

Silicone Resin 101:

Coating Fact Sheet



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Silicone Resin Process

Silicone Resins (Type SR) can be applied three ways: spray, dip, brush. The method of application will depend on the complexity of the masking involved, project volume, and costs of each method.

Spray application can be done via hand-spray, aerosol can, or by robotics. The material is usually diluted with solvents to get to a predetermined viscosity and is sprayed from all four quadrants at a 45 degree angle, when done manually or with aerosols. Robotic spray application is very useful whenever there is low board complexity, high volumes, and high repeatability. Unless these criteria are met, the cost of a skilled operator and programming time often outweigh the benefits of robotic spray.



Some advantages for spray coating are:

- High volume capable
- Reduced masking in comparison to the dip method
- Better tip and side edge coverage
- More uniform thickness
- Suitable for all conformal coatings

Dip coating is typically done by an automated machine, although it can be done manually as well. The assemblies are typically hung

by an arm and then lowered in a dip tank containing the coating with an immersion rate determined by the population density of the PCB to be dipped and the desired thickness of the coating.

Some advantages to dip coating are:

- Coating penetration under components
- Coating thickness can be assured
- High volume capable
- Typical low process time

Brush coating is done manually by an operator with a brush. Brush coating is mainly employed during coating touchup operations or for conformal coating rework.

Some advantages to brush coating are:

- Cost effective for low volume projects
- Low startup cost

Main Benefits of Silicone Resin

Silicone conformal coating is becoming an increasingly popular choice for conformal coating applications. Because of its high temperature capabilities, moisture protection,

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and ease of application/rework, people are strongly considering silicone coatings for their projects.

Most typical silicone coatings have continuous operating temperature ratings of 200°C. This is far higher than parylene (80°C) and acrylics (125°C). Some silicone coatings are rated as high as 600°C for ultra high temperature applications. We have seen a great deal of use for silicones in the automotive industry, where temperatures can get upwards of 175°C in the engine compartment.

An additional benefit of silicone conformal coating is its excellent moisture protection. Silicones have been used in cases where there were extreme temperature differences, which resulted in excessive moisture. Other conformal coatings failed within hours or days, while silicone, especially when applied thickly, has been proven to succeed.

Silicone conformal coatings are among the easiest to apply and re-work. Silicone coatings are typically low on solvents, ensuring a smooth coat that cures very quickly (about one hour at room temperature). Silicones are quite flexible and soft, having a relatively weak resistance to solvents. For assemblies that will require work after coating, this is critical because it will keep costs and time down.

How thick should silicone conformal coating be applied?

In order for the coating to function at its optimum level, it has to be applied at the proper thickness.

Maintaining proper thickness for silicone conformal coating is critical because it is applied very thick compared to other conformal coatings. If a coating is applied too thick, it may create excessive stresses on solder joints and components (particularly glass-bodied components). For this reason, the IPC created the J-STD-001 to regulate and standardize the thickness that coatings are applied at. For silicones, the J-STD-001 calls out 0.00197 to 0.00827 in. Our operators strive to hit between .002” and .008” for silicone applications.

Type SR Conformal Coating Examples

- Humiseal 1C49
- HumiSeal 1C49LV
- HumiSeal 1C51
- HumiSeal 1C55
- Dow Corning 1-2577
- Dow Corning 3-1753
- Dow Corning 3-1765
- Dow Corning 3-1744
- Dow Corning 3-1953

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- Dow Corning 3-1965
- Dow Corning 3-1944
- MG Chemicals 422B
- Peters DSL 1705 FLZ
- Peters DSL 1706 FLZ
- Electrolube SCC3
- Electrolube SCC4

Common Applications of Silicone Resin

- Aircraft Electronics
- LED assemblies
- Computer motherboards
- Power supplies
- Game cameras
- Other printed circuit boards

About Diamond-MT

Diamond MT was founded in 2001 as a firm specializing in contract applications of Conformal Coatings for Department of Defense and Commercial Electronic Systems.



Since our beginning, Diamond MT has established a reputation for providing the highest quality services in the industry. Our commitment to quality, integrity and customer satisfaction combined with an unmatched expertise in applications and processes has provided every one of our customers with superior results.

Diamond MT operates out of a free standing 12,000 square foot building in Johnstown, Pennsylvania which is located 60 miles southeast of Pittsburgh. Diamond MT is located near three major interstates and is supported by the Cambria County Airport which serves as a primary freight terminal for south central Pennsylvania.



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