



Product Guide

New Silicone Science Drives Innovation
DOWSIL™ EA-7100 Adhesive



Thermal Radical Cure



Imagine

There's a New Chemistry on the Road



Dow has new adhesion solutions for automotive PCB (system) assembly applications. With the auto industry's needs in mind — especially design flexibility and cost control — our scientists have created an innovative product family based on a technology that's never been available ... until now.

We put the new adhesives to the final test in the real world — meeting the demanding requirements of the first wave of Tier 1 and original

equipment manufacturers (OEMs) who used them. Now the new technology is available to you.

DOWSIL™ EA-7100 Adhesive is a new silicone adhesive that provides adhesion versatility and adhesion strength performance for automotive and transportation applications.



Versatility and Adhesion Strength

DOWSIL™ EA-7100 Adhesive is a one-part, thixotropic adhesive that offers these benefits:

- Design flexibility due to durable adhesion to a broad range of substrates
- Faster cure times and/or lower cure temperatures
- Adhesion that forms simultaneously with the cure to specific substrates
- Low void formation
- Adhesion in harsh environments
- Good results from salt spray, water immersion and saltwater immersion testing
- Potential elimination of some cleaning steps
- Less sensitive to contamination

The new adhesive can also reduce the cost of PCB system modules by removing process steps, reducing cure time, lowering cure temperatures and more.

Properties

DOWSIL™ EA-7100 Adhesive

Viscosity	360,000 cP
Thixotropy	5.8
Adhesion to Al	350 psi, 100% CF
Adhesion to PBT (Ticona)	380 psi, 100% CF
Adhesion to PBT (BASF)	370 psi, 100% CF
Durometer	43 Shore A
Tensile	490 psi
Elongation	260%
Modulus (100%)	160 psi

Adhesive Bonds with Diverse Substrates — Including New and Alternative Materials

DOWSIL™ EA-7100 Adhesive provides robust adhesion to a broad variety of surfaces. And Dow Performance Silicones scientists continue to add to this list.

Substrates*

Plastics

- Epoxy
- Liquid crystal polymer (LCP)
- Phenolic
- Poly (methyl methacrylate) (PMMA) (Plexiglas)
- Polyamide (nylon)
- Polybutylene terephthalate (PBT)
- Polycarbonate (PC)
- Polyethylene (low-density polyethylene/LDPE, cross-linked polyethylene/PEX)
- Polyimide
- Polyphenylene ether (PPE)
- Polyphenylene sulfide (PPS)
- Polyvinyl chloride (PVC)

Metals

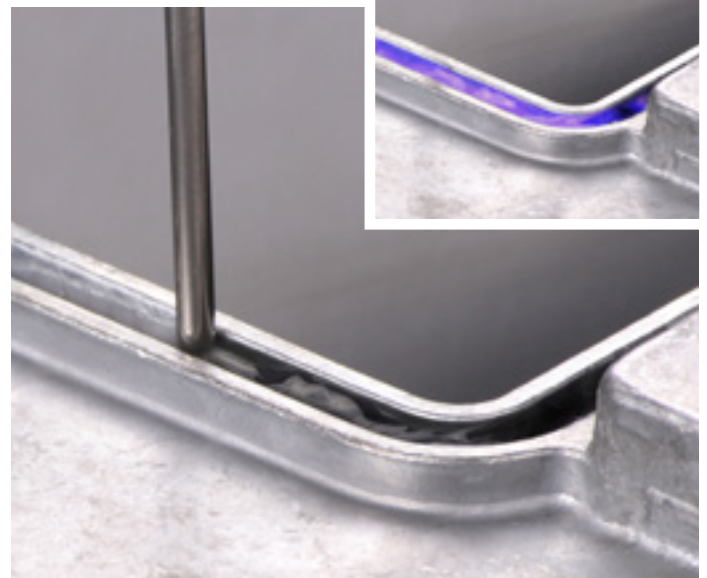
- Aluminum
- Brass
- Copper
- Steel

Cured silicones

Other substrates (contact Dow Performance Silicones)

* Typical 100% cohesive failure (CF) in peel @ 30-40 ppi, 21-28 N/cm lap shear, 300-450 psi, 2-3 MPa.

Lid Seal Application

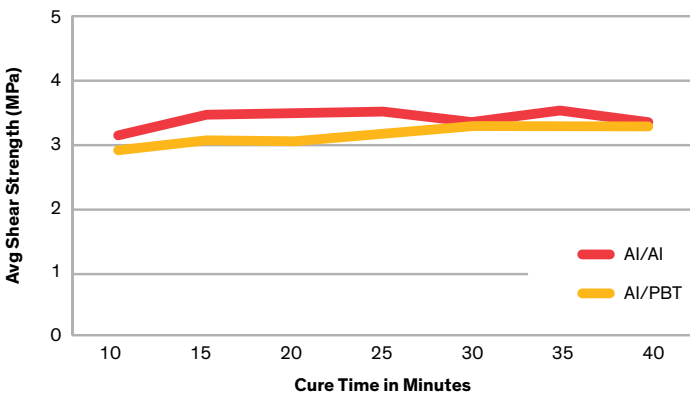


The compatibility with so many diverse substrates enables improved performance and new designs — including those that use alternative plastics to reduce overall manufacturing costs.

Cleaning/Contamination. While “addition cure” silicones may be sensitive to certain contaminants that interfere with bonding or cure (such as sulfur and amines), DOWSIL™ EA-7100 Adhesive doesn't have this sensitivity. Its cure is unaffected by amines and sulfur.

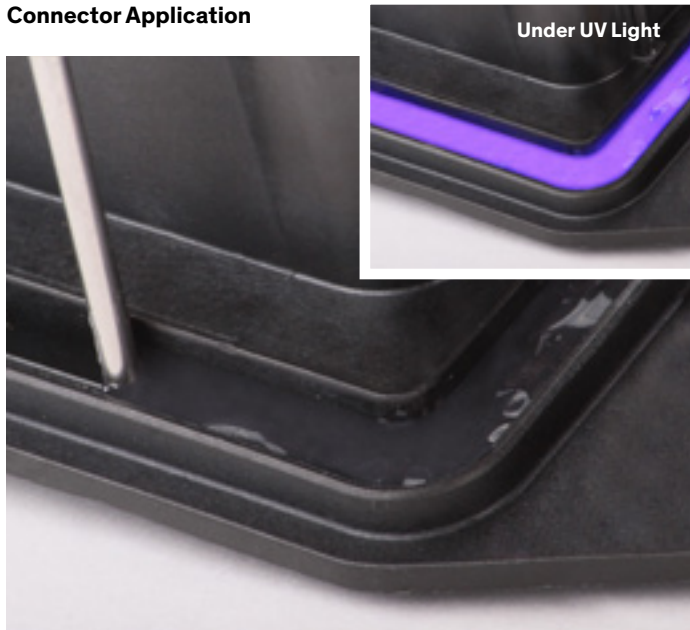
This thixotropic adhesive requires little to no pretreatment or cleaning for activation — possibly reducing or eliminating primers and plasma, UV and corona processes.

Figure 1: Shear strength of DOWSIL™ EA-7100 Adhesive at 100°C



Lap shear, 7-mil (178 um) bondline, Ticona 3300D PBT (30% GF), 2"/minute (0.8 mm/s) rate on Tensometer.

Connector Application

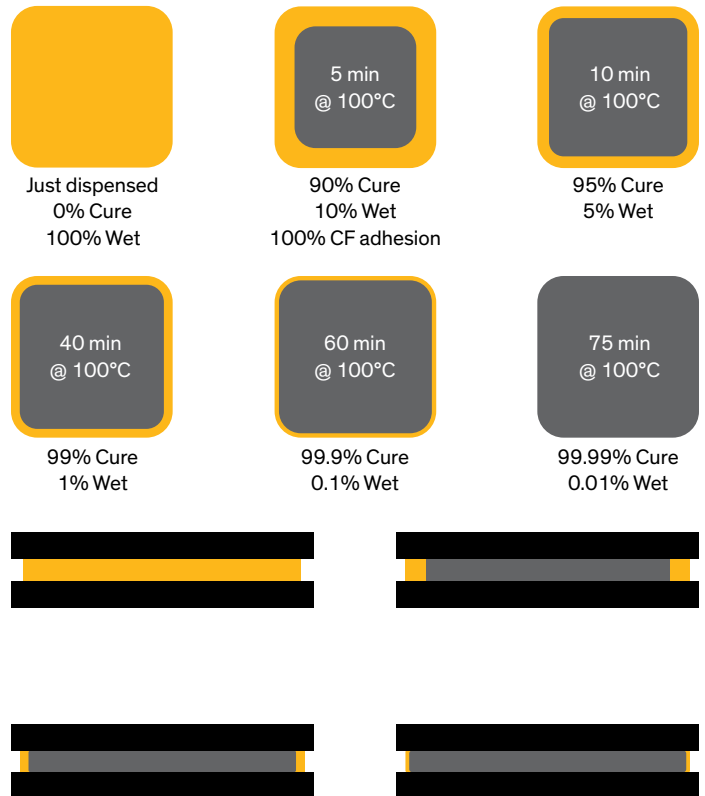


A Different Kind of Cure

DOWSIL™ EA-7100 Adhesive cures throughout the bulk and adhesion can form simultaneously with cure to many substrates (Figure 2). Cohesive adhesion can begin to develop in as fast as three minutes. The adhesive can be curable during the typical hot test (condition and substrate dependent) — allowing for immediate testing.

The cure/adhesion begins in the bulk — before skin-over time. The bulk material at the bondline between the two substrates is cured with complete adhesion (100 percent CF) immediately after cure, although the exposed material at an oxygen interface (squeeze out) may still appear wet or uncured. That's because the outer surface is oxygen-inhibited and remains tacky until the “dual cure” system — part of the unique chemistry of this adhesive — completes in approximately 24-48 hours. Curing in a low-oxygen oven can reduce this surface tack if desired.

Figure 2: DOWSIL™ EA-7100 Adhesive confined cure (such as a lid seal) in oxygen environment



Applications for DOWSIL™ EA-7100 Adhesive

DOWSIL™ EA-7100 Adhesive is considered for use in the assembly of electronics housings from plastic and/or metals and for attaching connectors, electronic control units (ECUs) or sensors onto substrates.

Powertrain

- Engine management: ECUs, electronic fuel injection, electronic ignition control
- Automatic gearbox controllers
- Electro-hydraulic power steering control units
- Electric power steering ECUs

Braking

- ABS with and without electronic stability control: ECUs, wheel sensors and stability controllers
- Brake-by-wire ECUs and electric motors
- Electric parking brake ECUs

Safety Sensors

- Airbag
- Occupant detection
- Direct tire-pressure monitoring system

Driver Assistance Sensors

- Adaptive headlight
- Night vision
- Passive cruise control
- Adaptive cruise control
- Blind spot detection
- Park-assist/Self-parking

Convenience/Comfort Sensors

- Air conditioning
- Rain-sensitive wiper
- Electric window
- Power sliding door
- Power tailgate
- Electric seat
- Electric roof

Power Distribution

- Lithium-ion battery control units
- Motor/generators (three-phase, AC permanent magnet motors)
- Motor/generator inverter-converter unit ICUs
- DC/DC converters
- Power inlet AC/DC power supply units

Performance During Assembly and on the Road

DOWSIL™ EA-7100 Adhesive performs well in reliability testing, such as salt spray and water immersion. Anti-corrosion performance is superior to traditional heat cure material.

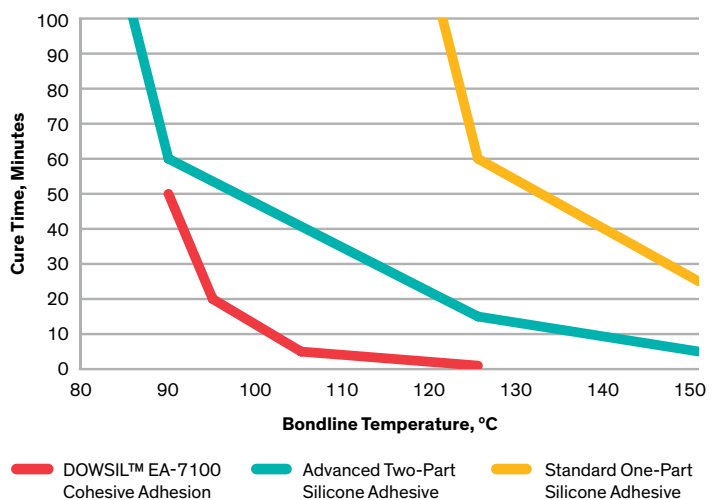
Faster Cure Reduces Cycle Time

With a cure time of 15 minutes — at 100°C (212°F) for DOWSIL™ EA-7100 Adhesive — the potential time savings can be converted into cost savings that may include:

- Reduced labor
- Reduced processing time
- Less storage space needed (due to less time waiting for full cure)
- Faster delivery/stock time

Traditional silicone adhesives take from 30 to 60 minutes to cure (Figures 3 and 4). With Dow's new adhesive, the starting point is 15 minutes. If you want an even faster cure, you have the option of accelerating the cure with the application of higher heat — with the potential for a three-minute cure time.

Figure 3: Adhesive cure time comparison



Lower Temperatures Can Lower Costs

Lower curing temperatures can translate into energy savings and lower process costs. Smaller curing ovens are possible, which can mean lower capital expenditures, a reduced footprint and lower operating expenses.

Time is saved in the heating up and cooling down of components, which also can add up to significant cost savings.

For an even lower-temperature cure, DOWSIL™ EA-7000 Adhesive is another new product in this family. This adhesive cures at 85°C (185°F), and supports select applications where lower temperatures are required.

DOWSIL™ TC-2021 Thermally Conductive Adhesive is also a new adhesive in this product family. It is a companion product for co-cure applications.

For more information, contact your Dow Performance Silicones representative.



Figure 4: Cure comparison in a typical lid seal design in oxygen environment



Note: dependent on substrate, environment and cure conditions.





Learn More

We bring more than just an industry-leading portfolio of advanced silicone-based materials. As your dedicated innovation leader, we bring proven process and application expertise, a network of technical experts, a reliable global supply base and world-class customer service.

To find out how we can support your applications, visit consumer.dow.com/pcb.

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