CCS Network
CCS Network (ME) Ltd

TECHNICAL PRESENTATION · UTILITY AND ASSET ENGINEERS

Si-COAT 570 RTV silicone HVIC for preventing pollution flashover

How a durable water-repellent coating suppresses leakage current on high-voltage insulators.

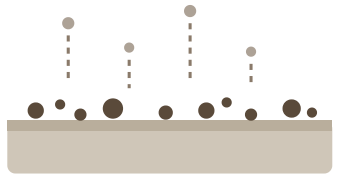


Approved EMEA applicator partner of CSL Silicones Inc.

THE PROBLEM

How pollution flashover develops

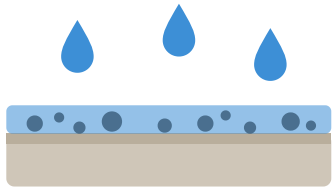
1



Contamination

Salt, dust or industrial deposits settle on the insulator surface.

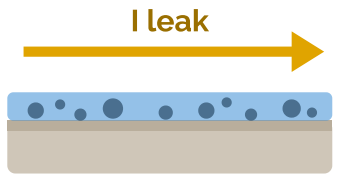
2



Water film

Fog, dew or light rain wets the deposit into a continuous conductive film.

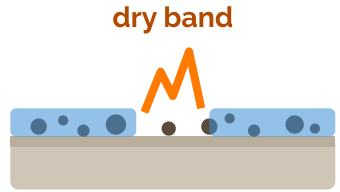
3



Leakage current

An ionic solution forms and current flows across the surface.

4



Dry-band arcing

Current heats and dries local bands; arcs bridge the gaps.

5



Flashover

Arcs extend and join until the whole insulator flashes over.

A hydrophobic surface **breaks the chain at step 2**: water stays as discrete droplets, no continuous film forms, so leakage current and dry-band arcing cannot develop.

WHERE IT HAPPENS

Pollution environments that drive flashover

Any deposit that turns conductive when wet can start the sequence. These are the environments documented in the sources and the Si-COAT 570 data sheet.

Saline
Ocean spray, salt fog and coastal winds

Coal and fly ash
Power-station and coal-handling dust

Cement
Cement and other cementitious dusts

Metal ores
Ore handling and steelworks, e.g. iron ore

Petrochemical
Refinery and chemical-plant emissions, acid emissions, carbon black

Desert sand
Wind-blown sand deposits



Heavy deposits on an insulator stack before treatment

USUAL FIXES

Washing, greasing, more creepage: and their limits

Water washing

Repetitive and expensive in the long term. Protection lasts only until the deposit builds up again.

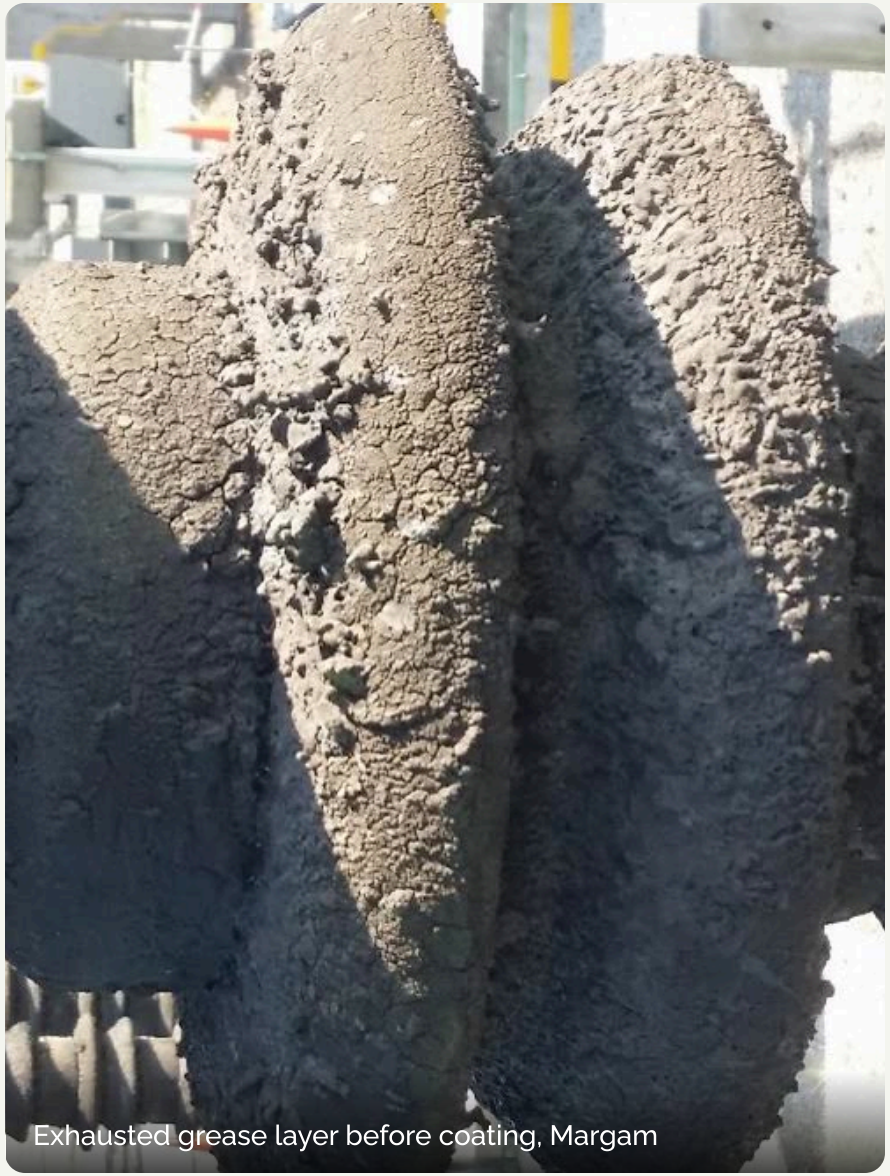
Greasing

Grease becomes saturated with pollution and has to be removed and replaced. Removal is messy: scraping, abrasive and solvent.

Added creepage / new insulators

An expensive option that only delays the time to flashover rather than stopping the mechanism.

The common thread: each method has to be repeated or only postpones the problem. None changes how water behaves on the surface.



Exhausted grease layer before coating, Margam

THE SI-COAT 570 ANSWER

One durable, water-repellent coating

A single-component, ready-to-use, room-temperature-vulcanising, moisture-cure, high-build polysiloxane coating, made by CSL Silicones Inc. Applied once at about 0.5 mm, it changes how water behaves on the insulator for the life of the coat.

- Glass, porcelain and polymer insulators; AC and DC; all substation voltages
- Typically ~10 years in heavy pollution, then overcoat without removal

01
Sustained hydrophobicity
Water beads, it does not film

02
Hydrophobic recovery
LMWS oils replenish the surface

03
Pollution encapsulation
Deposits become water-repellent

04
Arc-track resistance
Patented ATH filler

05
Weather and UV resistance
Stable Si–O backbone


Rows of post insulators coated in light grey RTV silicone HVIC

Manufactured by CSL Silicones Inc.

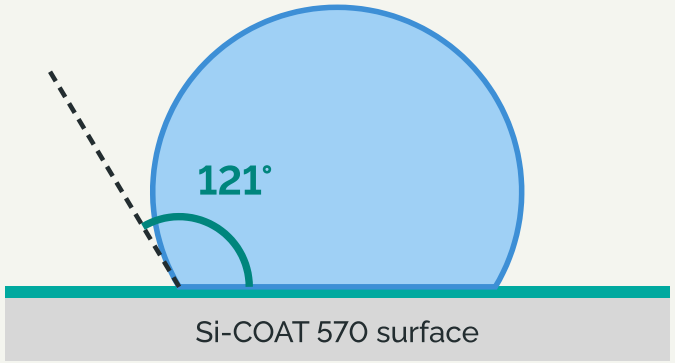
SUSTAINED HYDROPHOBICITY

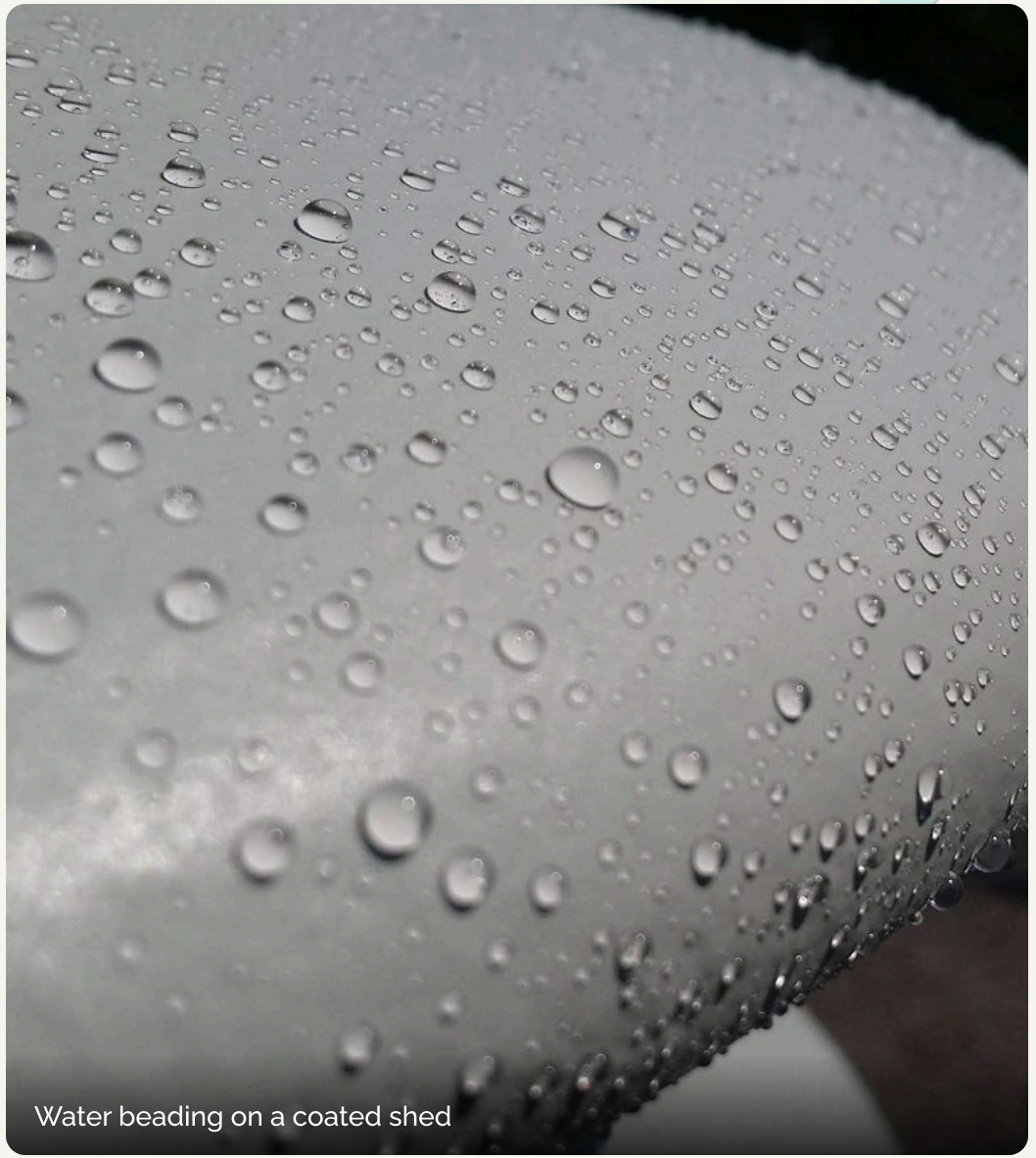
Water beads instead of filming

Discrete droplets cannot join into a continuous conductive layer, so contaminants do not dissolve into an ionic film and leakage current stays suppressed.

121.3°	121.4°	104.4°
Static contact angle	Advancing angle	Receding angle

Water-repellency angles to IEC 62073, typical values from the Si-COAT 570 TDS (27 Nov 2023). A surface above 90° is classed as hydrophobic.

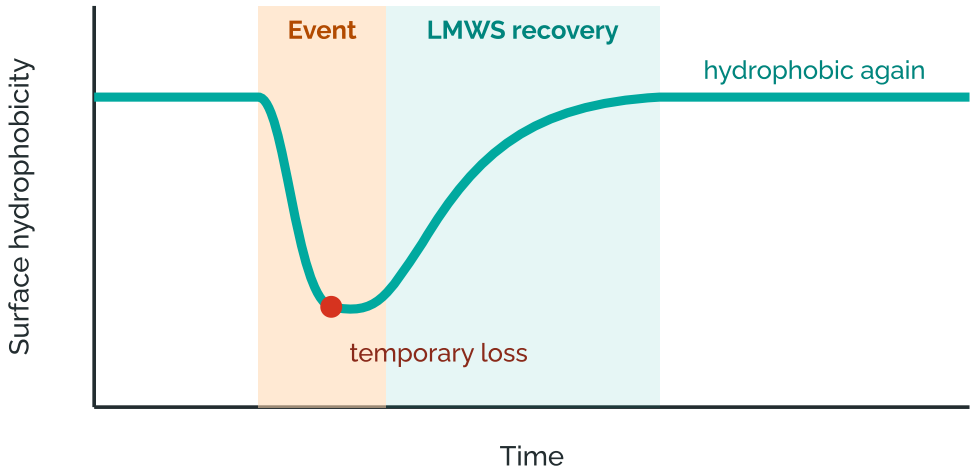




Water beading on a coated shed

HYDROPHOBIC RECOVERY

Hydrophobicity comes back after corona or storms



Schematic illustration, not test data

1 · In service
Surface beads water; LMWS present at the surface.

2 · Corona or heavy storm
Surface hydrophobicity is temporarily reduced.

3 · Recovery
LMWS oils migrate from the bulk and replenish the surface.

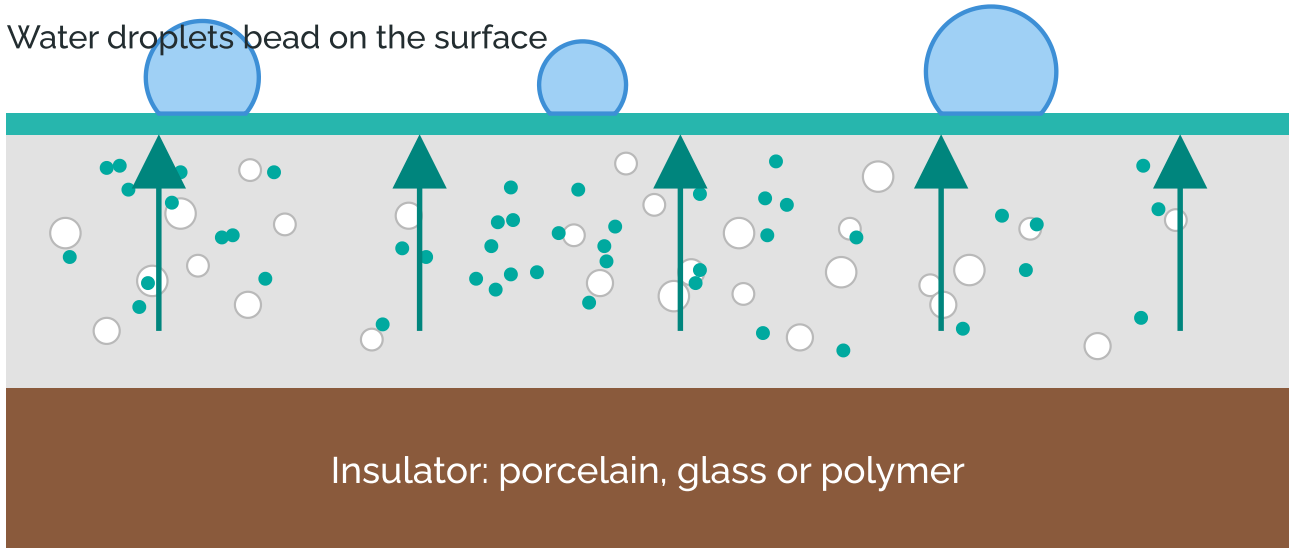
4 · Restored
Beading returns without cleaning or intervention.



Spray-bottle hydrophobicity demonstration

LOW MOLECULAR WEIGHT SILICONE (LMWS)

LMWS oils migrate to the surface



LMWS microlayer
Free silicone oil at the surface keeps it water-repellent.

LMWS in the bulk
Mobile low molecular weight silicone migrates upward through the cured coating.

ATH filler
Inorganic filler particles in the silicone network (next slides).

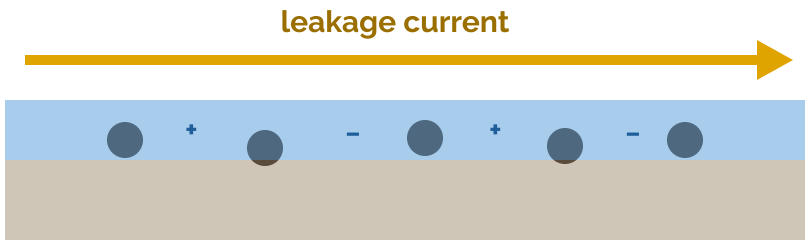
Substrate
Si-COAT 570 bonds to glass, porcelain and polymer.

This reservoir is what **sustains** hydrophobicity and drives **recovery** and **encapsulation**.

POLLUTION ENCAPSULATION

The pollution layer itself becomes hydrophobic

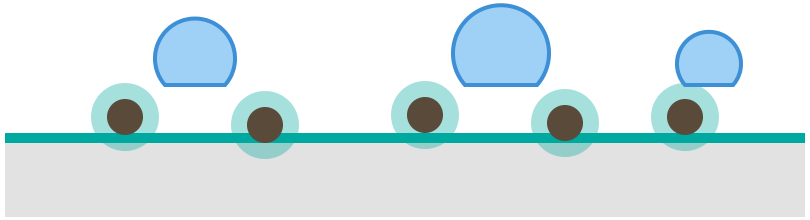
Uncoated or wettable surface



Water wets the deposit, dissolves the soluble salts and forms a conductive ionic film.

With Si-COAT 570

no continuous film · no current path

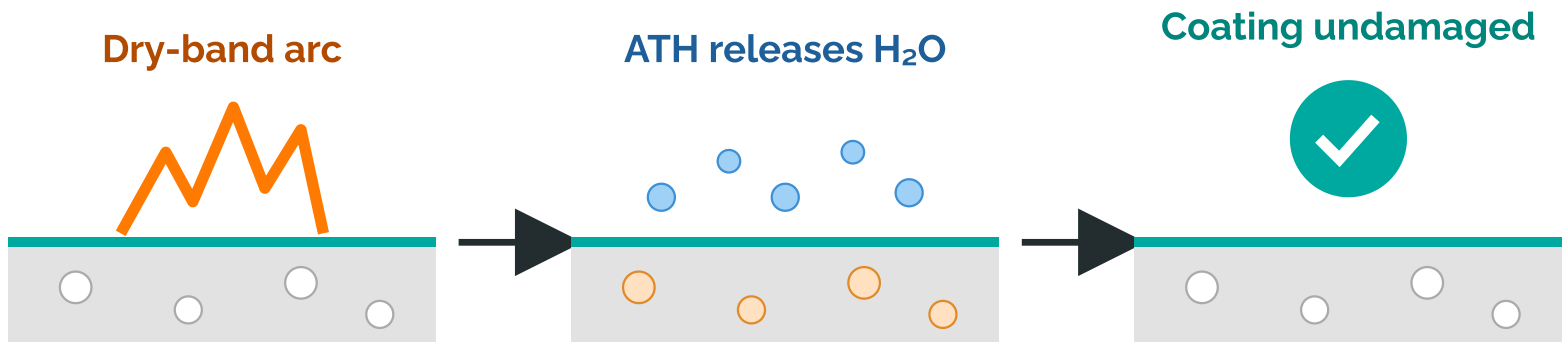


LMWS oil migrates into and around each particle, so the deposit takes on the coating's water-repellency.

Encapsulated pollution stays isolated under beaded water, so the coating keeps working as deposits build up **without washing or cleaning.**

ATH FILLER · ARC-TRACK RESISTANCE

ATH protects the coating during electrical activity



How it works

Dry-band arcing heats the alumina trihydrate (ATH). It releases water, absorbing the arc energy and restricting surface tracking and erosion.

PASS

1A 4.5 · 1B 4.5
Inclined-plane tracking and erosion, IEC 60587

>1,000 h

Tracking wheel withstand, CEA LWIWG-01

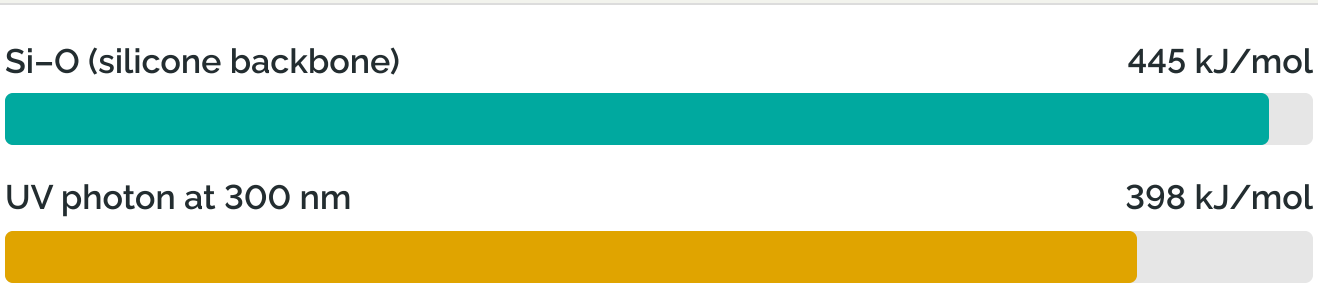
184 s

Dry arc track; burnout >450 s, ASTM D495

Patented, optimally sized ATH: about 13 µm per the TDS; CSL lab statement (28 May 2018) 10–20 µm, not less than 25% by weight. Typical TDS values (27 Nov 2023), not specifications.

UV AND WEATHERING DURABILITY

Built on a bond that sunlight cannot break



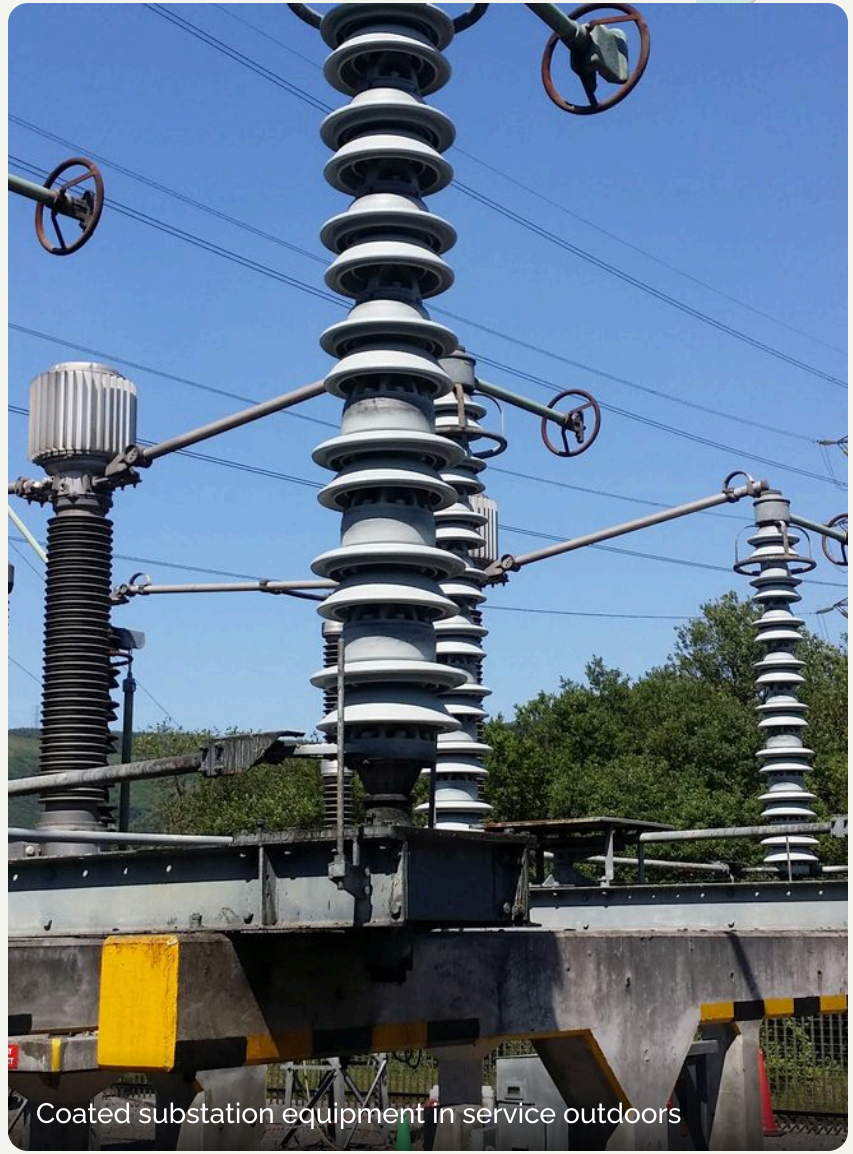
The silicone Si–O bond needs more energy to break than a 300 nm UV photon carries. Carbon-backbone organic elastomers are less stable.

5,000 h

UV and salt-fog ageing, no degradation, IEC 61109

–40 to 250 °C

Temperature stability



Coated substation equipment in service outdoors

EXCELLENT ADHESION

Bonds unprimed to the insulators you already have

Applied direct to clean, dry surfaces with no primer:

Glass | Porcelain | HTV silicone | LSR silicone | EPDM

PASS

Water blast test
IEEE 957

PASS

100 hours boiling water
CEA LWIWG-02

- A primer may be used on porous substrates or to improve adhesion
- Can refresh old RTV silicone HVIC that is cleaned and still well adhered
- Field check: a small coupon is cut and lifted; resistance confirms adhesion



Coupon cut from a finished coat for adhesion and thickness checks

GOOD APPLICATION PROPERTIES

Ready to use, quick to build, easy to apply

Ready to use

Single component. No mixing beyond a light remix if solids have settled.

Quick film build

High viscosity (1,350 ± 350 cP) builds thickness with fewer drips and runs; high solids, 57% by volume, limit weight loss on cure.

Flexible application

Airless air-assisted spray (recommended), or brush and roller.

Fast cure

Skin-over 20–25 min, tack-free 30–40 min, cure through 6 h (25 °C, 50% RH).

Overcoat later

Can be overcoated without removing the original coat.

Two standard colours

Light grey.



Airless spray equipment

TEST RESULTS AT A GLANCE

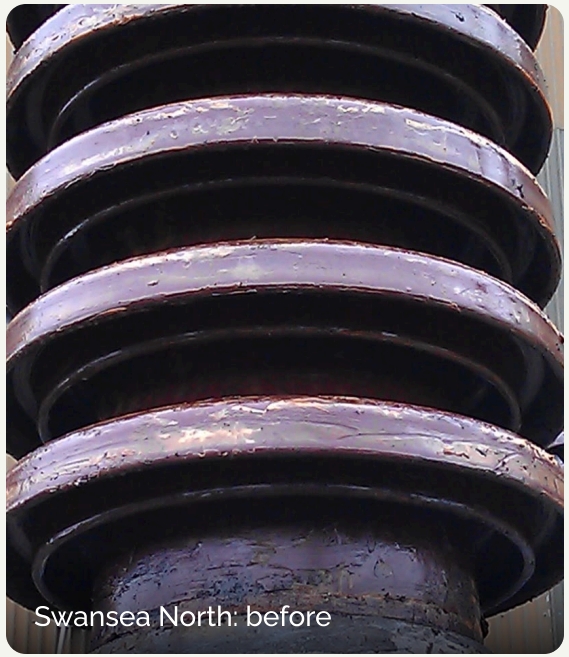
Si-COAT 570 typical properties

Typical values from the Si-COAT 570 TDS reviewed 27 November 2023. Not specifications.

Property	Typical value	Method
Dielectric strength	276.3 kV/cm (701.8 V/mil at 16.1 mil)	ASTM D149
Volume resistivity	3.48×10^{16} Ω·cm	ASTM D257
Surface resistivity	1.36×10^{16} Ω/□	ASTM D257
Dielectric constant	2.74 at 100 Hz; 2.63 at 100 kHz	ASTM D150
Dry arc resistance	Track 184 s; burnout >450 s	ASTM D495
Water-repellency angle	Static 121.3°; advancing 121.4°; receding 104.4°	IEC 62073
UV and salt-fog ageing	No degradation after 5,000 h	IEC 61109
Tracking and erosion	PASS: 1A 4.5; 1B 4.5	IEC 60587
Tracking wheel withstand	>1,000 h	CEA LWIWG-01
Adhesion, water blast	PASS	IEEE 957
Adhesion, boiling water 100 h	PASS	CEA LWIWG-02
Temperature stability	−40 to 250 °C	TDS

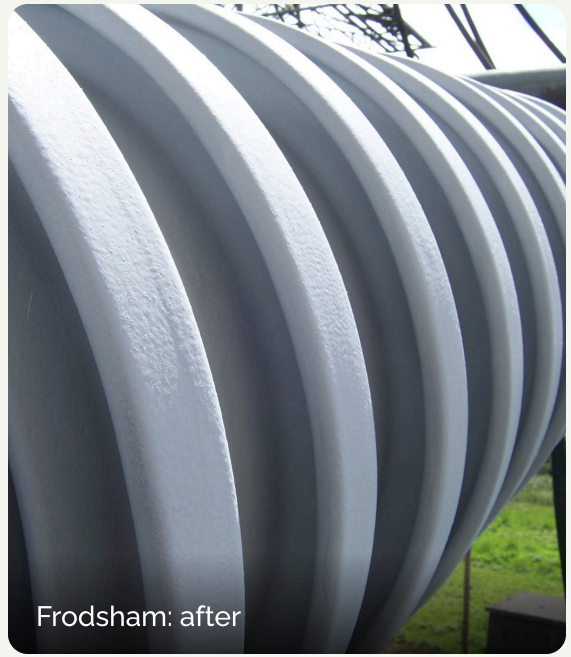
PROVEN IN SERVICE

From polluted sheds to a water-repellent finish


Swansea North: before


Swansea North: after


Frodsham: before


Frodsham: after

1997
CCS begins applying RTV silicone HVIC on HV insulators

12 yrs
Heysham: coating renewed after 12 years without flashover*

7–11 yrs
Hinkley Point: original coat still hydrophobic and fit to overcoat*

>14 yrs
Ras Laffan, Qatar: maintenance-free in saline and cement pollution*

2019
Si-COAT 570 with CSL Silicones; compatible as an overcoat

*Field follow-ups of earlier RTV silicone HVIC applied by CCS (case studies, ccs-network.com). Photos: RTV silicone HVIC finished coats applied by CCS. Work up to 400 kV.

SUPPLY

Getting Si-COAT 570

01
UK stock
Available from CCS stock in the UK, for delivery or EXW collection.

02
Direct from CSL
Larger or international orders ship direct from CSL Silicones, with lead times quoted at enquiry.

03
Supply only, or supply and apply
Buy the product, or have CCS apply it to the TDS and IEEE 1523 thickness guidance.

Colours
Light grey

Pack size
21 kg pails only

Shelf life
12 months unopened, stored below 32 °C

Documents
TDS and SDS supplied; application guidance available

Lead times are quoted per order. Ask for the TDS, SDS and type-test reports.



Si-COAT 570 pail

CCS Network

TALK TO US

Site survey, application or product supply

Talk to the applicators about your site, your pollution and your insulators.

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Technical data sheet and enquiry form

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