



PRIME™ 20ULV

Ultra Low Viscosity Epoxy Infusion System

- **Fast infusion times**
- **Gives higher quality, lower cost parts**
- **Excellent toughness at ambient only cures**
- **Ideal for production boatbuilders, who want to combine the use of polyester gelcoats with epoxy backing laminates**

Introduction

PRIME™ 20ULV is an ultra low viscosity epoxy infusion system, which utilises PRIME™ 20LV resin with a slow (ULV) hardener.

2. Experimental

2.1 Thermal Properties

- Thermal properties were measured by either DSC or DMA according to Work Instructions WI-TAN01 and WI-TAN04.

2.2 Viscosity

- The viscosities of the samples were tested with the CAP2000LT.

Hardener component settings; Cone 1, 2000rpm @ 20 & 25°C for 30 secs.

Mixed system settings; Cone 1, 900rpm @ 20°C & 25°C for 15 secs.

2.3 150g Geltime in Water

- 150 g geltimes were determined using a Tecam geltimer at 25°C according to Work Instruction WI-TMF1.

2.4 Mechanical Properties

- Neat resin casts were manufactured air-free between two glass plates separated by 5 mm o-ring according to WI-CP13.
- Samples were left to cure at ambient for 24hrs prior to a 16hr @ 50C post cure, cut and then tested in accordance with the following standards:

Test Type	Standard
Tensile strength, modulus and elongation.	ISO 527 - 2 : 1996
Charpy impact strength	ISO 179/ea

Table 1 - Test standards for neat resin casts.

2.5 Laminate Mechanical Properties

- Laminates were infused using RE301H8 as a carrier, panels were left to cure at ambient for 24hrs prior to a 16hr @ 50C post cure.
- Samples are cut and tested in accordance with the following standards:

Test Type	Standard
Tensile strength and modulus	BS2782 method 320
Compressive strength	BS EN ISO 14126
Compressive modulus	ISO 14126
ILSS	ASTM D2344

3. Results and Discussion

3.1 Component properties

Property	PRIME™ 20LV Resin	Slow Hardener (ULV)
Mix ratio by weight	100	19
Mix ratio by volume	100	23.5
Viscosity @ 20°C (cP)	1010-1070	4
Viscosity @ 25°C (cP)	600-640	3
Viscosity @ 30°C (cP)	390-410	N/A
Shelf Life (months)	12	12
Colour (Gardner)	1	1
Mixed Colour (Gardner)	1	2
Density (g/cm³)	1.123	0.885
Mixed density (g/cm³)	N/A	1.076
Mixed density (g/cm³)	Xi, N	C

3.2 Working properties

Property	PRIME™ 20ULV
Initial Mixed Viscosity @ 20°C (cP)	152
Initial Mixed Viscosity @ 25°C (cP)	139
Geltime – Tecam 150g in water @ 25°C (hrs:mins)	3:55
Pot-life 500g in air @ 20°C (hrs/min)	1:35
Latest flow under vacuum (theoretical, thin film, hr:min)	6:00
Earliest vacuum off time (theoretical, thin film, hrs:min)	12:00
Demould time (hrs:min)	23:00

3.3 Cured system thermal properties

Property	24 hours @ RT + 16 hours @ 50°C	24 hours @ RT + 10 hours @ 70°C
Tg, peak tan δ – DMA	81.0	91
Tg1 Ult, °C – DMA	86-88	86-88
Tg1, °C – DMA	72	80
Est HDT, °C	66	76
Tg2 Ult, °C – DSC	86	91
Tg2, °C – DSC	68	84
ΔH, J/g – DSC	8.6	0

3.4 Cured system mechanical properties (matrix), cured 24 hours @ 21°C + 16 hours @ 50°C

Property	PRIME™ 20ULV
Tensile strength, MPa	71.2
Tensile modulus, GPa	2.98
Strain to failure, %	6.28
Moisture absorption, %	TBC
Cured density, (g/cm³)	1.14
Linear shrinkage, %	TBC
Barcol hardness	25

3.5 Cured system mechanical properties (matrix), various cures

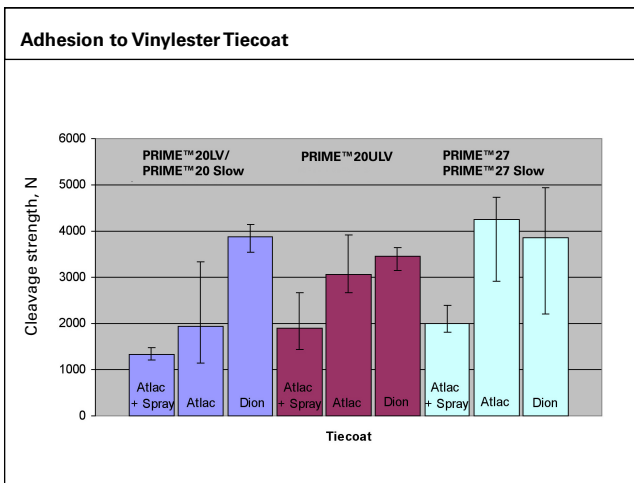
	3 days @ 21°C	7 days @ 21°C	24 hours @ 21°C +16 hours @ 50°C
Charpy impact strength, kJ/m²	1.78	1.82	6.79

3.6 Cured laminate properties (10 plies RE301H8), cured 24 hours @ 21°C + 16 hours @ 50°C

Property	PRIME™ 20ULV
Compressive strength, MPa	426
Compressive modulus, GPa	25.1
ILSS, MPa	48.4
ILSS wet retention, %	TBC

3.7 Adhesion to vinylester tiecoat

Cleavage strength achieved after infusing the products detailed through a laminate consisting of 3 plies of WRE 581 over the tiecoats described. Panels cured 24 hours @ 21°C + 16 hours @ 50°C.





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