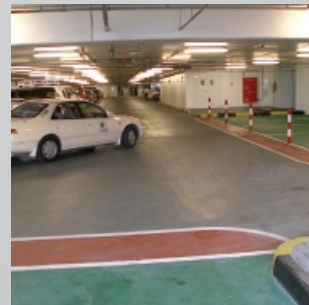
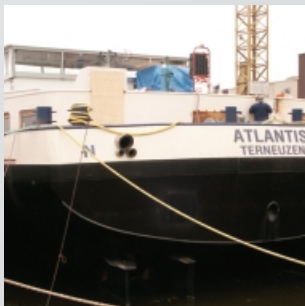
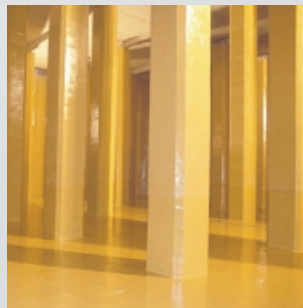
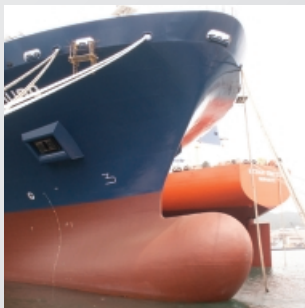




# Cardolite

The World Leader in Cashew Nutshell Liquid Technology



Speciality Curing Agents, Resins, Flexibilizers & Diluents for Epoxy Formulators

## Cardolite Corporation

Cardolite Corporation manufactures the world's largest variety of products derived from cashew nutshell liquid (CNSL). In addition to manufacturing products for the epoxy industry Cardolite produces binder resins and friction particles for the brake lining industry and a number of specialty chemicals.

Cardolite Corporation operates two production plants located in Newark (New Jersey, USA) and in Zhuhai (China).

Cardolite Corporation has sales and distribution offices in Belgium and Singapore and supplies about 50 countries all around the world.

Cashew nutshell liquid, a by-product of the cashew nut industry, has a great deal of versatility. The major constituent of CNSL is cardanol, 3-n-pentadecadienyl phenol, see figure 1. Due to the mixed aliphatic/aromatic structure of cardanol, the Cardolite products are compatible with a wide variety of organic solvents and resins. Epoxy systems derived from cardanol based products provide the following advantages:

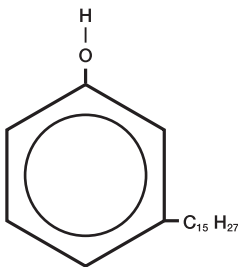


Figure 1

- excellent chemical resistance, especially acids and alkalis
- excellent water/salt water resistance
- flexibility, especially at low temperatures
- impact resistance
- exceptional bond strength
- excellent electrical properties
- low toxicity and volatility



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## Phenalkamine Curing Agents

Cardolite Corporation refers to its curing agents as Phenalkamines. These are a unique type of hardeners that possess the rapid curing characteristics of the aliphatic polyamines while also exhibiting the non-volatility and low order of toxicity associated with polyamides.

The Phenalkamines are composed of aliphatic polyamines attached to an aromatic backbone with an aliphatic side chain. Their unique structure imparts a unique combination of desirable properties to the curing agents as well as the coatings derived from them.

The following are a few advantages of using Phenalkamine curing agents:

- room temperature and low temperature cure
- fast cure / long pot-life
- excellent chemical resistance, especially acids and alkalis
- excellent water / salt water resistance
- good flexibility
- grades for high solids/solvent free
- moisture resistance during cure
- non-critical mix ratios

Applications of phenalkamines include : heavy duty industrial coatings, marine and offshore coatings and coatings for the transportation industry and for concrete. Cardolite Corporation offers a complete range of high performance curing agents for the epoxy coatings formulator.

	NC 540	NC 541	NC 541 X 90	NC 541 LV	NC 556 X 80 & NC 556 S 80	NC 558	NC 557	NC 562
Viscosity (Brookfield, 25°C)	2500 cPs	35000 cPs	3500 cPs	2500 cPs	6000 cPs	900 cPs	900 cPs	1300 cPs
AHEW :	81	130	144	125	135	95	95	174
Density (kg/l) :	0.99	0.99	0.98	0.99	0.99	0.98	0.98	0.98
Density (lbs/gal) :	8.34	8.23	8.18	8.21	8.27	8.24	8.24	8.19
Colour : (Gardner)	17	17	17	16	17	17	17	15
PHR : (Liquid resin, EEW=190)	30 - 40	65 - 75	70 - 85	65 - 80	80 - 90	50 - 65	50 - 65	100
Solids :	Solvent free	Solvent free	90% in Xylene	Solvent free	80% in Xylene or Solvesso 100	Solvent free	Solvent free	65



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## Phenalkamine Curing Agents Cardolite Lite Series

Cardolite Corporation produces the equivalents to all standard Phenalkamines in a lower Gardner colour specification. All these products comply to a colour specification of Gardner 10 maximum. Other properties are identical to the standard Phenalkamines.

	Lite 2001	Lite 2001LV	Lite 2002	NX 4901	Lite 2562	Lite 2004 (US only)
Viscosity (Brookfield, 25°C)	30000 cPs	2500 cPs	450 cPs	800 cPs	1500 cPs	270-510 cPs
AHEW :	132	125	104	114	174	180
Density (kg/l) :	0.99	0.99	0.99	+/- 1	0.98	0.99
Density (lbs/gal) :	8.20	8.23	8.23	8.29	8.19	8.15
Colour : (Gardner)	10	10	10	10	10	10
PHR : (Liquid resin, EEW=190)	70	70	50	60	100	90-100
Solids :	Solvent free	Solvent free	Solvent free	Solvent free	65 %	Solvent free



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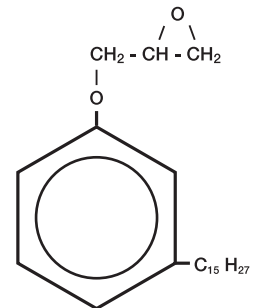
## Reactive diluents and flexible resins

### Cardolite® NC 513 Reactive flexibilizer/Diluent

A well known mono-functional flexibilizer. Increased resistance to impact, chemicals, water and ageing are obtained when using Cardolite® NC 513. In addition Cardolite® NC 513 has the ability to function as a diluent. As result of the low volatility, Cardolite® NC 513 imparts reduced health and safety risks when compared to other mono-functional diluents.

As result of its chemical structure, Cardolite® NC 513 imparts an excellent reactivity which allows complete reaction into the coating network resulting in low migration levels.

Cardolite® NC 513 maintains electrical properties and is therefore used to a great extent in electrical/electronic applications.



	NC 513
Viscosity (Brookfield, 25°C)	50 cPs
EEW :	490
Density (kg/l) :	0.97
Density (lbs/gal) :	8.17
Colour : (Gardner)	11
PHR : (Liquid resin, EEW=190)	2 - 20
Solids :	Solvent free
Hydrolisable Chlorine :	< 2 %

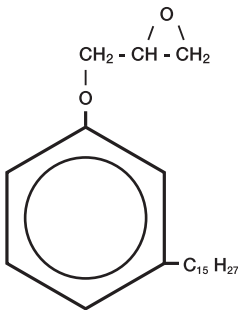


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### Cardolite<sup>®</sup> Lite 2513 HP Reactive flexibilizer/Diluent

Cardolite<sup>®</sup> Lite 2513 HP is a product of the latest generation epoxidised cardanol diluents offering a high level purity compared to Cardolite<sup>®</sup> NC 513.

Cardolite<sup>®</sup> Lite 2513 HP offers a serious viscosity reduction over Cardolite<sup>®</sup> NC 513 broadening its application range. Also available in electrical quality.



	Lite 2513 HP
Viscosity (Brookfield, 25°C)	30 cPs
EEW :	400
Density (kg/l) :	0.97
Density (lbs/gal) :	8.17
Colour : (Gardner)	6
PHR : (Liquid resin, EEW=190)	2 - 20
Solids :	Solvent free
Hydrolisable Chlorine :	< 2 %

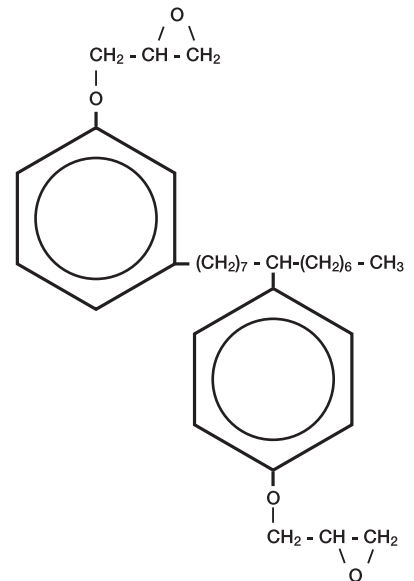


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## Cardolite® NC 514 Flexible Epoxy Resin

Cardolite® NC 514 difunctional glycidyl ether epoxy resin, unlike other flexible resins, exhibits the reactivity and chemical characteristics of a traditional Bisphenol A type resin. The chain flexibility resulting from the 8 carbons that separate the aromatic groups allows flexibilization by mixing them with traditional resins without loss of properties.



	NC 514
Viscosity (Brookfield, 25°C)	25000 cPs
EEW :	350
Density (kg/l) :	1.07
Density (lbs/gal) :	8.75
Colour : (Gardner)	17
PHR : (Liquid resin, EEW=190)	2 - 25
Solids :	Solvent free
Hydrolisable Chlorine :	< 2 %



**Cardolite**

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## Phenalkamine Grade Selection

	NC 540	NC 541	LITE 2001	NC 541X90	NC 541LV	LITE 2001LV	NC 556X80	NC 556S80	NC 558	NC 557	LITE 2002	NX 4901	NC 562	LITE 2562	LITE 2004	
<b>MARINE AND HEAVY DUTY</b>																
medium solids (340 g/l VOC)																
high solids (250 g/l VOC)																
solvent free coatings																
coal tar replacement / ballast tank coatings																
<b>GENERAL INDUSTRIAL COATINGS</b>																
medium solids (340 g/l VOC)																
<b>TRANSPORTATION</b>																
primer (340 g/l VOC)																
primer (250 g/l VOC)																
<b>POTABLE WATER COATINGS</b>																
pipe relining																
tank coating																
<b>CONCRETE</b>																
solvent free primer																
solvent based primer																

 recommended grade



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## Epoxy Diluent and Flexibilizers Grade Selection

	NC513	Lite 2513 HP	N 514	Lite 2020
reactive diluent				
flexibiliser				
resin modifier				

 recommended grade



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