





Material Data		Phenolic paper						Phenolic paper, melamine paper surface		
	Name	Voltis® Hp 2061		Voltis® Hp 2061.5		Gx_11.1104	Inbord E		Inbord M	Inbord E - GS
	Grade	Hp 2061		Hp 2061.5		Hp 2062.8	-		-	-
	(D) DIN 7735	PF CP 201		PF CP 202		PF CP 206	-		-	-
	EN 60893 / IEC 60893	X, XP		XX		XXXP	-		-	-
	(USA) NEMA L1	Phenolic resin						Phenolic resin/melamine resin		
	Resin	Paper								
Reinforcement										
Density	ISO 1183/A	DIN 53479	g/cm ³	approx. 1,4	approx. 1,4	approx. 1,3 - 1,4	approx. 1,4	approx. 1,4	approx. 1,45	
Flexural strength unmachined./ 23 ° C	ISO 178	DIN 53452	MPa	150	130	80	140	140	200	
Impact strength a _{n 10} and a _{n 15}	ISO 179	DIN 53453	kJ/m ²	20	20	8	12	12	18	
Notched impact strength	ISO 179	DIN 53453	kJ/m ²	-	-	-	-	-	-	
Tensile strength s _B	ISO 527	DIN 53455	MPa	120	100	70	120	120	120	
Compressive strength ó _{dB} //	ISO 604	DIN 53454	MPa	150	150	-	-	-	-	
Compressive strength ó _{dB} _/_			MPa	300	300	250	250	250	250	
Splitting force		DIN 53463	N	-	-	2000	-	-	-	
Flexural modulus of elasticity	ISO 178	DIN 53457	MPa	9000	7000	7000	16000	16000	16000	
Insulation resistance between inserts after 24 hours in water at 23 ° C	IEC 60167	DIN 53482	Ω	-	-	-	10 ⁹	-	10 ⁹	
Breakdown voltage parallel to the layers in oil at 90°C	IEC 243	DIN 53481	kV/25mm	15	60	-	30	5	30	
Electric strength perpendicular to the layers in oil at 90°C	IEC 243	DIN 53481	kV/mm	5	13	30	-	-	-	
Dissipation factor tan d - 50 Hz after 96 h 105 ° C - 1 MHz after 24 hours in water		DIN 53483	max. max.	- -	0,05 -	- -	approx. 5 0,08	- -	approx. 5 0,08	
Permittivity		IEC 250	»	<5,5	<5,5	5	-	-	-	
Tracking resistance		IEC 112	CTI	100	100	100	600	200	600	
Arc resistance	VDE 0303/5	DIN 53484	Stufe	-	-	-	L1	L1	L1	
Thermal conductivity		DIN 52612	W/m ² *k	-	-	0,2	-	-	-	
Thermal elongation coefficient		VDE 0304/2	10 ⁻⁶ /K	-	-	20 - 40	-	-	-	
Thermal endurance		IEC 216	T.l. in °C	120	120	120	-	-	-	
Water absorption	DIN EN ISO 62/1	DIN 53495	mg	250 (at 3 mm thickness)	162 (at 3 mm thickness)	120 (at 4 mm thickness)	200 (at 10 mm thickness)	500 (at 10 mm thickness)	200 (at 10 mm thickness)	
Colour				brown	brown	yellow-brown	depending on decor paper			

Material Data									
	Name			Voltis® Hgw 2082	Voltis® Hgw 2082.5 CE	Voltis® Hgw 2083	Gx_11.6205	Voltis® ME G5	Voltis® SI 2965
	Grade								
	(D) DIN 7735	Hgw 2082	Hgw 2082.5	Hgw 2083	Hgw 2282.5 ⁵⁾	Hgw 2272	Hgw 2572		
	EN 60893 / IEC 60893	PF CC 201	PF CC 202	PF CC 203	MF CC 201	MF GC 201	SI GC 202		
	(USA) NEMA L1	C	CE	L	-	G 5	G 7		
	Resin	Phenolic resin			Melamine resin			Silicone resin	
Reinforcement	Coarse cotton cloth			Fine cotton cloth	Coarse cotton cloth	Glass fabric			
Rev.03/2013									
Density	ISO 1183/A	DIN 53479	g/cm ³	approx. 1,4	approx. 1,4	approx. 1,4	1,4 - 1,5	approx. 2,0	approx. 1,8
Flexural strength unmachined./ 23 ° C	ISO 178	DIN 53452	MPa	130	115	150	90	400	120
Impact strength a _{n10} and a _{n15}	ISO 179	DIN 53453	kJ/m ²	10	10	12	6	70	25
Notched impact strength	ISO 179	DIN 53453	kJ/m ²	-	-	-	3	-	-
Tensile strength s _B	ISO 527	DIN 53455	MPa	80	60	100	60	250	90
Compressive strength $\hat{\sigma}_{dB} //$	ISO 604	DIN 53454	MPa	-	-	-	200	-	-
Compressive strength $\hat{\sigma}_{dB} \perp$		DIN EN 6089	MPa	-	-	-	90	-	160
Splitting force		DIN 53463	N	-	-	-	2500	-	-
Flexural modulus of elasticity	ISO 178	DIN 53457	MPa	7000	7000	7000	5000	20000	13000
Insulation resistance between inserts after 24 hours in water at 23 ° C	IEC 60167	DIN 53482	Ω	10 ⁶	5*10 ⁷	10 ⁶	10 ⁷	10 ⁸	10 ¹⁰
Breakdown voltage parallel to the layers in oil at 90°C	IEC 243	DIN 53481	kv/25mm	8	20	8	-	15	30
Electric strength perpendicular to the layers in oil at 90°C	IEC 243	DIN 53481	kV/mm	1,6	3	1,6	10	5	5
Dissipation factor tan d - 50 Hz after 96 h 105 ° C - 1 MHz after 24 hours in water		DIN 53483	max.	-	-	-	-	-	-
		DIN 53483	max.	-	-	-	-	-	0,022
Permittivity		IEC 250	»	5	5	5	6	-	4,5
Tracking resistance		IEC 112	CTI	100	100	100	560	-	450
Electrolytic corrosion		DIN 53489	max.	-	-	-	A/B 1,8	-	-
Arc resistance	VDE 0303/5	DIN 53484	class	-	-	-	-	-	180
Thermal conductivity		DIN 52612	W/m*k	-	-	-	0,2	-	-
Thermal elongation coefficient		VDE 0304/2	10 ⁻⁶ /K	-	-	-	20 - 40	-	-
Thermal endurance		IEC 216	T.I. in °C	120	120	120	95	-	180
Flamability		UL 94	class	-	-	-	V0	≥ 1,5 mm V0	-
Water absorption	DIN EN ISO 62/1	DIN 53495	mg (at 3 mm thickness)	200 (at 3 mm thickness)	160 (at 3 mm thickness)	200 (at 3 mm thickness)	160 (at 4 mm thickness)	188 (at 3 mm thickness)	75 (at 10 mm thickness)
Colour				brown	brown	brown	white	white	white

Material Data				Roving		Mat							
				Name	Isoval R	Isoval RDS	Gx_11.3408	Gx_11.3406	Gx_11.4423.878685	Gx_11.4413.878685	Gx_11.4414.863752	Gx_11.4415	
				Grade			Hm 34 / ME 730						
				(D) DIN 7735	Hgw 2370.4	Hgw 2370.4	-				Hm 2472	-	
				EN 60893 / IEC 60893	EP GC 205	EP GC 205 G10	EP GM 203	EP GM 203/308	UP GM 203 GPO-3	UP GM 203 GPO-3	UP GM 203 1290	UP GM 205	
				(USA) NEMA L1	-		-	-				-	
				Resin	Epoxy resin		Epoxy resin		Polyester Resin				
Reinforcement	Glass Roving Fabric gewebe			Glass Mat						Glass Mat Roving Fabric			
Rev.03/2013													
Density	ISO 1183/A	DIN 53479	g/cm ³	approx. 2,0	approx. 2,0	approx. 2,0	approx. 2,0	1,81	1,81	approx. 1,9	approx. 1,85		
Flexural strength unmachined./ 23 ° C	ISO 178	DIN 53452	MPa	400	450	360	320	192	192	200	250		
Impact strength a _{n10} and a _{n15}	ISO 179	DIN 53453	kJ/m ²	70	300	100	50	-	-	187	65		
Notched impact strength	ISO 179	DIN 53453	kJ/m ²	-	150	-	-	-	-	150	-		
Tensile strength s _B	ISO 527	DIN 53455	MPa	240	250	250	250	75	75	124	120		
Compressive strength ó _{dB} //	ISO 604	DIN 53454	MPa	-	-	-	-	-	-	188	-		
Compressive strength ó _{dB} /_		DIN EN 60893	MPa	500	600	600	350	282	282	200	300		
Splitting force		DIN 53463	N	-	-	-	-	-	-	2290	-		
Flexural modulus of elasticity	ISO 178	DIN 53457	MPa	20000	20000	20000	15000	-	-	10570	10000		
Insulation resistance between inserts after 24 hours in water at 23 ° C	IEC 60167	DIN 53482	Ω	10 ¹⁰	10 ⁹	5*10 ³	5*10 ³	3,1*10 ¹²	3,1*10 ¹²	7,1*10 ⁸	10 ¹²		
Breakdown voltage parallel to the layers in oil at 90°C	IEC 243	DIN 53481	KV/25mm	40	40	60	35	47	47	-	-		
Electric strength perpendicular to the layers in oil at 90°C	IEC 243	DIN 53481	kV/mm	13	-	13	9	23	23	34	-		
Dissipation factor tan d - 50 Hz after 96 h 105 ° C - 1 MHz after 24 hours in water		DIN 53483	max.	0,04	-	-	-	0,013 (bei 60Hz)	0,013 (bei 60Hz)	0,0092	-		
		DIN 53483	max.	0,04	0,04	-	-	0,01	0,01	0,0372	-		
Permittivity		IEC 250	-	5,5	5,5	-	-	4,1	4,1	5	-		
Tracking resistance		IEC 112	CTI	180	-	180	600	600	600	600	-		
Electrolytic corrosion		DIN 53489	max.	-	-	-	-	-	-	A/B 1,4	-		
Arc resistance	VDE 0303/5	DIN 53484	class	-	-	-	-	180 sek.	181 sek.	180 sek.	-		
Thermal conductivity		DIN 52612	W/m*k	0,3	-	0,35	0,35	0,274	1,274	0,63	-		
Thermal elongation coefficient		VDE 0304/2	10 ⁻⁶ /K	-	-	-	-	20	20	17	-		
Thermal endurance		IEC 216	T.l.	180	180	155	155	155	155	155	-		
Flamability		UL 94	class	-	-	-	-	≥ 2,4 mm V0	≥ 2,4 mm V0	V0	≥ 3,6 mm V0		
Oxygen index		ISO 4589	%	-	-	-	-	39	40	-	-		
				30 (at 10 mm thickness)	20 (at 10 mm thickness)	40 (at 10 mm thickness)	40 (at 10 mm thickness)			60 (at 4 mm thickness)	40 (at 4 mm thickness)		
Water absorption	DIN EN ISO 62/1	DIN 53495	mg					0,40%	0,40%				
Colour				brown	greenbrown	beige	white	red	white	white	white		

Material Data				Tubes and Rods									
				Name	Voltis® Hp TU 21	Voltis® Hqw TU 21	Voltis® Hqw TU 22	Voltis® Hqw RO 41	Voltis® Hqw RO 42	Isoval®TU 21	Isoval®TU 22	Isoval®TU 22 HKB	
				Grade							FR4		
				(D) DIN 7735	HP 2065	Hqw 2086	Hqw 2085	Hqw 2089	Hqw 2088	Hqw 2375	Hqw 2375.4	-	
				EN 60893 / IEC 893	PF CP 21	PF CC 21	PF CC 22	PF CC 41	PF CC 42	EP GC 21	EP GC 22	-	
				(USA) NEMA L1									
				Resin	Phenolic resin						Epoxy resin		
Reinforcement	Paper			Cotton cloth				Glass fabric					
Rev.03/2013													
Density	ISO 1183/A	DIN 53479	g/cm³	approx. 1,2	approx. 1,2	approx. 1,2	approx. 1,3	approx. 1,3	approx. 1,85	approx. 1,7	1,7		
Flexural strength perpendicular 23 ° C	ISO 178	DIN 53452	MPa	100	90	80	125	100	300	300	150		
Flexural strength perpendicular 150 ° C	ISO 178	DIN 53452	MPa	-	-	-	-	-	-	150	25		
Compressive strength axial	ISO 604	IEC 61212	MPa	100	120	100	90	80	175	175	150		
Cohesion between layers		IEC 51212	MPa	70	90	90	-	-	200	200	200		
Insulation resistance between inserts after 24 hours in water at 23 ° C	IEC 60167	DIN 53482	Ω	10 ⁵	10 ⁷	2x10 ⁶	5x10 ⁶	5x10 ⁵	10 ⁹	10 ⁹	10 ⁹		
Breakdown voltage parallel to the layers in oil at 90°C	IEC 243	DIN 53481	KV/25mm	25	10	10	5	5	40	40	40		
Electric strength perpendicular to the layers in oil at 90°C	IEC 243	DIN 53481	kV/mm	8,3	1,6	1,6	-	-	7,7	7,7	7,6		
Thermal endurance		IEC 216	T.I.	120	120	120	120	120	180	180	180		
Water absorption	DIN EN ISO 62/1	IEC 61212	mg/cm²	max. 10	max. 5	max. 10	max. 5	max. 8	max. 1,5	max. 1,5	max. 1,5		
Colour				brown	brown	brown	brown	brown	green	green	green		