



# Technical Data Sheet

## NVOC-HV Non-VOC Conformal Coating – High Viscosity

### Product Description

The NVOC range has been specifically designed to eliminate the use of volatile organic solvents in the conformal coating process. The range has been tested to many important standards recognised in the electronics industry, proving that NVOC is a viable and unique alternative to many standard solvent based conformal coatings. NVOC-HV is a flexible, moisture cure, conformal coating based on polyurethane technology for the protection of electronic circuitry. It has been designed with dip application in mind, providing a higher viscosity than standard NVOC for ease of application.

As well as offering the environmental benefit of a VOC-free conformal coating process, the coatings in the NVOC range spread much further than standard solvent based coatings. NVOC-HV is a 100% solids coating, eliminating only carbon dioxide upon cure. Therefore, the coverage of NVOC-HV is approximately 2-3 times greater than standard solvent based coatings at a set thickness. Overall, the environmental benefits of the NVOC range when compared to solvent based and solvent alternative coatings include; less waste per litre therefore less packaging, non-flammable product, no special storage or transport conditions, no solvent emissions and no expensive curing equipment required.

### Features

- Very low vapour pressure
- Specially formulated, ready to use, for dip coating and brush application
- Excellent adhesion to a wide variety of substrates
- Wide operating temperature range
- Resistant to mould growth
- Excellent solvent resistance
- Cured coating can be removed with Electrolube Remover Gel (DRG)
- Contains a UV trace for ease of inspection

### **Approvals**

**RoHS Compliant (2002/95/EC):**

**IEC 61086:**

**IPC-CC-830B**

**UL94 Vertical Burning Tests:**

**Yes**

**Meets Approval**

**Meets Approval**

**Meets V-0**

### **Liquid Properties**

Appearance:

Specific Gravity (Density) @ 20°C:

Vapour Pressure (Calculated):

Solids content:

Viscosity @ 20°C:

Flash Point (Closed Cup):

Coverage per Litre @ 50µm:

Shelf Life @ 25°C:

Amber Liquid

1.13-1.14g/ml

< 0.01 kPa

100%

165-185 cPs

>200°C

Approx. 14m<sup>2</sup>

12 months

<b>Curing</b>	Touch Dry: (Humidity Dependent)	80-90 minutes @ 20°C 30 minutes @ 60°C 20 minutes @ 80°C
	Full Cure:	36 hours @ 20°C
	Recommended Touch Dry Time:	10 minutes @ 30°C, ~70% RH Followed by 10-15 minutes @ 80°C
	Recommended Full Cure Time:	10 minutes @ 30°C, ~70% RH Followed by 2 hours @ 80°C

<b>Dry Film Coating</b>	Colour:	Light Amber
	Operating Temperature Range:	-60°C to +125°C
	Extended (Short Term) Temperature Range:	-70°C to +150°C
	Pencil Hardness:	6H
	Flammability:	Meets UL94 V-0
	Adhesion (BS EN ISO 2409):	
	➤ FR4	Class 0
	➤ Copper	Class 0
	➤ Solder Resist (Probimer 65)	Class 0
	Thermal Cycling (IEC-61086):	Meets Approval
Surface Insulation Resistance:	>1 x 10 <sup>13</sup>	
Moisture Resistance (IEC 61086):	>10 <sup>12</sup> (Meets Approval)	
Salt Mist Testing (IEC 61086) :	>10 <sup>12</sup> (Meets Approval)	
Dielectric Strength (ASTM D149):	60kV/mm	
Dielectric Constant @ 100 Hz (ASTM D150):	2.98	
Dissipation Factor @ 100 Hz (ASTM D150):	0.026	
Surface Resistivity (ASTM D257):	1 x 10 <sup>16</sup> Ω @ 70µm thickness	
CTI (BS EN 60112:2003) :	>400V, PLC Grade 1	

<u>Packing</u>	<u>Description</u>	<u>Order Code</u>	<u>Shelf Life</u>
NVOC Conformal Coating	200ml Aerosol	ENVOC200H	12 Months
	5 Litre Bulk	ENVOC05L	12 Months
NVOC High Viscosity Coating	5 Litre Bulk	ENVOC-HV05L	12 Months
NVOC Thixotropic Gel	1 Litre Bulk	ENVOC-G01L	12 Months
NVMC Machine Cleaner	5 Litre Bulk	ENVMC05L	48 Months
Coating Remover	1 Litre Bulk	DRG01L	36 Months

## **Directions for Use**

Although primarily designed for application via dip methods, NVOC-HV can be also be applied via spray or brush techniques. Thickness depends solely on the application and an approximate 20% reduction should be assumed upon cure. This is due to the release of carbon dioxide as part of the reaction process. Therefore, if a 50µm dry thickness is required, approximately 70µm wet thickness of coating should be applied.

NVOC-HV is a moisture cure coating. Therefore low humidity levels will result in delayed touch dry and full cure times. Relative humidity above 60% is advised and for optimum properties to be achieved the recommended cure schedule, as detailed above, should be followed. This is particularly true for solvent resistance and electrical properties as superior performance will be noted if a heat cure process is utilised.

Substrates should be thoroughly cleaned before coating. This is required to ensure that satisfactory adhesion to the substrate is achieved. Also, all flux residues must be removed as they may become corrosive if left on the PCB. Electrolube manufacture a range of cleaning products using both hydrocarbon solvent and aqueous technology. Electrolube cleaning products produce results within Military specification. Please refer to the material safety data sheet for health and safety information.

## **Dip Coating**

NVOC-HV is supplied in a ready to use viscosity for dip coating applications. Prior to use, ensure that all bubbles, present from transport or transferring from container to tank, have been allowed to disperse. There is no need to stir the coating before use. NVOC-HV is non-volatile and so no loss of material will be experienced at room temperature. Due to the moisture curing aspect it is advised that a blanket of dry argon or nitrogen gas is passed over the tank to avoid skinning of the coating material. Alternatively the tank can be sealed in between uses to avoid moisture ingress.

The board assemblies should be immersed into the dipping tank in the vertical position, or at an angle as close to the vertical as possible. Connectors should not be immersed in the liquid unless they are very carefully masked. Electrolube Peelable Coating Mask (PCM) is ideal for this application.

Leave submerged for approximately 10 seconds until the air bubbles have dispersed. The board or boards should then be withdrawn slowly (1 to 2 Seconds / mm) so that an even film covers the surface. After withdrawing, the boards should be left to drain over the tank or drip tray until the majority of residual coating has left the surface.

After the draining operation is complete, the cure schedule can be followed, as detailed below.

## **Drying**

NVOC-HV can be dried at room temperature or accelerated via drying in either a convection or IR oven. A typical IR profile with the PCB set to a constant temperature of 80°C will achieve an initial cure time of approximately 30 minutes. Increasing the humidity of the surrounding area will also reduce the cure time of the coating however wetting humidity (>95%RH) is not advised.

Atmospheric humidity is generally acceptable for the curing of NVOC-HV however in the case of very dry conditions a humidity generator should be used. This can be an enclosed container with adjustable %RH or alternatively, placing a beaker of hot deionised water in the bottom of a drying cabinet or oven should be sufficient. For more information or help with the application of any of the materials in the NVOC range, please contact Electrolube.

## **Cleaning**

Electrolube's NVMC has been designed as a suitable cleaner for use with the NVOC range. Machines should be flushed through and all parts cleaned thoroughly with NVMC prior to coating use.

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All information is given in good faith but without warranty. Properties are given as a guide only and should not be taken as a specification.

Electrolube cannot be held responsible for the performance of its products within any application determined by the customer, who must satisfy themselves as to the suitability of the product.