# NORYL™ RESIN HS2000X

REGION AMERICAS

## DESCRIPTION

NORYL HS2000X resin is a 17% mineral 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 V0 at 1.5m along with UL746C Outdoor Suitability rating of F1. NORYL HS2000X resin exhibits strong electrical performance, dimensional stability, very low moisture absorption, and hydrolytic stability. This material is an excellent candidate for electronic / electrical indoor and outdoor applications including air conditioner parts, smoke detector covers, pool + spa pump parts and housings.

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

| INDUSTRY | SUB INDUSTRY |
|---|---|
| Building and Construction | Building Component, Water Management |
| Consumer | Home Appliances, Commercial Appliance |
| Electrical and Electronics | Electronic Components, Mobile Phone - Computer - Tablets |
| Industrial | Electrical |

## TYPICAL PROPERTY VALUES

Revision 20260202

| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|---|---|---|
| MECHANICAL [1] | | | |
| **Tensile Stress, yld, Type I, 5 mm/min** | 74 | MPa | ASTM D638 |
| **Tensile Stress, brk, Type I, 5 mm/min** | 60 | MPa | ASTM D638 |
| **Tensile Strain, yield** | 3.8 | % | ASTM D638 |
| **Tensile Strain, brk, Type I, 5 mm/min** | 8.4 | % | ASTM D638 |
| **Tensile Modulus, 5 mm/min** | 3650 | MPa | ASTM D638 |
| **Flexural Stress, brk, 1.3 mm/min, 50 mm span** | 117 | MPa | ASTM D790 |
| **Flexural Stress, yld, 2.6 mm/min, 100 mm span** | 117 | MPa | ASTM D790 |
| **Flexural Modulus, 1.3 mm/min, 50 mm span** | 3670 | MPa | ASTM D790 |
| **Flexural Modulus, 2.6 mm/min, 100 mm span** | 3550 | MPa | ASTM D790 |
| **Tensile Stress, yield** | 71 | MPa | ISO 527 |
| **Tensile Stress, break** | 57 | MPa | ISO 527 |
| **Tensile Strain, yield** | 3.7 | % | ISO 527 |
| **Tensile Strain, break** | 10.5 | % | ISO 527 |
| **Tensile Modulus, 1 mm/min** | 4000 | MPa | ISO 527 |
| **Flexural Stress** | 117 | MPa | ISO 178 |
| **Flexural Modulus** | 3800 | MPa | ISO 178 |
| IMPACT [1] | | | |

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| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|---|---|---|
| Izod Impact, unnotched, 23°C | 2230 | J/m | ASTM D4812 |
| Izod Impact, notched, 23°C | 131 | J/m | ASTM D256 |
| Izod Impact, Reverse Notched, 3.2 mm | 811 | J/m | ASTM D256 |
| Instrumented Dart Impact Total Energy, 23°C | 60 | J | ASTM D3763 |
| Izod Impact, notched 80*10*4 +23°C | 9 | kJ/m² | ISO 180/1A |
| Charpy Impact, notched, 23°C | 10 | kJ/m² | ISO 179/2C |
| THERMAL [1] | | | |
| HDT, 0.45 MPa, 3.2 mm, unannealed | 117 | °C | ASTM D648 |
| HDT, 1.82 MPa, 3.2mm, unannealed | 108 | °C | ASTM D648 |
| HDT, 0.45 MPa, 6.4 mm, unannealed | 128 | °C | ASTM D648 |
| HDT, 1.82 MPa, 6.4 mm, unannealed | 116 | °C | ASTM D648 |
| CTE, -40°C to 40°C, flow | 7.06E-05 | 1/°C | ASTM E831 |
| CTE, -40°C to 40°C, xflow | 7.76E-05 | 1/°C | ASTM E831 |
| Vicat Softening Temp, Rate B/50 | 132 | °C | ISO 306 |
| Vicat Softening Temp, Rate B/120 | 136 | °C | ISO 306 |
| HDT/Be, 0.45MPa Edgew 120*10*4 sp=100mm | 126 | °C | ISO 75/Be |
| HDT/Ae, 1.8 MPa Edgew 120*10*4 sp=100mm | 111 | °C | ISO 75/Ae |
| Relative Temp Index, Elec [2] | 100 | °C | UL 746B |
| Relative Temp Index, Mech w/impact [2] | 85 | °C | UL 746B |
| Relative Temp Index, Mech w/o impact [2] | 100 | °C | UL 746B |
| PHYSICAL [1] | | | |
| Specific Gravity | 1.25 | - | ASTM D792 |
| Mold Shrinkage, flow, 3.2 mm [3] | 0.5 – 0.7 | % | SABIC method |
| Melt Flow Rate, 280°C/5.0 kgf | 7.6 | g/10 min | ASTM D1238 |
| Melt Flow Rate, 300°C/5.0 kgf | 7.6 | g/10 min | ASTM D1238 |
| Melt Volume Rate, MVR at 280°C/5.0 kg | 6 | cm³/10 min | ISO 1133 |
| Melt Volume Rate, MVR at 300°C/5.0 kg | 6 | cm³/10 min | ISO 1133 |
| ELECTRICAL [1] | | | |
| Volume Resistivity | 1.2E+16 | Ω.cm | ASTM D257 |
| Surface Resistivity | >1.E+16 | Ω | ASTM D257 |
| Dielectric Strength, in oil, 3.2 mm | 17.3 | kV/mm | ASTM D149 |
| Relative Permittivity, 50/60 Hz | 2.89 | - | ASTM D150 |
| Relative Permittivity, 1 MHz | 2.7 | - | ASTM D150 |
| Dissipation Factor, 50/60 Hz | 0.017 | - | ASTM D150 |
| Dissipation Factor, 1 MHz | 0.0044 | - | ASTM D150 |
| High Voltage Arc Track Rate {PLC} | 3 | PLC Code | UL 746A |
| Comparative Tracking Index (UL) {PLC} | 2 | PLC Code | UL 746A |
| High Amp Arc Ignition (HAI), PLC 2 | ≥3 | mm | UL 746A |
| High Amp Arc Ignition (HAI), PLC 3 | ≥1.5 | mm | UL 746A |
| Hot-Wire Ignition (HWI), PLC 0 | ≥1.5 | mm | UL 746A |
| Arc Resistance, Tungsten {PLC} | 6 | PLC Code | ASTM D495 |
| FLAME CHARACTERISTICS [2] | | | |
| UL Yellow Card Link | E121562-221170 | - | - |
| UL Recognized, 94-5VA Flame Class Rating | ≥2 | mm | UL 94 |
| UL Recognized, 94V-0 Flame Class Rating | ≥1.5 | mm | UL 94 |

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| PROPERTIES | TYPICAL VALUES | UNITS | TEST METHODS |
|---|---|---|---|
| Radiant Panel Listing | ☑ | - | UL Tested |
| 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 Flammability Index, 3.0 mm | 960 | °C | IEC 60695-2-12 |
| Glow Wire Ignitability Temperature, 1.0 mm | 850 | °C | IEC 60695-2-13 |
| Glow Wire Ignitability Temperature, 2.0 mm | 800 | °C | IEC 60695-2-13 |
| Glow Wire Ignitability Temperature, 3.0 mm | 800 | °C | IEC 60695-2-13 |
| UV-light, water exposure/immersion | F1 | - | UL 746C |
| INJECTION MOLDING [4] | | | |
| Drying Temperature | 105 – 110 | °C | |
| Drying Time | 3 – 4 | Hrs | |
| Drying Time (Cumulative) | 8 | Hrs | |
| Maximum Moisture Content | 0.02 | % | |
| Melt Temperature | 280 – 310 | °C | |
| Nozzle Temperature | 280 – 310 | °C | |
| Front - Zone 3 Temperature | 270 – 310 | °C | |
| Middle - Zone 2 Temperature | 260 – 305 | °C | |
| Rear - Zone 1 Temperature | 250 – 300 | °C | |
| Mold Temperature | 75 – 105 | °C | |
| Back Pressure | 0.3 – 0.7 | MPa | |
| Screw Speed | 20 – 100 | rpm | |
| Shot to Cylinder Size | 30 – 70 | % | |

(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.

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