MTM® 83

MTM® 83 is a 125 to 135°C (257 to 275°F) curing phenolic resin matrix that exhibits excellent fire, smoke and toxicity performance to FAR25.853 and has good mechanical properties.

MTM83 is a low tack system that can be supplied on a range of fibres, and is particularly suited to the production of cross-plied 0/90 laminates from unidirectional prepregs.

MTM83 is suitable for aircraft interiors, motorsport, automotive and mass transit applications where the operating temperature is within the range -55 to 80°C (-67 to 176°F).

Features and Benefits

- 3 to 4 days out life at 21°C (70°F) with flow life in excess of 30 days
- 12 months storage at -18°C (0°F)
- Process by autoclave, oven vacuum bag or press moulding
- Typical cure cycle 90minutes at 125°C (257°F)
- Maximum service temperature at 80°C (176°F)
- Excellent fire, smoke and toxicity performance
- Ideal for unidirectional prepreg production

RELATED DOCUMENTS

- De-bulking guidelines (TDS1036)
- Phenolic prepreg lay-up and bagging guidelines (TDS1042)
- Autoclave processing lay-up and bagging guidelines (TDS1037)

CURE CYCLE

Autoclave cure

Phenolic resins contain volatile materials and can produce water during polymerisation. To avoid problems with blistering and delamination, it is recommended that the laminate be allowed to 'breath' or 'rest' during processing, thereby allowing some of the trapped water to be released. Note, however, that this process will only release water generated up to that point, and that more water will be generated as the resin continues to cure.

Vacuum bag pressure	Minimum of 980mbar (29"Hg)* †
Autoclave pressure	3 to 6bar (45 to 90psi)**
Ramp rate	2 to 5°C (3.6 to 9°F)/minute
Recommended cure cycle	90 minutes at 125°C, +5/-0°C (257°F, +9/-0°F)
Cool down	Maximum of 10°C (18°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 in doubt, please contact our technical support staff for advice.

†If manufacturing complex shapes, the vacuum can be vented when the pressure reaches 2 bar (30psi) if there is a perceived risk of a bag burst and hence the need to avoid pressurised air going down the vacuum line.

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

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PRESS CURE

Mould tools should restrain the flow sufficiently under moulding conditions to avoid fibre distortion.

Press pressure	3 to 4bar (45 to 60 psi)
Ramp rate	2 to 5°C (3.6 to 9°F)/minute
Recommended cure cycle	90 minutes at 125°C, +5/-0°C (257°F, +9/-0°F)
Cool down	Maximum of 3°C (5.4°F)/minutes to 60°C (140°F)

Notes:

Demoulding at the cure temperature may be possible if the tooling is suitably designed. A specific trial is recommended.

To allow some of the water generated by the curing reaction to be released, relax the pressure prior to reaching the gel point. However, this process will only release water generated up to that point, and that more water will e generated as the resin continues to cure.

ALTERNATIVE CURE CYCLES

The following cure cycles are offered as a guide.

Time	Temperature
75 minutes	135°C (275°F)

PHYSICAL PROPERTIES

Test	Sample conditions	Results
Cured resin density	90 minutes at 125°C (257°F)	1.25 g/cm^3
DMA E' onset Tg		90°C (194°F)

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MECHANICAL PROPERTIES

Material: MTM83/GF0100 (7781 style) 40%RW

Cure cycle: 90 minutes at 125°C (257°F)

Property	Test condition	Test Method	Units	Autoclave 90psi (6bar)	Oven vacuum bag
0° Flexural strength	RT, dry	CRAG 200	MPa (ksi)	633 (91.8)	645 (93.5)
	RT, wet*			589 (85.4)	584 (84.7)
	50°C (122°F), dry			545 (79.0)	548 (79.5)
	50°C (122°F), wet			557 (80.8)	539 (78.2)
	80°C (176°F), dry			430 (62.4)	327 (47.4)
	80°C (176°F), wet			460 (66.7)	473 (68.6)
0° Flexural modulus	RT, dry		GPa (msi)	23.0 (3.34)	23.0 (3.34)
	RT, wet			21.0 (3.05)	23.0 (3.34)
	50°C (122°F), dry			20.0 (2.90)	21.0 (3.05)
	50°C (122°F), wet			21.0 (3.05)	21.0 (3.05)
	80°C (176°F), dry			19.0 (2.76)	18.0 (2.61)
	80°C (176°F), wet			21.0 (3.05)	23.0 (3.34)
0° Interlaminar shear strength (ILSS)	RT, dry	ASTM D2344	MPa (ksi)	50.0 (7.25)	50.0 (7.25)
	RT, wet			53.0 (7.69)	50.0 (7.25)
	50°C (122°F), dry			46.0 (6.67)	37.0 (5.37)
	50°C (122°F), wet			47.0 (6.82)	41.0 (5.95)
	80°C (176°F), dry			30.0 (4.35)	18.0 (2.61)
	80°C (176°F), wet			31.0 (4.50)	26.0 (3.77)

*Wet – 14 days in water at 70°C (158°F).

Data normalised to 40% Vf.

Material: MTM83/T700 - 210g/m 38%RW

Cure method: Autoclave

Cure cycle: 90 minutes at 125°C (257°F), 60 psi (4bar)

Property	Test condition	Test Method	Units	Result
0° Flexural strength	RT, dry	CRAG 200	MPa (ksi)	1663 (241.1)
0° Flexural modulus			GPa (msi)	139 (20.2)

Data normalised to 60% Vf.

Material: MTM83/E-glass UD - 210g/m 29%RW

Cure method: Autoclave

Cure cycle: 90 minutes at 125°C (257°F), 45 psi (3bar)

Property	Test condition	Test Method	Units	Result
0° Flexural strength	RT, dry	CRAG 200	MPa (ksi)	1260 (182.7)
0° Flexural modulus			GPa (msi)	55 (7.98)
0° Interlaminar shear strength (ILSS)		ASTM D2344	MPa (ksi)	68 (9.86)

Data normalised to 60% Vf.

FIRE, SMOKE AND TOXICITY PROPERTIES

Material: MTM83/GF0100 (7781 style) 40%RW 1ply

Cure method: Oven vacuum bag

Cure: 90 minutes at 125°C (257°F)

Test			Result
60 second burn test	After flame	0 seconds	Pass
	Burn length	38mm (1.5in)	
Smoke density	DS	0	Pass
Heat release	Peak HRR	29kW/m^2	Pass
	2 minute total heat release	19	

AVAILABILITY

MTM83S prepregs are available with a wide range of reinforcements

STORAGE

Out life* at 21°C (70°F)	3 to 4 day
Storage at -18°C (0°F)	12 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.

EXOTHERM

MTM® 83 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 MSDS for safe handling, personal protective equipment recommendations and disposal considerations.