

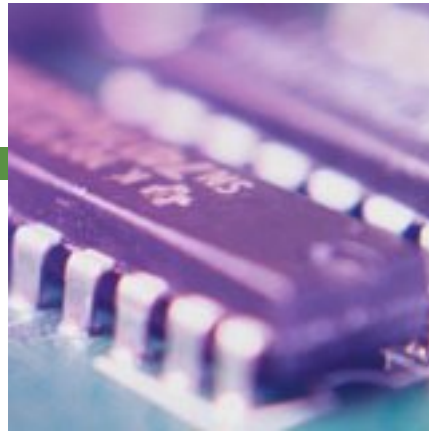


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Conformal Coating and Solder Resist

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Attendee Quick Reference

You need to use your phone for the audio.

The number is on the bottom right hand side of your screen as shown in this example, along with the access code.

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1. From the Attendee Control Panel **File** Menu, select **Exit – Leave Webinar**.
2. On the **Leave Webinar?** Confirmation dialog box, click **Yes**.

The screenshot shows the GoToWebinar control panel with the following annotated features:

- My Details:** Shows the attendee name and Satisfaction Rating. Attendees can change their Satisfaction Rating by clicking on the drop-down arrow.
- Webinar Info:** Provided for quick reference. Includes the URL: <https://got1.gotomeeting.com/register/100345110>, Webinar ID# 100-345-110, and Dial 805 772 3322, access code 106805420.
- Grab Tab:** Enables attendees to minimize the Control Panel to the side of their desktops and still access Viewer tools.
- Question and Answer:** If turned on by an organizer, attendees can submit questions and review answers. Broadcast messages from an organizer will also show here.



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What is Conformal Coating?

Per IPC-T-050, page 22

It is an insulating protective covering that conforms to the configuration of the objects coated, providing a protective barrier against deleterious effects from environmental conditions.



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Are There Different Types?

There are five types:

- AR - Acrylic Resin
- ER - Epoxy Resin
- UR - Urethane Resin
- SR - Silicone Resin
- XY - Paraxylylene Resin or Parylene Resin



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Acrylic Resin

- Acrylic resin conformal coatings are perhaps the most popular of all conformal coatings due to their ease of application, removal, and forgiving nature.
- Easy to work with for component removal.

HumiSeal Technical Bulletin 1B31 Aerosol



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Epoxy

- Epoxies are very hard, usually opaque, and good at resisting the effects of moisture.
- Difficult, if almost impossible, to remove without damaging components.



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Urethane

- These coatings are tough, hard, and exhibit excellent resistance to solvents.
- They have limited high temperature capability, and an inability to be repaired often prevents their use.

Emphasis, Manufacturer's Corner, Jan/Feb 2003



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Paraxylylene or Parylene

- Excellent coverage and uniform
- High cost, sensitive to contaminants, and need vacuum application.

Emphasis, Manufacturer's Corner, Jan/Feb 2003

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Application Methods

Usual application methods are:

- Dipping
- Spraying
- Flow coating
- Vacuum application



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Uses

- Mechanical protection
- Corrosion prevention
- Minimize dendritic growth on PWA
- Improves insulation resistance between circuits



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Does It Have to Cover Everything?

- No, apply it to areas where it needs to be applied, but keep it off areas where additional connections to the product will be made.
- Keep it out of unsealed components
- Therefore, per 001D, page 38: *“Cover only those areas specified on the assembly drawing(s)/documentation.”*



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J-STD-001 & 610 Acceptance Criteria

- J-STD-001D, par. 10.1.2.2 Coating Coverage
- IPC-A-610, 10.5.2 Conformal Coating

Acceptable - Class 1,2,3

- Completely cured and homogenous.
- Coating only in those areas where coating is required.
- Loss of adhesion adjacent to masking.
- No bridging of adjacent lands or conductive surfaces from:
 - loss of adhesion (mealing)
 - voids or bubbles
 - dewetting
 - cracks
 - ripples
 - fisheyes or orange peel
- Foreign material does not violate minimum electrical clearance between components, lands or conductive surfaces.
- Coating is thin but still coats component/device edges.

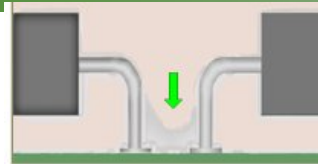





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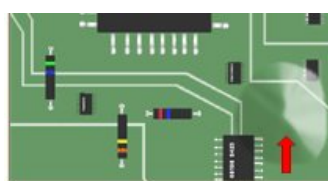
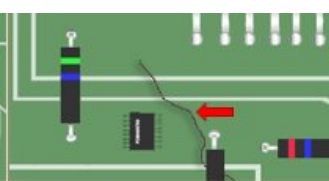



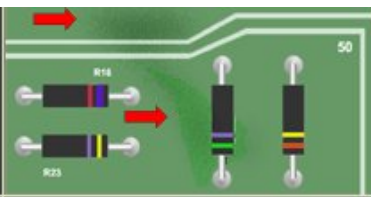
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Examples:

	
ACCEPTABLE BRIDGING Conformal coating may bridge adjacent part leads, provided stress relief is not negated. NASA-STD-8739.1 [10.2.5.e], [11.8.2.]	UNACCEPTABLE BRIDGING Coating shall not bridge between the bottom of ceramic-bodied DIPs or surface mount parts and the PWB, or between the part lead and the PWB, thereby negating stress relief. NASA-STD-8739.1 [10.2.4.b], [11.8.3.b]

	
ACCEPTABLE FISHEYES Fisheyes shall not exceed 5% of the surface area. NASA-STD-8739.1 [10.2.5]	UNACCEPTABLE FISHEYES Fisheyes shall not exceed 5% of the surface area. NASA-STD-8739.1 [11.8.3.k]

	
UNACCEPTABLE BLISTERING Blistering is typically caused by improper preparation/priming or entrapped moisture or contaminants, and is cause for rejection. NASA-STD-8739.1 [11.8.3.e]	UNACCEPTABLE CONTAMINATION Contamination (i.e. flux, loose particles, foreign material, etc.) shall be cause for rejection. NASA-STD-8739.1 [10.2.5.c], [11.8.3.f]

	
UNACCEPTABLE CRACKING Cracking is typically caused by improper cure, excessive heat during cure, or excessive flexure of the substrate, and negate the environmental sealing properties of the coating. NASA-STD-8739.1 [11.8.3.e]	UNACCEPTABLE DISCOLORATION Conformal coating shall not exhibit discoloration (due to such things as excessive curing oven temperature, contamination, etc.). NASA-STD-8739.1 [10.2.5.f], [11.8.3.g]

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Is There a Thickness Requirement?

From J-STD-001D, Page 38:

“Thickness is measured on a flat, unencumbered, cured surface of the printed circuit assembly or a coupon that has been processed with the assembly”

Type AR	Acrylic Resin	0.03-0.13 mm [0.00118 to 0.00512 in]
Type ER	Epoxy Resin	0.03-0.13 mm [0.00118 to 0.00512 in]
Type UR	Urethane Resin	0.03-0.13 mm [0.00118 to 0.00512 in]
Type SR	Silicone Resin	0.05-0.21 mm [0.00197 to 0.00827 in]
Type XY	Paraxylylene Resin	0.01-0.05 mm [0.000394 to 0.00197 in]



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IPC-TM-650 Test Methods

- 2.6.3.4 Moisture and Insulation Resistance
Conformal Coating
- 2.6.7.1A Thermal Shock, conformal coating
- 2.6.11 Fungus Resistance, conformal
coating
- 2.6.11.1 Hydrolytic Stability, conformal
coating



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Conformal Coating

- It's a coating to protect the product from its environment
- It will not prevent tin whiskers
- Lots of information on the web, just do a search for [Conformal Coating](#)



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Debris in the Solder Mask

- One question we get many times is, “What about if debris or something is in the solder mask -- is it OK?”
- What is the criteria?



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Example of Debris in Solder Mask



- IPC-SM-840 D Sect. 3.3 Visual Requirements:

Solder mask appearance shall be observed visually in all stages of evaluation, qualification and conformance inspection with the aid of a magnifying lens rated between 1.75 and 10x magnification unless otherwise specified. The material shall be uniform in appearance and free of foreign materials, cracks, inclusions, peeling, and roughness that would interfere with the assembly or operation of the printed boards.



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Document Flowdown for Soldermask

IPC-A-600 par 2.9:

Detailed specifications and information regarding solder resist requirements are contained in IPC-6012 and IPC-SM-840

IPC-6012B par 3.7: Solder Resists (Solder Mask)

Requirements shall meet the requirements of IPC-SM-840

IPC-SM-840D: *is the qualification and performance specification of permanent solder mask.*



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Upcoming . . .

December 12th

- Lead Protrusion and Damaged Pins

January 17th

- Subject to be announced, watch our web site and email coming your way



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