

## MTM<sup>®</sup> 49-3

MTM<sup>®</sup> 49-3 is an 80 to 160 °C (176 to 320 °F) curing, toughened epoxy prepreg resin system developed specifically for the manufacture of structural components.

MTM<sup>®</sup> 49-3 prepregs exhibit excellent ambient and hot mechanical performance combined with good impact resistance after only moderate cure cycles making them ideal for use in the motorsport industry.

### Features and Benefits

- 60 days out life at 21 °C (70 °F)
- 24 Months storage at -18 °C (0 °F)
- Tg 190 °C (374 °F)
- Bonds directly to Nomex core in bodywork type applications
- Versatile cure temperatures

### PHYSICAL PROPERTIES

Property	Method	Units	Result
Cured Resin Density	ASTM D792	g/cm <sup>3</sup>	1.22
Max DMA E' onset Tg	ASTM D7028	°C (°F)	190 (374)

### PRODUCT REINFORCEMENTS AND VARIATIONS

MTM<sup>®</sup> 49-3 prepregs are available in a wide range of reinforcing fabrics and unidirectional tapes, including glass, carbon, aramid and hybrids. Contact Syensqo for available options.

The MTM<sup>®</sup> 49-3 is available in the following variants:

- MTM49-3 High Tg and moderate toughness
- MTM49-3B Black pigmented variant of MTM49-3
- MTM49-3BB Black pigmented variant of MTM49-3 (higher pigment loading)
- MTM49-3BD Black dyed variant of MTM49-3
- MTM49-3e30 Resin contains 30 wt% bio derived content

### STORAGE

Out life* at 21 °C (70 °F)	Up to 60 days
Storage at -18 °C (0 °F)	24 months from date of manufacture

\*Out life refers to accumulated time out of the freezer before the part is cured.

Note: The actual freezer storage life and out life are dependent on a number of factors, including; fibre type, format and application. For certain formats, it may be possible for the storage life and out life to be longer than stated. Please contact our technical support staff for advice.



**RECOMMENDED CURE CYCLE**
**Autoclave Cure**

Segment	Recommendation
Vacuum bag pressure	Apply minimum of 950 mbar (28"Hg)*
Autoclave pressure	Apply min 90 psi† (0.62 MPa) and maintain vacuum
Heating rate	1 to 3 °C (1.8 to 5.4 °F)/minute
Recommend cure cycle	90 minutes at 135 °C +5 °C/-0 °C (275 °F, +9 °F/-0 °F)**
Cool down	Maximum of 3 °C (5.4 °F)/minute to 60 °C (140 °F)

\*This is the ideal vacuum level, however, it is recognised that it is not always possible to attain.

† If producing sandwich panels, apply the maximum pressure allowable for the honeycomb type.

\*\*This is an industry standard cure cycle, however it is possible to cure at 135°C in a shorter time. Consult our technical support staff for further information.

**ALTERNATE CURE CYCLES**

MTM49-3 can also be press cured, contact Syensqo for recommendations.

Dwell Temperature	Dwell time
70 °C (158 °F)	24 hours
80 °C (176 °F)	16 hours
100 °C (212 °F)	4 hours
120 °C (248 °F)	1 hour
140 °C (284 °F)	25 minutes
160 °C (320 °F)	7 minutes

If none of the cure cycles above are suitable, contact Syensqo for further options.

**POST CURE CYCLE**

The recommended free standing post cure cycle for MTM<sup>®</sup> 49-3 is as follows:

Segment	Recommendation
Heating rate	0.3 °C (0.5 °F)/minute
Post cure cycle	2 hours at 180* °C -0/+5 °C (356 °F -0/+9 °F)
Cool down	Maximum of 3 °C (5.4 °F)/minute to 60 °C (140 °F)

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

Notes:

- Parts may be loaded into a pre-heated oven or heated at 3 °C (5.4 °F) /minute to the initial cure temperature.
- Large components should be adequately supported to avoid distortion
- Post-cures from 100 to 200 °C (212 to 392 °F) may be used to suit specific applications. Please consult our technical support staff if you require assistance in determining the correct cure cycle for your application.



**PROPERTIES**
**Cure Cycle Comparison**

Cure Cycle	DMA E' onset Tg*
16 hours at 80 °C (176 °F), dry	95 °C (203 °F)
90 minutes at 135 °C (275 °F), dry	140 °C (284 °F)
Maximum dry Tg	190 °C (374 °F)
Maximum wet Tg**	115 °C (239 °F)

\* Tg data is not applicable for U.S. export control classification or licensing. For export-related information, please contact Syensqo.

\*\* Wet conditioning – 14 days immersion at 70°C (158°F)

**MECHANICAL PROPERTIES OF MTM<sup>®</sup> 49-3**

Cure Cycle: 90 minutes at 135°C (275°F), 6.2 bar (90 psi)

Test Conditions: Room temperature, dry

Properties	Test method	Units	Material		
			MTM49-3/ M46J-124-36 %	MTM49-3/ T1000 GB -124-36%	MTM49-3/ T800 GB -124-36%
0° Tensile strength	ASTM D3039	MPa (ksi)	1709 (248)	2999 (435)	2211 (321)
0° Tensile modulus		GPa (msi)	235 (34.1)	155 (22.5)	149 (21.6)
90° Tensile strength		MPa (ksi)	25.8 (3.74)	19.3 (2.80)	-
90° Tensile modulus		GPa (msi)	6.87 (1.00)	6.80 (0.99)	-
0° Compressive strength	SACMA SRM01R94	MPa (ksi)	875 (127)	1431 (208)	1396 (202)
0° Compressive modulus		GPa (msi)	201 (29.2)	127 (18.4)	122 (17.7)
90° Compressive strength		MPa (ksi)	189 (27.4)	199 (28.9)	-
90° Compressive modulus		GPa (msi)	7.59 (1.10)	7.51 (1.09)	-
In-plane shear strength (IPSS)	ASTM D3518	MPa (ksi)	69.0 (10.0)	132 (19.1)	107 (15.5)
In-plane shear modulus (IPSM)		GPa (msi)	4.09 (0.59)	3.09 (0.45)	3.10 (0.45)
0° Interlaminar shear strength (ILSS)	ASTM D2344	MPa (ksi)	88.2 (12.8)	105 (15.2)	107 (15.5)

Data normalised to 55%Vf except for ILSS and IPSS & IPSM.



Cure Cycle: 90 minutes at 135°C (275°F), 6.2 bar (90 psi)

Test Conditions: Room temperature, dry

Properties	Test method	Units	Material		
			MTM49-3 42% 6K M46J 2X2T 200 GSM	MTM49-3 42% 12K T1000 5HS 283 GSM	MTM49-3 42% 6K T800HB 2X2T 200 GSM
0° Tensile strength	ASTM D3039	MPa (ksi)	590 (85.6)	1065 (155)	870 (126.2)
0° Tensile modulus		GPa (msi)	104 (15.1)	72.0 (10.4)	67.0 (9.72)
90° Tensile strength		MPa (ksi)	573 (83.1)	1035 (150)	834 (121)
90° Tensile modulus		GPa (msi)	102 (14.8)	70.0 (10.2)	65.0 (9.43)
0° Compressive strength	SACMA SRM01R94	MPa (ksi)	400 (58.0)	640 (92.8)	630 (91.3)
0° Compressive modulus		GPa (msi)	89.0 (12.9)	59.0 (8.56)	59.0 (8.56)
90° Compressive strength		MPa (ksi)	370 (53.7)	610 (88.5)	580 (84.1)
90° Compressive modulus		GPa (msi)	87.0 (12.6)	57.0 (8.27)	57.0 (8.27)
In-plane shear strength (IPSS)	ASTM D3518	MPa (ksi)	82.7 (12.0)	108 (15.7)	123 (17.8)
In-plane shear modulus (IPSM)		GPa (msi)	3.98 (0.58)	3.74 (0.54)	4.39 (0.64)
0° Interlaminar shear strength (ILSS)	ASTM D2344	MPa (ksi)	50.2 (7.28)	64.2 (9.31)	78.3 (11.4)

Data normalised to 48%Vf except for ILSS and IPSS &amp; IPSM

**RELATED DOCUMENTS**

- De-bulking guidelines (TDS1036)
- Autoclave processing lay-up and bagging guidelines (TDS1037)



**EXOTHERM**

MTM<sup>®</sup> 49-3 prepregs are reactive formulations which can undergo severe exothermic heat up during the initial curing process if incorrect curing procedures are followed.

Great care must be taken to ensure that safe heating rates, dwell temperatures and lay-up/bagging procedures are adhered to, especially when moulding solid laminates in excess of 10mm (0.4in) thickness. The risk of exotherm increases with lay-up thickness and increasing cure temperature. It is strongly recommended that trials, representative of all the relevant circumstances, are carried out by the user to allow a safe cure cycle to be specified. It is also important to recognise that the model or tool material and its thermal mass, combined with the insulating effect of breather/bagging materials can affect the risk of exotherm in particular cases.

**HEALTH & SAFETY**

Please refer to the product SDS for safe handling, personal protective equipment recommendations and disposal considerations.

