

Technical data sheet of industrial rigid laminated sheets based on melamin resins (page 1 of 8)

1. The statements are requirements to Norm 60893-3-3 IEC:2003; (German version EN 60893-3-3:2004)
2. A dash "-" signifies that there is no requirement.
3. All statements are not binding. No liability is accepted for any injury, loss, damage arising from the use of this information.
4. The following abbreviations are used at this pages.

Resin	
MF	Melamin resin

Reinforcement	
CC	woven cotton cloth
GC	woven glass cloth

5. Similar norms

	MF CC 201	MF GC 201
DIN 7735	Hgw 2282.5	Hgw 2272
Nema		G 5

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Types			Applications and distinguishing characteristics (note 1)
Resin	Reinforcement	Serial no.	
MF	CC	201	Mechanical and electrical applications. Arc and tracking resistant (coarse weave note 2)
	GC	201	Mechanical and electrical applications. High mechanical strength. Arc and tracking resistant Low flammability.

Note 1: It should not be inferred from the contents of Table 1 that laminates of any particular type are necessarily unsuitable for applications other than those listed for them or that specific laminates will be suitable for all applications within in the wide description given.

Note 2: Fabric weaves of type CC reinforcements. These values are only for information. They are not to be considered as specification values. In general, the finer weave materials have better machining characteristics.

	Mass per unit area g/m ²	thread count cm ⁻¹
Coarse weave	>130	≤ 30

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Table 2; Tolerances on thickness (test method: see IEC 60893-2, 4.1), Norm EN 60893-3-3 IEC:2003 (German version EN 60893-3-3:2004)		
Thickness mm	Tolerances +- mm	
	MF CC 201	MF GC 201
0,40	—	0,10
0,50	—	0,12
0,60	—	0,13
0,80	0,19	0,16
1,00	0,20	0,18
1,20	0,22	0,21
1,50	0,24	0,24
2,00	0,26	0,28
2,50	0,29	0,33
3,00	0,31	0,37
4,00	0,36	0,45
5,00	0,42	0,52
6,00	0,46	0,60
8,00	0,55	0,72
10,00	0,63	0,82
12,00	0,70	0,94
14,00	0,78	1,02
16,00	0,85	1,12
20,00	0,95	1,30
25,00	1,10	1,50
30,00	1,22	1,70
35,00	1,34	1,95
40,00	1,45	2,10
45,00	1,55	2,30
50,00	1,65	2,45

Where the nominal thickness is not one of the preferred thicknesses listed, then the tolerance for the next higher preferred nominal thickness shall apply. Other tolerances may be agreed between the supplier and the purchaser.

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Table 3; Flatness (test method: see 4.2 of IEC 60893-2); Norm EN 60893-3-3 IEC:2003 (German version EN 60893-3-3:2004)		
Thickness d mm	Length of straight edge	
	mm	
	1000	500
$3 < d \leq 6$	10	2,5
$6 < d \leq 8$	8	2,0
$8 < d$	6	1,5

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Table 4; Tolerances on width of cut strips; (minus tolerances only); Norm EN 60893-3-3 IEC:2003 (German version EN 60893-3-3:2004)						
Thickness d in mm	Nominal width, all types, mm					
	3 < b ≤ 50	50 < b ≤ 100	100 < b ≤ 160	160 < b ≤ 300	300 < b ≤ 500	500 < b ≤ 600
0,40	0,50	0,50	0,50	0,60	1,00	1,50
0,50	0,50	0,50	0,50	0,60	1,00	1,50
0,60	0,50	0,50	0,50	0,60	1,00	1,50
0,80	0,50	0,50	0,50	0,60	1,00	1,00
1,00	0,50	0,50	0,50	0,60	1,00	1,00
1,20	0,50	0,50	0,50	1,00	1,20	1,20
1,50	0,50	0,50	0,50	1,00	1,20	1,20
2,00	0,50	0,50	0,50	1,00	1,20	1,50
2,50	0,50	1,00	1,00	1,50	2,00	2,50
3,00	0,50	1,00	1,00	1,50	2,00	2,50
4,00	0,50	2,00	2,00	3,00	4,00	5,00
5,00	0,50	2,00	2,00	3,00	4,00	5,00

Unilateral, all-negative tolerances are nominally applied to the width of cut strips, and are given in the above table. Other tolerances may be agreed between purchaser and supplier.

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Property	IEC 60893-2 subclause	Unit	Min. or Max.	Thickness of sheet to which test is applicable mm	Type	
					MF CC 201	MF GC 201
Flexural strenght	5.1	Mpa	Min.	≥ 1,5	70	240
Charpy impact strenght to lamination (note 1)	5.4.2	kJ/m ²	Min.	≥ 5	3	30
Izod impact strenght to lamination (note 1)	5.4.3	kJ/m ²	Min.	≥ 5	2,5	31
Electrical strenght at 90 °C in oil ⊥ to lamination.	6.1	kV/mm	Min.	≤ 3	table 6	table 6
Breakdown voltage at 90 °C in oil to lamination.	6.1	kV	Min.	> 3	15	15
Insulation resistence after immersion in water	6.3	MΩ	Min.	all	1 x 10 ¹	1 x 10 ²
Proof tracking index	6.4	—	Min.	≥ 3	500	500
Flammability (note 2)	7.2	Category		3	V-O	V-O
Water absorption	8.2	mg	Max.	all	table 7	table 7

Note 1: Conformance with the requirement for either Charpy or Izod test consitutes, in this respect, conformance with this specification.

Note 2: The small-scale laboratory test used in this standard for assingning a flammability category is primarily for monitoring consistency of production of laminates. The results so obtained should not in any circumstances be considered as an overall indication of the potential fire hazards presented by these laminates under actual conditions of use.

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Table 6; Electric strength at 90 °C in oil \perp to lamination (1-min-proof test or 20 s step by step test) (kV/mm) (note 1); Norm EN 60893-3-3 IEC:2003 (German version EN 60893-3-3:2004)																	
Typ	Mean measured thickness of test specimens in mm (note 2)																
	0,40	0,50	0,60	0,70	0,80	0,90	1,00	1,20	1,50	1,80	2,00	2,20	2,40	2,50	2,60	2,80	3,00
MF CC 201	—	—	6,60	6,30	6,10	5,80	5,60	5,30	4,90	4,50	4,30	4,20	4,10	4,10	4,10	4,00	4,00
MF GC 201	9,10	8,60	8,20	7,90	7,60	7,30	7,00	6,60	6,10	5,60	5,40	5,30	5,20	5,20	5,20	5,10	5,00

Note 1: The two test are alternatives. A material meeting either requirements shall be deemed to comply with the specification to electric strenght at 90 °C in oil, \perp to laminations.

Note 2: If the arithmetic mean of the measured values of thickness of the test specimen lies between two values of thickness shown in the aboce table, the limit shall be obtained by interpolation. If the arithmetic mean of the measured values of thickness is below the minimum thickness for which a limit is given, the electric strenght limit appropriate to the minimum thickness shall apply. If the nominal thickness is 3 mm and the arithmetic mean measured thickness exceeds 3 mm, the limit for 3 mm shall apply.

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Typ	Mean measured thickness in mm of test specimens (note 1)																				
	0,4	0,5	0,6	0,8	1	1,2	1,5	2	2,5	3	4	5	6	8	10	12	14	16	20	25	22,5 (note 2)
MF CC 201	—	—	—	133	136	139	144	151	157	162	169	190	210	260	305	350	400	450	550	660	1080
MF GC 201	103	107	110	116	123	129	139	155	172	188	220	252	285	350	414	479	544	609	738	900	1080

Note 1: If the arithmetic mean of measured values of thickness of the test specimen lies between two values of thickness shown in the above table, the limit shall be obtained by interpolation. If the arithmetic mean of the measured values of thickness is below the minimum thickness for which a limit is given, the water absorption limit appropriate to the minimum thickness shall apply. If the nominal thickness is 25 mm and the arithmetic mean measured thickness exceeds 25 mm, the limit for 25 mm shall apply.

Note 2: Sheets of nominal thicknesses greater than 25 mm shall be machined to a relatively smooth surface on one face to a thickness of 22,5 ± 0,3 mm