

# NORYL™ RESIN LS6010

REGION AMERICAS

## DESCRIPTION

NORYL™ LS6010 resin is a non-reinforced blend of polyphenylene ether (PPE) + polystyrene (PS). This high performance, injection moldable and extrudable grade contains non-brominated, non-chlorinated flame retardant and carries a UL94 flame rating of V0 at 1.5mm. NORYL LS6010 resin features low smoke production upon burning, high heat resistance, very low specific gravity, enhanced resistance to melting and dripping and meets the requirements of FAR 25.853. In addition, this material is heat stabilized and impact modified. It is an excellent candidate for aerospace interior applications such as rub strips, seat track covers, cable guides, switch panels, conduit, wall/ceiling mounted electronics, and parts machined from slab stock.

| GENERAL INFORMATION   |  |
|-----------------------|--|
| Features              | Flame Retardant, Heat Stabilized, Hydrolytic Stability, Low Warpage, Low Smoke and Toxicity, Amorphous, Low Shrinkage, Low Moisture Absorption, Low Specific Gravity, Non Cl/Br flame retardant, Non halogenated flame retardant, Dimensional stability, No PFAS intentionally added |
| Fillers               | Unreinforced   |
| Polymer Types         | Polyphenylene Ether + PS (PPE+PS)  |
| Processing Techniques | Sheet extrusion, Injection Molding, Profile Extrusion  |

| INDUSTRY   | SUB INDUSTRY |
|------------|--------------|
| Automotive | Aerospace    |
| Industrial | Electrical   |

## TYPICAL PROPERTY VALUES

Revision 20231109

| PROPERTIES                                   | TYPICAL VALUES | UNITS             | TEST METHODS |
|--|----------------|-------------------|--------------|
| <b>MECHANICAL <sup>(1)</sup></b>             |                |                   |              |
| Tensile Stress, yld, Type I, 50 mm/min       | 64             | MPa               | ASTM D638    |
| Tensile Stress, brk, Type I, 50 mm/min       | 53             | MPa               | ASTM D638    |
| Tensile Strain, yld, Type I, 50 mm/min       | 4.6            | %                 | ASTM D638    |
| Tensile Strain, brk, Type I, 50 mm/min       | 20             | %                 | ASTM D638    |
| Tensile Modulus, 5 mm/min                    | 2220           | MPa               | ASTM D638    |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 100            | MPa               | ASTM D790    |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 2390           | MPa               | ASTM D790    |
| Tensile Stress, yield, 50 mm/min             | 64             | MPa               | ISO 527      |
| Tensile Stress, break, 50 mm/min             | 58             | MPa               | ISO 527      |
| Tensile Strain, yield, 50 mm/min             | 4.7            | %                 | ISO 527      |
| Tensile Strain, break, 50 mm/min             | 8.3            | %                 | ISO 527      |
| Tensile Modulus, 1 mm/min                    | 2440           | MPa               | ISO 527      |
| Flexural Stress, yield, 2 mm/min             | 100            | MPa               | ISO 178      |
| Flexural Modulus, 2 mm/min                   | 2360           | MPa               | ISO 178      |
| <b>IMPACT <sup>(1)</sup></b>                 |                |                   |              |
| Izod Impact, notched, 23°C                   | 300            | J/m               | ASTM D256    |
| Izod Impact, notched, -30°C                  | 181            | J/m               | ASTM D256    |
| Instrumented Dart Impact Total Energy, 23°C  | 52             | J                 | ASTM D3763   |
| Izod Impact, notched 80°10*4 +23°C           | 18             | kJ/m <sup>2</sup> | ISO 180/1A   |

| PROPERTIES  | TYPICAL VALUES                 | UNITS                   | TEST METHODS         |
|---|--------------------------------|-------------------------|----------------------|
| Izod Impact, notched 80*10*4 -30°C                  | 14                             | kJ/m <sup>2</sup>       | ISO 180/1A           |
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm          | 20                             | kJ/m <sup>2</sup>       | ISO 179/1eA          |
| <b>THERMAL <sup>(1)</sup></b>                       |                                |                         |                      |
| Vicat Softening Temp, Rate B/50                     | 143                            | °C                      | ASTM D1525           |
| HDT, 1.82 MPa, 3.2mm, unannealed                    | 122                            | °C                      | ASTM D648            |
| CTE, -40°C to 40°C, flow                            | 6.7E-05                        | 1/°C                    | ASTM E831            |
| CTE, -40°C to 40°C, xflow                           | 6.7E-05                        | 1/°C                    | ASTM E831            |
| CTE, -40°C to 40°C, flow                            | 6.7E-05                        | 1/°C                    | ISO 11359-2          |
| CTE, -40°C to 40°C, xflow                           | 6.7E-05                        | 1/°C                    | ISO 11359-2          |
| Vicat Softening Temp, Rate B/50                     | 143                            | °C                      | ISO 306              |
| Vicat Softening Temp, Rate B/120                    | 146                            | °C                      | ISO 306              |
| HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm               | 124                            | °C                      | ISO 75/Af            |
| Relative Temp Index, Elec <sup>(2)</sup>            | 130                            | °C                      | UL 746B              |
| Relative Temp Index, Mech w/impact <sup>(2)</sup>   | 65                             | °C                      | UL 746B              |
| Relative Temp Index, Mech w/o impact <sup>(2)</sup> | 130                            | °C                      | UL 746B              |
| <b>PHYSICAL <sup>(1)</sup></b>                      |                                |                         |                      |
| Specific Gravity                                    | 1.11                           | -                       | ASTM D792            |
| Mold Shrinkage, flow, 3.2 mm <sup>(3)</sup>         | 0.5 – 0.8                      | %                       | SABIC method         |
| Melt Flow Rate, 280°C/5.0 kgf                       | 5.6                            | g/10 min                | ASTM D1238           |
| Density   | 1.11                           | g/cm <sup>3</sup>       | ISO 1183             |
| Water Absorption, (23°C/saturated)                  | 0.2                            | %                       | ISO 62-1             |
| Moisture Absorption (23°C / 50% RH)                 | 0.05                           | %                       | ISO 62               |
| Melt Volume Rate, MVR at 280°C/5.0 kg               | 5                              | cm <sup>3</sup> /10 min | ISO 1133             |
| <b>FLAME CHARACTERISTICS <sup>(2)</sup></b>         |                                |                         |                      |
| UL Yellow Card Link                                 | <a href="#">E121562-644041</a> | -                       | -                    |
| UL Recognized, 94V-0 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, 1.5 mm                | 960                            | °C                      | IEC 60695-2-12       |
| Glow Wire Flammability Index, 2.0 mm                | 960                            | °C                      | IEC 60695-2-12       |
| Glow Wire Flammability Index, 3.0 mm                | 960                            | °C                      | IEC 60695-2-12       |
| Glow Wire Ignitability Temperature, 1.0 mm          | 775                            | °C                      | IEC 60695-2-13       |
| Glow Wire Ignitability Temperature, 1.5 mm          | 775                            | °C                      | IEC 60695-2-13       |
| Glow Wire Ignitability Temperature, 2.0 mm          | 775                            | °C                      | IEC 60695-2-13       |
| Glow Wire Ignitability Temperature, 3.0 mm          | 800                            | °C                      | IEC 60695-2-13       |
| Flame Spread Index (1.52mm)                         | 15                             | -                       | ASTM E162            |
| Vertical Burn a (60s, 1.52mm) passes at             | 0                              | Seconds                 | FAR 25.853           |
| Vertical Burn b (12s, 1.52mm) passes at             | 4                              | Seconds                 | FAR 25.853           |
| NBS Smoke Density, Flaming, 4 min (1.52mm)          | 30                             | -                       | ASTM E662            |
| Draeger Tube Toxicity, Flaming (1.52mm)             | Pass                           | -                       | ASTM E662 - Modified |
| NBS Smoke Density, Non-Flaming, 4 min (1.52mm)      | 7                              | -                       | ASTM E662            |
| Draeger Tube Toxicity, Non-Flaming (1.52mm)         | Pass                           | -                       | ASTM E662 - Modified |
| <b>INJECTION MOLDING <sup>(4)</sup></b>             |                                |                         |                      |
| Drying Temperature                                  | 95 – 105                       | °C                      |                      |
| Drying Time   | 2 – 4                          | Hrs                     |                      |
| Drying Time (Cumulative)                            | 12                             | Hrs                     |                      |

| PROPERTIES                  | TYPICAL VALUES | UNITS | TEST METHODS |
|-----------------------------|----------------|-------|--------------|
| Melt Temperature            | 280 – 305      | °C    |              |
| Nozzle Temperature          | 295 – 305      | °C    |              |
| Front - Zone 3 Temperature  | 295 – 305      | °C    |              |
| Middle - Zone 2 Temperature | 290 – 300      | °C    |              |
| Rear - Zone 1 Temperature   | 280 – 295      | °C    |              |
| Mold Temperature            | 65 – 100       | °C    |              |
| Screw Speed                 | 40 – 80        | rpm   |              |
| Shot to Cylinder Size       | 30 – 70        | %     |              |
| <b>SHEET EXTRUSION</b>      |                |       |              |
| Drying Temperature          | 95 – 105       | °C    |              |
| Drying Time                 | 2 – 4          | Hrs   |              |
| Drying Time (Cumulative)    | 12             | Hrs   |              |
| Maximum Moisture Content    | 0.07           | %     |              |
| Melt Temperature            | 220 – 260      | °C    |              |
| Barrel - Zone 1 Temperature | 220 – 260      | °C    |              |
| Barrel - Zone 2 Temperature | 220 – 260      | °C    |              |
| Barrel - Zone 3 Temperature | 220 – 260      | °C    |              |
| Barrel - Zone 4 Temperature | 220 – 260      | °C    |              |
| Adapter Temperature         | 220 – 260      | °C    |              |
| Die Temperature             | 220 – 260      | °C    |              |
| Roll Stack Temp - Top       | 90 – 150       | °C    |              |
| Roll Stack Temp - Middle    | 90 – 150       | °C    |              |
| Roll Stack Temp - Bottom    | 90 – 150       | °C    |              |
| <b>PROFILE EXTRUSION</b>    |                |       |              |
| Drying Temperature          | 95 – 105       | °C    |              |
| Drying Time                 | 2 – 4          | Hrs   |              |
| Drying Time (Cumulative)    | 12             | Hrs   |              |
| Maximum Moisture Content    | 0.07           | %     |              |
| Melt Temperature            | 220 – 260      | °C    |              |
| Barrel - Zone 1 Temperature | 220 – 260      | °C    |              |
| Barrel - Zone 2 Temperature | 220 – 260      | °C    |              |
| Barrel - Zone 3 Temperature | 220 – 260      | °C    |              |
| Barrel - Zone 4 Temperature | 220 – 260      | °C    |              |
| Hopper Temperature          | 80 – 120       | °C    |              |
| Adapter Temperature         | 220 – 260      | °C    |              |
| Die Temperature             | 220 – 260      | °C    |              |
| Calibrator Temperature      | 30 – 60        | °C    |              |
| Water Bath Temperature      | 30 – 50        | °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) 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.
- (4) 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.



## ADDITIONAL PRODUCT NOTES

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.

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