (0.40)
<b>ELECTRICAL</b>						
Volume Resistivity	ASTM D257	Ohm/cm	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>15</sup>
Surface Resistivity	ASTM D257	Ohm	10 <sup>16</sup>	10 <sup>15</sup>	10 <sup>15</sup>	10 <sup>15</sup>
Dielectric Constant 10 <sup>2</sup> Hz	ASTM D150	—	3.40	12.65	3.03	5.56
Dielectric Constant 10 <sup>4</sup> Hz	ASTM D150	—	3.39	12.41	3.02	5.53
Dielectric Constant 10 <sup>6</sup> Hz	ASTM D150	—	3.35	11.92	2.98	5.47
Dielectric Strength	ASTM D149	V/mil (MV/m)	400 (15.8)	200 (7.9)	500 (19.7)	
Dissipation Factor 10 <sup>2</sup> Hz	ASTM D150	—	.0016	.0067	.0012	.0019
Dissipation Factor 10 <sup>4</sup> Hz	ASTM D150	—	.0030	.0096	.0031	.0028
Dissipation Factor 10 <sup>6</sup> Hz	ASTM D150	—	.0039	.0190	.0049	.0035
<b>GENERAL</b>						
Specific Gravity	ASTM D792	—	1.39	1.48	1.57	1.53
Hardness Shore D	ASTM D2240	—	92	90	80	85
Water Absorption	ASTM D570	%	0.13	0.13	0.62	0.18
<b>OTHER</b>						
Outgassing	ASTM E5955	% TML	1.63	1.38	1.25	1.19
Outgassing	ASTM E55955	%CVCVM	.01	.00	.00	.02
Outgassing	ASTM E595	%WVR	1.04	.69	1.15	.5
<b>500°F (260°C)</b>						
Tensile Strength Ultimate	ASTM D638	psi (MPa)	7,000 (48.2)	5,600 (38.6)	2,000 (13.7)	3,200 (22)
Tensile Modulus	ASTM D638	psi x 10 <sup>5</sup> (GPa)	1.25 (0.8)	1.50 (1.0)	.90 (0.6)	1.05 (0.7)
Elongation Ultimate	ASTM D638	%	7.0	3.5	2.8	3.0
Compressive Strength Ultimate	ASTM D695 modified	psi (MPa)	29,500 (203.3)	14,500 (100)	8,000 (55.1)	
Compressive Strength Yield	ASTM D695 modified	psi (MPa)	11,000 (75.8)	9,000 (62)	5,500 (38)	
Compressive Strain Yield	ASTM D695 modified	%	7.0	7.0	7.0	
Compressive Modulus	ASTM D695 modified	psi x 10 <sup>5</sup> (GPa)	1.75 (1.2)	1.90 (1.3)	0.80 (0.5)	
<b>600°F (316°C)</b>						
Tensile Strength Ultimate	ASTM D638	psi (MPa)	3,000 (20.6)	2,000 (13.7)	500 (3.4)	
Tensile Modulus	ASTM D638	psi x 10 <sup>5</sup> (GPa)	0.30 (0.2)	0.35 (0.2)	0.10 (0.06)	
Elongation Ultimate	ASTM D638	%	25	12	4.0	
Compressive Strength Ultimate	ASTM D695 modified	psi (MPa)	25,000 (172.3)	8,500 (58.6)	5,000 (34.4)	
Compressive Strength Yield	ASTM D695 modified	psi (MPa)	7,000 (48.2)	5,000 (34.4)	3,200 (22)	
Compressive Strain Yield	ASTM D695 modified	%	7.0	7.0	6.0	
Compressive Modulus	ASTM D695 modified	psi x 10 <sup>5</sup> (GPa)	1.00 (0.6)	0.75 (0.5)	0.55 (0.3)	

# Customized Engineering Support and Solutions

Saint-Gobain Performance Plastics uses its state-of-the-art testing and engineering equipment to support you in your most challenging applications.

## Tribology Test Rigs

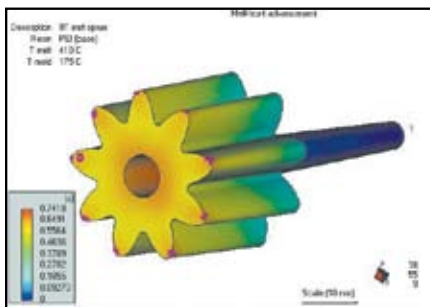


Tribology test rigs continuously measure material wear, coefficient of friction, and mating surface temperature over time. A wide range of mating surface materials, surface finishes, and surface hardnesses are available for testing. Test rig options include submerged (wet) testing, as well as externally heated mating surfaces to simulate hot environments.

## Tribological Test Room



Tribology test room can operate 24 hours a day with continuous computer data acquisition.



Mold flow analysis is used for both engineering and process studies.



## Saint-Gobain Performance Plastics Plants for MELDIN® Products



Bristol/USA



Kontich/Belgium



Logroño/Spain

# Chemical Resistance of MELDIN®

	MELDIN® 2001	MELDIN® 2021	MELDIN® 2030	MELDIN® 2211	MELDIN® 3110	MELDIN® 3120
2-Butanene	•	•	•	•	•	•
Acetic Acid	•	•	•	•	•	•
Acetylene	•	•	•	•	•	•
Alkalines						
Ammonia						
Amyl Chloride	•	•	•	•	•	•
Analine	•	•	•	•	•	•
Aqua Regia	•	•	•	•	•	•
Benzaldehyde	•	•	•	•	•	•
Benzonitrile	•	•	•	•	•	•
Benzenesulfonic Acid	•	•	•	•	•	•
Bromine	•	•	•	•	•	•
Calcium Hypochlorite	•	•	•	•	•	•
Camphor Oil	•	•	•	•	•	•
Carbon Sulfide	•	•	•	•	•	•
Carbon Tetrachloride	•	•	•	•	•	•
Chloral Hydrate	•	•	•	•	•	•
Chloroacetic Acid	•	•	•	•	•	•
Chlorine or Bleaching Agents						
Chloroform	•	•	•	•		
Chlorosulfonic Acid	•	•	•	•		
Chromic Acid	•	•	•	•	•	•
Concentrated Oxidizing Acids	•	•	•	•		
Creosote	•	•	•	•	•	•
Cresol	•	•	•	•	•	•
Decalin	•	•	•	•	•	•
Dichlorobenzene	•	•	•	•	•	•
Diethyl Ether	•	•	•	•	•	•
Dimethylamine	•	•	•	•	•	•
Dimethyl Sulfoxide	•	•	•	•	•	•
Ethyl Acetate	•	•	•	•	•	•
Ethylene & Propylene Dichloride	•	•	•	•	•	•
Ferric Chloride	•	•	•	•	•	•
Ferric Nitrate	•	•	•	•	•	•
Ferric Sulfate	•	•	•	•	•	•
Ferrous Sulfate	•	•	•	•	•	•
Fluoboric Acid	•	•	•	•	•	•
Flourinating Agents, strong	•	•				
Flourine >140°F & Dry Gas >250°F	•	•				
Fluosilicic Acid	•	•	•	•		
Hydrobromic Acid	•	•	•	•	•	•
Hydrochloric Acid					•	•
Hydrocyanic Acid	•	•	•	•	•	•
Hydrofluoric Acid					•	•
Hydrofluosilicic Acid	•	•	•	•	•	•
Hydrogen Fluoride, Dry >250°F	•	•	•	•	•	•
Hydrogen Peroxide	•	•	•	•	•	•
Hydroxides						
Mercury of Silver salts	•	•	•	•	•	•
Methylene Chloride	•	•	•	•	•	•
MEK	•	•	•	•	•	•
Molten Alkali metals	•	•			•	•
Molten Anhydrous bases					•	•
Nitric Acid (30%)					•	•
Nitrobenzene	•	•	•	•	•	•
Oleum	•	•	•	•	•	•
P-Dioxane	•	•	•	•	•	•
Partly Halogenated Hydrocarbons	•	•	•	•	•	•
Phenol (Diluted)	•	•	•	•	•	•
Phosphoric Acid	•	•	•	•	•	•
Potassium Chlorate	•	•	•	•	•	•
Potassium Cyanide	•	•	•	•	•	•
Potassium Dichromate	•	•	•	•	•	•
Potassium Hydroxide					•	•
Potassium Nitrate	•	•	•	•	•	•
Sodium Chlorate	•	•	•	•	•	•
Sodium Cyanide	•	•	•	•	•	•
Sodium Hydroxide					•	•
Sodium Nitrate	•	•	•	•	•	•
Stannous Chloride	•	•	•	•	•	•
Steam						
Sulfur Dioxide 5% + H2O	•	•	•	•	•	•
Sulfur, Molten	•	•	•	•	•	•
Sulfuric Acid (40%)	•	•	•	•	•	•
Tetralin	•	•	•	•		
Trichloroethylene	•	•	•	•		
Toluene	•	•	•	•	•	•
Trifluoroacetic Acid	•	•	•	•	•	•
Xylene	•	•	•	•	•	•
Zinc Chloride	•	•	•	•	•	•





PERFORMANCE PLASTICS

Saint-Gobain Performance Plastics

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Toll Free: 800-223-4966
Fax: 401-253-8211
www.plastics.saint-gobain.com

MELDIN® APPLICATION INQUIRY FORM

NOTE: Please attach any helpful comments/sketches

CUSTOMER INFORMATION

COMPANY:

STREET:

CITY, STATE, ZIP:

ENGINEERING CONTACT

TELEPHONE No. FAX No.

PURCHASING CONTACT:

TELEPHONE No. FAX No.

Table with 3 columns: ACTION REQUIRED, DATE NEEDED, QUOTATION GENERALITIES. Rows include: MATERIAL RECOMMENDATION, PROVIDE TECH DATA ON MATERIAL, PART DESIGN RECOMMENDATION, PRODUCE PROTOTYPES.

PRODUCT INFORMATION (ATTACH DRAWING OR SKETCH IF AVAILABLE)

DESIGN: NEW [ ] EXISTING [ ] BEARING\* SIZE: UNITS: IN [ ] MM [ ]
\*For non-bearing application, attach drawing

IF EXISTING:

TYPE/BRAND: ID: OD:

MATERIAL: LENGTH: FLANGE OD:

PART/DRAWING No: FLANGE THICKNESS:

DESCRIBE END USES: OTHER DIMENSIONS:

DESIRED CHARACTERISTICS:

OTHER COMMENTS:

# MELDIN® APPLICATION INQUIRY FORM

## APPLICATION PARAMETERS

### PART INSTALLATION

PRESS FIT ON OD: \_\_\_\_\_

SHRINK FIT ON ID: \_\_\_\_\_

MECHANICAL MEANS: \_\_\_\_\_

SLIP FIT: \_\_\_\_\_

BONDING: \_\_\_\_\_

OTHER (List): \_\_\_\_\_

### SHAFT SPECIFICATIONS

DIAMETER (& TOLERANCE): \_\_\_\_\_

MATERIAL TYPE: \_\_\_\_\_

SURFACE FINISH: \_\_\_\_\_

HARDNESS: \_\_\_\_\_

### HOUSING SPECIFICATIONS

DIAMETER (& TOLERANCE): \_\_\_\_\_

MATERIAL TYPE: \_\_\_\_\_

LENGTH (& TOLERANCE): \_\_\_\_\_

### TEMPERATURE

TYPICAL: °F  °C

MAXIMUM: °F  °C

DURATION: Min.  Hrs.

MINIMUM: °F  °C

DURATION: Min.  Hrs.

MAXIMUM: \_\_\_\_\_

### LOAD

RADIAL  THRUST

UNITS: LB  PSI  N/MM<sup>2</sup>  OTHER: \_\_\_\_\_

CANTILEVERED  IMPACT

CONSTANT  MISALIGNMENT

TYPICAL: \_\_\_\_\_

MAXIMUM: \_\_\_\_\_

Duration: \_\_\_\_\_

MINIMUM: \_\_\_\_\_

Duration: \_\_\_\_\_

### VELOCITY

UNITS: RPM  FT/MIN  M/SEC

LINEAR/STROKE LENGTH: \_\_\_\_\_

NUMBER OF STROKES/MIN: \_\_\_\_\_

ROTARY: \_\_\_\_\_

DEGREE OF OSCILLATION: \_\_\_\_\_

NUMBER OF CYCLES/MIN: \_\_\_\_\_

OTHER: \_\_\_\_\_

RUNNING SURFACE: ID  OD  FACE

### ENVIRONMENT

DRY  WATER  LUBRICATED

CLEAN  DIRT  VACUUM

CHEMICALS (SPECIFY): \_\_\_\_\_

GASES (SPECIFY): \_\_\_\_\_

OIL (TYPE): \_\_\_\_\_

### SERVICE LIFE

CURRENT: \_\_\_\_\_

DESIRED: \_\_\_\_\_

### PRODUCT VALIDATION

BENCH:

FIELD:

BOTH:

### PRODUCT TESTING

TEST START DATE: \_\_\_\_\_

TEST DURATION: \_\_\_\_\_

		INJECTION MOLDING	NORGLIDE® BEARINGS	NORSLIDE®	OMNILIP®	OMNISEAL®	MELDIN®	RULON®	RAM EXTRUSION	HIGH PURITY PRODUCTS	MACHINED & MOLDED COMPONENTS	
<b>NORTH AMERICA</b>												
* Saint-Gobain Performance Plastics Corporation Wayne, New Jersey • USA	Phone: (1) 973-696-4700 Fax: (1) 973-696-4056		•	•								
* Saint-Gobain Performance Plastics Corporation Bristol, Rhode Island • USA	Phone: (1) 401-253-2000 Fax: (1) 401-253-1755	•					•	•	•		•	
* Saint-Gobain Performance Plastics Corporation Garden Grove, California • USA	Phone: (1) 714-630-5818 Fax: (1) 714-688-2614				•	•				•	•	
<b>EUROPE</b>												
* Saint-Gobain Performance Plastics Pampus GmbH Willich • Germany	Phone: (49) 2154 600 Fax: (49) 2154 60310		•	•				•			•	
* Saint-Gobain Performance Plastics N.V. Kontich • Belgium	Phone: (32) 34 58 28 28 Fax: (32) 34 58 26 69				•	•	•	•			•	
* Saint-Gobain Performance Plastics Asti Charnay-les-Macon • France	Phone: (33) 3 85 20 27 00 Fax: (33) 3 85 29 18 48									•		
* Saint-Gobain Performance Plastics Asti Nanterre • France	Phone: (33) 1 55 68 59 59 Fax: (33) 1 55 68 59 68		•	•						•		
Saint-Gobain Performance Plastics Agrate Brianza (Mi) • Italy	Phone: (39) 03 96 50 070 Fax: (39) 03 96 52 736		•	•	•	•	•	•		•		
Saint-Gobain Performance Plastics Espana, S.A. Barcelona • Spain	Phone: (34) 93 682 8138 Fax: (34) 93 682 8143		•	•								
* Saint-Gobain Performance Plastics Espana, S.A. Logrono • Spain	Phone: (34) 94 14 86 035 Fax: (34) 94 14 37 095	•					•	•			•	
<b>SOUTH AMERICA</b>												
* Saint-Gobain Ceramicas Industrias Ltda. Vinhedo-SP • Brazil	Phone: (55) 19 3876 8153 Fax: (55) 19 3876 8077	•	•	•	•	•	•	•				
<b>ASIA</b>												
* Saint-Gobain KK-Performance Plastics Tokyo • Japan	Phone: (81) 33 26 30 285 Fax: (81) 33 26 30 286		•	•	•	•	•	•		•	•	
* Saint-Gobain Performance Plastics Korea Co., Ltd. Seoul • South Korea	Phone: (82) 25 08 82 00 Fax: (82) 25 54 15 50		•	•	•	•	•	•			•	
* Saint-Gobain Performance Plastics Shanghai Co., Ltd. Shanghai • China	Phone: (86) 21 54 72 15 68 Fax: (86) 21 54 72 60 35	•	•	•	•	•	•	•		•	•	
* Saint-Gobain Advanced Materials (Taiwan) Co., Ltd. Taipei • Taiwan	Phone: (886) 22 50 34 201 Fax: (886) 22 50 34 202		•	•	•	•	•	•			•	
* Grindwell Norton Ltd. Bangalore • India	Phone: (91) 80 847 2900 Fax: (91) 80 847 2905		•	•	•	•	•	•				
Saint-Gobain Advanced Materials (M) Sdn.Bhd Selangor Darul Ehsan • Malaysia	Phone: (60) 37 36 40 82/81 Fax: (60) 37 36 40 99		•	•	•	•	•	•				

\* Manufacturing Facilities

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Rulon® are registered trademarks.



**Limited Warranty:** For a period of 6 months from the date of first sale, Saint-Gobain Performance Plastics Corporation warrants this product(s) to be free from defects in manufacturing. Our only obligation will be to provide replacement product for any portion proving defective, or at our option, to refund the purchase price thereof. User assumes all other risks, if any, including the risk of injury, loss or damage, whether direct or consequential, arising out of the use, misuse, or inability to use this product(s). SAINT-GOBAIN PERFORMANCE PLASTICS DISCLAIMS ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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