Dow Corning® CI-2001 White Reflective Coating

Application Bulletin

Material Description

*Dow Corning* CI-2001 White Reflective Coating is a highly reflective optical coating that delivers good resistance to environmental aging and enhances LED light output and efficiency. It is a room-temperature-vulcanizing (RTV), solventborne, elastoplastic resin. Key features of this advanced material include:

- Performance targeting high reflectance — 96% at 5-mil and 94% at 3-mil coating thicknesses
- One-component formulation offers simple room-temperature cure and can be accelerated with heat for higher productivity
- Easy application by spray, dip, brush or flow methods
- Reliable, long-lasting performance between -45 and 200 °C (-49 and 392 °F)
- Less than 50 g/l of nonexempt VOC content
- Easily adjustable viscosity using VOC-exempt, SNAP-approved, low-odor, low-toxicity (200 ppm IHG) *Dow Corning*® OS-20 Fluid or other silicone diluents
- Good electrical properties over a wide temperature range
- Recognized under UL flammability rating UL-94 V0

Use

*Dow Corning* CI-2001 White Reflective Coating is used as a bright-white reflective coating to enhance light output and efficiency for light reflectors, mixing chambers, backlight units, light engine units, printed circuit boards and aluminum surfaces used in assembly of LED lamps and luminaires.

Dilution

*Dow Corning* CI-2001 White Reflective Coating can be diluted as needed for use in specified coating methods. A diluent, such as *Dow Corning* OS-20 Fluid, can be used to lower the coating’s viscosity. The following graph shows the correlation between *Dow Corning* CI-2001 White Reflective Coating’s relative viscosity and the amount of *Dow Corning* OS-20 Fluid added.

Example: A 5% ratio of *Dow Corning* OS-20 Fluid drops the viscosity of *Dow Corning* CI-2001 White Reflective Coating by approximately 60%.
Cure

*Dow Corning®* CI-2001 White Reflective Coating cures upon contact with ambient moisture. Cure time depends on the method of application, film thickness, temperature and humidity. Generally, films less than 5 mils in thickness will be tack-free in under 20 minutes at 25 °C (77 °F) and greater than 30% relative humidity. Under these conditions, final cure will typically be achieved in 48 hours. Tack-free and cure times can be shortened significantly by introducing heat up to 60 °C (140 °F) and 70% relative humidity. Cracks may occur if the coating is exposed to cold temperatures or thermal cycling before adequate cure has developed. A typical cure schedule for a 3-mil coating is 10 minutes at room temperature followed by 10 minutes at 60 °C (140 °F). If the coating bubbles, allow additional time at room temperature for the solvent to evaporate prior to oven cure.

Adhesion

*Dow Corning®* CI-2001 White Reflective Coating adheres to most electronic substrates in one to seven days, depending on processing conditions. Mild heating shortens the time to build adhesion and, in some cases, can improve full adhesion on difficult substrates. The coating achieves ISO Class: 0 and ASTM Class: 5B adhesion on aluminum, steel, FR4, polymethyl methacrylate and polycarbonate substrates.

Pot Life

The pot life of *Dow Corning®* CI-2001 White Reflective Coating depends on the conditions under which it is processed. Dry nitrogen or other dry blanketing can extend pot life. Dilution using reactive solvents, such as alcohol or solvents containing water, will reduce shelf and pot life.

Application Methods

*Dow Corning®* CI-2001 White Reflective Coating is compatible with multiple application methods, including spray, brush, flow and automated pattern-coating. Production volume, complexity, selectivity, budget, space and ease of use are among the factors that help determine which method is most productive and cost-effective. This bulletin will address manual spray methods. For information on other application methods, please contact Dow Corning Technical Customer Service.

Manual spray-coating is one of the most common processing options for evenly coating substrates. While simple to use, this method also can lead to a highly variable application plagued by operational discrepancies, undesired results and waste. However, a proper understanding of manual spraying will result in reliable processing with very repeatable results and optimal efficiency.

Manual spray-coating normally is used when low investment in equipment is required or when coating different boards in progression or simultaneously.

Application Procedure

Dry coating thicknesses of 3 to 5 mils will achieve desired reflectance. Following are guidelines for coating viscosity at approximately 500 cP using DeVilbiss® HVLP spray guns. Spray guns from other manufacturers can also be used. Operating manuals for these guns generally provide a guide for choosing the proper air caps, tips and needles as well as recommended air pressure settings. For purposes of demonstrating the use of *Dow Corning®* CI-2001 White Reflective Coating in this bulletin, a DeVilbiss HVLP spray gun was used in our lab with the following:

| Air cap: 58 | Fluid pressure: 10-20 psig |
| Fluid tip: AV-2115-FX | Supply pressure: 40 psig dry air |
| Fluid needle: JGA-402-FX | Coating distance: 9-12 inches |

Notes on Application

- The above information is based on lab testing only.
- It is important to flush the fluid delivery system with an inserting fluid, such as *Dow Corning®* OS-20 Fluid, prior to the introduction of the coating.
- Failure to adequately remove moisture from the process lines can result in gel formation in the coating.
- Extensive shutdowns should have no effect, as long as the fluid system is sealed and free of air or moisture. In addition, air pressure should be turned off during shutdown.

Before beginning the coating process, the operator should spray a horizontal test pattern with the air cap in vertical position, then hold the trigger open until material begins to run. If the material is not evenly distributed, adjust the pattern width. For air guns, optimum fluid pressures are 8 to 20 psi. Pressures greater than this generally indicate the need for a larger fluid tip.

If possible, a two-step (double-action trigger) spray gun is recommended. Slight pressure on the trigger provides air through the gun, while additional pressure releases both coating and air. To apply, spray straight linear paths across the sample with a flexible wrist. Hold the gun at least six inches away from the end of the sample to be coated. As the gun reaches approximately one inch from the sample’s edge, further depressing the trigger will begin the application process, and the operator should continue the movement across the sample at a steady speed.

Approximately one inch after reaching the end of the target, the trigger pressure should be reduced until only air is expelled from the gun, while maintaining the speed of the gun movement for at least five more inches. This last step should keep the gun clean from accumulated coating. To ensure uniform line-of-sight coating coverage, rotating the target on a turntable at 90-degree intervals between coats is recommended.
Before coating the sample, first test the spray pattern on paper to determine the best distance and speed combination. Using the spray adjustment skews will achieve the best coverage and finish. Masking off connectors and other areas is critical.

To reach difficult spots blocked by tall components and components that are aligned on the sample shadow, positioning samples so they are perpendicular to the spray gun movement is recommended.

**Maintenance**

To keep the spray gun operating at optimal capacity, remove the air cap and clean it with solvent after every use. A bristle brush can help clean the sprayer components. Never use metal objects for cleaning. It may be necessary to soak the individual parts in a solvent, but use caution with seals and O-rings, as these have a tendency to swell.

If the spray gun is flushed well, it may not be necessary to disassemble it for cleaning. Remove the cup from the gun if a pressure pot is not used. Empty any excess material and wipe it out with a cloth. Fill the cup with solvent, reassemble the gun and spray the solvent into a container. Next, remove the cap, fluid tip and fluid needle and clean them with solvent. Then, remove the cup, wipe it out and reassemble the gun. Spray air through the system for a few seconds to dry and clean the gun.

**Summary**

When these methods and maintenance procedures are used, manual spray-coating can be a productive and highly cost-effective solution for applying Dow Corning® CI-2001 White Reflective Coating and other protective coatings to samples.

Should you have specific needs not covered in this bulletin, or if you have questions about other application methods, Dow Corning experts can help. Connect with our experts at dowcorning.com/lighting or email us at electronics@dowcorning.com.
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