MICROTEX COMPOSITES

X1 - 120

Cosmetic Matrix Epoxy Prepregs

TECHNICAL DATA SHEET

X1 MATRIX SERIES is a thermosetting epoxy matrix series with high cosmetic results[1] and is available in several product variants. X1 matrix exhibit high mechanical properties and, properly postcured, can be used at continuous operating temperatures up to 80°C. Higher not continuous operating temperatures can be supported.

PRODUCT VARIANTS

X1-120: Solvent version, unpigmented

X1-120HM: Hotmelt version

SHELF LIFE

OUT LIFE
28 days @ 21 °C

STORAGE LIFE
12 months @ -18 °C

TYPICAL APPLICATIONS

AUTOMOTIVE

SPORTING GOODS

FEATURES

- GREAT COSMETIC PROPERTIES
- GOOD MECHANICAL PROPERTIES

[1] Where the intended end application is for a cosmetic product, customers are advised to consult a Microtex Composites sales representative for specific advice on fibre selection when placing an order for material.

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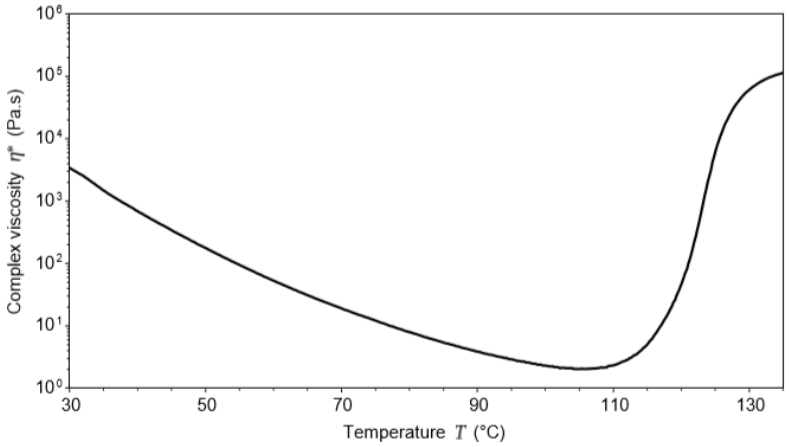
MATRIX PROPERTIES

Cured resin density @ RT: (average value) 1.20 g/cm³.

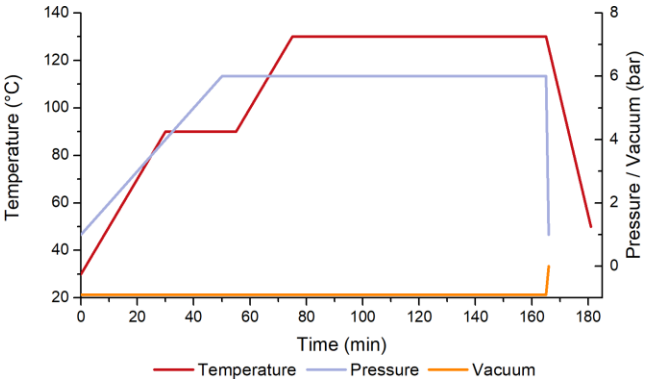
Resin viscosity: ramp rate = 2 °C/min, v = 10 rad/sec.



CURING CONDITIONS

Preliminary Note: The matrix rheology, reaction times and final component surface quality are all affected by the chosen heat up rates. Heating rates are generally related to components size (large and thick components require slow heating rates). The heat up rate selected should avoid large temperature differentials between the component, tool and the heat source. For certain configurations and for most large components, an intermediate dwell can also be introduced into the cure cycle. It will guarantee even temperature distribution throughout the tooling and component. Good temperature control will provide consistent and improved resin flow characteristics during cure. To ensure that the matrix stability is fully developed, no polymerization residual should be present on the products.

Option 1 - Autoclave Cure[2,3]			
Time (min)	**Temp. (°C)**	**Time (min)**	**Pressure (bar)**
0	30	0	1
30	90	10	2
55	90	30	4
75	130	50	6
165	130	165	6
181	50	166	1



2 Temperature must be measured by the lagging thermocouple attached to the part.
3 Vacuum bag pressure: 0.9 bar.

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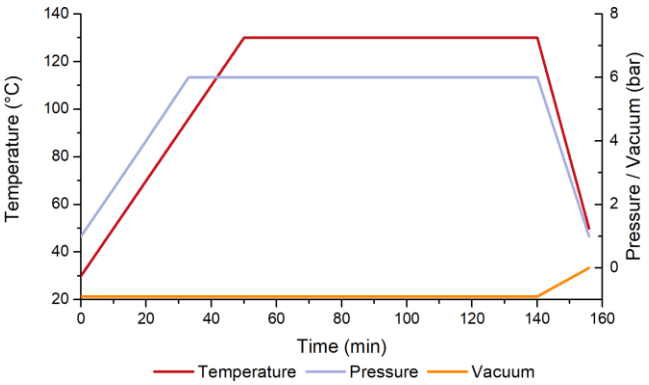
CURING CONDITIONS

Option 2 - Autoclave Cure[4,5]			
Time (min)	**Temp. (°C)**	**Time (min)**	**Pressure (bar)**
0	30	0	1
50	130	10	2.5
90	130	20	4
130	130	33	6
140	130	140	6
156	50	156	1



ALTERNATIVE CURING CYCLES AND Tg's

X1-120			
Cure cycle	**Tg (DSC) (°C)**	**Tg (DMA)* Onset (°C)**	**Tg (DMA)* tanδ (°C)**
8h @ 80°C	95÷100	-	-
6h @ 100°C	100÷105	-	-
60 min @ 120°C	110÷115		
60 min @ 130°C	115÷120	-	-
90 min @ 130°C	120÷125	115	130
Max Wet Tg [7]	-	-	87

* The reported DMA values are obtained from specimens consisting of light supports (*e.g.* 200 gsm carbon fabric).

4 Temperature must be measured by the lagging thermocouple attached to the part.
5 Vacuum bag pressure: 0.9 bar.
6 Wet conditioning: 14 days immersion in water @ 70 °C.

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MECHANICAL PROPERTIES

X1-120 - 90 min @ 130 °C, 6 bar		GG245T-42[7]	GG290P-37[8]	GG380T-42[9]	GG630T-34[10]
Property	**Test Method**	**Value***			
0° Tensile strength [MPa]	ASTM D3039	707	1188	1062	974
0° Tensile modulus [GPa]		66	74	62	-
0° Tensile Poisson ratio		0.05	-	0.05	-
90° Tensile strength [MPa]		670	1223	1035	815
90° Tensile modulus [GPa]		64	75	62	-
90° Tensile Poisson ratio		0.05	-	0.05	-
0° Compressive strength [MPa]	ASTM D6641	697	682	624	-
0° Compressive modulus [GPa]		63	69	64	-
90° Compressive strength [MPa]		675	613	582	-
90° Compressive modulus [GPa]		66	73	51	-
0° Compressive strength [MPa]	SACMA SRM 1R-94	-	-	-	577
90° Compressive strength [MPa]		-	-	-	548
0° Interlaminar shear strength (ILSS) [MPa]	ASTM D2344	-	61	63	70
0° Flexural strength [MPa]	ASTM D7264 (B METHOD)	1030	-	1048	-
0° Flexural modulus [GPa]		83	-	91	-
90° Flexural strength [MPa]		975	-	978	-
90° Flexural modulus [GPa]		82	-	87	-
0° Flexural strength [MPa]	ASTM D790	-	799	1103	868
0° Flexural modulus [GPa]		-	53	66	-
90° Flexural strength [MPa]		-	829	-	-
90° Flexural modulus [GPa]		-	55	-	-
Mode I Strain Energy release Rate G1c [J/m^2]	ASTM D5528 (MBT METHOD)	-	-	900-1000	724

* Test conditions: room temperature, dry . Normalized values at 55% VF .

[7] Carbon fabric 245 gsm twill 2/2 3K TC, RC 42%.
[8] Carbon fabric 290 gsm plain 24K MR60, RC 37%.
[9] Carbon fabric 380 gsm twill 2/2 12K ZH, RC 42%.
[10] Carbon fabric 630 gsm twill 2/2 12K ZH, RC 34%.

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OTHER PROPERTIES

Citotoxicity: ISO 10993-5 2009: Carbon Laminate - Thickness 1.2 mm[11]

Result: test specimen did not show cytotoxicity effect (skin contact).

Fluid compatibility:

X1-120		
	Carbon Laminate[12]	**Carbon Laminate**[13]
Fluid type	**1 day Absorption @ RT**	**28 days Absorption @ RT**
Fuel Total WEC 2018	+0.013%	+0.056%
Oil Elf Huile HTX 860	-0.089%	+0.569%
Coolant Elf RF1-CO-02	+0.345%	+0.488%

AVAILABILITY

X1-120 series prepregs are available in a wide range of reinforcing fabrics, including carbon, aramid, glass and special fabrics.

STORAGE CONDITIONS

This prepreg should be stored as received in a cool dry place or in a refrigerator.
After removal from refrigerated storage, prepreg should be allowed to reach room temperature before opening the polyethylene bag, thus preventing condensation (a full roll in its packaging can take more than 1 day).

CHARACTERISTIC MARK

Possible shelf-life reduction for prepregs of higher weights (>400 gsm).

PRECAUTIONS FOR USE

The usual precautions when handling uncured resins and fibrous materials should be observed, and a Safety Data Sheet is available for this product.

SDS Reference Codes: X1-120: SIS-402

[11] Various configurations of fibers and fabrics (no painting, glossy painting, matt painting).
[12] Carbon fabric 245 gsm twill 2/2 3K TC, RC 40%; cure cycle 90'@130°C (no painted).
[13] Carbon fabric (glossy painted).

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EXOTHERM RISK

This matrix system can undergo severe exothermic heat up during the curing process if incorrect procedures are followed. Great care must be taken to ensure that safe heating rates, dwell temperatures and lay-up/bagging procedures are properly executed, especially when molding solid laminates with more than 8 mm thickness. The risk of exotherm increases with lay-up thickness and increasing of temperature cure. It is strongly recommended that the user identifies a safe cure cycle through trials that are representative of all the relevant processing parameters. It is also important to recognize that the model or tool material and its thermal mass, combined with the insulating effect of breather/bagging materials can affect the risk of an exotherm.

Please contact our technical department for further information on the exotherm behavior of these systems.

	Exotherm Test 1	**Exotherm Test 2**
Material	GG600T 12K X1-120 - RC 36%	GG600T 12K X1-120 - RC 36%
Final laminate thickness	16 mm	16 mm
Mold	Aluminium	Aluminium
Autoclave Cure Vacuum bag pressure	0.9 bar	0.9 bar
Autoclave Cure Pressure	4 bar	4 bar
Temperature steps:	Ramp 2°/min 20 to 100 °C Isotherm 80’ @ 100 °C	Ramp 2°/min 20 to 110 °C Isotherm 80’ @ 110 °C
Maximum temperature recorded on the part	120 °C	130 °C

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