



THE CARBON NANOTUBE SPECIALIST

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EPOCYL

*Ref: EPOCYL™ NC R1MY-04 – 17 March 2009 - V04*

## **EPOCYL™ NC R1MY-04 Product Data: Dilution Factor 6.**

Master Batch Liquid tetrafunctional epoxy Resin for solvent based Formulation Purposes.

### **General information**

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#### **Description**

EPOCYL™ NC R1MY-04 is a Master Batch based on liquid tetrafunctional epoxy resin containing high concentration of Carbon Nanotubes (CNT) produced by Nanocyl with a suggested dilution factor of 6. It is specifically developed to enhance the mechanical properties of final fiber reinforced composite materials. Special features include easy integration and great flexibility in design of new multifunctional materials.

#### **Applications: high performance structural composite parts**

- Automotive (bumpers and other structural parts)
- Marine, especially sailing boats (structural outer shell in carbon fiber composite, masts and other generic structural parts)
- Industrial parts (rollers, doctor-blades and wind-mill blades)
- Sporting equipments (bike frames, hockey sticks, tennis rackets, skis and golf shafts)
- Aerospace (structural parts and interiors)

#### **Main direct advantages (demonstrated in specific final formulation)**

- Improved fracture toughness (G1C) of over 100% = higher crack propagation/delamination resistance
- Improved failure strength: transverse and off-axis (+/- 45°) by over 15% = higher shear resistance
- Reduced CTE over 15% = less distorted parts produced
- No reduction in the Tg = possible to be used in any formulation

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EPOCYL™ NC R1MY-04 / Product Data / Page 2

### Additional advantages in general

- Electrical properties: induces antistatic properties in the composite parts; excellent for electrostatic painting application
- Flame resistance: higher resistance to flammability up to UL 94 level on the final fiber reinforced composite
- Better thermal dissipation: avoids hot-spots during curing, more homogenous temperature

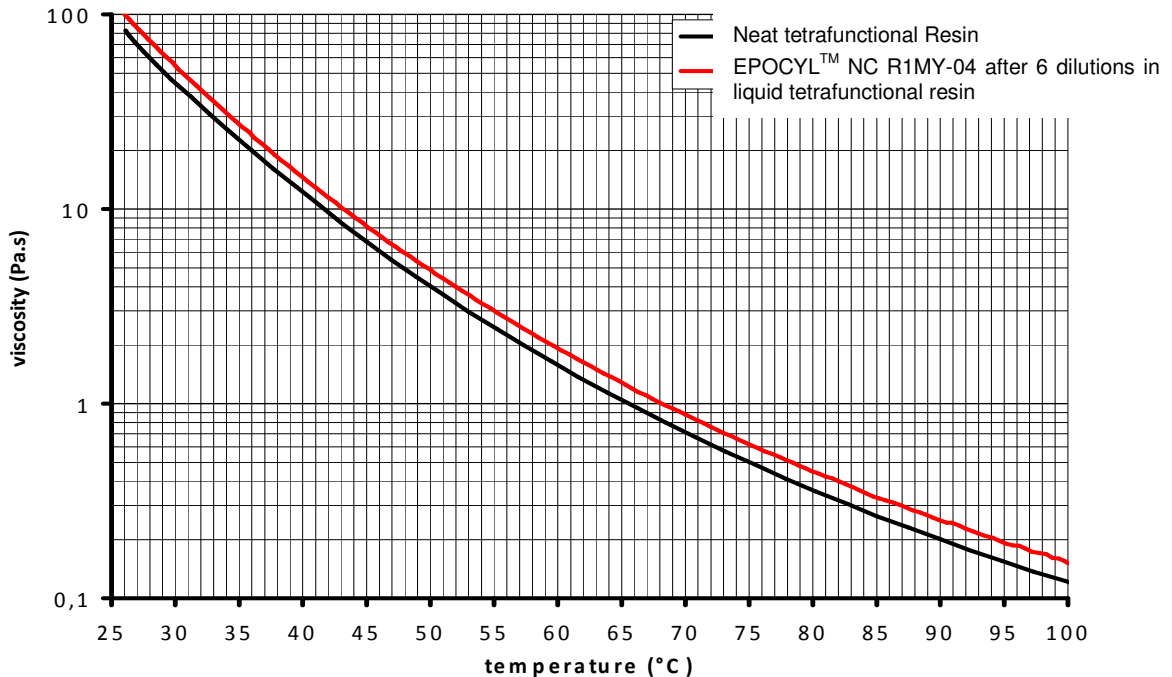
### Typical properties of EPOCYL™ NC R1MY-04

Visual Appearance:	Paste, black (Master Batch)
Viscosity @ 25°C*:	NA
Viscosity @ 60°C*:	20 ± 15 Pa.s
Epoxy Value:	7.90-8.42 eq/kg
Epoxy Equivalent:	118.81-126.44 g/eq
Density at 25°C:	1.15 – 1.18 g/ml
Storage temperature:	5°C

\*measured with parallel plate in dynamic mode at 10 rad/s and a strain of 1%

### Viscosity

Viscosity vs temperature profile: EPOCYL™ NC R1MY-04 (after diluting six times with neat liquid tetrafunctional epoxy resin versus neat with neat liquid tetrafunctional)



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EPOCYL™ NC R1MY-04 / Product Data / Page 3

### Curing agents

EPOCYL™ NC R1MY-04 based formulations can be cured or cross-linked with different types of curing agents which could be decided accordingly to the desired processing conditions and the properties of the final composite like any conventional tetrafunctional based formulations.

### Guide to processing and to create a formulation based on EPOCYL™ NC R1MY-04

To achieve high ***mechanical performances***, Nanocyl advises to dilute EPOCYL™ NC R1MY-04 four times in the final resin formulation (resin & hardener).

***For example: [EPOCYL™ NC R1MY-04 (17%)] + [Neat resin + hardener + other additives (83%)].***

**IMPORTANT:** EPOCYL™ NCR1MY-04 is not an additive in your formulation; it is a substitution product for the equivalent parts of your conventional TGMDA liquid resin.

### Dilution conditions

The Master Batch EPOCYL™ NC R1MY-04 is recommended to pre-mix well before introducing it into any formulation. The premixing can be easily done at room temperature (RT) and if required can also be heated up to the temperature between 45° and 60°C to reduce its viscosity.

**First method:** prepare a good mixture of EPOCYL™ NC R1MY-04 with the required amount of neat resin and other additives according to your formulation. Then, add required amount of solvent to adjust the final viscosity.

**Second method:** prepare a good premix of your neat resin with additives and the required amount of solvent. Then, add the required amount of the Master Batch EPOCYL™ NC R1MY-04 with a continuous mixing. After this step, if needed, you can further adjust the viscosity by adding more solvent in the mixture with a continuous mixing process.

Time, temperature and speed of the mixing may need to be adapted to obtain a final homogenous mixture. All common equipments available in any resin formulation, pre-preg and composite facilities are good to achieve a good and homogeneous mixture.

**NOTE:** Avoid addition of any solvent directly in the EPOCYL™ NC R1MY-04.

Hardener must be added according to your conventional processing conditions. The amount of hardener required will depend on the final epoxy equivalent weight (EEW) of the formulation.

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**EPOCYL™ NC R1MY-04 / Product Data / Page 4**

**Further impregnation and curing conditions after final resin formulation**

Further processing (coating, fiber impregnation...) must be made according to your conventional processing conditions.

**Important**

All information is believed to be accurate but is given without acceptance of liability. Users should make their own assessment of the suitability of the product for their use and applications.

**For technical assistance, sales or further information, please contact us :**

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