MECHANICAL

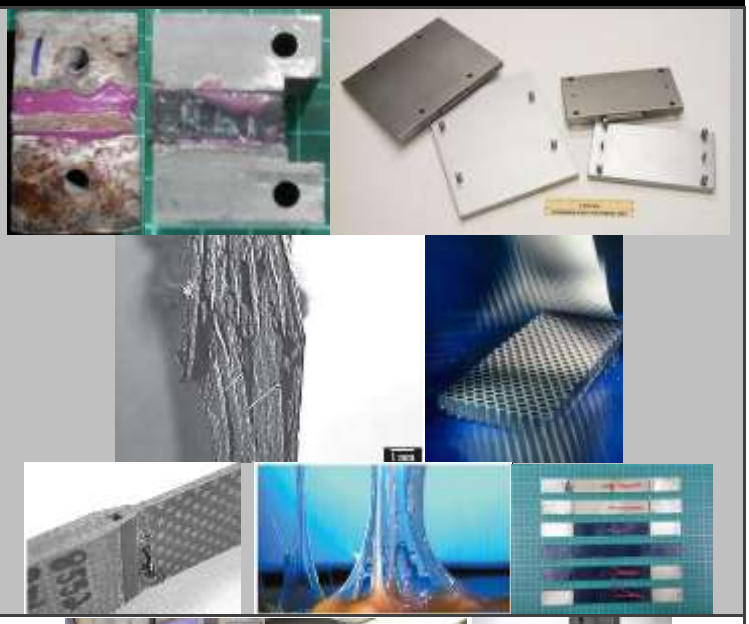
CHEMICAL

PHYSICAL

SAMPLE PREPARATION

Updated Revision: February 2016

Sample Preparation

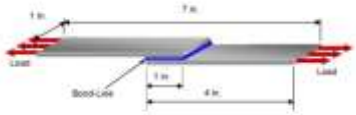
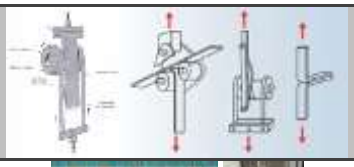
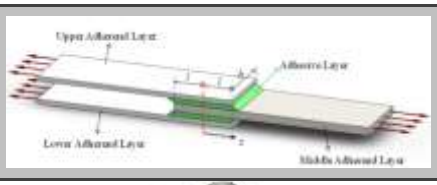
No	Description	
1	**Bonding** To bond sample with tab for tensile and compression, lap shear preparation, flatwise for testing purpose	
2	**Trimming** To trim the sample according to specimen dimension as per specification	
3	**Strain Gauge Preparation and Installation** To prepare specimen surface and installation of strain gauge	
4	**Microsection Preparation** To prepare specimen mounting and surface finish for micro-sectioning process	

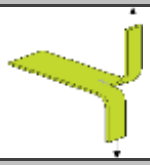
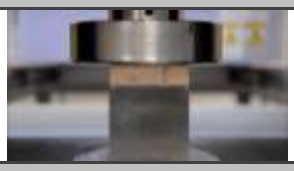
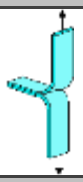
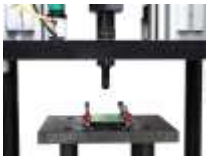
FRP Tank Compliance

No	Description
1	**BS 2782 Methods of testing plastics** Capable to fulfill test requirement as per BS EN ISO 75-1, BS EN ISO 527, BS EN ISO 899, BS EN ISO 178, BS EN ISO 604, , BS EN ISO 62, BS EN ISO 3251, BS 4994
2	**BS 4994 Specification for design and construction of vessels and tanks in reinforced plastics** Capable to fulfill test requirement as per Glass Content BS 2782:Method 1002, Tensile BS2782:Method 320C, Extension to Failure BS2782-3,Lap Shear, Shear Strength, Peel Strength, Barcol BS2782:Method 1001, Water Absorption BS2782:Method 551A
3	**Other FRP tank and vessels requirement** ASME RTP-1, SS245:1995, BS EN 13121
4	**Inter operator laminator and painting competency** Capable to verify the laminator competency through void level analysis and painting skill through cross cut test on painting panel

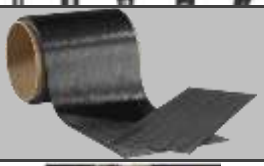
Mechanical Testing

No	Description	Test Method	
1	**Beam Shear** To determine the short-beam strength of high-modulus of the material	RMS 025,ASTM C393	
2	**Compression Strength and Modulus** To determine the compression strength of the material	RMS 027, ASTMD3410,EN2850,ASTM D695, ASTMC365, ASTMC363,ASTM C364, ISO14126	
3	**Flatwise Tensile** To determine flatwise tension between the core and facings of honeycomb sandwich constructions	ABT 1-0007, AITM 1.0025, I+D-E -246 ASTM C297,ASTM C365	
4	**Flexural Strength and Modulus** To determine the flexural strength of the material	ABT 1-0005,EN 2562, RMS 060/-1 RMS 040/-1, ASTM D790, ISO 178, EN 2746, ASTM D7264	
5	**Horizontal Shear Ultimate** To determine the shear strength of the material	RMS 060/-1 RMS 040/-1	

No	Description	Test Method	
6	**Interlaminar Shear Strength** To determine the interlaminar shear strength of the material	ABT 1-0006,EN 2563, ASTM D2344,I+D-E-31A, ISO 14130	
7	**Laminate Thickness** To determine the thickness per ply of a laminate	ABT 1-0017	
8	**Lap Shear** To determine the strength of the adhesive	RMS 003,EN 2243-1 Type 1,RMS058, AITM1.0019, ASTM D3165, BS 2782: Method 1002, BMS 5-141,ISO 4587	
9	**Peel Strength** To determine the peel resistance between facings and core of honeycomb sandwich constructions.	ABT 1-0008,EN 2243, I+D-E-256, ASTM F88, BS 3712-4,ASTM D1781	
10	**Tensile Strength & Modulus** To determine the tensile strength of the material	ABT 1-0032,EN 2747,EN 2561 Type B, ASTM D 3039, ISO 527, ASTM D638, DIN 53504, ASTM E8, BS 2782: Method 1003,	
13	**Double Overlap Shear** To determine foaming adhesive strength at bonding line	ABR 2-0036 AiTM 1.0019	
14	**Release Film Tensile Strength** To determine Release Film tensile strength	ASTM D882	
15	**In Plane Shear** To determine in-plane shear modulus strength by the ± 45° tension test	ISO 14129, ASTM D3518	
16	**Open Hole Tensile** To determine open-hole tensile strength of the material	ASTM D5766	
17	**Bearing Response** To determine bearing response of pinned or fastened joints of the material	ASTM D5961	
18	**Core Shear** To determine the shear properties of sandwich construction core materials	ASTM C273	

No	Description	Test Method	
19	**V-Notched Rail Shear** To determine shear properties of material between two pairs of loading rails	ASTM D7078	
20	**Tear Strength** To determine a property of conventional vulcanized rubber and thermoplastic elastomers called tear strength	ASTM D624	
21	**Automotive Hinge** **Static Strength test** To determine the strength of automotive hinge	SAE J934	
22	**Core Compressive** To determine the compressive strength and modulus of sandwich cores	ASTM C365	
23	**Beam Method V-Notch** To determine shear properties of composite materials reinforced	ASTM D5379	
24	**Bond Strength** **Peel Off Angle 180°** To determine strength of seals in flexible barrier materials	ASTM F88 GIFLEX NO 3	
25	**Delamination Test** To determine tensile-node bond strength of honeycomb core materials	ASTM C363	
26	**Drop Weight Impact** To determines the damage resistance of multidirectional polymer matrix composite laminated plates subjected to a drop-weight impact event	ASTM D7136	
27	**Charpy Impact Test** To estimate the brittleness or toughness of specimens within the limitations inherent in the test conditions	ISO 179	
28	**Peel Strength Between Thermoplastic Lining and Composites** To determine the peel strength between Thermoplastic material and composites	BS 4994	

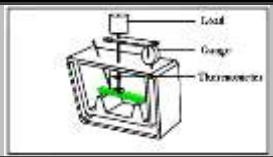
Chemical Testing

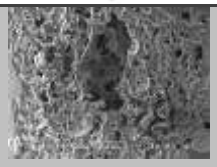
No	Description	Test Method	
1	**Appearance Visual Check** To check the physical properties of material	AIMS 05-02-000 RMS0 40-1	
2	**Drape** To determine the material ability to be draped	RMS 067	
3	**Expansion** To measure the foam material ability to expand prior heat treatment	RMS 025	
4	**Extrusion Rate/Application Time** To measure the extrusion rate of mixed tubing filler	AITM 7.0003	
5	**Fiber Areal Weight** To determine the weight of fiber areal of prepreg material	EN 2559 C I+D-E-242 RMS 040 RMS 058 RMS 067 RMS 060/-1 EN 2329 EN2557	
6	**Fiber Volume Fraction, Void Content** To measure fiber content in percentage of cured sample	ABT 1-0018,EN 2564,ASTM D3171, ASTM D2734, ISO 1172	
7	**Film Mass Per Unit Area** To determine the mass of designated area of film adhesive	EN 3009, EN 2559 EN2329 ABT 1-0030 ABT 1-0039 BS EN 2557 : 1997	
8	**Foaming Ability** To determine the ability of the material to foam by percentage	ABR 2-0050	
9	**Gel Time** To determine gellation duration of prepreg material	AiTM3-0004,RMS 040/-1,RMS 082 RMS 060/-1,ABT1-0014,BMS 8-301	
11	**Metal Mesh Areal Weight** To determine the weight of metal mesh areal	EN 2331	
12	**Nonvolatile matter** To determine there is no volatile matter in the chemical	RIMS 1017 ASTM D 1353	

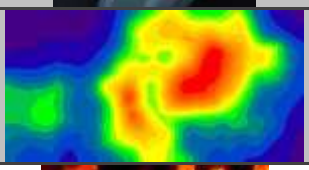
No	Description	Test Method	
13	**Pot Life** To determine mixture pot life prior gellation	RMS 003 ISO 2431/ISO 9514	
15	**Resin Content** To determine resin content by percentage of prepreg	EN 2331 EN 2559 C I+D-E-242 RMS 040 RMS 082 RMS 060/-1 ABT 1-0016 BSS7336	
16	**Resin Flow** To determine the flow percentage of prepreg materials	EN 2560 RMS 040 RMS 082 RMS 060/-1	
17	**Tackiness Minimum/Maximum** To measure the tackiness properties of prepreg material	ABR3-0067 AIMS 05-02-000 RMS 082 ABT1-0015	
18	**Viscosity** To determine the resistance of a fluid to shear forces and hence to flow	AiTM3.0004, ISO 2431	
19	**Volatile Content** To determine volatile content by percentage of prepreg material	ASTM D3530 I+D-E-242 EN 2330 EN 2558 RMS 040 RMS 058 RMS 067 RMS 082 RMS 060/-1 ABT 1-0031	
22	**Scratch Resistance** To establish the coating resistance by scratching	ISO1518	
23	**Flexibility (cylindrical mandrel)** To assess the flexibility and adhesive of coating properties under bending stresses	ISO 1519	
25	**Drying Time** To determine the paint drying time	AITM2-0011, ISO 1517	
26	**Resistance to Water** To check the paint resistance to water	ISO 2812/2	
28	**Assembly Time** To determine period of time after mixing before fastened	AITM 1.0036	

No	Description	Test Method	
29	**Cure Time** To check Sealant hardness	AITM1.0033	
31	**Density** To determine the density of specimen	ASTM C271,ISO 845 ASTM D792, ISO 1183	
32	**Water Absorption** To determine the effects of immersion in liquid chemicals	ISO 175, EN 2823	
33	**Glass Content** Specification for the design and construction of vessels and storage tanks in reinforced plastics	BS4994	
34	**Ignition Loss** To determine the ignition loss of cured reinforced resins	ASTM D2584	
35	**Oxygen Permeability** To determination of the steady-state rate of transmission of oxygen gas through plastics	ASTM D3985	
36	**Water Vapor Permeability** Determination of water vapor transmission (WVT) of materials through	ASTM E96	

Physical Testing

No	Description	Test Method	
1	**Determination Stability Under Heat** To determine the temperature of deflection under load of plastics	ISO 75-2	
2	**High Performance Liquid Chromatography (HPLC)** To analyze component in material by liquid chromatography	AiTM3.0001, ABT 1-0023	
3	**Infra Red (IR)** To determine the uncured resin chemical structure by infrared analysis	AITM 3-0003C, ABT 1-0024 RIMS 1017,RIMS1027,ASTM E 1252	
5	**Glass Transition Temperature** To determine of the glass transition temperature of the material	ABT 1-0028,SACMA SRM 18,AiTM 1-0003,ASTM D7028, ASTM E1640	

No	Description	Test Method	
7	**Composition Analysis, TGA** To determine the amount of highly volatile matter, medium volatile matter, combustible material, and ash content of compounds	ASTM E1131	
8	**Differential Scanning Calorimetry (DSC)** To determine curing characteristic and glass transition temperature of non metallic material	AiTM 3.0002, I+D-E-242,ASTM D3418,ASTM E1269	
9	**Energy Dispersive Spectroscopy, EDS** To quantifying the elemental composition of phases in a microstructure	ASTM E1508	
10	**Surface Roughness** Surface roughness, often shortened to roughness, is a measure of the texture of a surface	JIS '01	
11	**Thickness Measurement** A scanning electron microscope (SEM) is a type of electron microscope that produces images of a sample by scanning it with a focused beam of electrons	Scanning Electron Microscope, SEM	
14	**Energy Dispersive X-Ray** An analytical technique used for the elemental analysis or chemical characterization of a sample	**EDX**	
16	**Hardness test at Shore D** To determine indentation hardness of material	ASTM D2240-03	
17	**Barcol Hardness** To determine indentation hardness of both reinforced and non-reinforced rigid plastics	ASTM D2583, DIN 53505	
18	**Rockwell Hardness** Determination of the Rockwell hardness and the Rockwell superficial hardness of metallic materials	ASTM E18	
19	**Water Absorption and Diffusivity** Determination of moisture absorption or desorption properties in the through-the-thickness direction	ASTM D5229,ISO 62	
20	**Dimensional Stability** Determination of the changes of linear dimensions which occur when the test specimens (100 mm x 100 mm x 25 mm) have been subjected to specified environments	ISO 2796	

No	Description	Test Method	
21	**Colour Difference** The instrumental measurement of specimens resulting in color coordinates and color difference values by using a tristimulus colorimeter	ASTM E1347	
22	**Thermal Expansion Coefficient** Determines the technical coefficient of linear thermal expansion of solid materials using thermomechanical analysis techniques	ASTM E831	
23	**Heat Distortion Temperature** Determination of Dimensional Stability at Elevated Temperatures with Flexural Load and with Compressive Load	DIN 53424	

Product Testing

No	Description	Test Method	
1	**Enzymatic Radiator Cleaner** To determine the effectiveness of microorganism enzymatic on car radiator	Custom test	
2	**Leak Bottle Test** To check the bottle leakage under 260mmHg vacuum pressure	Custom test	
3	**Automotive Door Hinge** This purpose of this testing is to check the breaking strength of the specimen when loaded in longitudinal and transverse direction.	SAE J934	
4	**Chemical reaction on sheet-steel Test** Representative sheet-steel specimens are measured, cleaned, and weighed for period of time. Then specimens are rinsed, dried, and reweighed after the timed exposure.	Custom test	

For other test no listed, please contact us at testing@ctla.asia or azizi@ctla.asia

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