

> CYCOM[®] 823 RTM RESIN SYSTEM

TECHNICAL DATA SHEET



DESCRIPTION

CYCOM[®] 823 RTM is a liquid epoxy resin system. It is primarily available as a one-part system, with one working week out-life at room temperature so as to remove the requirement for customers to carry out resin mixing and its associated quality control processes. Its frozen storage shelf-life is 6 months at 0°F (-18°C). If extended ambient storage is required then the resin could be supplied as a two-part system.

CYCOM 823 RTM's viscosity is low enough at room temperature to allow injection without having to heat either the resin or the transfer pipework. When the resin is heated to the cure temperature its viscosity is further reduced, helping to ensure full wet-out of the reinforcing fibers.

CYCOM 823 RTM is fully cured after one hour at 255°F (125°C) giving a continuous dry service performance of 230°F (110°C) and a continuous hot/wet service performance of 195°F (90°C).

CYCOM 823 RTM neat resin has high elongation, high G_{IC} and high K_{IC} values, all of which are indicative of a tough material.

CYCOM 823 RTM is compatible with the usual range of reinforcing fibers utilized for the manufacture of composite components, i.e., carbon, glass, aramid, etc.

For reinforcement preforming operations a fully compatible binder system, CYCOM[®] 790 RTM has been developed for use with CYCOM 823 RTM. The binder is available pre-coated onto fabrics of the customers' choice. A separate datasheet for CYCOM 790 is available on request.

FEATURES & BENEFITS

- Available as a one- or two-part system
- 4 – 5 day out-life at room temperature, indefinite as a two-part system
- Six-month shelf-life at 0°F (-18°C)
- Room temperature injectable
- 250 cps initial injection viscosity
- <20 cps minimum viscosity
- One hour at 255°F (125°C) cure
- 230°F (110°C) continuous dry service performance
- 195°F (90°C) continuous hot/wet service performance
- High neat resin toughness
- Fully compatible toughness enhancing binder, CYCOM 790 RTM, available

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CHARACTERISTICS

Viscosity Data

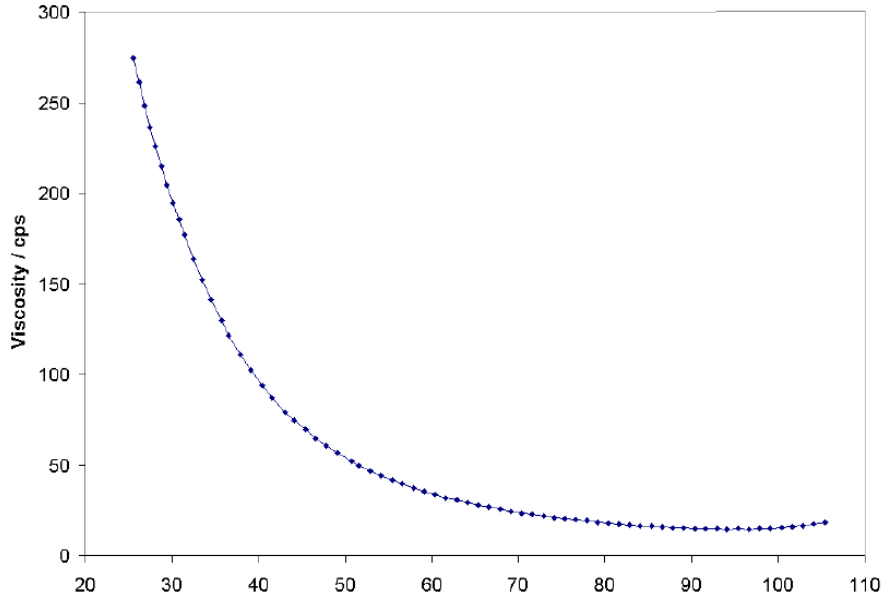


Figure 1 | CYCOM 823 RTM Room Temperature Out-Life
Initial viscosity = 250 cps, Time below 500 cps = 4 days at room temperature
Time below 1000 cps (gel) > 7 days at room temperature

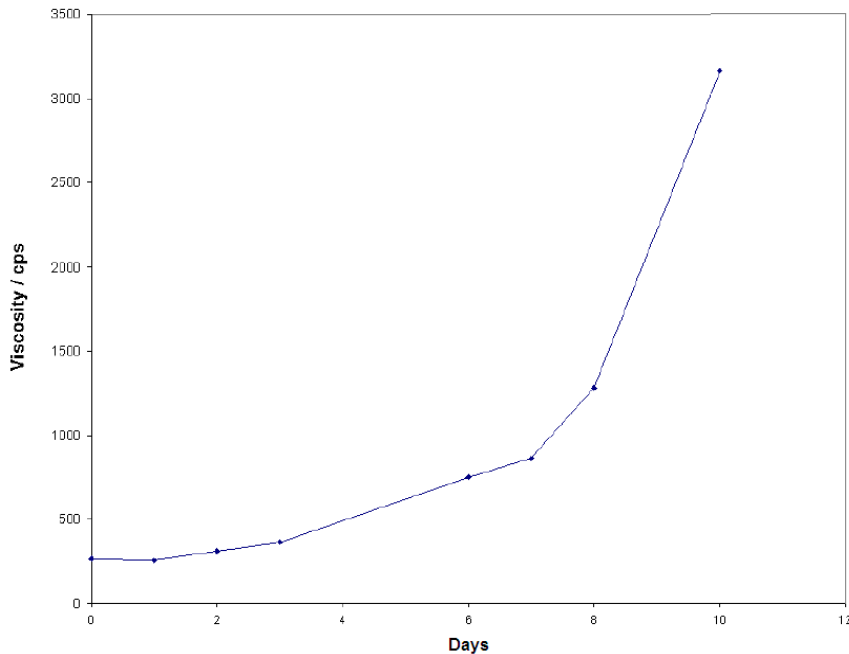


Figure 2 | CYCOM 823 RTM Viscosity versus Temperature Profile
Heating rate = 2°C/min, Minimum viscosity = 15 cps at 95°C
Gel Times: >30 minutes at 95°C, 15 min at 125°C (cure temperature)

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D.M.T.A. Data

For neat resin casts cured for 1 hour at 250°F (121°C)

See page 4 for Tg Values derived from these cures.

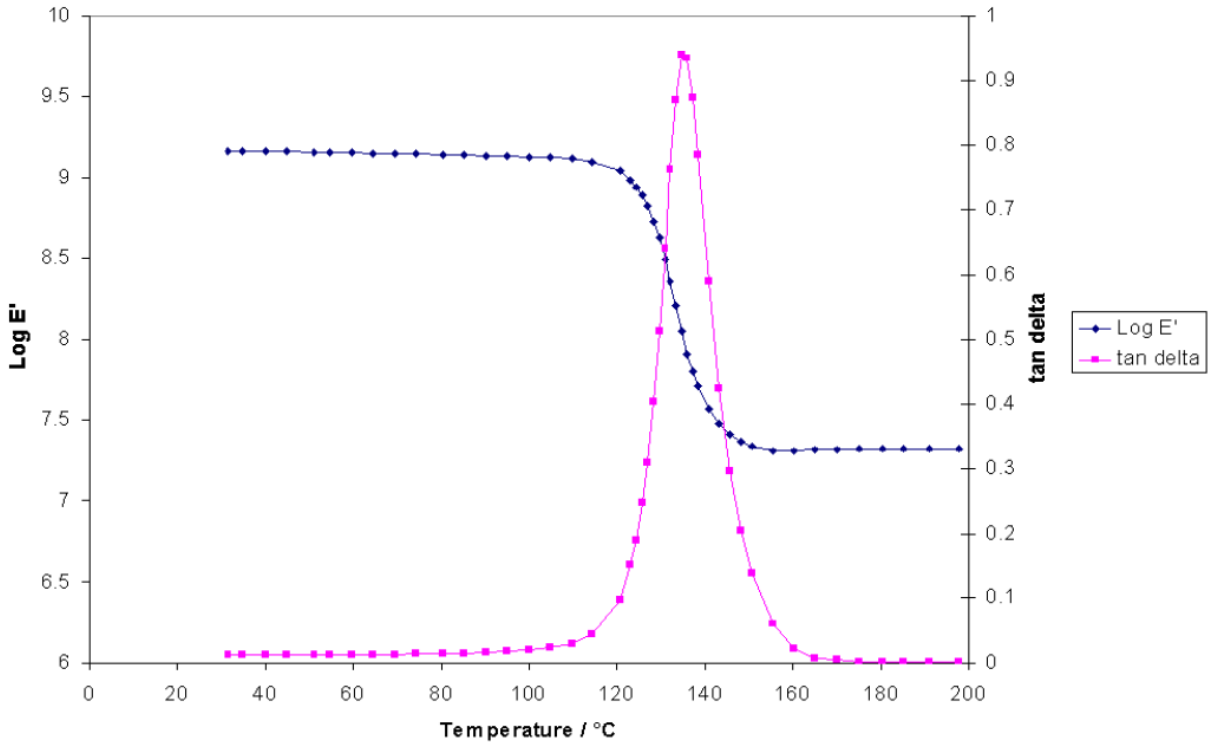


Figure 3 | CYCOM 823 RTM DMTA Data, Dry

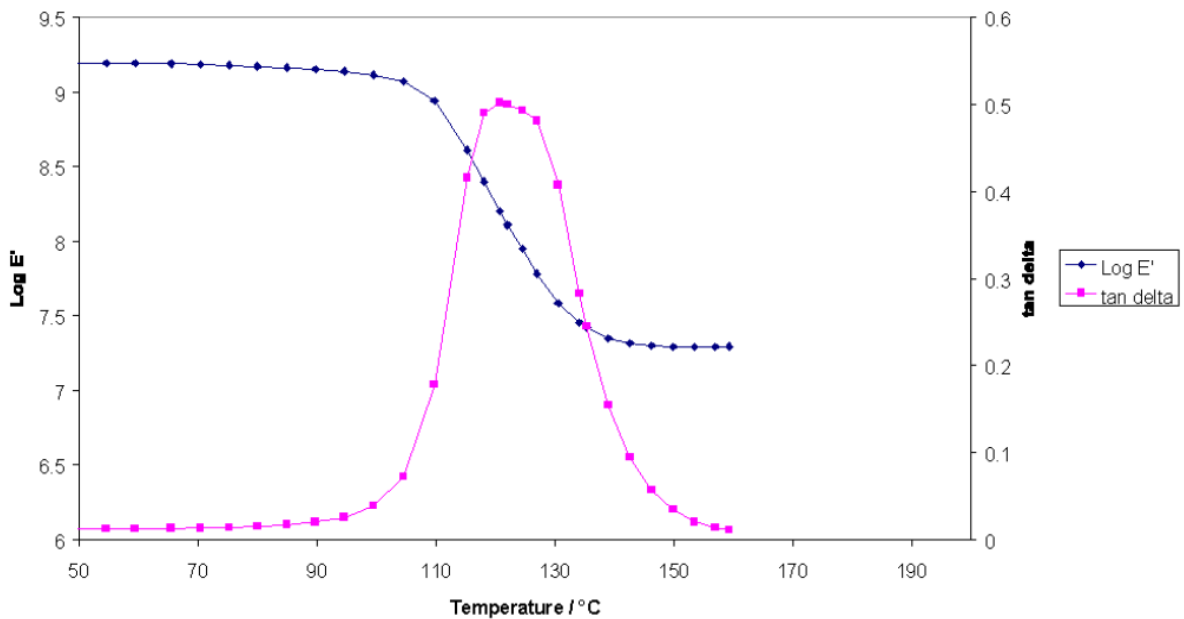


Figure 4 | CYCOM 823 RTM DMTA Data, Wet

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Table 1 | Neat Resin Characteristics

Property ¹	Specimen Conditioning	Value
Cured resin density, lb/ft ³ (g/cm ³)	Room temperature, dry	76.7 (1.23)
T _g (peak tan delta), °F (°C) *	Room temperature, dry	275 (135)
T _g (E' onset), °F (°C) *	Room temperature, dry	257 (125)
T _g (peak tan delta), °F (°C) *	Wet, 48 hour water boil ¹	250 (121)
T _g (E' onset), °F (°C) *	Wet, 48 hour water boil ¹	226 (108)
Elastic Shear Modulus G', ksi (MPa)	180°F (82°C), dry	160 (1.13)
	200°F (93°C), dry	150 (1.06)
Tensile Strength, ksi (MPa)	Room temperature, dry	11.3 (80)
Tensile Modulus, ksi (GPa)	Room temperature, dry	410 (2.9)
Tensile Elongation, %	Room temperature, dry	8.8
Flexural Strength, ksi (MPa)	Room temperature, dry	20.5 (144)
Flexural Modulus, ksi (GPa)	Room temperature, dry	480 (3.4)
Flexural Elongation, %	Room temperature, dry	7.6
Strain Energy Release, G _{IC}	Room temperature, dry	5.1 in·lb/in ² (0.9 kJ/m ²)
Fracture Toughness, K _{IC}	Room temperature, dry	1.4 ksi·in ^{1/2} (1.6 MPa·m ^{1/2})

¹ 1.2% moisture uptake

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

PROPERTIES

Table 2 | Composite Mechanical Data

Property	Conditioning	Orientation	6K-5HS-HTA-370
Flexural strength, ksi (MPa)	Ambient, dry	Warp	160 (1106)
	158°F (70°C), wet ²	Warp	130 (894)
Flexural modulus, Msi (GPa)	Ambient, dry	Warp	10.4 (71.7)
	158°F (70°C), wet ²	Warp	10.1 (69.7)
ILSS, ksi (MPa)	Ambient, dry	Warp	10.5 (72.7)
	158°F (70°C), wet ²	Warp	6.64 (45.8)
Compressive strength, ksi (MPa)	Ambient, dry	Warp	114 (788)
	158°F (70°C), wet ²	Warp	81.2 (560)
Compressive modulus, Msi (GPa)	Ambient, dry	Warp	8.58 (59.2)
	158°F (70°C), wet ²	Warp	8.70 (60.0)
Fiber volume	NA	NA	52

² Wet denotes a 48-hour water boil prior to testing, 1.1% moisture uptake

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SUGGESTED PROCESSING PARAMETERS

- CYCOM 823 RTM resin has an initial viscosity of 250 cps at room temperature. At this viscosity it is easily transferable to the RTM equipment injection system (e.g., pressure pot, piston ram, etc.) without the need for further heating.
- Degas resin in homogenizer for a minimum of 30 minutes at room temperature, under a minimum of 25" Hg vacuum, prior to injecting.
- Apply full vacuum to tool containing the preformed reinforcement, ensuring that there is no vacuum loss.
- Preheat tool to 255 + 8°F (125 + 5°C). At this temperature the resin will gel in 15 minutes after injection has been completed.

Depending on total cure cycle time requirements, degree of heating control on the tool, component size and geometry, etc., it is possible to inject the resin under alternate conditions in order to ensure full wet-out of the reinforcement. The resin may be injected into a tool at any temperature from room temperature to 255°F (125°C). The tool may then be heated to 255°F (125°C) at 3 – 5°F /minute (2 – 3°C/minute) after injection has been completed.

- Close off the vacuum line and open the homogenizer to start injecting. Then increase homogenizer pressure (typically to 1 – 2 bar) to fill the tool.
- When the resin appears in the vent lines, close off the vent lines and continue injecting under pressure until the resin has gelled (15 minutes). Then shut off the inlet valve to trap the pressure.
- Dwell at 255 + 9°F (125 + 5°C) for 1 hour before cooling to 140°C (60°F) or below before attempting to release part from tool.

The above cure parameters have been used at Cytec to mold test panels (280mm x 530mm x 2mm) for process and mechanical performance evaluation. A Plastech Hypaject system was used to inject the resin into a steel tool held in a heated platen press. Some parameters may require adjustment depending on 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. Injection pressure for larger parts/alternative tooling may require adjustment to ensure filling of the tool cavity within the resin gel time (if injecting into a pre-heated tool) and to ensure full consolidation of the component.

Different injection equipment may require alternative conditions for degassing.

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PRODUCT HANDLING AND SAFETY

Cytec Engineered Materials recommends wearing clean, impervious gloves when working with epoxy resin systems to reduce skin contact and to avoid contamination of the product.

Materials Safety Data Sheets (MSDS) and product labels are available upon request and can be obtained from any Cytec Engineered Materials Office.

DISPOSAL OF SCRAP MATERIAL

Disposal of scrap material should be in accordance with local, state, and federal regulations.

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