



Global Thermoset Composite Solutions

Sheet Products - Property Comparison

			NP600	NP602	NP605	NP610
			Paper			
			Phenolic			
PHYSICAL PROPERTIES						
Specific Gravity (0.500")		-	1.38	1.30	1.30	1.40
Rockwell Hardness (0.250" Build-up)		M Scale	90	90	90	90
Moisture Absorption (0.062")	Condition D <sub>1</sub> -24/23	%	8.00	8.00	8.00	1.80
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	25,000 / 25,000	25,000 / 22,000	25,000 / 25,000	34,000 / 28,000
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --	-- / --
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	-- / --	-- / --	-- / --	1,900 / 1,400
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	17,000 / 13,000	17,000 / 13,000	17,000 / 13,000	17,000 / 13,000
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.55 / 0.50	0.55 / 0.50	0.55 / 0.50	0.82 / 0.76
Compressive Strength (0.500")	Flatwise	psi	35,000	35,000	35,000	35,000
Bonding Strength (0.500")	Condition A	lb	--	--	--	1,000
	Condition D-48/50		--	--	--	--
Shear Strength (0.062")	Perpendicular	psi	--	--	--	15,000
THERMAL PROPERTIES						
Temperature Index <sup>1</sup>	Electrical / Mechanical	°C	150 / 150	150 / 150	150 / 150	130 / 130
Coefficient of Thermal Expansion (0.125")	X-axis / Y-axis	"/"°Cx10 <sup>-6</sup>	-- / --	-- / --	-- / --	13.0 / 17.0
Flammability Rating U.L. 94 (0.062")	Condition A	Class	HB	HB	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D <sub>1</sub> -24/23	-	--	--	--	--
Permittivity (0.062")	Condition D <sub>1</sub> -24/23	-	--	--	--	--
Breakdown Voltage (0.062")	Condition A	kV	60	60	--	40
	Condition D-48/50		3	3	--	--
Electric Strength (0.062")	Condition A	V/mil	--	--	--	600
	Condition D-48/50		--	--	--	--
Arc Resistance D495 (0.125")	Condition A	sec	--	--	--	90
Comparative Tracking Index D3638 (0.125")		V	--	--	--	--

NOTE a: A double dash (--) indicates that the value has not been determined or is not applicable to the product.

NOTE b: All testing per ASTM D348 unless otherwise noted.

<sup>1</sup> NEMA LI-6: This temperature is a recommendation only and is based upon experience in various applications. The maximum operating temperature is dependent upon the application and should be investigated prior to use.



Global Thermoset Composite Solutions

Sheet Products - Property Comparison

			NP611	NP611R	NP612	NP613
			Paper			
			Phenolic			Epoxy
PHYSICAL PROPERTIES						
Specific Gravity (0.500")		-	1.35	1.35	1.38	1.35
Rockwell Hardness (0.250" Build-up)		M Scale	100	100	84	90
Moisture Absorption (0.062")	Condition D <sub>1</sub> -24/23	%	1.50	1.50	3.20	2.80
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	29,000 / 22,000	29,000 / 22,000	19,300 / 17,600	34,000 / 26,000
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --	-- / --
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	1,200 / 900	1,200 / 900	1,000 / 850	2,000 / 1,500
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	18,000 / 13,500	18,000 / 13,500	12,500 / 8,400	-- / --
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.70 / 0.60	0.70 / 0.60	0.76 / 0.66	1.25 / 1.00
Compressive Strength (0.500")	Flatwise	psi	45,000	45,000	27,000	40,000
Bonding Strength (0.500")	Condition A	lb	1,100	1,100	1,400	1,000
	Condition D-48/50		--	--	--	770
Shear Strength (0.062")	Perpendicular	psi	12,200	12,200	9,500	--
THERMAL PROPERTIES						
Temperature Index <sup>1</sup>	Electrical / Mechanical	°C	130 / 130	130 / 130	130 / 130	140 / 140
Coefficient of Thermal Expansion (0.125")	X-axis / Y-axis	"/"°Cx10 <sup>-6</sup>	13.0 / 17.0	13.0 / 17.0	15.0 / 19.0	-- / --
Flammability Rating U.L. 94 (0.062")	Condition A	Class	HB	HB	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D <sub>1</sub> -24/23	-	--	--	0.060	0.040
Permittivity (0.062")	Condition D <sub>1</sub> -24/23	-	--	--	5.50	5.13
Breakdown Voltage (0.062")	Condition A	kV	50	50	55	80
	Condition D-48/50		4	4	10	4
Electric Strength (0.062")	Condition A	V/mil	600	600	700	--
	Condition D-48/50		--	--	--	--
Arc Resistance D495 (0.125")	Condition A	sec	75	75	110	--
Comparative Tracking Index D3638 (0.125")		V	180	180	500	--

NOTE a: A double dash (--) indicates that the value has not been determined or is not applicable to the product.

NOTE b: All testing per ASTM D348 unless otherwise noted.

<sup>1</sup> NEMA LI-6: This temperature is a recommendation only and is based upon experience in various applications. The maximum operating temperature is dependent upon the application and should be investigated prior to use.



Global Thermoset Composite Solutions

Sheet Products - Property Comparison

			NP625	NP629	NP630	NP631
			Paper			
			Phenolic			
PHYSICAL PROPERTIES						
Specific Gravity (0.500")		-	1.39	1.39	1.38	1.38
Rockwell Hardness (0.250" Build-up)		M Scale	85	95	101	115
Moisture Absorption (0.062")	Condition D <sub>1</sub> -24/23	%	1.60	2.00	1.30	1.00
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	19,000 / 17,000	22,000 / 17,000	20,000 / 15,000	16,000 / 13,200
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --	-- / --
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	1,000 / 850	-- / --	1,300 / 1,050	1,100 / 900
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	12,400 / 10,400	13,500 / 11,500	14,000 / 12,000	15,000 / 12,000
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.75 / 0.70	0.50 / 0.40	0.55 / 0.45	0.65 / 0.60
Compressive Strength (0.500")	Flatwise	psi	29,500	25,000	30,000	32,000
Bonding Strength (0.500")	Condition A	lb	1,100	900	1,000	1,000
	Condition D-48/50		--	--	--	--
Shear Strength (0.062")	Perpendicular	psi	10,500	11,500	12,800	11,500
THERMAL PROPERTIES						
Temperature Index <sup>1</sup>	Electrical / Mechanical	°C	130 / 130	130 / 130	130 / 130	125 / 125
Coefficient of Thermal Expansion (0.125")	X-axis / Y-axis	"/"°Cx10 <sup>-6</sup>	15.0 / 19.0	-- / --	15.0 / 19.0	16.0 / 20.0
Flammability Rating U.L. 94 (0.062")	Condition A	Class	HB	HB	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D <sub>1</sub> -24/23	-	0.060	0.052	0.050	0.035
Permittivity (0.062")	Condition D <sub>1</sub> -24/23	-	6.05	6.20	6.10	4.80
Breakdown Voltage (0.062")	Condition A	kV	50	40	40	60
	Condition D-48/50		--	5	10	15
Electric Strength (0.062")	Condition A	V/mil	700	--	700	750
	Condition D-48/50		--	--	600	600
Arc Resistance D495 (0.125")	Condition A	sec	90	--	110	124
Comparative Tracking Index D3638 (0.125")		V	180	--	200	200

NOTE a: A double dash (--) indicates that the value has not been determined or is not applicable to the product.

NOTE b: All testing per ASTM D348 unless otherwise noted.

<sup>1</sup> NEMA LI-6: This temperature is a recommendation only and is based upon experience in various applications. The maximum operating temperature is dependent upon the application and should be investigated prior to use.



Global Thermoset Composite Solutions

Sheet Products - Property Comparison

			NP643	NP660	NP664
			Paper		
			Epoxy	Phenolic	
<b>PHYSICAL PROPERTIES</b>					
Specific Gravity (0.500")		-	1.40	1.35	1.37
Rockwell Hardness (0.250" Build-up)		M Scale	115	100	90
Moisture Absorption (0.062")	Condition D <sub>1</sub> -24/23	%	--	3.50	5.50
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	27,700 / 20,800	33,000 / 30,000	26,000 / 24,000
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	-- / --	1,900 / 1,400	1,200 1,000
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	16,900 / 13,900	20,000 / 16,000	22,500 / 12,500
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.65 0.56	0.75 / 0.70	0.67 / 0.62
Compressive Strength (0.500")	Flatwise	psi	44,100	49,000	30,000
Bonding Strength (0.500")	Condition A	lb	900	1,100	1,100
	Condition D-48/50		--	--	--
Shear Strength (0.062")	Perpendicular	psi	--	14,000	11,000
<b>THERMAL PROPERTIES</b>					
Temperature Index <sup>1</sup>	Electrical / Mechanical	°C	140 / 140	130 / 130	130 / 130
Coefficient of Thermal Expansion (0.125")	X-axis / Y-axis	"/"/°Cx10 <sup>-6</sup>	-- / --	13.0 / 17.0	18.0 / 20.0
Flammability Rating U.L. 94 (0.062")	Condition A	Class	HB	HB	HB
<b>ELECTRICAL PROPERTIES</b>					
Dissipation Factor (0.062")	Condition D <sub>1</sub> -24/23	-	0.057	0.045	--
Permittivity (0.062")	Condition D <sub>1</sub> -24/23	-	4.50	5.45	--
Breakdown Voltage (0.062")	Condition A	kV	> 65	47	60
	Condition D-48/50		6	--	10
Electric Strength (0.062")	Condition A	V/mil	170	500	500
	Condition D-48/50		--	300	300
Arc Resistance D495 (0.125")	Condition A	sec	120	60	110
Comparative Tracking Index D3638 (0.125")		V	150	150	180

NOTE a: A double dash (--) indicates that the value has not been determined or is not applicable to the product.

NOTE b: All testing per ASTM D348 unless otherwise noted.

<sup>1</sup> NEMA LI-6: This temperature is a recommendation only and is based upon experience in various applications. The maximum operating temperature is dependent upon the application and should be investigated prior to use.



Global Thermoset Composite Solutions

Sheet Products - Property Comparison

			NP843	MC844G
			Semi-conductive Surfaces	Paper
			Phenolic	
<b>PHYSICAL PROPERTIES</b>				
Specific Gravity (0.500")		-	1.40	1.40
Rockwell Hardness (0.250" Build-up)		M Scale	100	--
Moisture Absorption (0.062")	Condition D <sub>1</sub> -24/23	%	--	2.47
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	-- / --	32,000 / 25,000
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	20,000 / 13,500
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	-- / --	-- / --
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	22,000 / 15,000	17,900 / 12,500
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.70 / 0.50	1.05 / 0.94
Compressive Strength (0.500")	Flatwise	psi	44,000	48,800
Bonding Strength (0.500")	Condition A	lb	1,000	1,200
	Condition D-48/50		--	--
Shear Strength (0.062")	Perpendicular	psi	--	17,000
<b>THERMAL PROPERTIES</b>				
Temperature Index <sup>1</sup>	Electrical / Mechanical	°C	125 / 125	130 / 130
Coefficient of Thermal Expansion (0.125")	X-axis / Y-axis	"/"/°Cx10 <sup>-6</sup>	10.0 / 12.0	-- / --
Flammability Rating U.L. 94 (0.062")	Condition A	Class	HB	HB
<b>ELECTRICAL PROPERTIES</b>				
Dissipation Factor (0.062")	Condition D <sub>1</sub> -24/23	-	--	--
Permittivity (0.062")	Condition D <sub>1</sub> -24/23	-	--	--
Breakdown Voltage (0.062")	Condition A	kV	--	--
	Condition D-48/50		--	--
Electric Strength (0.062")	Condition A	V/mil	--	--
	Condition D-48/50		--	--
Arc Resistance D495 (0.125")	Condition A	sec	--	--
Comparative Tracking Index D3638 (0.125")		V	--	--

NOTE a: A double dash (--) indicates that the value has not been determined or is not applicable to the product.

NOTE b: All testing per ASTM D348 unless otherwise noted.

<sup>1</sup> NEMA LI-6: This temperature is a recommendation only and is based upon experience in various applications. The maximum operating temperature is dependent upon the application and should be investigated prior to use.