

**COMPOSITES TECHNOLOGY CENTER**

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**TEST METHODS AND TESTING CHARGES UNDER COMPOSITES TEST FACILITY : [ FOR INDUSTRY ]**

**TEST OF REINFORCEMENT FIBERS :**

<b>SL. NO</b>	<b>Names of test</b>	<b>ISO Method</b>	<b>ASTM Method</b>	<b>BS Method</b>	<b>IS and Others standards</b>	<b>No.of Specimens to Be tested</b>	<b>Preparation Charges Per Specimen</b>	<b>Testing Charges Per Specimen</b>
1.	Specific Gravity of fiber/yarn / rovings	3801 1889	D3317 D1505	-	DIN53854 53830 10119	5	Nil	1000*
2.	Diameter (average)of glass fiber/yarn	1888-85	D578-85	-	-	50	Nil	1000*
3.	Linear Density (tex,end,denier) Of Roving/Strands/Yarns	1889-75	D578-89 D861-89	3691-69	11320-85	10	Nil	1000*
4.	Moisture Content of Textile glass/ rovings/filaments/ yarns	3344-77	D2654-89	3691-69 3496-73	11320-85 11551-86	3	Nil	1000
5.	Mass per unit area of chopped Strand Mat/Woven fabrics	3374-80	D579-89	3496-73	11551-86	3	Nil	1000
6.	Fabrics count (Number of	4603-78	D4029-89	3749-74	DIN53853	4	Nil	1000

	yarns/Unit length) in warp and weft direction of woven fabrics/Woven roving mats	7211/2/6	D3775-85 D1910					
* - per test								
7.	Thickness of Woven Roving Fabrics/Chopped strand Mat	4603-78 3616-77	D1777-75 D579-89	3496-73	11551-86 DIN53855	3	Nil	1000
8.	Wet out time of Glass fibre Chopped Strand Mat	3374-80	D579-89	3496-73	11551-86	2	*	1000
9.	Binder solubility (Time of Dissolution ) of CSM Mat	2558-74 2559	-	3496-73	11551-86	3	*	1000
10.	Resin Pick-up CSM Mat (Maximum and minimum)	-	-	3496-73	-	12	*	1000
11.	Effect of CSM Mat on Resin Gel Time	-	-	3496-73	-	2	*	1000
12.	Thermal Conductivity of Fibre materials	-	C177-85	-	-	-	X	-
13.	Co-efficient of Thermal Expansion of Fibre Materials	-	-	-	-	-	X	-
14.	Tensile Properties of Rovings / Strands / Yarns	3341-77	D2343-85	3496-73	DIN 53834TI	5	*	1000
15.	Tensile Strength / Modulus of High Modulus Single Filament	-	D3379-89	-	-	5	*	1000
16.	Apparent Tensile Strength of ring by split Disk Methods	-	D2290-87	-	-	5	500	1000
17.	Breaking Strength of CSM Mat	-	-	3496-63	-	5	500	1000
18.	Cross Breaking Strength of Chopped strand mat Laminate	-	D790-86	3496-73 3749-74	-	5	500	1000
19.	Flexural (Cross Breaking ) Strength of composites in the Form of Laminate/Rods Made from Textile Glass Rovings	3597-77	-	3749-74	-	10	500	1000

**TESTING FACILITY FOR THERMOSETTING RESINS / RESIN CASTINGS :**

20.	Specific Gravity of Liquid resin (Density)	1675-75	D1475-85	3532Apx	DIN51757	1	*	1000`
21.	(Brook Field -RVT Model ) Viscosity of Liquid Resin	2555-74 3214	D2393-86	3900-76	6746-72	1	*	1000
22.	Viscosity of Liquid resin using Flow-cup	-	-	3900-76	-	1	*	1000
23.	Sag flow of high Viscous Resins	-	D2730-80	-	-	-	X	1000
24.	Total volume shrinkage of polyester and Epoxy Casting Resins	3521-76 2577	D2566-86	2782 Part-6 644A	6746-72 DIN16945 DIN16946	1	*	1000
25.	Linear shrinkage of Thermosetting plastics at elevated Temp.	-	D2566-86	-	-	1	*	1000
26.	Shrinkage of moulded and Laminated Thermosetting Plastics at Elevated Temp.	3521	D1299-85	-	6746-72	1	*	1000
27.	Water vapour absorption at 23 °C for 7 days	R62-80	D1570-81	2782 Method 503F/G	DIN53472 53475	-	*	1000
28.	Boiling water Absorption	R117	D1570-81	2782 method 5013A/C	DIN53471		*	1000
29.	acid number of unsaturated Polyester Resin	2114-74	D1630 D1634	2782 Method 647B	6746-72DIN	53183 53402	*	1000
30.	Hydroxyl Number of unsaturated polyester resins	2554-74	E222-73	2782 Method 407A	-	2	*	1000
31.	Epoxy content of the Epoxy resins	3001-78	D1652-88	2782 Method 407A	6746-72 DIN16945	1	*	1000

32.	Gelation time (Peak Exothermic temp. of reacting Thermosetting Resins)	2535-74	D2471-88	2782 Method 111ND	6746-72 DIN16945	1	*	1000
33.	Effects of liquid Chemicals (Chemicals Resistance) on solid Plastics	175-81	C543-67 C581-74 C582-68	2782 Method 505A	6746-72 1146-81	3	500	1000
34.	Volatile Content (Residual styrene Monomer ) of Unsaturated Polyester Resins	2561-74	-	2782 Method 107B-D	6746-72	1	*	1000
35.	Gel and Peak Exotherm Temperature of Reacting Thermosetting Resins	584-82	D2471-88	-	-	1	*	1000
36.	Deflection Temp of Plastics under Flexural loads	75-74	D648-88	2782 Method 102G/H	6746-72 DIN53461	2	500	1000
37.	Martin's Heat Deflection Temperature of Cast Resins	-	-	-	DIN53462 53456	-	X	-
38.	Coefficient of cubical Thermal Expansion of Plastics	-	D864	-	-	-	X	-
39.	Rate of Burning (Flammability) of Flexible Plastics in a Vertical position	1210-82	D568-85 D635-88	2782 Method50 8A	6746-72 DIN53459	3	500	1000
40.	Plastic Yield	-	-	-	1146-81	2	500	1000
41.	Tensile strength of cast Resin Tensile modulus, Elongation @Break of cast Resin / Plastics	R527-66	D638-89	2782 Method 320C	DIN53455	5	500	1000
42.	Compressive Strength / Modulus of Cast Resin /Rigid Plastics	604-73	D695-89	2782 Method 303B	DIN53454	3	500	1000
43.	Flexural Strength / Modulus of Unreinforced plastics	178-75	D790-86	2782 Method 304A	DIN53452	5	500	1000
44.	Shear strength and Mechanical Damping (with Torsion Pendulum)	537-80	D73	2782 Method 305A	-	5	500	1000

45.	Shear Modulus of cast Resin	537-80		2782 Method 305A	-	5	500	1000
46.	Charpy Impact Resistance of Plastics	179-82	D256-88	2782 Method 305B	-	5	500	1000
47.	Izod Impact Resistance of Plastics	180-82	D256-88	2782 Method 305A	-	5	500	1000
48.	Tensile Impact Energy to break plastics	-	D1822-84	2782 Method 305C	-	5	500	1000
49.	Indentation Hardness of Rigid Plastics by means of Barcol Impressor GYSJ.9341	2039	D2583-87	2782 Method 1001	-	-	*	1000
50.	Volume resistivity of cast Resin	-	D257-76	2782 Method 202A	DIN53482	2	X	-
51.	High voltage, Low current, Dry-Arc Resistance of solid Electrical Insulation	-	D495-84	-	IEC93	3	500	1000

**TEST FACILITY FOR THERMOPLASTICS :**

52.	Measuring the flow properties of thermoplastic moulding materials	-	D569-82	-	-	5	*	1000
53.	Flow rates of thermoplastics by Extrusion Plastometer. ( Melt Flow Index)	R292-67	D1238-88	-	-	2	*	1000
54.	Specific Gravity (Relative Density) and Density of plastics by Displacement	-	D792-86	2782 Method 509A	6746-72	-	*	1000
55.	Water absorption of plastics at Room temperature for 24hrs/7days/28days	62-80 Method 1	D570-88	2782 Method 502F/G	53472 53475	3	500	1000

56.	Gas permeability Characteristics of Plastic Film and sheet	-	D1434-88	-	DIN53471	-	X	-
57.	Permeability of Gases	-	-	2782 Method 504A	DIN53471	-	X	-
58.	Thermal Conductivity of Plastics	2582	-	-	-	-	X	-
59.	Coefficient of cubical Thermal Expansion of Plastics	-	-	-	-	-	X	-
60.	Deformation of Plastics under Compression (Parallel Plate Method)	-	-	-	-	-	X	-
61.	Mar Resistance of plastics	-	D673-88	-	-	-	X	-
62.	Compressive Properties of Rigid Plastics	604-73	D695-89	-	-	5	500	1000
63.	Rockwell Hardness of Plastics & Electrical Insulating Materials	-	D785-89	-	-	-	X	-
64.	Bond or Cohesive Strength of Sheet Plastics	-	D952-84	-	-	5	500	1000
65.	Bearing Strength of Plastics	-	D953-87	-	-	5	500	1000
66.	Recommended Practice for Determining Permanent Effect of heat on Plastics	-	D794-82	-	-	-	X	-

**TEST FACILITY FOR COMPOSITE MATERIALS :**

67.	Specific Gravity (Relative density) & Density of Plastics by Displacement	R1183-70	D792-86	-	DIN53479	2	*	1000
68.	Fibre content of Resin Matrix Composites by Matrix Digestion	1172-75	D3171-82	2782 Method 1002-77	DIN53395	4	500	1000
69.	Void content of Reinforced Plastics	-	D2734-85	-	-	1	*	1000
70.	Water absorption of Reinforced Plastics 24hrs/7days/28days	R62-80 Method 1	D570-88	2782 Method 502F4	DIN53472 53475	3	500	1000
71.	Volatile Matter (Including Water ) of Vinyl Chloride Resin	-	D3030-84	-	-	-	*	1000
72.	Outgasing of Composites	-	-	-	-	-	X	-
73.	Linear Shrinkage of cured Thermosetting Casting Resins during cure	3521-76	D2566-86	-	-	-	*	1000
74.	Shrinkage of Moulded & Laminated Thermosetting Plastics at elevated temp.	-	D1299-79	-	-	-	X	-
75.	Acetone Extraction and Ignition of Glass fibre strands, yarns and rovings for Reinforced plastics	-	D2587-85 D494-79	-	-	-	*	1000

76.	Loss of Ignition of glass reinforced Plastics	1172-75	D2584-85	2782 Method 1002-77	-	3	500	1000
77.	Resistance Of Plastics To Chemical Reagent (Effect On Liquid Chemicals Of Plastics)	175-81	D543-87	-	IS1146	Per hour	500	1000
78.	Coefficient of Linear Thermal Expansion of Plastics	-	D696-88	-	-	-	X	-
79.	Heats of fusion and Crystallization of polymers by Thermal Analysis	2582	D3417-88	-	-	-	X	-
80.	Flammability,Extent & Time of Burning of self supporting Reinforced plastics in a horizontal position	1210-82	D635-88 D229-77 D757-77	2782 Method 508A	DIN53454	3	500	1000
81.	Oxygen Index Test	-	D2863-88	-	-	-	X	-
82.	Ignition Properties of plastics	-	D1929-85	-	-	-	X	-
83.	Density of smoke from the burning or Decomposition of plastics	-	D2843-88	-	-	-	X	-
84.	Tensile properties of Plastics/Reinforced plastics	3268-78	D638-89 D3039	2782 Method 1003	DIN53455 53451	5	500	1000



85.	Tensile properties of Glass fibre strands, yarns, Rovings used in Reinforced Plastics	3268-78	D2343-85 D695-89	2782 Method100 3	-	5	500	1000
86.	Poisson's Ratio	3268-78	D638-89 D3039	2782 Method 1003	DIN53455 53451	5	500	1000
87.	Compressive Properties of Unidirectional Cross-Ply fibre resin Composites	-	D3410-B7	2782 Method 303B	DIN53463 53463	5	500	1000
88.	Compressive Properties of Rigid Plastics	604-73	D695-89	2782 Method 303B	DIN53463	5	500	1000
89.	Flexural properties of Unreinforced /Reinforced Plastics	178-85	D790-86	2782 Method 304B/D	DIN5352	5	500	1000
90.	Inplane shear strength of Plastics / Reinforced plastics by Punch Tool In planed Shear Strength	-	D3846-58 D732-85 D3914-84	-	-	5	500	1000
91.	Inter laminar (Lab)Shear strength of composites (Short beam method)	4585	D2344 D2345	4994-87 App-B10	-	5	500	1000
92.	Inter Laminar Shear strength of composites (Short Beam Method)	-	-	-	-	5	500	1000

93.	Inplane shear, stress-strain response of unidirectional Reinforced Plastics (Picture Frame Method )	-	D3518-82	2782 Method 306A/E	-	5	500	1000
94.	Charpy Impact /Izod impact resistance of Plastics Tensile Impact energy to break plastics	180-82 179-75	D256-88 D1822-84	Method 306B	DIN53453	5	500	1000
95.	Ball impact strength of composites	-	-	-	-	-	X	-
96.	Tensile properties of reinforced plastics at high speeds	-	D2289-84	2782 Method 1001	-	5	X	-
97.	Indentation hardness of rigid/Reinforced plastics by means of a Barcol Impressor / Durometer	2039	D2583-87 D1706 D2240	-	DIN53505 53456	-	*	1000
98.	Bearing Strength of Plastics	-	D953-87		-	5	500	1000
99.	Projection penetration into Composites impact resistance by freeing .	-	D1709-85 D3029-84	-	-	-	X	-
100.	Dynamic Ball burst (Pendulum) Impact resistance of plastic film	-	D3420-85	-	-	-	X	-
101.	Effect of Exposure to Damp Heat, Water spray & Salt Mist	4611-87	G23	-	-	-	X	-

102.	Weathering of Composites under Xenon-Arc lamp	-	D2565-84	-	-	-	X	-
103.	Accelerated - Outdoor weathering of plastics using Natural Sun Light	-	D4364-84	-	53387 53389	<b>To be Mutually Agreed between Clients</b>		
104.	Index of Refraction of Transparent Organic Plastics (Can be done at optic lab )	R489-83	D542-88	-	53491	-	X	1000
105.	Mar resistance of plastics	-	D673-88	-	-	-	X	-
106.	Creep & creep rupture of plastics	-	D2990-82	-	-	-	X	-
107.	Fatigue Resistance of Composites	-	D671-87	-	-	-	X	-
108.	Bond strength of Joints / Sandwich composites (Peel of Strength )	-	D1781-86 D2918 D2919 D3167	4994-87 App- B11/B12	-	5	500	1000
109.	Dynamic Mechanical Properties of Plastics	-	D4065-82	-	-	-	X	-
110.	Dielectric breakdown voltage & Dielectric strength of Insulating Materials		D149-81	2782 Method 201A-g	IEC243 DIN53481	-	X	-
111.	A.C. Loss Characteristics & Permittivity of solid Electrical insulation	-	D150-87	2782 Method 206E	DIN53483	-	X	-

112.	Comparative Tracking Index of electrical insulating Materials	-	D3638-85	11221	IEC243 IS2824 DIN53480	5	500	1000
113.	High voltage Low Current, Dry-Arc resistance of solid Electrical Insulation	-	D495-84	-	-	3	500	1000
114.	Surface resistance of Composites	-	Dis continued	2782 Method 203A	DIN53482 IEC93	-	X	-
115.	Volume Resistivity of Composites	-	D257-76	2782 Method 203A	IEC93 DIN53482	-	X	-
116.	Insulation Resistance	-	-	2782 Method 204A	IEC 167	-	X	-
117.	Method of Exposure to (Outdoor) Natural weathering of Plastics	4607-78 877-76	D1435-85	-	IS 53386 IS 53388	<b>To be Mutually Agreed Between Clients</b>		
118.	Damping Factor	-	D162 D662	-	-	-	-	-

**TEST FACILITY FOR COMPOSITE PRODUCTS :**

119.	Longitudinal Tensile properties of Reinforced Thermosetting Resin pipe and tube	-	D2105-85	-	-	-	X	-
120.	Axial compressive strength of filament wound tubes / Pipes	-	-	-	-	-	X	-
121.	Determination of External loading characteristics of Plastic pipe by Parallel plate loading	-	D2412-87	-	-	-	X	-
122.	Bolt shear test, water absorption, Glass content	-	--	4154	IS12866-1989	5	500	1000
123.	Testing of Roofing sheets/ panels (Load deflection)	-	-	4154	IS12866-1989	1	*	5000
124.	Loading test on Panels upto 2m×2m plan size	-	-	-	-	-	XX	-
125.	Hydraulic Test for Battery containers	-	-	-	IS11464	1	*	1000
126.	Testing of FRP Doors (Performance) test Materials test for doors	-	-	-	IS11246 IS4020	1	*	10000
127.	Testing of Squating Pan	-	-	-	IS11286	-	500	6000

**TEST FACILITY FOR GEO GRID :**

128	Tensile Strength Of Geogrid	-	D6637-0	-	-	5	500	1000
129.	Elongation at break	R527-66	D6637-01	-	-	-	-	-
130.	Melting Point	-	D276	-	-	1	-	1000
131.	Mass per unit Area	-	D5261-92	-	-	3	500	1000

**TEST FACILITY FOR FIBRE ROVINGS :**

132.	Roving Tex	-	-	-	11320-97	3	500	1000
133.	Moisture Content	3344-77	D2584-85 D2654-89	2782 Method 1002	11320-97	3	500	1000
134.	Loss on ignition	1172-75	D2584-85	2782 Method 1002	11320-97	3	500	1000
135.	Glass Content	-	-	-	11320-97	2	500	1000
136.	Tensile Breaking Load	-	-	-	11320-97	5	500	1000

137.	Cross Breaking Strength	-	D2343-85	2782 Method 1003	3268-78	5	500	1000
138.	Tensile Properties	3341-77	D1557-03 D2343-85	3496-73	11551-86	5	500	1000

**TEST FACILITY FOR STEEL METALS :**

139.	Tensile Strength Modulus	-	-	-	2062-99	5	500	1000
140.	Yield Strength	-	-	-	2062-99	5	500	1000
141.	Bending Strength (Bend at 180° )	-	-	-	1599-85	5	500	1000

**MATERIALS CHARACTERISATION FACILITIES :**

142.	Barb Length	-	F1379-95	-	-	3	-	1000
143.	Diameter of wire	-	F1379-95	-	-	3	-	1000
144.	Width of Barb	-	F1379-95	-	-	3	-	1000
145.	Pitch of Barb	-	F1379-95	-	-	3	-	1000
146.	Tensile Strength	-	F1379-95	-	-	5	500	1000

**MATERIALS CHARACTERISATION FACILITIES :**

S.No	Name of the Test	Equipment	No. of specimens to be tested	Preparation charges per Specimen	Testing Charges per Specimen
147.	Structural determination of Thermoset Resins	FT-IR	1	Nil	500
148.	Structural determination of Thermoplastics	FT-IR	1	Nil	500
149.	Structural determination of Elastomers	FT-IR	1	Nil	500
150.	Structural determination of Ceramics	FT-IR	1	Nil	500
151.	Determination of sample / Coating thickness	Ultrasonic	1	Nil	300
152.	Identification of interior defects	Ultrasonic	1	Nil	300
153.	Determination of the degree of cure	DMA	1	500	3000
154.	Estimation of Crystatallinity	DMA	1	500	3000
155.	Determination of the degree of the compatibility of Copolymers	DMA	1	500	3000
156.	Determination of glass transition temperature of Thermosets(RT HT )	DSC	1	500	2000
157.	Determination of glass transition temperature of Thermosets(LT HT )	DSC	1	500	2000



158.	Determination of Curing Temperature	DSC	1	500	2000
159.	Determination of heat of reaction in thermosets	DSC	1	500	2000
160.	Determination of melting temperature	DSC	1	500	2000
161.	Determination of glass transition temperature of Thermoplastics(RT → HT )	DSC	1	500	2000
162.	Determination of glass transition temperature of Thermoplastics(LT → HT )	DSC	1	500	2000
162.	Determination of heat of reaction in Thermoplastics	DSC	1	500	2000
164.	Quantitative estimation of decomposition products in thermosets	STA	1	Nil	2000
165.	Determination of glass transition temperature of Thermosets	STA	1	Nil	2000
166.	Quantitative estimation of decomposition products in thermoplastics	STA	1	Nil	2000
167.	Determination of glass transition temperature of Thermoplastics	STA	1	Nil	2000
168.	Quantitative estimation of decomposition products in Elastomers	STA	1	Nil	2000

169.	Determination of Oxidation temperature of Metals	STA	1	Nil	2000
170.	Estimation of phase changes in metals	STA	1	Nil	2000
171.	Estimation of oxide products	STA	1	Nil	2000
172.	Determination of phase changes in Ceramics	STA	1	Nil	2000
173.	Quantitative estimation of decomposition products in Ceramics	STA	1	Nil	2000

\* → Indicates that the charges shown are for the total test and not for each specimen

X → Indicates Facility not available