

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 20231109

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⁾			

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/m ²	ISO 180/1A
Charpy Impact, notched, 23°C	10	kJ/m ²	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	cm ³ /10 min	ISO 1133
Melt Volume Rate, MVR at 300°C/5.0 kg	6	cm ³ /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

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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