

Sheet Products - Property Comparison

			NP600	NP602	NP605	NP610
			Paper			
			Phenolic			
PHYSICAL PROPERTIES						
Specific Gravity (0.062")		-	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 ₁ -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						
Maximum Operating Temperature ¹	Electrical / Mechanical	°C	150 / 150	150 / 150	150 / 150	-- / 130
Coefficient of Thermal Expansion (0.062")	X-axis / Y-axis	"/"°Cx10 ⁻⁶	-- / --	-- / --	-- / --	13.0 / 17.0
Flammability Rating U.L. 94	Condition A	Class	HB	HB	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D ₁ -24/23	-	--	--	--	--
Permittivity (0.062")	Condition D ₁ -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	--	--	--	--

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

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Sheet Products - Property Comparison

			NP611	NP612	NP613	NP625
			Paper			
			Phenolic	Epoxy	Phenolic	
PHYSICAL PROPERTIES						
Specific Gravity (0.062")		-	1.35	1.38	1.35	1.39
Rockwell Hardness (0.250" Build-up)		M Scale	100	84	90	85
Moisture Absorption (0.062")	Condition D ₁ -24/23	%	1.50	3.20	--	1.60
Flexural Strength (0.062")	Condition A	psi	29,000 / 22,000	19,300 / 17,600	27,000 / 22,000	19,000 / 17,000
	Lengthwise / Crosswise					
Flexural Modulus (0.062")	Condition E-1/150 T150	kpsi	-- / --	-- / --	-- / --	-- / --
	Lengthwise / Crosswise					
Tensile Strength (0.125")		psi	18,000 / 13,500	12,500 / 8,400	-- / --	12,400 / 10,400
Izod Impact Strength (0.500")	Condition E-48/50	ft-lb/in (notched)	0.70 / 0.60	0.76 / 0.66	1.25 / 1.00	0.75 / 0.70
Compressive Strength (0.500")		psi	45,000	27,000	40,000	29,500
Bonding Strength (0.500")	Condition A	lb	1,100	1,400	1,000	1,100
	Condition D-48/50		--	--	--	--
Shear Strength (0.062")		psi	12,200	9,500	--	10,500
THERMAL PROPERTIES						
Maximum Operating Temperature ¹	Electrical / Mechanical	°C	130 / 130	130 / 130	140 / 140	130 / 130
Coefficient of Thermal Expansion (0.062")	X-axis / Y-axis	"/"°Cx10 ⁻⁶	13.0 / 17.0	15.0 / 19.0	-- / --	15.0 / 19.0
Flammability Rating U.L. 94	Condition A	Class	HB	HB	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D ₁ -24/23	-	--	0.060	0.040	0.060
Permittivity (0.062")	Condition D ₁ -24/23	-	--	5.50	4.60	6.05
Breakdown Voltage (0.062")	Condition A	kV	50	55	40	50
	Condition D-48/50		4	10	6	--
Electric Strength (0.062")	Condition A	V/mil	600	700	--	700
	Condition D-48/50		--	--	--	--
Arc Resistance D495 (0.125")	Condition A	sec	75	110	--	90
Comparative Tracking Index D3638 (0.125")		V	180	500	--	180

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Sheet Products - Property Comparison

			NP629	NP630	NP631	NP639
			Paper			
			Phenolic			
PHYSICAL PROPERTIES						
Specific Gravity (0.062")		-	1.39	1.38	1.38	1.39
Rockwell Hardness (0.250" Build-up)		M Scale	95	101	115	105
Moisture Absorption (0.062")	Condition D ₁ -24/23	%	2.00	1.30	1.00	1.00
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	22,000 / 17,000	20,000 / 15,000	16,000 / 13,200	25,000 / 20,000
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --	-- / --
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	-- / --	1,300 / 1,050	1,100 / 900	1,500 / 1,300
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	13,500 / 11,500	14,000 / 12,000	15,000 / 12,000	17,000 / 16,500
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.50 / 0.40	0.55 / 0.45	0.65 / 0.60	0.65 / 0.50
Compressive Strength (0.500")	Flatwise	psi	25,000	30,000	32,000	40,000
Bonding Strength (0.500")	Condition A	lb	900	1,000	1,000	1,600
	Condition D-48/50		--	--	--	--
Shear Strength (0.062")	Perpendicular	psi	11,500	12,800	11,500	13,000
THERMAL PROPERTIES						
Maximum Operating Temperature ¹	Electrical / Mechanical	°C	130 / 130	130 / 130	125 / 125	150 / 150
Coefficient of Thermal Expansion (0.062")	X-axis / Y-axis	" / " / °C x 10 ⁻⁶	-- / --	15.0 / 19.0	16.0 / 20.0	22.0 / 25.0
Flammability Rating U.L. 94	Condition A	Class	HB	HB	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D ₁ -24/23	-	0.052	0.050	0.035	--
Permittivity (0.062")	Condition D ₁ -24/23	-	6.20	6.10	4.80	--
Breakdown Voltage (0.062")	Condition A	kV	40	40	60	50
	Condition D-48/50		5	10	15	--
Electric Strength (0.062")	Condition A	V/mil	--	700	750	700
	Condition D-48/50		--	600	600	--
Arc Resistance D495 (0.125")	Condition A	sec	--	110	124	--
Comparative Tracking Index D3638 (0.125")		V	--	200	200	--

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Sheet Products - Property Comparison

			NP643	NP660	NP664	NP670
			Paper			
			Epoxy	Phenolic		Epoxy
PHYSICAL PROPERTIES						
Specific Gravity (0.062")		-	1.40	1.35	1.37	1.35
Rockwell Hardness (0.250" Build-up)		M Scale	90	100	90	94
Moisture Absorption (0.062")	Condition D ₁ -24/23	%	--	3.50	5.50	0.75
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	27,700 / 20,800	33,000 / 30,000	26,000 / 24,000	20,500 / 18,500
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --	-- / --
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	-- / --	1,900 / 1,400	1,200 / 1,000	1,300 / 1,000
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	16,900 / 13,900	20,000 / 16,000	22,500 / 12,500	12,500 / 9,500
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	29,000
Bonding Strength (0.500")	Condition A	lb	900	1,100	1,100	--
	Condition D-48/50		--	--	--	--
Shear Strength (0.062")	Perpendicular	psi	21,700	14,000	11,000	13,000
THERMAL PROPERTIES						
Maximum Operating Temperature ¹	Electrical / Mechanical	°C	140 / 140	130 / 130	130 / 130	120 / 120
Coefficient of Thermal Expansion (0.062")	X-axis / Y-axis	"/"°Cx10 ⁻⁶	-- / --	13.0 / 17.0	18.0 / 20.0	-- / --
Flammability Rating U.L. 94	Condition A	Class	HB	HB	HB	V-0
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D ₁ -24/23	-	0.057	0.045	--	0.045
Permittivity (0.062")	Condition D ₁ -24/23	-	4.50	5.45	--	4.90
Breakdown Voltage (0.062")	Condition A	kV	> 65	47	60	60
	Condition D-48/50		6	--	10	30
Electric Strength (0.062")	Condition A	V/mil	170	500	500	600
	Condition D-48/50		--	300	300	450
Arc Resistance D495 (0.125")	Condition A	sec	120	60	110	110
Comparative Tracking Index D3638 (0.125")		V	150	150	180	--

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Sheet Products - Property Comparison

			NP680	NP691	NP843	MC844G
			Paper		Semi-conductive Surfaces	Paper
			Phenolic			
PHYSICAL PROPERTIES						
Specific Gravity (0.062")		-	1.39	1.33	1.40	1.40
Rockwell Hardness (0.250" Build-up)		M Scale	94	85	100	--
Moisture Absorption (0.062")	Condition D ₁ -24/23	%	1.30	1.20	2.30	2.47
Flexural Strength (0.062")	Condition A Lengthwise / Crosswise	psi	26,400 / 21,600	16,000 / 13,000	25,000 / 21,000	32,000 / 25,000
	Condition E-1/150 T150 Lengthwise / Crosswise		-- / --	-- / --	-- / --	20,000 / 13,500
Flexural Modulus (0.062")	Lengthwise / Crosswise	kpsi	1,000 / 900	1,000 / 900	2,140 / 1,480	-- / --
Tensile Strength (0.125")	Lengthwise / Crosswise	psi	17,000 / 13,500	12,000 / 9,000	22,000 / 15,000	17,900 / 12,500
Izod Impact Strength (0.500")	Condition E-48/50 Lengthwise / Crosswise	ft-lb/in (notched)	0.56 / 0.49	0.90 / 0.80	0.70 / 0.50	1.05 / 0.94
Compressive Strength (0.500")	Flatwise	psi	38,000	25,000	44,000	48,800
Bonding Strength (0.500")	Condition A	lb	1,300	1,200	1,000	1,200
	Condition D-48/50		--	--	--	--
Shear Strength (0.062")	Perpendicular	psi	11,000	12,000	11,500	17,000
THERMAL PROPERTIES						
Maximum Operating Temperature ¹	Electrical / Mechanical	°C	130 / 130	105 / 105	125 / 125	130 / 130
Coefficient of Thermal Expansion (0.062")	X-axis / Y-axis	"/"°Cx10 ⁻⁶	16.0 / 20.0	16.0 / 20.0	10.0 / 12.0	-- / --
Flammability Rating U.L. 94	Condition A	Class	HB	V-0	HB	HB
ELECTRICAL PROPERTIES						
Dissipation Factor (0.062")	Condition D ₁ -24/23	-	0.040	0.065	--	--
Permittivity (0.062")	Condition D ₁ -24/23	-	5.00	5.20	--	--
Breakdown Voltage (0.062")	Condition A	kV	55	55	--	--
	Condition D-48/50		12	5	--	--
Electric Strength (0.062")	Condition A	V/mil	750	500	--	--
	Condition D-48/50		500	300	--	--
Arc Resistance D495 (0.125")	Condition A	sec	100	100	--	--
Comparative Tracking Index D3638 (0.125")		V	180	240	--	--

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