

CONFORMAL COATING and STAKING (BONDING) CONFORMAL COATING	
	<p>CONFORMAL COATING</p> <p>Conformal coatings are intended to provide electrical insulation and environmental protection to the PWA, eliminating or minimizing any performance degradation caused by humidity, handling, debris, and/or contamination.</p> <p>Typical conformal coatings (i.e., Acrylic, Urethane, Epoxy, Silicone) can be applied in any standard vented environment by automatic / manual operations (i.e., spraying, brushing, dipping, or a combination thereof). High performance coatings (i.e., Paraxylene) require a highly controlled environment, and are applied by Chemical Vapor Deposition (CVD).</p>

	<p>PREFERRED</p> <p>Conformal coating covers all areas as specified on the engineering documentation. Coating exhibits uniform color, thickness, proper adhesion, and is smooth, transparent, and tack free. No bubbles, entrapped contaminants or particles, excessive fillets, runs, drips, etc. Identification markings are visible.</p>
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	<p>ACCEPTABLE BRUSH APPLICATION</p> <p>The conformal coating is evenly applied, without forming excessive fillets or thick areas. Minor brush marks are acceptable, provided minimum thickness is maintained.</p> <p>NASA-STD-8739.1 [10.2.2.b]</p>
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	<p>ACCEPTABLE BRIDGING</p> <p>Conformal coating may bridge adjacent part leads, provided stress relief is not negated.</p> <p>NASA-STD-8739.1 [10.2.5.e], [11.8.2.j]</p>
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	<p>UNACCEPTABLE BRIDGING</p> <p>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.</p> <p>NASA-STD-8739.1 [10.2.4.b], [11.8.3.b]</p>
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NASA WORKMANSHIP STANDARDS			
	NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	Released: 04.05.2002	Revision: Revision Date:
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CONFORMAL COATING and STAKING (BONDING) CONFORMAL COATING (cont.)	
	<p>ACCEPTABLE RUNS</p> <p>Runs shall not exceed 5% of the surface area.</p> <p>NASA-STD-8739.1 [10.2.5]</p>
	<p>UNACCEPTABLE RUNS</p> <p>Runs shall not exceed 5% of the surface area.</p> <p>NASA-STD-8739.1 [11.8.3.k]</p>

	<p>ACCEPTABLE SCRATCHES</p> <p>Scratches, which do not expose conductive surfaces, or reduce the coating thickness below minimum thickness requirements, are acceptable.</p> <p>NASA-STD-8739.1 [10.2.5]</p>
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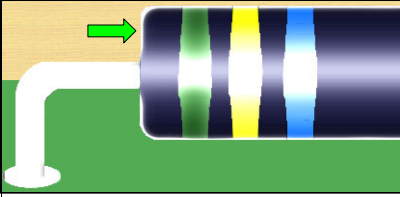
	<p>UNACCEPTABLE SCRATCHES / SCRAPES</p> <p>Scratches, which expose conductive surfaces, are not acceptable.</p> <p>NASA-STD-8739.1 [11.8.3.e]</p>
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	<p>ACCEPTABLE SPRAY APPLICATION</p> <p>The conformal coating is evenly applied, exhibits uniform color, thickness, proper adhesion, and is smooth and tack free. No evidence of shadowing, orange peel, or dusting.</p> <p>NASA-STD-8739.1 [10.2.2.a]</p>
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	<p>ACCEPTABLE TERMINALS</p> <p>Terminals shall be conformally coated, including the wire insulation gap, unless it is a solder ball termination (i.e., a high-voltage termination). Minor pullback from sharp points and edges is acceptable.</p> <p>NASA-STD-8739.1 [10.2.5.d]</p>
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**CONFORMAL COATING and STAKING (BONDING)
CONFORMAL COATING (cont.)**

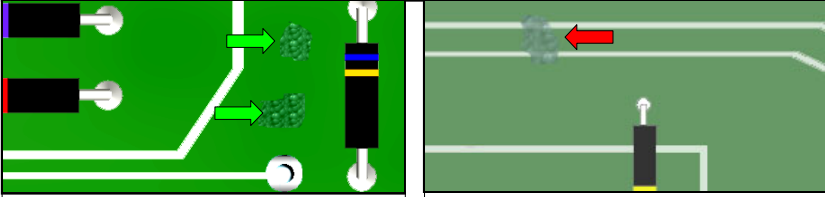


**ACCEPTABLE
ULTRAVIOLET (UV) FLUORESCENCE**

Conformal coatings containing a fluorescent dye shall be examined under an ultraviolet (UV) source. The coating shall exhibit uniform fluorescence when exposed to an ultraviolet (UV) light source.

[NASA-STD-8739.1 \[11.9.2 \]](#)

**CONFORMAL COATING and STAKING (BONDING)
CONFORMAL COATING (cont.)**



**ACCEPTABLE
BUBBLES**

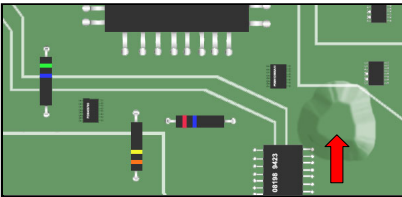
Small bubbles, which do not bridge uncommon conductors, expose conductor surfaces, or exceed 0.76 mm (0.030 inch) in any dimension, are acceptable.

[NASA-STD-8739.1 \[10.2.5 \]](#)

**UNACCEPTABLE
BUBBLES**

Bubbles, which bridge uncommon conductors, expose conductor surfaces, or exceed 0.76 mm (0.030 inch) in any dimension, are not acceptable.

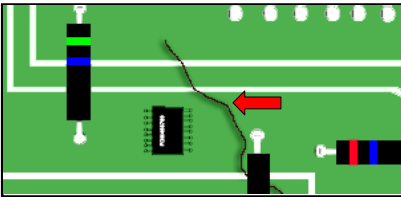
[NASA-STD-8739.1 \[11.8.3.h \], \[11.8.3.i \]](#)



**UNACCEPTABLE
BLISTERING**

Blistering is typically caused by improper preparation / priming, or entrapped moisture or contaminants, and is cause for rejection.

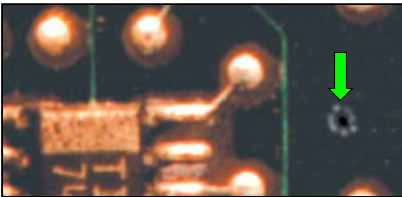
[NASA-STD-8739.1 \[11.8.3.e \]](#)



**UNACCEPTABLE
CONTAMINATION**

Contamination (i.e., flux, loose particles, foreign material, etc.) shall be cause for rejection.

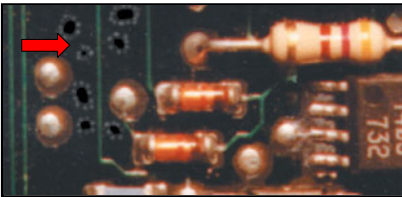
[NASA-STD-8739.1 \[10.2.5.c \], \[11.8.3.f \]](#)



**ACCEPTABLE
FISHEYES**

Fisheyes shall not exceed 5% of the surface area.

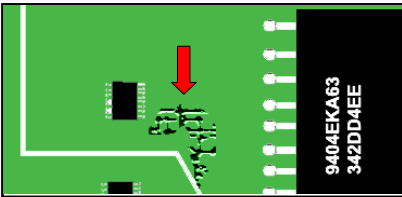
[NASA-STD-8739.1 \[10.2.5 \]](#)



**UNACCEPTABLE
FISHEYES**

Fisheyes shall not exceed 5% of the surface area.

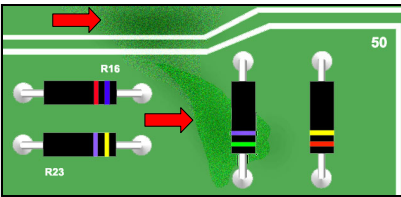
[NASA-STD-8739.1 \[11.8.3.k \]](#)



**UNACCEPTABLE
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.

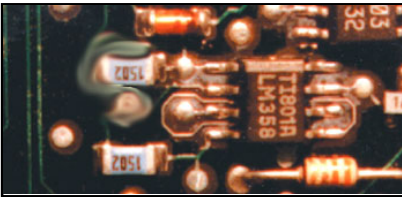
[NASA-STD-8739.1 \[11.8.3.e \]](#)



**UNACCEPTABLE
DISCOLORATION**

Conformal coating shall not exhibit discoloration (due to such things as excessive curing oven temperature, contamination, etc.).

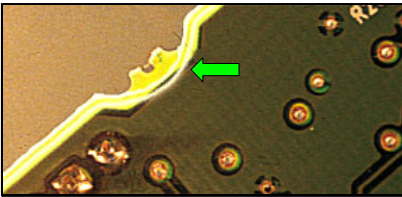
[NASA-STD-8739.1 \[10.2.5.f \], \[11.8.3.g \]](#)



**ACCEPTABLE
DIP APPLICATION**

The conformal coating exhibits complete coverage. Slightly uneven thickness, uneven filleting around parts, run contours, and edge loading are acceptable, provided minimum thickness is maintained.


[NASA-STD-8739.1 \[10.2.2.c \]](#)




**ACCEPTABLE
PULL BACK**

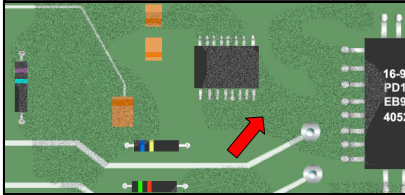
Minor pull back from sharp points and edges is permissible, unless otherwise specified on engineering documentation.

[NASA-STD-8739.1 \[10.2.5.b \], \[11.8.2.g \]](#)

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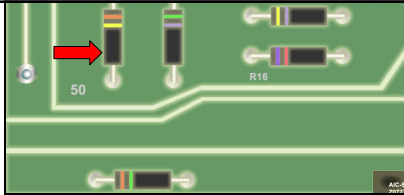
**CONFORMAL COATING and STAKING (BONDING)
CONFORMAL COATING (cont.)**



**UNACCEPTABLE
DUSTY / POWDERY FINISH**

A dusty or powdery finish is typically caused by over-spray from adjacent boards and/or improper spray distance.

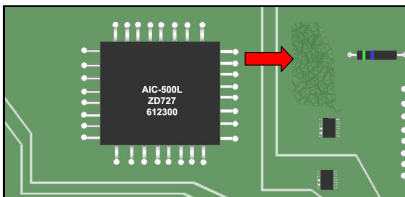
[NASA-STD-8739.1 \[10.2.5.a \]](#)



**UNACCEPTABLE
EXCESSIVE THICKNESS**

Conformal coatings shall completely encapsulate the components with a uniform thickness of material, and follow the contours of the PWA.

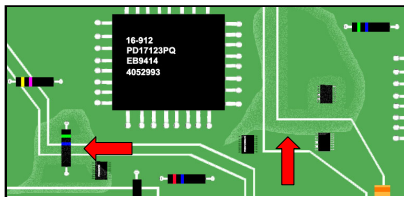
[NASA-STD-8739.1 \[10.2.5.b \]](#)



**UNACCEPTABLE
FINGERPRINTS / INDENTATIONS**

Permanent fingerprints or indentations in the coating are an indicator of improper cure or handling.

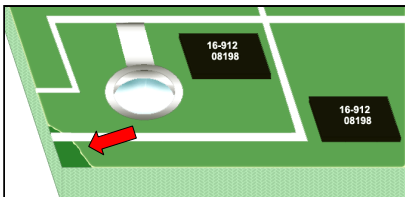
[Best Workmanship Practice](#)



**UNACCEPTABLE
HAZY / MILKY FINISH**

A hazy or milky appearance is an indicator of entrapped moisture, improperly mixed material, or material with an outdated shelf-life.

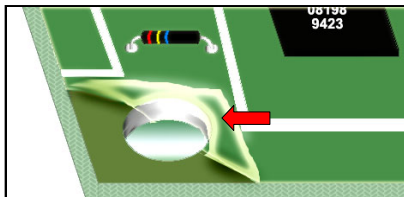
[NASA-STD-8739.1 \[10.2.5.b \]](#), [11.8.3.a]



**UNACCEPTABLE
IMPROPER / MISSING COATING**

PWAs exhibiting coating that has not been applied to required areas, or coating on areas required to be free of coating, shall be rejectable.

[NASA-STD-8739.1 \[10.2.5.b \]](#), [11.8.2.g]



**UNACCEPTABLE
LIFTING / MEASLING / PEELING**

Coating exhibiting excessive lifting, mealing, or peeling may be an indicator of improper cleaning, priming, curing, or excessive thickness. Any lifting on conductive areas is nonconforming.

[NASA-STD-8739.1 \[11.8.3.j \]](#)

NASA WORKMANSHIP STANDARDS



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Released:
04.05.2002

Revision:

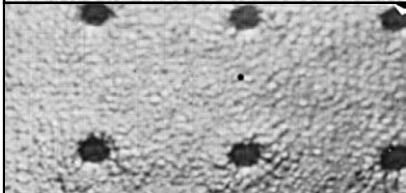
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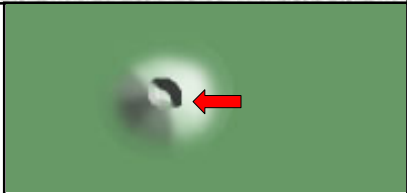
**CONFORMAL COATING and STAKING (BONDING)
CONFORMAL COATING (cont.)**



**UNACCEPTABLE
ORANGE PEEL**

Uneven surface textures, such as orange peel, are an indicator of improper application, thickness, and/or cure.

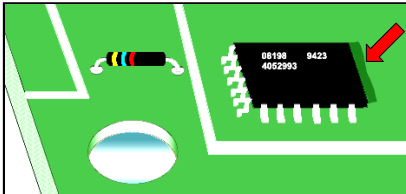
[NASA-STD-8739.1 \[10.2.5.b \]](#)



**UNACCEPTABLE
PINHOLES**

Pinholes in the coating allow moisture and contaminants to potentially reduce the reliability of the PWA.

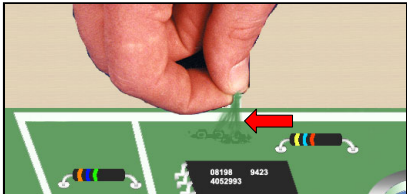
[NASA-STD-8739.1 \[10.2.5.b \], \[11.8.3.e \]](#)



**UNACCEPTABLE
SHADOWING**

Shadowing is caused by the incomplete / improper application of coating material during the spray process, and results in improper thickness or missing coverage.

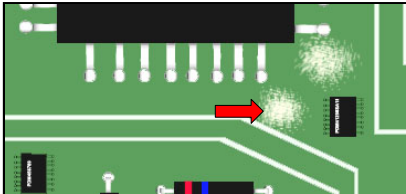
[NASA-STD-8739.1 \[10.2.2.a \], \[10.2.5.b \]](#)



**UNACCEPTABLE
SOFT SPOTS / TACKINESS**

Soft spots / tackiness (stickiness) indicate that the coating may not have been properly cured. Silicone coatings have a slight rubbery feel, but are not sticky.

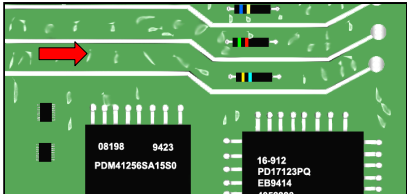
[NASA-STD-8739.1 \[10.3.1 \], \[11.8.3.d \], \[11.9.4 \]](#)



**UNACCEPTABLE
WHITISH SPOTS (MEASLING)**

Whitish spots are an indication of moisture / solvent contamination, and shall be rejectable.

[NASA-STD-8739.1 \[11.8.3.e \]](#)




**UNACCEPTABLE
WRINKLING**

Wrinkling is an indicator of an improper / uneven cure or a reaction to unevaporated solvents on the laminate surface.

[NASA-STD-8739.1 \[11.8.3.e \]](#)

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