

# Cardolite<sup>®</sup> NX-4005

## CNSL Novolac Resin

### Preliminary Technical Datasheet

#### DESCRIPTION

Cardolite NX-4005 is a solvent-free, very low viscosity cardanol based novolac resin designed as a cross-linking agent for epoxy resins and particularly suitable for wet layup, pultrusion and adhesives. This product is specifically engineered to have low odor and good miscibility with epoxy and epoxy-novolac resins. It is characterized by a high functionality and high equivalent weight with good moisture and chemical resistance and improved flexibility and toughness. In addition, NX-4005 enables high biocontent formulations.

#### PROPERTIES

PROPERTY	TYPICAL VALUE	TEST METHOD
Appearance	Dark Brown Liquid	Visual
Color (Gardner)	≤18	ASTM D1544
Viscosity @ 25°C (cPs)	800 – 1,300	ASTM D2196
Hydroxyl Equivalent Weight <sup>1</sup>	290 - 325	Calculated
Density @ 25°C (kg/L) (lbs/gal)	0.95 – 1.00 7.92 – 8.35	ASTM D1475
Recommended Use Level	15 - 30	-

Typical properties are not to be construed as specifications

<sup>1</sup>Based on total product weight

#### APPLICATIONS

- Composites based on epoxy chemistry
- Wet Layup
- Pultrusion
- Hot Mold formulations
- Vacuum assisted processes
- High temperature cure composites
- Composites for automotive, sports & leisure, and construction
- Natural fiber composites

#### ADVANTAGES

- Good processability
- Excellent formulation latitude
- Good chemical resistance
- Very long pot life
- Good mechanical properties
- High in biocontent
- Compatible with most epoxy resins and novolac-epoxy resins
- Non-toxic
- Based from natural, renewable, non-food chain raw material feedstock

## TYPICAL HANDLING PROPERTIES

PROPERTIES <sup>1</sup>	TYPICAL VALUE	TEST METHOD
Use Level with Epoxy Resin	20	-
Mix viscosity @ 25°C (cPs)	3,625	ASTM D2196
Mix viscosity @ 50°C (cPs)	322	ASTM D2196
Pot Life, 100 g mix @ 50°C	8.5 hrs	Internal Method <sup>2</sup>
Pot Life, 100 g mix @ 80°C	53 min	Internal Method <sup>2</sup>
Cure time @ 100°C (min)	12	Internal Method <sup>3</sup>
Cure time @ 120°C (min)	3.5	Internal Method <sup>3</sup>

<sup>1</sup> Properties have been measured on a standard formulation of: 80% Liquid Epoxy Resin (EEW=188), 20% NX-4005, and 2,9 pbw 2-ethyl,4-methylimidazole, cured at 120°C for 2 hrs.

<sup>2</sup> Pot life refers to the time at which the formulation reaches a viscosity of 10,000 cPs at the reference temperature.

<sup>3</sup> Based on cure time of a thin layer of formulation on hot plate at the reference temperature.

## TYPICAL PERFORMANCE PROPERTIES

PROPERTIES	TYPICAL VALUE <sup>1</sup>	TEST METHOD
Glass transition temperature (°C) <sup>2</sup>	93	ASTM 3418-99
Tensile strength (MPa)	48	ASTM D638-10
Tensile modulus (MPa)	1,625	ASTM D638-10
Tensile elongation (%)	2.58	ASTM D638-10
Flexural strength (MPa)	73	ISO 178
Flexural modulus (MPa)	1,850	ISO 178

<sup>1</sup> Cure schedule: 2h @120°C. Base resin: Liquid epoxy (EEW=190) @ 80%

<sup>2</sup> DSC scan from 0 to 200°C, 2<sup>nd</sup> run

## REGULATORY STATUS

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Please refer to the material safety data sheet (MSDS). Specific information regarding chemical inventory listing can be obtained from your local sales representative.

## SAFETY PRECAUTIONS

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Please refer to the material safety data sheet (MSDS). Copies of the MSDS can be requested on the Cardolite website or via your local sales representative.

## STABILITY AND STORAGE

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Cardolite products may absorb moisture and carbon dioxide when left in open containers, which could result in increased viscosity, discoloration, reduction of reactivity, and/or crystallization of the products. These products should be kept tightly sealed in their original containers when not in use, and stored in a cool, dry place.

## CONTACT INFORMATION

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<http://www.cardolite.com>

Cardolite Corporation  
500 Doremus Avenue  
Newark, NJ 07105  
United States of America

T: +1-973-344-5015

Cardolite Specialty  
Chemicals Europe NV  
Wijmenstraat 21K / 2  
B-9030 Mariakerke (Gent)  
Belgium

T: +32 (0) 92658826

Cardolite Specialty Chemicals  
India LLP  
Plot No. IP-1 & IP-2, Mangalore  
Special Economic Zone  
Bajpe, Mangalore 574 142,  
India

T: + 91 (0) 824 2888 300

Cardolite Chemical Zhuhai Ltd.  
Biyang Road  
Harbor Industrial Zone  
Zhuhai, Guangdong 519050  
P.R. China

T: +86-756-726-9066

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