



**NORYL™ Resin NH4050**  
**Americas: COMMERCIAL**

NORYL® NH4050 resin is a modified PPE + PS blend with an excellent balance of non-chlorinated non-brominated flame retardance, hydrolytic stability, impact and heat resistance, good flow, and low specific gravity for light-weight parts. This injection-molding resin is available in custom colors. NORYL® NH4050 resin may be an excellent candidate for industrial battery applications.

| TYPICAL PROPERTIES <sup>1</sup>              | TYPICAL VALUE | Unit                | Standard    |
|----------------------------------------------|---------------|---------------------|-------------|
| <b>MECHANICAL</b>                            |               |                     |             |
| Tensile Stress, yld, Type I, 50 mm/min       | 680           | kgf/cm <sup>2</sup> | ASTM D 638  |
| Tensile Stress, brk, Type I, 50 mm/min       | 530           | kgf/cm <sup>2</sup> | ASTM D 638  |
| Tensile Strain, yld, Type I, 50 mm/min       | 4.4           | %                   | ASTM D 638  |
| Tensile Strain, brk, Type I, 50 mm/min       | 19            | %                   | ASTM D 638  |
| Tensile Modulus, 5 mm/min                    | 27200         | kgf/cm <sup>2</sup> | ASTM D 638  |
| Flexural Stress, yld, 1.3 mm/min, 50 mm span | 1100          | kgf/cm <sup>2</sup> | ASTM D 790  |
| Flexural Modulus, 1.3 mm/min, 50 mm span     | 28800         | kgf/cm <sup>2</sup> | ASTM D 790  |
| Tensile Stress, yield, 50 mm/min             | 67            | MPa                 | ISO 527     |
| Tensile Stress, break, 50 mm/min             | 51            | MPa                 | ISO 527     |
| Tensile Strain, yield, 50 mm/min             | 4.3           | %                   | ISO 527     |
| Tensile Strain, break, 50 mm/min             | 10            | %                   | ISO 527     |
| Tensile Modulus, 1 mm/min                    | 2640          | MPa                 | ISO 527     |
| Flexural Stress, yield, 2 mm/min             | 108           | MPa                 | ISO 178     |
| Flexural Modulus, 2 mm/min                   | 2560          | MPa                 | ISO 178     |
| <b>IMPACT</b>                                |               |                     |             |
| Izod Impact, notched, 23°C                   | 16            | cm-kgf/cm           | ASTM D 256  |
| Instrumented Impact Total Energy, 23°C       | 494           | cm-kgf              | ASTM D 3763 |
| Izod Impact, notched 80*10*4 +23°C           | 14            | kJ/m <sup>2</sup>   | ISO 180/1A  |
| Izod Impact, notched 80*10*4 -30°C           | 9             | kJ/m <sup>2</sup>   | ISO 180/1A  |
| Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm   | 16            | kJ/m <sup>2</sup>   | ISO 179/1eA |
| <b>THERMAL</b>                               |               |                     |             |
| Vicat Softening Temp, Rate B/50              | 118           | °C                  | ASTM D 1525 |
| HDT, 1.82 MPa, 3.2mm, unannealed             | 94            | °C                  | ASTM D 648  |



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| <b>THERMAL</b>                        |               |                         |              |
| CTE, -40°C to 40°C, flow              | 8.E-05        | 1/°C                    | ASTM E 831   |
| CTE, -40°C to 40°C, xflow             | 8.2E-05       | 1/°C                    | ASTM E 831   |
| CTE, -40°C to 40°C, flow              | 8.E-05        | 1/°C                    | ISO 11359-2  |
| CTE, -40°C to 40°C, xflow             | 8.2E-05       | 1/°C                    | ISO 11359-2  |
| Vicat Softening Temp, Rate B/50       | 120           | °C                      | ISO 306      |
| Vicat Softening Temp, Rate B/120      | 120           | °C                      | ISO 306      |
| HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm | 101           | °C                      | ISO 75/Af    |
| <b>PHYSICAL</b>                       |               |                         |              |
| Specific Gravity                      | 1.11          | -                       | ASTM D 792   |
| Mold Shrinkage, flow, 3.2 mm (5)      | 0.3 - 0.6     | %                       | SABIC Method |
| Melt Flow Rate, 280°C/5.0 kgf         | 25.4          | g/10 min                | ASTM D 1238  |
| Density                               | 1.11          | g/cm <sup>3</sup>       | ISO 1183     |
| Water Absorption, (23°C/sat)          | 0.1           | %                       | ISO 62       |
| Moisture Absorption (23°C / 50% RH)   | 0.06          | %                       | ISO 62       |
| Melt Volume Rate, MVR at 280°C/5.0 kg | 32            | cm <sup>3</sup> /10 min | ISO 1133     |



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| PROCESSING PARAMETERS       | TYPICAL VALUE | Unit |
|-----------------------------|---------------|------|
| <b>Injection Molding</b>    |               |      |
| Drying Temperature          | 95 - 100      | °C   |
| Drying Time                 | 3 - 4         | hrs  |
| Drying Time (Cumulative)    | 8             | hrs  |
| Maximum Moisture Content    | 0.02          | %    |
| Melt Temperature            | 260 - 290     | °C   |
| Nozzle Temperature          | 260 - 290     | °C   |
| Front - Zone 3 Temperature  | 250 - 290     | °C   |
| Middle - Zone 2 Temperature | 240 - 280     | °C   |
| Rear - Zone 1 Temperature   | 225 - 275     | °C   |
| Mold Temperature            | 70 - 95       | °C   |
| Back Pressure               | 0.3 - 0.7     | MPa  |
| Screw Speed                 | 20 - 100      | rpm  |
| Shot to Cylinder Size       | 30 - 70       | %    |
| Vent Depth                  | 0.038 - 0.051 | mm   |