Consumer Solutions



# Flexible Options for Processing, Protection and Performance from a Conformal Coating

DOWSIL™

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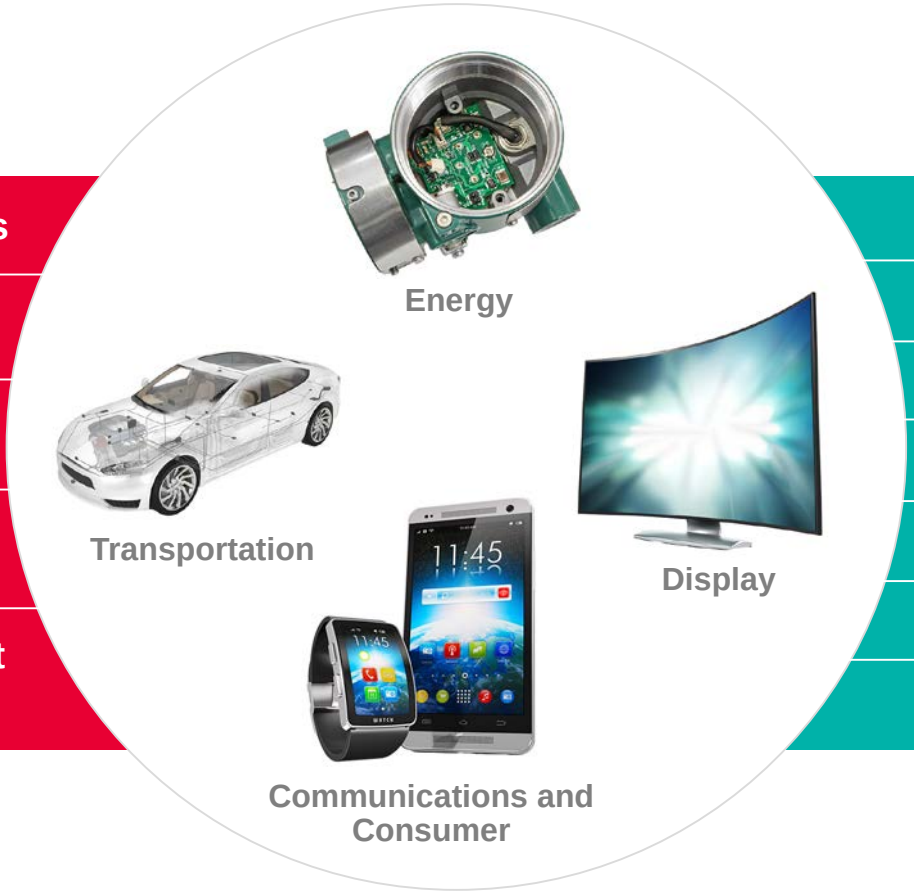
# Imagine Enhanced Performance, Improved Reliability and Lower Cost of Ownership



# Materials

An extensive portfolio of advanced assembly solutions.

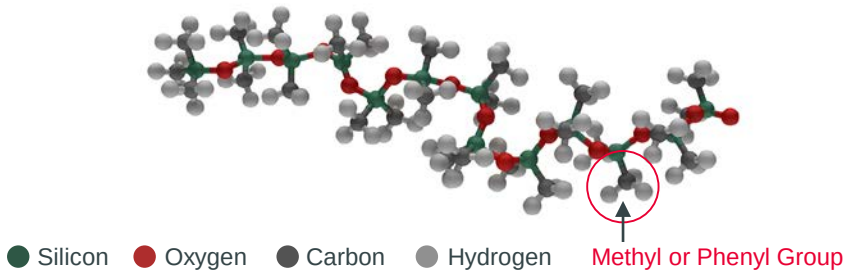
- Adhesives & Sealants
- Conformal Coatings
- Encapsulants
- Dielectric Gels
- Thermal Management Materials




- Bonding
- Sealing
- Protection
- Stress Relief
- Heat Dissipation
- Processing
- Aesthetics

# Why Silicon Based Materials in Your Application

- **Thermal stability**
  - High temperature resistance
  - Low temperature retention of elastomeric properties
- **Hardness can be modified**
  - From soft to hard depending on application
  - Flexible/compliant
- **Hydrophobic/waterproof**
  - Liquid water resistant
- **Low surface energy (wetting)**
- **Liquid to solid forms**
- **High purity**

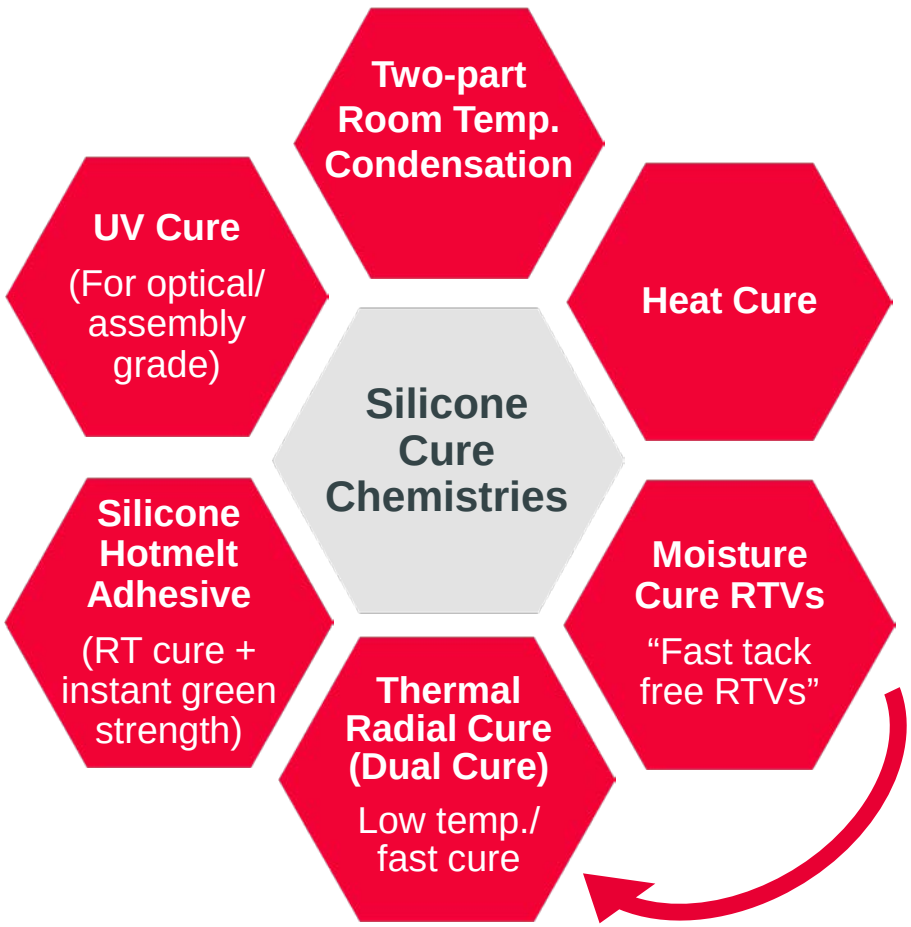


# Why Use Silicones?

| | Acrylic | PU | Epoxy | Silicone |
|---|---|---|---|---|
| Thermal Stability | ●● | ● | ●● | ●●● |
| Moisture Resistance | ● | ● | ●● | ●●● |
| Solvent Resistance | ●●● | ● | ●●● | ●● |
| Adhesion | ●● | ●● | ●●● | ●● |
| Repairable | ●●● | ● | ●●● | ●● |

● Low ● Medium ● High

# The Silicone Cure Profile You Need




- Dow offers many bonding and sealing solutions commonly used
- Silicone bonding and sealing materials maintain **their flexibility (not brittle)** and have **excellent thermal stability**, making them differentiated to conventional organic adhesives
- **Different cure chemistries** are available to meet your assembly process
- **Evolving and driven by new application needs.** Faster assembly, lower temperatures, higher performance, low production cost

# Conformal Coatings Cure Profile Options

## Fast Moisture-cure

- Cure quickly at room temperature
- Provide a “dispense-and-forget” solution
- Tack-free and ready to move down the production line in less than 10 minutes
- Ideal option for high-volume assembly operations

## Extended-working-time Moisture Cure

- Cure at room temperature
- Permit more time for the material to flow further over large or complex board
- Preferred solution for applications that require a thicker coating

## Heat Cure – Command Cure

- Allow control over the rate of cure
- Material of choice when your processing operation demands full cure in under 5 minutes
- May impose lower stress on board components during thermal cycling

# Conformal Coatings Trends

## General market trends and implications for conformal coatings

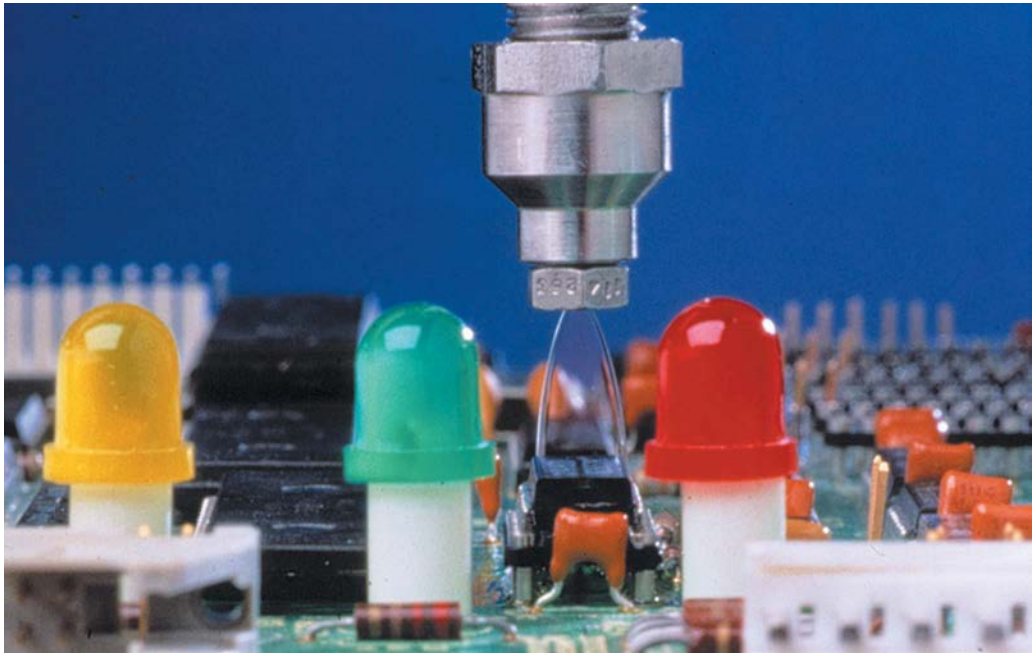
- System integrated
- Increasing electric capacitance
- Smaller
- Higher speed
- Modular
- Eco-friendly
- Low power consumption
- Smaller PCBs and components vs. higher power and efficiency
  - Use of components in very harsh environments
  - Higher need for protecting printed circuits

## Material needs for conformal coatings

- For harsher environments:
  - Excellent **protection** in highly **humid** and **corrosive** environments
  - Excellent **flame retardancy** and **electrical** properties
- Regulations:
  - Less VOC
  - Solventless
  - UV cure
  - Water-based and moisture cure coatings (100% solid silicones)

# Why Conformal Coat?

- PCB protection
  - Environment
  - Impact/vibration
  - Dust/debris
  - Leakage currents
- Cost savings
- Concealing of circuitry



# Processing Options

## Application Methods

- Spray
- Brush
- Flow
- Dip
- Automated pattern coating



# Viscosity

## Low viscosity for high-speed production

- Support high-speed production methods, including manual or automated spraying, flow or jetting techniques
- Faster-flowing materials
- Suitable options when you want your coating to flow through vias or under chips

## Higher viscosity for greater control

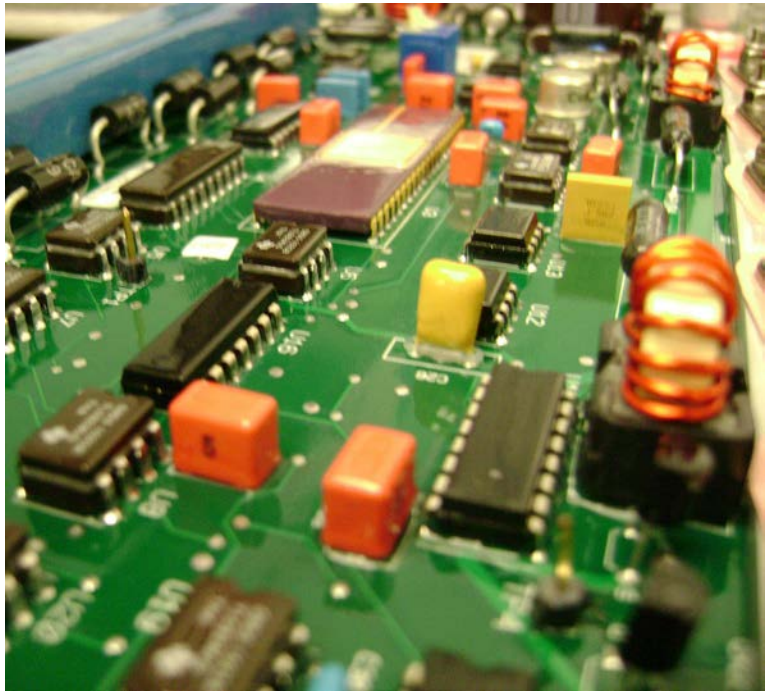
- Offer incrementally higher viscosities
- Provides increasing control over the speed and distance of flow to prevent their spread into “no-go” areas
- Enable thicker coating layers in one pass
- Some grades offer a stable coat on tall vertical surfaces

# Conformal Coatings Key Benefits

- **Thin protective film/breathing membrane** that filters water vapor and solid debris
- **Environmental and mechanical protection** of circuitry and components
- Thickness of **25 to 200 um**

## Key Benefits

- Improves **reliability** in humid environments
- Protects PCBs and other components against **environmental particles, moisture and contaminants**, preventing **short circuits and corrosion** of conductors and solder joints
- Protects circuits and components from **abrasion and solvents**
- **Stress relieving**
- Protects **insulation resistance**
- Reduces **conductor spacing** on PCBs
- Good **dielectric properties** (insulation, moisture resistance, breakdown voltage)



# Conformal Coatings Solutions

| Key Properties | Units | DOWSIL™ 1-2577 Low VOC Conformal Coating | DOWSIL™ 1-2620 Low VOC Conformal Coating | DOWSIL™ 1-4105 Conformal Coating | DOWSIL™ 3-1953 Conformal Coating |
|---|---|---|---|---|---|
| One- or Two-part | | One | One | One | One |
| Color | | Transparent | Transparent | Clear | Translucent |
| Viscosity | cP | 1,050 | 350 | 450 | 350 |
| NVC (Non-volatile Content) | % | 33.6 | 33.6 | 98 | 99.4 |
| Specific Gravity | | 1.12 | 1.12 | 0.97 | 0.99 |
| Tack-free Time at 25ºC | minutes | 6 | 5 | N/A | 8 |
| Tack-free Time at 60ºC/15% RH | minutes | 1.5 | 1 | N/A | 0.5 |
| Heat Cure Time at 100ºC | minutes | N/A | N/A | 5 | N/A |
| Durometer | | 25 (Shore D) | 25 (Shore D) | 64 (Shore 00) | 34 (Shore A) |
| Dielectric Strength | kV/mm | 13 | 16 | 20 | 17 |
| Volume Resistivity | ohm*cm | 1.90E+14 | 1.05E+15 | 2.7E+13 | 5.5E+15 |
| Dielectric Constant at 100 kHz | | 2.33 | 2.48 | 2.63 | |
| Dissipation Factor at 100 kHz | | 0.0003 | 0.004 | <0.0002 | <0.0002 |
| Agency Listing | | IPC-CC-830B, UL 746E | IPC-CC-830B, UL 746E | UL 746E | IPC-CC-830B, UL 746E |
| UL Flammability Classification | | UL94 V-0 | UL94 V-0 | UL94 V-1 | UL94 V-0 |
| Mil Specification | | 46058C Amend. 7 | 46058C Amend. 7 | N/A | 46058C Amend. 7 |

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