

CYCOM® 890 RTM RESIN SYSTEM

CYCOM® 890 RTM is a one-part liquid epoxy resin system. It has one month out-life at room temperature which reduces time required for the freeze-thaw-storage processes in a production environment. Its frozen storage shelf-life is 12 months at -18°C (0°F).

CYCOM® 890 RTM's viscosity is low enough at 80°C (176°F) to allow injection without excessive heating of either the resin or the transfer pipework. When the resin is heated to cure temperature its viscosity is further reduced, helping to ensure full wet-out of the reinforcing fibres.

CYCOM® 890 RTM is fully cured after two hours at 180°C (356°F) after which it will have a dry performance up to 196°C (385°F) and a hot/wet performance of 177°C (351°F)

If needed, an optional free-standing post-cure for two hours at 200°C (392°F) can be used. After post-cure the dry Tg of CYCOM® 890 RTM increases to 217°C (423°F)

CYCOM® 890 RTM is compatible with the range of reinforcing fibres used in manufacturing composite components, i.e., carbon, glass, aramid, etc.

A fully compatible binder system, CYCOM® 7720 has been developed for use with CYCOM® 890 RTM. The binder is available pre-coated onto fabric. A separate datasheet for CYCOM® 7720 is available on request.

Features and Benefits

- One-part system
- Injectable at 80°C (176°F) with a 24-hour pot-life
- Two hours at 180°C (356°F) cure
- 196°C (385°F) dry Tg [217°C (423°F) after optional post-cure]
- Low reactivity; no special shipment requirements
- 30 days outlife at RT, 12 months shelf life at -18°C (0°F)
- 250 cP initial injection viscosity, less than 10 cP minimum viscosity
- Fully compatible with CYCOM 7720 binder coating and CYCOM® 890-1 low resin content (LRC) film for tack enhancing fabrics

APPLICATIONS

Infusion applications requiring low viscosity and extended pot-life:

- Control surfaces
- Large surface fairings
- Nacelle casing
- Hinges/brackets/fittings



PHYSICAL PROPERTIES

Properties	Test Method	Value
Cured density:	ASTM D792	1.20 g/cm ³
Tg dry:	EN6032	196°C
Tg wet ¹ :		177°C
Gel time @ 210 ± 2 °C	prEN 6043	
Start		32 min
End		30 min
Viscosity @ 120 °C	prEN 6043	
0 hrs		30.5 mPa·s
2 hrs		37.4 mPa·s

¹ Conditioned to equilibrium at 70°C/85%R.H.

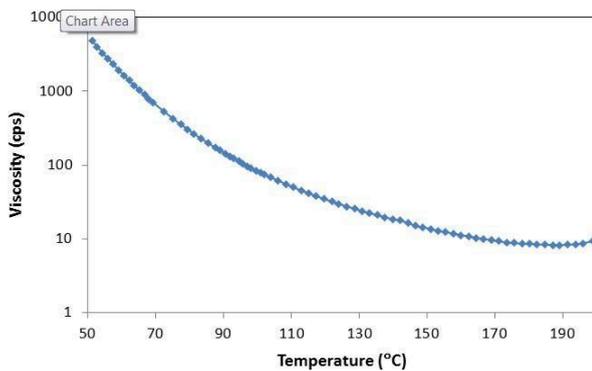


Figure 1

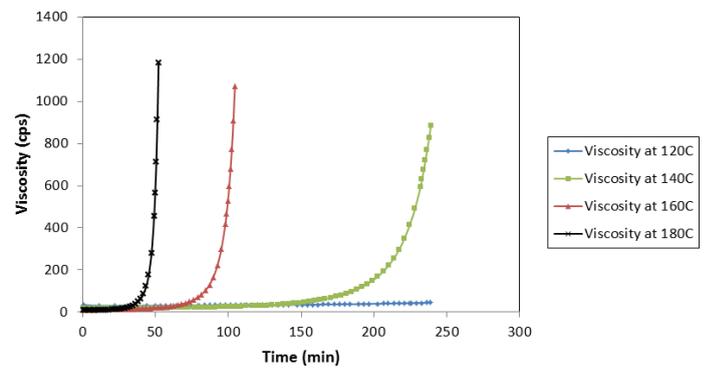


Figure 2

Figure 1 CYCOM 890 RTM viscosity/temperature profile. Heating rate is 2°C/minute. Minimum viscosity is less than 10 cps at temperatures above 170°C.

Figure 2 CYCOM 890 RTM isothermal viscosity profiles



MECHANICAL PROPERTIES

Property	Condition	Test Method	CYCOM 890 RTM 7720-9D-6KT650-5H-370-1500 ²
Warp TS, MPa (ksi)	RT/Dry	SRM-04	862 (125)
Warp TM, GPa (Msi)	RT/Dry		71.7 (10.4)
Weft TS, MPa (ksi)	RT/Dry	SRM-04	800 (116)
	82°C/Wet ¹		876(127)
Weft TM, GPa (Msi)	RT/Dry	SRM-04	66.9 (9.7)
	82°C/Wet ¹		70.3 (10.2)
Weft CS, MPa (ksi)	RT/Dry	SRM-01	703 (102)
	82°C/Wet ¹		655 (95)
Weft CM, GPa (Msi)	RT/Dry		58.6 (8.50)
	82°C/Wet ¹		60.7 (8.80)
IPSS, MPa (ksi)	RT/Dry	SRM-07	104 (15.1)
	82°C/Wet ¹		89.6 (13.0)
IPSM, GPa (Msi)	RT/Dry		5.03 (0.73)
	82°C/Wet ¹		4.83 (0.70)
Weft ILSS, MPa (ksi)	RT/Dry	SRM-08	71.0 (10.3)
	82°C/Wet ¹		57.8 (8.39)
CAI@30J, MPa (ksi)	RT/Dry	SRM-02	231 (33.5)
	82°C/Wet ¹		193 (28.0)

¹ 70°C/85% R.H.

² Fibre dominating properties normalised to Vf = 57%


CURE CYCLE AND PROCESS INFORMATION

- Preheat the resin to 80°C (176°F) in its container for transfer to the RTM equipment injection system (eg. pressure pot, piston ram, etc.).

At this temperature the resin will achieve an initial viscosity of 250 cP and will stay below 350 cP for 24 hours. The resin holding vessel and all transfer pipework should be maintained at a minimum of 80°C (176°F) for the duration of the injection in order to ensure proper resin viscosity.

- Prior to injecting, degas the resin in a homogeniser for a minimum of 30 minutes at 80°C (176°F), under a minimum of 25" Hg vacuum
- Apply full vacuum to the tool containing the preformed reinforcement, ensuring that there is no vacuum loss.
- Preheat the tool to 180 +5/-0°C (356 +8/-0°F).

At this temperature the resin will gel in 50 minutes after injection has completed.

Depending on factors such as total cure cycle time requirements, degree of heating control on the tool and component geometry, it is possible to inject the resin under alternative conditions in order to ensure full wet-out of the reinforcement. The resin may be injected into a tool at any temperature between 80° and 180°C (176° and 356°F). After injection has been completed, the tool may be heated at 2° – 3°C (3° – 5°F)/minute to 180°C (356°F).

Close off the vacuum line and open the homogenizer to start injection.

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 [50 minutes at 180°C (356°F)].

Shut off the inlet valve to trap the pressure.

Dwell at 180 +5/-0°C (356 +9/-0°F) for 2 hours.

Cooling to 60°C (140°F) or below before attempting to release the part from the tool.

Note: The above cure parameters have been defined using the viscosity profile information found in Figures 2, 3 and 4 and Syensqo Engineered Material's experience of molding panels (280mmx530mmx2mm) for process and mechanical performance evaluation of various RTM resin systems. A Plastech Hypaject system has been utilized to inject resin into a steel tool held in a heated platen press for such panel fabrication. 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. 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.

POST CURE

Optional free-standing post-cure for two hours at 180°- 200°C (356°-392°F) can be used.



PRODUCT FORMS

CYCOM® 890 RTM resin can be supplied in cans or barrels of different volumes; please contact Syensqo Customer Service representative.

STORAGE

Shelf-life of CYCOM® 890 RTM is 12 months at -18°C (0°F) and one month out-life at 23°C (73°F)

EXOTHERM

CYCOM® 890 RTM 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.

