X4-160

Transparent Epoxy Prepregs

TECHNICAL DATA SHEET

X4-160 MATRIX is a thermosetting epoxy matrix family with process temperatures ranging from 110°C to 160°C with wide curing and processing options.

The system has high cosmetic results[1], high thermal resistance and high Tg.

PRODUCT VARIANTS

X4-160: Solvent version

X4-160HM: Hotmelt version

SHELF LIFE

OUT LIFE
> 4 weeks @ 21 °C
> 8 weeks @ 10 °C

STORAGE LIFE
12 months @ -18 °C

TYPICAL APPLICATIONS

AUTOMOTIVE

SPORTING GOODS

FEATURES

- HIGH COSMETIC PROPERTIES
- HIGH Tg
- HIGH UV RESISTANCE

[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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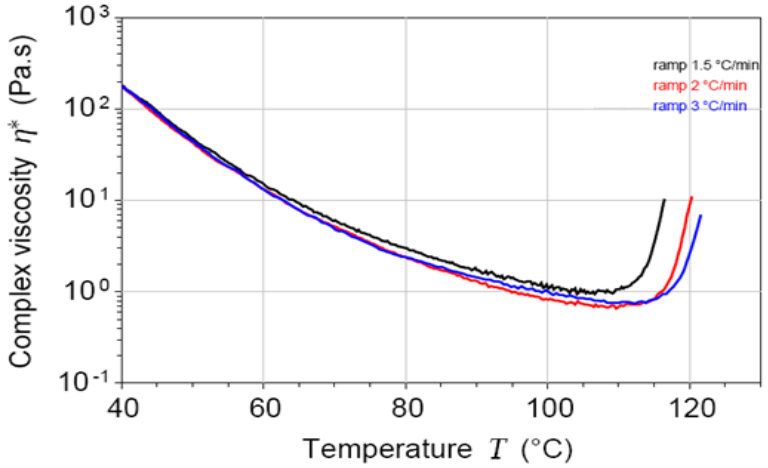
Quality system certified
ISO 9001:2015
by TUV Italia s.r.l.
cert. no. 50 100 12429

Quality system certified
IATF 16949:16
by TUV SUD Management Service GmbH
cert. no. 0365935

MATRIX PROPERTIES

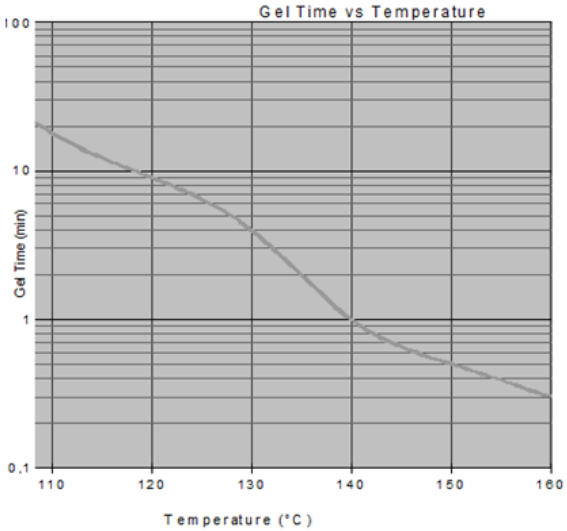
Cured resin density @ RT: (average value) 1.20 g/cm^3.

Resin viscosity: ramp rate = 1.5-2-3 °C/min, strain 0.1 %, frequency 1.0 Hz.



Ramp	1.5 °C/min	2 °C/min	3 °C/min
Minimum Viscosity [Pa·s]	0.94	0.74	0.65
Temperature at minimum viscosity [°C]	106.63	109.40	112.20

Gel Time: (Hot Plate)



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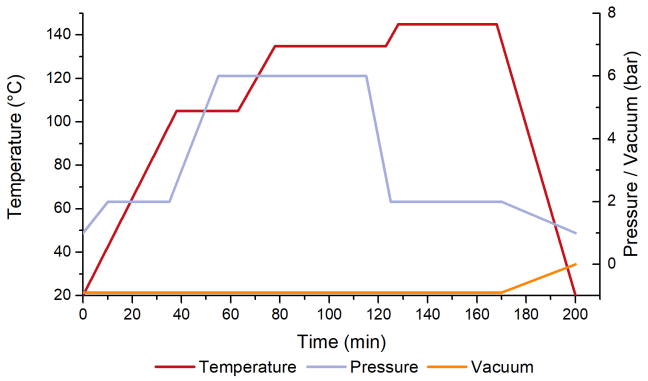
CURING CONDITIONS

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.

Autoclave Cure[2,3,4]			
Time (min)	**Temp. (°C)**	**Time (min)**	**Pressure (bar)**
0	20	0	1
38	105	10	2
63	105	35	2
78	135	55	6
123	135	115	6
128	145	125	2
168	145	170	2
200	20	200	1



ALTERNATIVE CURING CYCLES AND Tg's

Cure cycle	Tg (DSC) (°C)	Tg (DMA) Onset (°C)	Tg (DMA) tanδ (°C)
8 h @ 110 °C	120÷125	-	-
90 min @ 135 °C	-	130	150
60 min @ 130 °C + 40 min @ 145 °C	-	135	160

2 Temperature must be measured by the lagging thermocouple attached to the part.

3 Vacuum bag pressure: 0.9 bar.

4 This system has not adhesion properties and is not suggested for classical sandwich production; For this kind of application please contact our Technical Department.
Suggested Release film: Not perforated release film

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MECHANICAL PROPERTIES

X4-160 - 90 min @ 130 °C, 6 bar		GG200T-40[5]
Property	**Test Method**	**Value***
0° Tensile strength [MPa]	ASTM D3039	775
90° Tensile strength [MPa]		663
0° Compressive strength [MPa]	ASTM D6641	582
90° Compressive strength [MPa]		550
0° Interlaminar shear strength (ILSS) [MPa]	ASTM D2344	66
Mode I Strain Energy release Rate G1c [J/m^2]	ASTM D5528 (MBT METHOD)	320

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

AGING TEST

PV1200 (20 cycles)	PV1303 (5 cycles)	SAE J2020 (100 h)	SAE J2412 (790 h)
Pass [6]	GC 5/5 [6]	GC 5/5 [7]	GC 4/5 [8]

5 HS Carbon fabric, 200 gsm twill 2/2 3K TR30S, RC 40%.
6 X4-160 Carbon laminate; Cure cycle: 90 min @ 130 °C (no painted).
7 X4-160 Carbon laminate; Cure cycle: 90 min @ 130 °C (glossy painting).
8 X4-160HM Carbon laminate; Cure cycle: 90 min @ 130 °C (no 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 high 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.

AVAILABILITY

X4-160 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).

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: X4-160: SDS-416

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