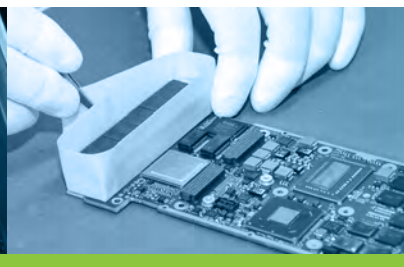
CHILTERN
CONNECTIONS

SOLUTIONS FOR
DESIGN & MANUFACTURE

CONFORMAL COATING



Chiltern Connections Ltd is a global leader in delivering conformal coating solutions in industries such as Automotive, Electronics, Marine, Military, Aerospace and LED & Lighting.

For the past 25 years, customers have turned to Chiltern Connections for expert advice on coating materials and the application of conformal coatings to their assemblies.

A team of conformal coating specialists, stringent quality control systems and modern coating facilities ensure that Chiltern Connections customers receive the most innovative, precise and consistent coating process for components and applications where compromise is not an option.

Regardless of the end use, electronic components must meet a complex and exacting set of specifications to ensure reliability and high performance. Chiltern Connections provides innovative solutions for the protection of pcbs using acrylics, hybrid, polyurethane, silicone and environmentally friendly coatings.

Conformal Coating

The Benefits of Conformal Coating

With the expansion of the electronics industry, and the miniaturisation of electronics, there has been a growth in the requirement to conformally coat in both domestic and industrial applications which can be affected by exposure to the environment.

A layer of conformal coating on electronic assemblies can protect pcbs from moisture, salt spray, chemicals and temperature extremes, thus preventing corrosion, electric failures and mould growth.

The protection provided by the right conformal coating for each application can reduce or eliminate vibration and current leakage, therefore increasing the reliability of the design and extending the working life of the assemblies.

Chiltern Connections Services

Chiltern Connections provides a consultative approach to conformal coating.

At the pcb design stage, experienced materials engineers provide information to customers about the most innovative and applicable coatings and applications for their specific requirements. Where the conformal coating is pre-specified and often this is the case, recommendations on alternative low VOC coatings for future applications will always be provided where available.

Chiltern Connections can apply conformal coatings to a vast range of surface materials and to any pcb configuration or quantity; typically applied at 25-75µm.

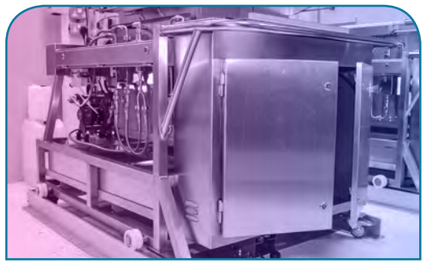
We use and distribute coatings manufactured by Electrolube, ACC Silicones and Shin-Etsu, some of which are approved to the following standards: UL746; Def Stan 59/47; IPC-CC-830; MIL 46058-C and IEC 61086. Alternative products may be sourced where required.

Chiltern Connections Applications

- **Modern spraying facilities**: whereby materials are blended to suit client requirements and applied using manual hand spray systems.
- **Selective Coating Machine**: this is a programmable facility to reduce and/ eliminate masking of components by selectively coating in a controlled, repeatable process; popular with large batches of printed circuit boards.
- **Dipping**: using a semi-automatic controlled system, dipping pcbs either by complete immersion or to a controlled and repeatable set depth.
- **Brushing**: used in almost all conformal coating applications in the final stages of production to 'touch in' areas missed by shadowing or reworked due to masking removal where required. This is also a method used to coat small quantities of pcbs, complex systems and re-touching requirements, providing a cost effective solution.
- **PCB Cleaning**: Fully automated aqueous cleaning service to remove contaminants such as surface debris, grease and flux to suit customer requirements. This is provided as a standalone service or as part of the conformal coating process.
- **Coating Removal**: Solvent cleaning facilities available for most types of conformal coatings. Micro abrasive blasting process can be used to selectively remove conformal coatings.

Environmentally Friendly Coatings and Processes

Chiltern Connections are aware of the environmental impacts of Volatile Organic Compounds (VOCs) used in conformal coatings which contribute towards the formulation of ground level ozone. As part of future developments at Chiltern Connections, R&D managers continually review the use of such products and seek out alternative low VOC materials without compromising on performance. This has not only a positive impact on the environment, but also reduces risks related to VOCs in the conformal coating processes used.



Conformal Coatings

The range of coatings offered at Chiltern Connections are as follows:

- **Acrylic**: Solvent & water based materials. Offer good water and moisture resistance; suitable for use on assemblies that have a wide operating temperature range (-25°C - +125°C) and are relatively simple to re-work.

  Excellent protection against salt spray, mould growth and some vibration dampening. Some acrylic coatings have also shown to reduce the 'tin-whiskering' effect which has been a concern since the move to lead-free solders.

  Excellent dielectric properties and resistant to mould growth; fluoresces under UV light for ease of inspection and have excellent adhesion on a wide variety of substrates.

  The low VOC content and low odour provides an environmentally friendly alternative.
- **Hybrid and UV Cure**: Hybrid coatings are compounds that have a polyurethane base modified with silicone.

  The silicone in the coating increases the operating temperature range of the polyurethane resin. They are flexible and easy to apply, have excellent chemical resistance and provide good protection in a range of environments.

  UV Cure coatings are another type of hybrid coatings. Often with a dual-cure system, they cure in a matter of seconds using UV light, and any shadowed areas will cure via the secondary cure system.

  UV cure applications are particularly useful for high output applications.

  They are not recommended for use at more extreme temperatures (below -55°C) as they tend to become brittle. They can also be difficult to remove and can cause a reduction in flexibility during temperature changes due to their highly cross-linked structures.
- **Silicones**: Silicone coatings deliver excellent levels of protection against solvents. Very good at resisting mould growth, have a higher dielectric strength (90kV/mm versus 45kV/mm for acrylics) therefore, designers can use closer tracking and hence reduce size.

  Suitable for use at working temperatures as low as -60°C and about +250°C (short peaks at +300°C).

  The elasticity of silicone helps to reduce mechanical stress and thermal tension on components.
- **Polyurethanes**: One and two-part polyurethane coatings offer exceptional protection in harsh environments; have a good operating temperature range (-55°C to + 130°C); provide excellent solvent and chemical resistance; have good flexibility even at low temperatures and also have a very good abrasion resistance.
- **Water Based**: Water-based conformal coatings are based on polymeric materials which have been specifically formulated for the protection of electronic circuitry.
- **Potting/Encapsulation**: Single and 2-part epoxy resins, silicone resins and polyurethane potting compounds - generally used in addition to conformal coating on assemblies where extreme environmental conditions may be prevalent, such as exposure to chemicals or physical, thermal and vibrational shock.

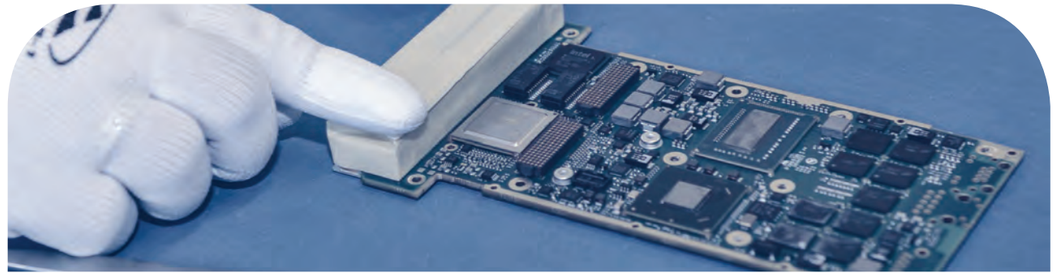
See Table overleaf for Examples of some conformal coatings Chiltern Connections use and supply.

CONFORMAL COATINGS

Product Name	DCA	FSC	WBP / WBPS	HPA	ACC15	TFA	KE-3421	PUCAF	UVCL	TFCF
	Silicone Conformal Coating (SCC3)	Flexible Modified Silicone Coating	Aquacoat Plus / Sprayable	High Performance Acrylic	Silicone Conformal Coating	Toluene Free Acrylic	Silicone Conformal Coating	Aromatic-Free Polyurethane Coating	UV Cure Conformal Coating	Flurocoat
Colours Available	Clear	Clear	Clear	Clear	Clear	Clear	Clear to Amber	Clear	Clear	Clear
Viscosity (mPa s @ 20°C) (Bulk)	200	550	200/80	300	118	260	250 @ 25°C	90	200	2
Flashpoint (°C) (Bulk)	27	27	None	-7	>150	-7	1	27	>90	7
Solids (%) (Bulk)	37	50	35	35	100	36	100	37	100	2
Dielectric Strength (Kv/mm)	90	80	50	45	18.5	45	25	60	27	90
Insulation Resistance (Ω)	1×10^{15}	1×10^{20}	5×10^{11}	1×10^{15}	8.59E+14	1×10^{15}	-	1×10^{15}	7×10^{12}	1×10^{15}
Temp Range (°C)	-70 to +200	-50 to +125	-60 to +125	-55 to +130	-55 to +200	-65 to +125	-55 to +200	-55 to +130	-65 to +135	-50 to +125
Touch Dry Time (Mins @ 20°C)	50-55	10-15	25-35	10-15	12	15-20	3	10	-	5
Cure Time (Hours @ 20°C)	2 @ 20°C & 2 @ 90°C	24	24	24	0.65 @ 25°C	24	72 hr @ 23°C/50%RH	24	-	24
Solvent Resistance	Excellent	Good	Excellent	Good	Excellent	Good	Excellent	Good	Best	Good
Humidity Resistance	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Excellent	Good	Excellent	Excellent
Mould Resistance	Excellent	Excellent	Good	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Good
Thinners	DCT	DCT	DI Water	UAT	ACC34 / ACC34UV	DCT	-	FTH	-	N/A
UV Trace	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Approvals	UL746	IEC61086		MIL-I-46058C		IPC-CC-830, UL 746			IPC-CC-830	

*SCC3 may also be cured at ambient temperature, however the solvent resistance will be reduced
** Data Sheets are available for all conformal coatings to provide further information about the products

a. Electrolube Conformal Coating Brochure (www.electrolube.co.uk)
b. ACC Silicones Technical Data Sheet (www.acc-silicones.com)



Providing Innovative Solutions for Design and Manufacture

Chiltern Connections provides conformal coating solutions for its customers across the globe. With over 35 years of experience, the expertise is provided on every project for each customer from design stages through to application.

The proactive approach taken by our highly experienced materials engineers, sales engineers and manufacturing technicians in production and quality control – documenting. testing of materials, following processes and procedures – provides customers with peace of mind, to meet challenging industry specifications and quality requirements.

quality standards

Chiltern Connections is an accredited ISO 9001:2008 and OHSAS 18001:2007 company working to IPC/EIA J-STD-001 / IPC-A-610 Standards to ensure customer confidence in our ability to handle and process valuable and often urgently required pcbs quickly, efficiently and above all, safely.

Chiltern Connections Other Products and Services

- **Materials and ESD Protection Products**
  Chiltern Connections offer a wide range of products and solutions for the design and maintenance of electronics used across industries. These include, silicones, thermal management, encapsulation/potting resins, conformal coatings, greases, cleaning and maintenance products and a range of ESD protection products manufactured by Electrolube, ACC Silicones, Shin-Etsu and TBA Protective Solutions.
- **Materials Consultancy**
  Consultants with over 35 years of experience are on hand to work with design engineers to advise or recommend materials and applications for their specific requirements. Chiltern Connections also custom blend materials to suit customer needs, offering a totally bespoke product and or solution.
- **Conformal Coating Production Line Equipment Engineering**
  Chiltern Connections has the facilities and expertise to design and engineer machinery used in conformal coating applications, supplying custom built machinery worldwide – either stand alone or integrated into production lines.
- **Product Re-Packaging & Dispensing Equipment**
  All products supplied by Chiltern Connections can be re-packed into a number of different sized containers from syringes to pails meeting customers' particular dispensing requirements.

For further information about all Chiltern Connections products and services, please visit us at www.chilternconnections.co.uk

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