

# NORYL™ RESIN SE1GFN2

REGION EUROPE

## DESCRIPTION

NORYL SE1GFN2 resin is a 20% glass fiber reinforced blend of polyphenylene ether (PPE) + polystyrene (PS). This injection moldable grade contains non-brominated, non-chlorinated flame retardant and carries a UL94 flame rating of 5VA at 2mm and V1 at 1.5mm along with UL746C Outdoor Suitability rating of F1 and RTI of 110C. NORYL SE1GFN2 exhibits high heat resistance, good dielectric strength, dimensional stability, hydrolytic stability, and very low moisture absorption. This material is an excellent candidate for a variety of applications such as solar frames, unattended power supply (UPS) inverter/charger, indoor and outdoor electrical enclosures / housings / connectors, and wall plates / sockets / switches. No PFAS intentionally added to this grade (AMR and EUR sourced only).

| GENERAL INFORMATION   |   |
|-----------------------|---|
| Features              | Flame Retardant, Hydrolytic Stability, Low Warpage, Amorphous, Low Shrinkage, Low Moisture Absorption, Low Specific Gravity, Non Cl/Br flame retardant, Non halogenated flame retardant, Dimensional stability, High stiffness/Strength |
| Fillers               | Glass Fiber   |
| Polymer Types         | Polyphenylene Ether + PS (PPE+PS)   |
| Processing Techniques | Injection Molding   |

| INDUSTRY                   | SUB INDUSTRY   |
|----------------------------|--|
| Automotive                 | Automotive EV Batteries                              |
| Electrical and Electronics | Energy Management, Mobile Phone - Computer - Tablets |
| Industrial                 | Electrical   |

## TYPICAL PROPERTY VALUES

Revision 20241016

| PROPERTIES                                  | TYPICAL VALUES | UNITS             | TEST METHODS |
|---|----------------|-------------------|--------------|
| <b>MECHANICAL <sup>(1)</sup></b>            |                |                   |              |
| Taber Abrasion, CS-17, 1 kg                 | 65             | mg/1000cy         | SABIC method |
| Tensile Stress, break, 5 mm/min             | 80             | MPa               | ISO 527      |
| Tensile Strain, break, 5 mm/min             | 2              | %                 | ISO 527      |
| Tensile Modulus, 1 mm/min                   | 5500           | MPa               | ISO 527      |
| Flexural Stress, break, 2 mm/min            | 125            | MPa               | ISO 178      |
| Flexural Modulus, 2 mm/min                  | 4500           | MPa               | ISO 178      |
| Ball Indentation Hardness, H358/30          | 125            | MPa               | ISO 2039-1   |
| <b>IMPACT <sup>(1)</sup></b>                |                |                   |              |
| Izod Impact, unnotched 80*10*4 +23°C        | 25             | kJ/m <sup>2</sup> | ISO 180/1U   |
| Izod Impact, unnotched 80*10*4 -30°C        | 25             | kJ/m <sup>2</sup> | ISO 180/1U   |
| Charpy 23°C, Unnotch Edgew 80*10*4 sp=62mm  | 30             | kJ/m <sup>2</sup> | ISO 179/1eU  |
| Charpy -30°C, Unnotch Edgew 80*10*4 sp=62mm | 30             | kJ/m <sup>2</sup> | ISO 179/1eU  |
| <b>THERMAL <sup>(1)</sup></b>               |                |                   |              |
| CTE, -40°C to 40°C, flow                    | 5.E-05         | 1/°C              | ASTM E831    |
| CTE, -40°C to 40°C, xflow                   | 6.8E-05        | 1/°C              | ASTM E831    |
| Thermal Conductivity                        | 0.28           | W/m·°C            | ISO 8302     |
| CTE, -40°C to 40°C, flow                    | 5.E-05         | 1/°C              | ISO 11359-2  |

| PROPERTIES  | TYPICAL VALUES                | UNITS                   | TEST METHODS   |
|---|-------------------------------|-------------------------|----------------|
| CTE, -40°C to 40°C, xflow                           | 6.8E-05                       | 1/°C                    | ISO 11359-2    |
| CTE, 23°C to 80°C, flow                             | 3.E-05                        | 1/°C                    | ISO 11359-2    |
| CTE, 23°C to 80°C, xflow                            | 7.E-05                        | 1/°C                    | ISO 11359-2    |
| Ball Pressure Test, 125°C +/- 2°C                   | PASSES                        | -                       | IEC 60695-10-2 |
| Ball Pressure Test, approximate maximum             | 135                           | °C                      | IEC 60695-10-2 |
| Vicat Softening Temp, Rate A/50                     | 150                           | °C                      | ISO 306        |
| Vicat Softening Temp, Rate B/50                     | 140                           | °C                      | ISO 306        |
| Vicat Softening Temp, Rate B/120                    | 145                           | °C                      | ISO 306        |
| HDT/Be, 0.45MPa Edgew 120*10*4 sp=100mm             | 135                           | °C                      | ISO 75/Be      |
| HDT/Ae, 1.8 MPa Edgew 120*10*4 sp=100mm             | 130                           | °C                      | ISO 75/Ae      |
| Relative Temp Index, Elec <sup>(2)</sup>            | 110                           | °C                      | UL 746B        |
| Relative Temp Index, Mech w/impact <sup>(2)</sup>   | 105                           | °C                      | UL 746B        |
| Relative Temp Index, Mech w/o impact <sup>(2)</sup> | 110                           | °C                      | UL 746B        |
| <b>PHYSICAL <sup>(1)</sup></b>                      |                               |                         |                |
| PFAS <sup>(3)</sup>                                 | Not Intentionally added       | -                       |                |
| Specific Gravity                                    | 1.25                          | -                       | ASTM D792      |
| Mold Shrinkage on Tensile Bar, flow <sup>(4)</sup>  | 0.2 – 0.4                     | %                       | SABIC method   |
| Density   | 1.25                          | g/cm <sup>3</sup>       | ISO 1183       |
| Water Absorption, (23°C/saturated)                  | 0.22                          | %                       | ISO 62-1       |
| Moisture Absorption (23°C / 50% RH)                 | 0.07                          | %                       | ISO 62         |
| Melt Volume Rate, MVR at 280°C/10.0 kg              | 12                            | cm <sup>3</sup> /10 min | ISO 1133       |
| <b>ELECTRICAL <sup>(1)</sup></b>                    |                               |                         |                |
| Volume Resistivity                                  | 1.E+15                        | Ω.cm                    | IEC 60093      |
| Surface Resistivity, ROA                            | >1.E+15                       | Ω                       | IEC 60093      |
| Dielectric Strength, in oil, 0.8 mm                 | 30                            | kV/mm                   | IEC 60243-1    |
| Dielectric Strength, in oil, 1.6 mm                 | 25                            | kV/mm                   | IEC 60243-1    |
| Dielectric Strength, in oil, 3.2 mm                 | 16                            | kV/mm                   | IEC 60243-1    |
| Relative Permittivity, 1 MHz                        | 2.9                           | -                       | IEC 60250      |
| Dissipation Factor, 50/60 Hz                        | 0.004                         | -                       | IEC 60250      |
| Dissipation Factor, 1 MHz                           | 0.002                         | -                       | IEC 60250      |
| Comparative Tracking Index <sup>(5)</sup>           | 225                           | V                       | IEC 60112      |
| Relative Permittivity, 50/60 Hz                     | 3                             | -                       | IEC 60250      |
| Comparative Tracking Index (UL) {PLC}               | 3                             | PLC Code                | UL 746A        |
| High Amp Arc Ignition (HAI), PLC 3                  | ≥6                            | mm                      | UL 746A        |
| High Voltage Arc Track Rate {PLC}                   | 4                             | PLC Code                | UL 746A        |
| High Amp Arc Ignition (HAI), PLC 4                  | ≥1.5                          | mm                      | UL 746A        |
| Hot-Wire Ignition (HWI), PLC 0                      | ≥1.5                          | mm                      | UL 746A        |
| <b>FLAME CHARACTERISTICS <sup>(2)</sup></b>         |                               |                         |                |
| UL Yellow Card Link                                 | <a href="#">E45329-236777</a> | -                       | -              |
| UL Recognized, 94-5VA Flame Class Rating            | ≥2                            | mm                      | UL 94          |
| UL Recognized, 94V-0 Flame Class Rating             | ≥6                            | mm                      | UL 94          |
| UL Recognized, 94V-1 Flame Class Rating             | ≥1.5                          | mm                      | UL 94          |
| Glow Wire Flammability Index, 1.0 mm                | 960                           | °C                      | IEC 60695-2-12 |
| Glow Wire Flammability Index, 2.0 mm                | 960                           | °C                      | IEC 60695-2-12 |
| Glow Wire Ignitability Temperature, 1.0 mm          | 800                           | °C                      | IEC 60695-2-13 |

| PROPERTIES                                 | TYPICAL VALUES | UNITS | TEST METHODS   |
|--|----------------|-------|----------------|
| Glow Wire Ignitability Temperature, 2.0 mm | 800            | °C    | IEC 60695-2-13 |
| UV-light, water exposure/immersion         | F2             | -     | UL 746C        |
| Oxygen Index (LOI)                         | 30             | %     | ISO 4589       |
| <b>INJECTION MOLDING <sup>(6)</sup></b>    |                |       |                |
| Drying Temperature                         | 100 – 120      | °C    |                |
| Drying Time                                | 2 – 3          | Hrs   |                |
| Melt Temperature                           | 280 – 300      | °C    |                |
| Nozzle Temperature                         | 260 – 280      | °C    |                |
| Front - Zone 3 Temperature                 | 280 – 300      | °C    |                |
| Middle - Zone 2 Temperature                | 260 – 280      | °C    |                |
| Rear - Zone 1 Temperature                  | 240 – 260      | °C    |                |
| Hopper Temperature                         | 60 – 80        | °C    |                |
| Mold Temperature                           | 80 – 120       | °C    |                |

- (1) The information stated on Technical Datasheets should be used as indicative only for material selection purposes and not be utilized as specification or used for part or tool design.
- (2) UL Ratings shown on the technical datasheet might not cover the full range of thicknesses, colors and regions. For details, please see the UL Yellow Card.
- (3) No PFAS intentionally added: The grade listed in this document does not contain PFAS intentionally added during Seller's manufacturing process and is not expected to contain unintentional PFAS impurities. Each user is responsible for evaluating the presence of unintentional PFAS impurities.
- (4) Measurements made from laboratory test coupon. Actual shrinkage may vary outside of range due to differences in processing conditions, equipment, part geometry and tool design. It is recommended that mold shrinkage studies be performed with surrogate or legacy tooling prior to cutting tools for new molded article.
- (5) Value shown here is based on internal measurement.
- (6) Injection Molding parameters are only mentioned as general guidelines. These may not apply or may need adjustment in specific situations such as low shot sizes, large part molding, thin wall molding and gas-assist molding.

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