



# Technical Data Sheet

## DCA Modified Silicone Conformal Coating (SCC3)

### Product Description

DCA is a flexible, transparent and unique modified silicone conformal coating specifically designed for the protection of electronic circuitry. It has been formulated to meet the highest defence standards in both Europe and the United States. It holds approvals including the British Ministry of Defence (MOD) DEF-STAN 59/47 Issue 4, and Underwriters Laboratories UL746CQMJU2.

When exposed to heat, DCA cross-links to provide excellent resistance to a variety of harsh environments, particularly those requiring resistance to chemicals. Although the optimum properties are achieved through heat curing (the recommended curing method), DCA can be also be dried under ambient conditions whilst still providing a good level of protection; further information is provided in this data sheet and testing to the desired cure schedule is required.

### Features

- Resistant to most solvents, lubricants and chemicals associated with most aerospace and automotive applications.
- Excellent adhesion under all climatic conditions to a variety of substrates, including high altitude/decompression to BS.3G100, MIL-STD-810C, RTCA D0160A, ARINC600.
- Fluoresces under UV light for ease of inspection.
- Extreme operating temperature range.
- Can be soldered through without fear of highly toxic gases being produced (contains no isocyanates).
- Non-corrosive to Cadmium and Zinc plate (contains no phenols).
- Excellent resistance to mould growth & UV light
- Cured coating can be removed with Electrolube Conformal Coating Remover Gel (CCRG).
- Excellent dielectric properties at all frequencies in accordance to DEF-STAN 59-4/2 Annex C

### Approvals

**UL746C-QMJU2**  
**DEF-STAN 59/47 (Issue 4)**  
**RoHS Compliant (2002/95/EC):**  
**IPC-CC-830**  
**NATO Stock Numbers:**

**Approved E138403**  
**Yes**  
**Yes**  
**Meets approval**  
**6850996642823 (DCA05L)**  
**6850992530057 (DCA200H)**

### Liquid Properties

Appearance:	Clear Pale Straw
Specific Gravity (Density) @ 20°C:	0.97 (Bulk), 0.78 (Aerosol) g/ml
VOC Content:	63% (Bulk) 73% (Aerosol)
Flash Point:	27°C (Bulk), <23°C (Aerosol)
Solids content:	37% (Bulk), 27% (Aerosol)
Viscosity @ 20°C:	180 - 250 Centipoise (Bulk)
Touch Dry:	50 - 55 minutes
Recommended Curing Schedule*:	2 Hours @ 20°C followed by: 2 - 24 Hours @ 90°C to 120°C
*(Maximum Solvent Resistance Achieved @ 120°C; Ambient Curing Schedule: 24 Hours @ 20-25°C)	
Coverage @ 25 µm:	14.8 m <sup>2</sup> per litre (Bulk), 2.16 m <sup>2</sup> (200ml Aerosol)

<b>Cured Film Coating:</b>	Colour:	Colourless
	Operating Temperature Range:	-70°C to +200°C
	Flammability:	UL946 Approved (UL94 V-1)
	Thermal Cycling (IPC-CC-830):	Meets approval
	Coefficient of Expansion:	90ppm
	Dielectric Strength:	90 kV/mm
	Dielectric Constant:	3.95 @ 1 MHz
	Insulation Resistance:	1 x 10 <sup>15</sup> Ohm (DEF-STAN 59/47)
	Dissipation Factor:	0.037 @1 MHz 25°C
	Moisture Resistance (IPC-CC-830):	Meets approval

<u>Packing</u>	<u>Description</u>	<u>Order Code</u>	<u>Shelf Life</u>
<u>DCA Conformal Coating</u>	200ml Aerosol	DCA200H	36 Months
	1 Litre Bulk	DCA01L	48 Months
	5 Litre Bulk	DCA05L	48 Months
<u>Thinners</u>	1 Litre	DCT01L	36 Months
	5 Litre Bulk	DCT05L	36 Months
<u>Remover</u>	1 Litre Bulk	CCRG01L	36 Months

**The complete SCC3 Range in Brief**

	Clear	Red Opaque	Black Opaque	Thixotropic	High Viscosity	200ml Aerosol	1 Litre Bulk	5 Litre Bulk
<b>DCA *</b>	✓					✓	✓	✓
<b>DCB *</b>			✓				✓	✓
<b>DCR *</b>		✓				✓	✓	✓
<b>DCE *</b>	✓			✓			✓	
<b>DCRT *</b>		✓			✓			✓
<b>DCT (Thinners)</b>							✓	✓
<b>CCRG (Remover)</b>							✓	

\* Approvals may vary, please consult the relevant data sheet for full information.

## Directions For Use

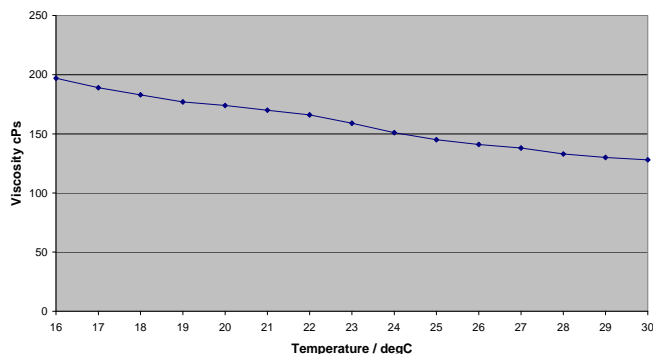
DCA can be sprayed, dipped or brushed. The thickness of the coating depends on the method of application (typically 25 microns). Temperatures of less than 16°C or relative humidity in excess of 75% are unsuitable for the application of DCA. As is the case for all solvent based conformal coatings, adequate extraction should be used (refer to MSDS for further information).

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.

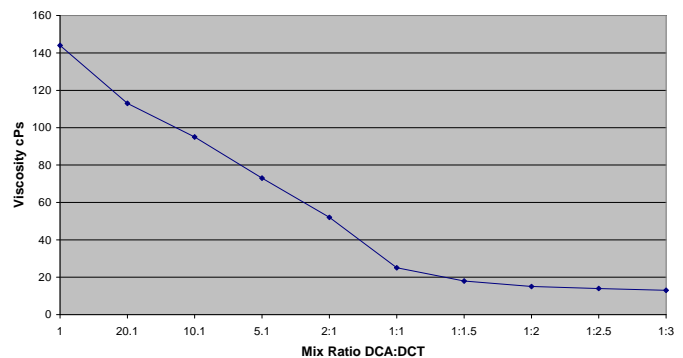
## Spraying – Bulk

DCA needs to be diluted with the appropriate thinners (DCT) before spraying. The optimum viscosity to give coating quality and thickness depends on the spray equipment and conditions, but normally a dilution ratio of 2:1 (DCA to DCT) is required. Suitable spray viscosity is typically 50-80 centipoise. If bulk coating material has been agitated, allow to stand until air bubbles have dispersed. DCA is suitable both for use in manual spray guns and selective coating equipment. The selected nozzle should enable a suitable even spray to be applied in addition to suiting the prevailing viscosity. The normal spray gun pressure required is 274 to 413 kPa (40 - 60 lbs/sq.inch). After spraying, the boards should be placed in an air-circulating drying cabinet following the curing schedule highlighted on page 4.

Viscosity Change with Temperature - DCA



Viscosity Chart DCA:DCT



## Spraying - Aerosol

When applying DCA in aerosol form care must be taken to ensure the can is not shaken before use. Shaking the can will introduce excessive air bubbles and will give a poor coating finish.

The can should be held at 45°, and 200mm from the substrate to be coated. The valve should then be depressed when the can is pointing slightly off target and moved at about 100mm / second across the target. To ensure the best coating results are achieved try to use a smooth sweeping motion with small overlap for successive rows.

To ensure penetration of the coating beneath the components and in confined spaces, spray the assembly from all directions to give an even coating. After spraying, the boards should be placed in an air-circulating drying cabinet following the curing schedule highlighted on page 4.

## **Dip Coating**

Ensure that the coating material in the container has been agitated thoroughly and has been allowed to stand for at least 2 hours for all the air bubbles to disperse.

SCC3 Thinners (DCT) should be used to keep the DCA coating at a suitable viscosity for dipping (180 – 250cPs @ 20°C). DCT is added periodically as the solvent evaporates. The viscosity should be checked using a viscosity meter or "flow cup". The board assemblies should be immersed in the DCA 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 boards should be placed in an air-circulating drying cabinet following the curing schedule (shown below).

## **Brushing**

Ensure that the coating material has been agitated thoroughly and has been allowed to settle for at least 2 hours. The coating should be kept at ambient temperature.

When the brushing operation is complete, the boards should be placed in an air-circulating drying cabinet following the curing schedule (shown below).

## **Drying Times and Curing Conditions**

The properties gained from DCA are dependent on the curing schedule employed. It is essential that the coating be allowed a minimum of two hours drying time at ambient temperature prior to any heat curing. This is necessary to allow the solvent system to evaporate.

**Ambient** Ambient curing is via solvent evaporation only. Eliminating the heat curing step will reduce solvent resistance. Other properties, such as resistance to humid and corrosive environments, may also reduce but still meet the requirements of many industry standards. Coated boards should be left at room temperature for the solvent to evaporate; extraction is required in the curing area.

**Commercial** Most commercial users will gain satisfactory performance from this coating by curing for two hours at 90°C after the two-hour ambient cure. This will give limited resistance to solvents.

**Military** If the assemblies are to be used under conditions of high temperature or be exposed to extremes of thermal cycling, the coating should be cured for 12 hours at ambient followed by 24 hours at 90°C. For maximum solvent resistance cure at 2 hours at ambient following by 24 hours @ 120°C. This curing schedule will give resistance to the more aggressive solvents.

It is recommended that the coating be thoroughly cured on circuits, which have design areas of very high impedance that require adjustment after application.

## **Inspection**

DCA contains a UV trace, which allows inspection of the PCB after coating to ensure complete and even coverage; the stronger the reflected UV light, the thicker the coating layer is. Fluorescence emission will occur between 400-500nm; peak emission is around 440nm.

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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.

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