NORYL™ RESIN NHP6012

DESCRIPTION

NORYL NHP6012 resin is a 10% glass fiber reinforced blend of polyphenylene ether (PPE) + polystyrene (PS). This injection moldable grade contains non-brominated, non-chlorinated flame retardant and carries a CTI 2 and UL94 flame rating of V0 at 1.5mm for thin-wall molding capability. NORYL NHP6012 is based on a unique co-polymer technology and exhibits high flow, high heat resistance, dimensional stability, hydrolytic stability, strong electrical performance, low moisture absorption and very low specific gravity. This material is an excellent candidate for appliance internals, indoor and outdoor electrical and electrical vehicle (EV) battery modules/housings.

GENERAL INFORMATION	
Features	Flame Retardant, High Flow, 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, High temperature resistance
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, Electronic Components
Industrial	Electrical

TYPICAL PROPERTY VALUES

Revision 20260303

PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
MECHANICAL [1]			
Tensile Stress, break, 5 mm/min	82	MPa	ISO 527
Tensile Strain, break, 5 mm/min	2.5	%	ISO 527
Tensile Modulus, 1 mm/min	4400	MPa	ISO 527
Flexural Strength, 2 mm/min	132	MPa	ISO 178
Flexural Modulus, 2 mm/min	4000	MPa	ISO 178
Ball Indentation Hardness, H358/30	214	MPa	ISO 2039-1
Hardness, Rockwell M	90	-	ISO 2039-2
Tensile Stress, brk, Type I, 5 mm/min	82	MPa	ASTM D638
Tensile Strain, brk, Type I, 5 mm/min	2.5	%	ASTM D638
Tensile Modulus, 5 mm/min	4200	MPa	ASTM D638
Flexural Strength, 1.3 mm/min, 50 mm span	132	MPa	ASTM D790
Flexural Modulus, 1.3 mm/min, 50 mm span	4000	MPa	ASTM D790
Hardness, Rockwell M	90	-	ASTM D785
IMPACT [1]			
Izod Impact, unnotched 80*10*4 +23°C	25	kJ/m²	ISO 180/1U
Izod Impact, unnotched 80*10*4 -30°C	25	kJ/m²	ISO 180/1U
Izod Impact, notched 80*10*4 +23°C	6	kJ/m²	ISO 180/1A
Izod Impact, notched 80*10*4 -30°C	6	kJ/m²	ISO 180/1A
Charpy 23°C, Unnotch Edgew 80*10*4 sp=62mm	25	kJ/m²	ISO 179/1eU

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PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
Charpy -30°C, Unnotch Edgew 80*10*4 sp=62mm	25	kJ/m²	ISO 179/1eU
Charpy 23°C, V-notch Edgew 80*10*4 sp=62mm	6	kJ/m²	ISO 179/1eA
Charpy -30°C, V-notch Edgew 80*10*4 sp=62mm	6	kJ/m²	ISO 179/1eA
Izod Impact, unnotched, 23°C	440	J/m	ASTM D4812
Izod Impact, unnotched, -30°C	425	J/m	ASTM D4812
Izod Impact, notched, 23°C	70	J/m	ASTM D256
Izod Impact, notched, -30°C	60	J/m	ASTM D256
Instrumented Dart Impact Energy @ peak, 23°C	3	J	ASTM D3763
Instrumented Dart Impact Total Energy, 23°C	4	J	ASTM D3763
Instrumented Dart Impact Peak Force, 23°C	1340	N	ASTM D3763
THERMAL [1]			
HDT/Af, 1.8 MPa Flatw 80*10*4 sp=64mm	125	°C	ISO 75/Af
HDT/Bf, 0.45 MPa Flatw 80*10*4 sp=64mm	132	°C	ISO 75/Bf
Vicat Softening Temp, Rate A/50	144	°C	ISO 306
Vicat Softening Temp, Rate B/50	136	°C	ISO 306
Vicat Softening Temp, Rate B/120	138	°C	ISO 306
CTE, -40°C to 40°C, flow	3.36E-05	1/°C	ISO 11359-2
CTE, -40°C to 40°C, xflow	5.83E-05	1/°C	ISO 11359-2
Thermal Conductivity	0.21	W/m-°C	ISO 8302
HDT, 1.82 MPa, 3.2mm, unannealed	127	°C	ASTM D648
HDT, 0.45 MPa, 3.2 mm, unannealed	134	°C	ASTM D648
Vicat Softening Temp, Rate A/50	144	°C	ASTM D1525
Vicat Softening Temp, Rate B/50	136	°C	ASTM D1525
Vicat Softening Temp, Rate B/120	138	°C	ASTM D1525
CTE, -40°C to 40°C, flow	3.36E-05	1/°C	ASTM E831
CTE, -40°C to 40°C, xflow	5.83E-05	1/°C	ASTM E831
Thermal Conductivity	0.21	W/m-K	ASTM D5930
Ball Pressure Test, 125°C +/- 2°C	PASS	-	IEC 60695-10-2
Relative Temp Index, Elec [2]	65	°C	UL 746B
Relative Temp Index, Mech w/impact [2]	65	°C	UL 746B
Relative Temp Index, Mech w/o impact [2]	65	°C	UL 746B
PHYSICAL [1]			
Density	1.19	g/cm³	ISO 1183
Water Absorption, (23°C/saturated)	0.2	%	ISO 62-1
Water Absorption, (23°C/24hrs)	0.1	%	ISO 62-1
Moisture Absorption, (23°C/50% RH/Equilibrium)	0.05	%	ISO 62-4
Moisture Absorption, (23°C/50% RH/24hrs)	0.02	%	ISO 62-4
Melt Volume Rate, MVR at 280°C/10.0 kg	20	cm³/10 min	ISO 1133
Specific Gravity	1.19	-	ASTM D792
Water Absorption, (23°C/Saturated)	0.2	%	ASTM D570
Water Absorption, (23°C/24hrs)	0.1	%	ASTM D570
Mold Shrinkage, flow [3]	0.5 – 0.7	%	SABIC method
Mold Shrinkage, xflow [3]	0.5 – 0.7	%	SABIC method
ELECTRICAL [1]			
Surface Resistivity, ROA	5.32E+15	Ω	IEC 60093

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PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
Volume Resistivity	2.01E+16	Ω.cm	IEC 60093
Dielectric Strength, in oil, 0.8 mm	51.7	kV/mm	IEC 60243-1
Dielectric Strength, in oil, 3.2 mm	21.7	kV/mm	IEC 60243-1
Dielectric Strength, in air, 1.6 mm	24.8	kV/mm	IEC 60243-1
Dielectric Strength, in air, 3.2 mm	15.3	kV/mm	IEC 60243-1
Dissipation Factor, 50/60 Hz	0.1089	-	IEC 60250
Relative Permittivity, 50/60 Hz	3.37	-	IEC 60250
Dissipation Factor, 1 MHz	0.0029	-	IEC 60250
Relative Permittivity, 1 MHz	2.83	-	IEC 60250
Surface Resistivity	5.32E+15	Ω	ASTM D257
Comparative Tracking Index	250	V	IEC 60112
Volume Resistivity	2.01E+16	Ω.cm	ASTM D257
Relative Permittivity, 50/60 Hz	3.37	-	ASTM D150
Dissipation Factor, 50/60 Hz	0.1089	-	ASTM D150
Dissipation Factor, 1 MHz	0.0029	-	ASTM D150
Relative Permittivity, 1 MHz	2.83	-	ASTM D150
Arc Resistance, Tungsten {PLC} [2]	6	PLC Code	ASTM D495
Comparative Tracking Index (UL) {PLC} [2]	2	PLC Code	UL 746A
Hot-Wire Ignition (HWI), PLC 0 [2]	≥1.0	mm	UL 746A
High Amp Arc Ignition (HAI), PLC 0 [2]	≥1.0	mm	UL 746A
High Voltage Arc Track Rate {PLC} [2]	4	PLC Code	UL 746A
FLAME CHARACTERISTICS [2]			
UL Yellow Card Link	E207780-104492508	-	-
UL Recognized, 94V-0 Flame Class Rating	≥1.5	mm	UL 94
UL Recognized, 94V-1 Flame Class Rating	≥1.0	mm	UL 94
UL Recognized, 94-5VA Flame Class Rating	≥2.5	mm	UL 94
UL Recognized, 94-5VB Flame Class Rating	≥2.5	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	850	°C	IEC 60695-2-13
Glow Wire Ignitability Temperature, 1.5 mm	825	°C	IEC 60695-2-13
Glow Wire Ignitability Temperature, 2.0 mm	850	°C	IEC 60695-2-13
Glow Wire Ignitability Temperature, 3.0 mm	850	°C	IEC 60695-2-13
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	

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PROPERTIES	TYPICAL VALUES	UNITS	TEST METHODS
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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