The Institute for Interconnecting and Packaging Electronic Circuits
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IPC-TM-650
TEST METHODS MANUAL

Number	
2.3.11	
Subject	
Glass Fabric Construction	
Date	Revision
4/73	
Originating Task Group	
N/A	

1 Scope The purpose of this test method is to provide a procedure for examining glass fabric to determine its construction, including its weight, thickness, strength, and type of weave. Since this method may be used to examine glass fabric used in PCB laminate and pre-impregnated ''B'' stage glass fabric, the method provides a procedure for removing any obscuring resin by a combustion process.

2 Applicable Documents

IPC-EG-140 Specification for Finished Fabric Woven from ''E'' Glass for Printed Boards

3 Test Specimen

3.1 Three pieces of material, 5 cm x 5 cm

4 Equipment/Apparatus

4.1 Muffle furnace capable of maintaining 538°C ± 14°C

4.2 Analytical balance capable of weighing to the nearest milligram (0.001 g)

4.3 Micrometer capable of measuring to the nearest 0.0025 mm

4.4 Binocular microscope, magnification to 30X

5 Procedure

5.1 A minimum of three specimens of each test material shall be tested by the following procedure: Place a specimen in a crucible of suitable size and place in muffle furnace maintained at 538°C ± 14°C for 30 minutes. Remove from muffle furnace and allow to cool.

5.2 Examine Residual Material

5.2.1 If the residue shows any evidence of glass fusion, repeat 5.1, but with the muffle furnace temperature maintained at 488°C ± 14°C. If there is evidence of glass fusion at this lower temperature, again repeat the procedure of 5.1, lowering the temperature in 50°C increments until there is no evidence of glass fusion.

5.2.2 If the residue shows evidence of incomplete removal of resin, increase the temperature of the furnace by 50°C and repeat 5.1.

5.2.3 After the initial period and cooling to room temperature, the residual glass fabric must be white, free of resin residue, and exhibit no evidence of glass fusion.

5.3 Thickness Measurement Place the glass fabric specimen between two flat plates and measure the thickness with a micrometer. Remove the glass fabric specimen and measure the thickness of the two flat plates. The thickness of the glass fabric shall be determined by subtracting the thickness of the two flat plates without the glass fabric from the measurement obtained with the glass fabric between the plates. The thickness of at least three specimens shall be measured and recorded. The thickness of each specimen shall be determined as the average of five separate measurements.

5.4 Glass Fabric Weight

5.4.1 The length and width dimensions of the glass fabric specimens shall be measured to the nearest 0.25 mm.

5.4.2 The weight of the specimen shall be determined using the analytical balance and weighing to the nearest milligram.

5.4.3 The weight of the glass fabric shall be determined using IPC-EG-140.

5.5 Fabric Construction The number of yarns in the warp and fill used in constructing the fabric shall be determined by counting a 2.5 sq. cm area of the fabric using a microscope.

5.6 All other properties in Table 1 shall be as specified in the procurement document.

5.7 Report The results of testing glass fabric by this test method shall be reported in a written report, which (as a minimum) contains the following:

1. Certification that the test was performed in accordance with this test method
2. Identification of the specimens tested
3. Dimensions of each specimen (length and width)

4. Thickness of the specimens
5. Fabric construction
6. Weight of each specimen in ounces per square yard
7. Results of any additional tests required by the test request or purchase document
8. Conclusions as to whether the test specimens meet the requirements of the glass fabric specified

Table 1

Cloth No.	Nominal Width Inches	Thickness Inch	Weight Per Square Yard Ounces	Yarn, Warp, and Fill	Construction	Minimum Breaking Strength Per Inch of Width		Yards per Standard Roll	Type of Weave
						Warp Pounds	Fill Pounds		
106	38	0.0015	0.85	900-1/0	56x56	46	52	250 ± 25	Plain
108	38	0.0020	1.43	900-1/2	60x47	70	40	250 ± 25	Plain
112	38	0.0030	2.09	450-1/2	40x39	82	80	250 ± 25	Plain
113	38	0.0030	2.46	450-1/2 900-1/2	60x64	123	60	250 ± 25	Plain
116	38	0.0040	3.16	450-1/2	60x58	123	120	250 ± 25	Plain
119	38	0.0040	2.80	450-1/2	54x50	110	100	250 ± 25	Plain
120	38	0.0040	3.16	450-1/2	60x58	125	120	250 ± 25	4-harness satin
126-150	38	0.0060	5.50	150-1/2	34x32	225	195	250 ± 25	Plain
126	38	0.0065	5.37	450-3/2	34x32	205	185	250 ± 25	Plain
127	38	0.0070	6.00	450-3/2	42x32	225	185	250 ± 25	Plain
128	38	0.0070	6.00	225-1/3	42x32	250	200	250 ± 25	Plain
128-150	38	0.0067	6.00	150-1/2	42x32	250	200	250 ± 25	Plain
140	38	0.0100	8.70	450-4/3	32x21	400	290	125 ± 25	Plain
141	38	0.0100	8.70	225-2/3	32x21	400	290	125 ± 25	Plain
143	38	0.0090	8.90	225-3/2 450-1/2	49x30	611	56	125 ± 25	4-harness satin
143-150	38	0.0086	9.40	150-2/2 450-1/2	49x30	660	70	125 ± 25	4-harness satin
148	38	0.0120	10.10	450-3/5	30x19	450	360	125 ± 25	Plain
149	38	0.0120	10.80	225-2/4	30x19	450	360	125 ± 25	Plain
161	38	0.0150	12.20	450-4/5	28x16	550	450	125 ± 25	Plain
162	38	0.0150	12.20	225-2/5	28x16	450	350	125 ± 25	Plain
164	38	0.0150	12.60	225-4/3	20x18	500	450	125 ± 25	Plain
164-150	38	0.0140	13.00	150-4/2	20x18	500	450	125 ± 25	Plain
181	38	0.0085	8.90	225-1/3	57x54	340	330	125 ± 25	8-harness satin
181-150	38	0.0080	9.50	150-1/2	56x54	350	325	125 ± 25	Plain
182	38	0.0130	12.40	225-2/2	60x56	440	400	125 ± 25	8-harness satin
182-150	38	0.0134	12.65	150-1/3	60x56	440	400	125 ± 25	Plain
183	38	0.0180	16.75	225-3/2	54x48	650	620	75 ± 15	8-harness satin
184	38	0.0270	25.90	225-4/3	42x36	950	800	50 ± 10	8-harness satin
184-150	38	0.0246	24.16	150-4/2	44x35	950	800	50 ± 10	
573-150	38	0.0110	8.00	150-3/2	16x16	335	316	125 ± 25	Plain
1000-150	38 and 44	0.0130	9.66	150-4/2	16x14	450	410	125 ± 25	Plain
1044-150	38	0.0220	19.20	.....	16x14	450	410	125 ± 25	Plain
1523-150	38	0.0140	11.70	150-3/2	28x20	525	400	125 ± 25	Plain
1527-150	38	0.0150	12.90	150-3/3	17x17	535	485	125 ± 25	Plain