PRISM® EP2400

PRISM® EP2400 is a single part, 180°C (356°F) curing, toughened liquid epoxy resin system offering simple and flexible processing with the damage tolerance required for composite primary structure.

The value of resin infusion is the ability to design complex geometric parts while leveraging a unitized structure which ultimately leads to a reduction in weight, lower part counts and the elimination of many post-manufacturing processes. The growth in resin infusion drives the demand for new resin and textile solutions which exhibit increased toughness and improved processability.

Features and Benefits

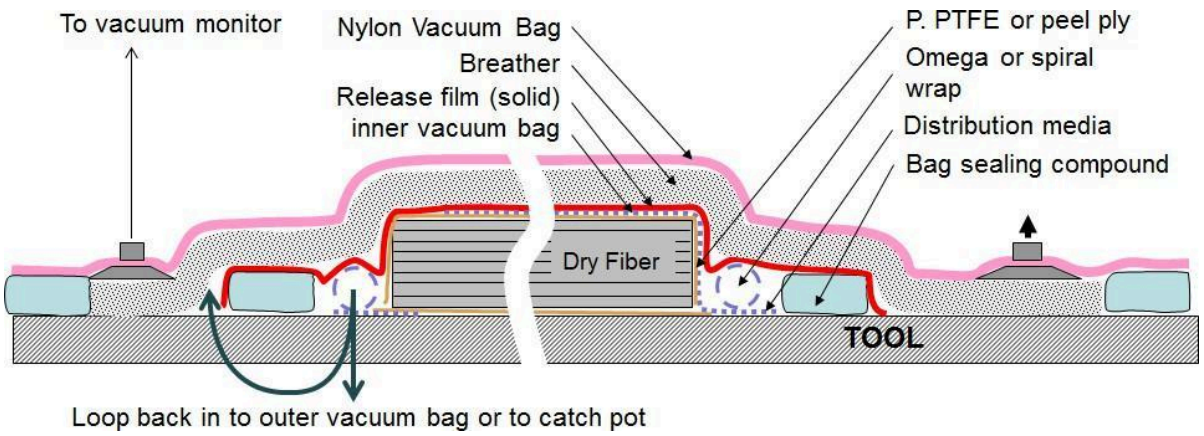
- One-part toughened resin system specifically developed for ease of processing primary aircraft structures
- Suitable for processing via RTM, VaRTM, CAPRI
- Two-hour 180°C (356°F) cure giving service temperature of >120°C (>248°F)
- Exceptional "wet" Tg of 163°C (325°F) on neat resin
- Injectable at 70°C (158°F)
- Wide processing window; 10 hours at <300cP at 100°C (212°F)
- <100cP initial injection viscosity
- Minimum viscosity of 20 cP at 120°C (248°F)
- Excellent compression strength and damage tolerance
- Compliance with FAR/JAR Flammability, Smoke and Toxicity
- High strain enhances fatigue and microcrack resistance
- Shelf-life >12 months at -18°C (0°F) and out-life >28 days at 22°C (72°F)
- Low reactivity; Non UN 4.1 with special shipping requirements

APPLICATIONS

Primary structure applications requiring superior toughness, low viscosity and extended pot-life:

- Stringer Stiffened Outer and Central Wing Box's
- Fuselage and Window Frames
- Pressure Bulkheads
- Passenger and Cargo Door Structures
- Engine Containment Cases
- Hinge/Brackets/Fittings

BAGGING



Note: Resin also compatible with semi-permeable membranes

SUGGESTED PROCESSING PARAMETERS[1]

- Preheat the resin to 60°C (140°F) in its container for transfer to the resin pot.
- Degas the resin for 30 – 45 minutes while heating to 90°C (194°F).
- Preheat the tool to 100°C (212°F) for optimized flow or to 120°C (248°F) for parts having complex geometry.
- Maintaining resin pot temperature of 90°C (194°F) and tool temperature of 100 – 120°C (212 – 248°F), begin resin infusion.
- Depending on the infusion process adopted, tooling design and part geometry/complexity, sufficient time, vacuum and or pressure should be established to ensure complete fiber wetting.
- Once the tool is filled with resin and the inlet/outlet gates/vents are closed, increase tool temperature at 2°C /minute (4°F /minute) to 180°C (356°F). Dwell at 180°C (356°F) for 120 minutes.
- Allow tool to cool to 60°C (140°F) or below at < 5°C /minute (< 9°F /minute) before releasing part from tool.

[1] The above cure parameters have been defined using the viscosity profile information and Syensqo's experience of molding development and demonstration panels. Some parameters may require adjustment depending upon the nature of the part being molded and the equipment being used.

For larger or thicker parts, some parameters may require adjustment to avoid the risk of exotherm. Different injection equipment may require alternative conditions for degassing.

CURE CYCLE

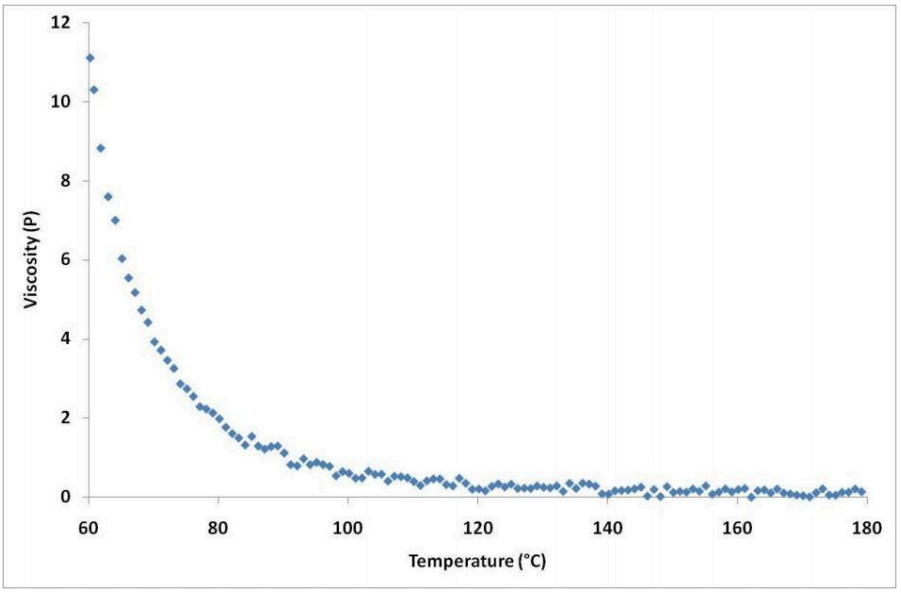
Parameter	Units
Vacuum	<10 mbar abs
Ramp rate	2 ± 1°C/minute
Cure temperature	180 ± 3°C
Hold time	180 - 210 minutes
Cooling	to below 60°C

NEAT RESIN CHARACTERISTICS

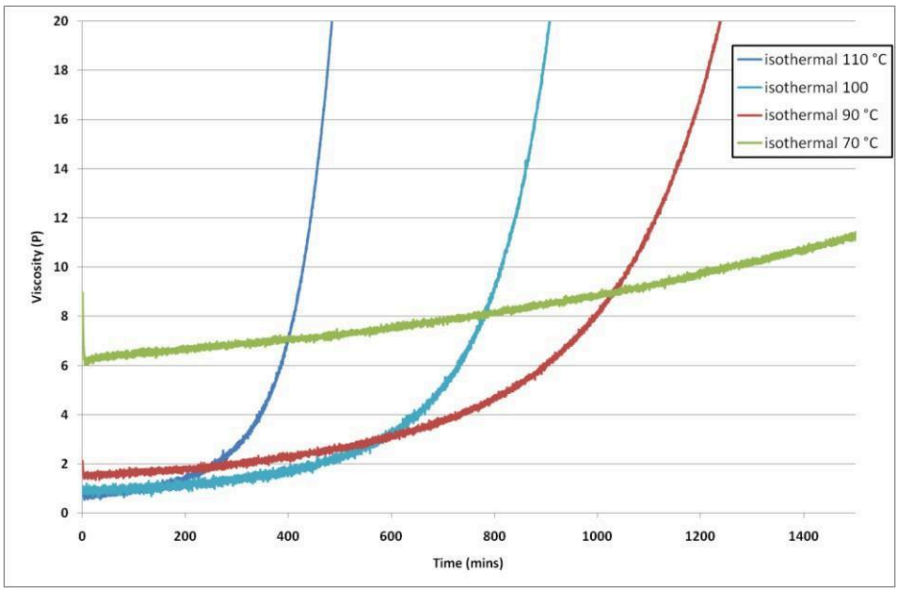
Property	Specimen Conditioning	Value
Cured resin density, g/cm^3(lb/ft^3)	Room Temperature, Dry	1.22 (76.16)
Tg, °C (°F)*	Room Temperature, Dry	179 (354)
Tg, °C (°F)*	Wet, 48 Hour Water Boil	163 (325)

* NOTE: Tg data is not applicable for U.S. export control classification or licensing. For export-related information please contact us.

VISCOSITY PROFILES



PRISM EP2400 Viscosity Sweep to 180°C (356°F) at 2°C min -1



PRISM EP2400 Isothermal Viscosity Profiles Time to 300cP at 100°C = 10hrs

MECHANICAL PROPERTIES

Mechanical Properties: PRISM EP2400 3K T300 PW Woven Carbon Fabric[1]

Property	Test Method	Condition	3K T300 PW
Compression strength[1] 0/90, MPa (ksi)	ASTM D695	Dry 23°C (73°F)	802 (116)
Compression strength[1] 0/90, MPa (ksi)	ASTM D695	Wet[2] 82°C (180°F)	528 (76.6)
Compression modulus[1] 0/90, GPa (msi)	ASTM D695	Dry -55°C (-67°F)	62 (9.0)
Compression modulus[1] 0/90, GPa (msi)	ASTM D695	Wet[2] 82°C (180°F)	61 (8.8)
Notched compression strength1 quasi-isotropic, MPa (ksi)	ASTM D6484	Dry 23°C (73°F)	301 (43.6)
Notched compression strength1 quasi-isotropic, MPa (ksi)	ASTM D6484	Wet[2] 82°C (180°F)	230 (33.4)
In-plane shear strength +45/-45, MPa(ksi)	ASTM D3518	Dry 23°C (73°F)	118 (17.1)
In-plane shear modulus +45/-45, GPa (msi)	ASTM D3518	Dry 23°C (73°F)	4.4 (0.63)
In-plane shear modulus +45/-45, GPa (msi)	ASTM D3518	Wet[3] 23°C (73°F)	4.1 (0.60)
Apparent interlaminar shear strength 0/90, MPa (ksi)	ASTM D2344	Dry 23°C (73°F)	79 (11.5)
Compression after impact (CAI)1 30 J impact quasi-isotropic, MPa (ksi)	ASTM D7137	Dry 23°C (73°F)	217 (31.5)
Indent depth 30 J impact quasi-isotropic, mm (in)	ASTM D7137	Dry 23°C (73°F)	1.8 (0.071)
Delamination area quasi-isotropic, mm^2 (in^2)	ASTM D7137	Dry 23°C (73°F)	1224 (1.90)

[1] Normalized to 60% fiber volume

[2] 14 day water soak at 72°C (162°F)

[3] 6 day MEK soak at 23°C (73°F)

Mechanical Properties: PRISM EP2400 (Development Batch) 12K HTS40 536gsm BX NCF

Property	Test Method	Condition	12K HTS40 536gsm BX NCF
Unnotched Tensile Strength, MPa (ksi)	EN 6035	Dry 23°C (73°F)	756(109.6)
Unnotched Tensile Modulus, MPa (ksi)	EN 6035	Dry 23°C (73°F)	58(8.4)
Notched Tensile Strength, MPa (ksi)	EN 6035	Dry 23°C (73°F)	440(63.8)
Unnotched Comp Strength, MPa (ksi)	EN 6036	Dry 23°C (73°F)	595(86.2)
Unnotched Comp Modulus, GPa (msi)	EN 6036	Dry 23°C (73°F)	54(7.8)
Notched Comp Strength, MPa (ksi)	EN 6036	Dry 23°C (73°F)	283 (41.0)
Notched Comp Strength, MPa (ksi)	EN 6036	Wet[2] 82°C (180°F)	242(35.1)
BBS Strength (Ult.), MPa (ksi)	EN 6037	Dry 23°C (73°F)	993(144.0)
CAI (30J)	EN 6038	Dry 23°C (73°F)	216 (31.3)

[1] Normalized to 60% fiber volume

[2] 14 day water soak at 72°C (162°F)

PACKAGING

Available in 10 kg tins.

STORAGE

Storage Life is 365 days minimum from date of manufacture stored at -18°C or below, in a sealed container; Out life is 30 days if stored at 23°C.

EXOTHERM

PRISM® EP2400 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 consideration