Coating Removal, Identification of Conformal Coating

Board Type: R, F, W, C
See 1.4.2
Skill Level: Advanced
See 1.4.3
Level of Conformance: High
See 1.5.1

GENERAL REQUIREMENTS

Clauses 1.7 (Basic Considerations), 1.8 (Workstations, Tools, Materials and Processes) and 1.9 (Lead Free) provide important information and guidance about the use of this procedure, including but not limited to tin-lead and lead-free alloys. This procedure is also applicable to lead free products.

OUTLINE

This procedure covers the techniques for identifying various coatings so that the appropriate coating removal method can be selected.

Conformal Coating Types IPC-CC-830 has superseded MIL-I-46058 as the primary specification for printed circuit assembly conformal coatings, and covers the following types of conformal coatings:

1. Type AR – Acrylic resin (includes lacquers and varnishes)
2. Type ER – Epoxy resin
3. Type SR – Silicone resin
4. Type UR – Polyurethane resin
5. Type XY – Paraxylylene

REFERENCES

2.1 Handling Electronic Assemblies
2.2 Cleaning
2.5 Baking and Preheating
2.6 Epoxy Mixing and Handling
IPC - CC-830

TOOLS AND MATERIALS

Abrasive Discs
Brush
Cleaner
Cleaner Wipes
Cotton Swab
Dental Style Drill
Heated Blade
Knife
Solvent
Thermal Parting Tool
Wood Stick

PROCEDURE

To determine the appropriate coating removal procedure the coating must first be identified. During original manufacture the specific coating is usually known. Consequently, the coating removal methods can usually be specified and based on the known coatings being used. Labels conforming to Standards such as IPC-1066 (superseded by IPC/JEDEC J-STD-609) and IPC/JEDEC J-STD-609 may be present on the assembly to identify the coating material.

When identification of the coating is not available, simple observation and testing will help identify the coating characteristics so that the proper removal procedure can be specified.

NOTE

The generic or commercial identification of the coating material is not necessary to accomplish coating removal.

1. *Hardness*

   Penetration test in a non-critical area to determine relative hardness. The harder the coating the more suitable to pure abrasive techniques. The softer and gummier the coatings the more suitable to the brushing removal procedures.

2. *Transparency*

   Obviously transparent coatings are usually more suitable for removal than the opaque type. Removal methods used with opaque coatings must be far more controllable and less sensitive to damaging the covered components and printed board surfaces and are usually slower.

3. *Solubility*

   Most coatings are soluble; however, the solvent required to dissolve a specific coating may also attack the board and/or components. Unless directed by other maintenance actions, the solubility test and solvent use should be limited to isopropyl alcohol. Test coat the surface in a noncritical area by brushing on a small quantity and observing the solubility action.

   CAUTION
   Printed board assemblies should not be immersed in harsh solvents.

4. *Thermal Removal*

   Use a thermal parting device with controlled heating and without a cutting edge to determine whether the coating can be thermally removed. Start with a low temperature, approximately 100°C, and increase the temperature until the coating is removed. If the coating flows or gums up,

the temperature is too hot or the coating is not suitable for thermal removal.

5. *Stripability*

   Carefully slit the coating with a sharp blade in a non-critical area and try to peel back from the surface to determine if this method is feasible. Due to the adhesion required of coating materials, stripable techniques without chemical aids is usually very limited.

6. *Thickness*

   Coating thickness is determined by visual inspection. Thin coatings show sharp outlines of the components and almost no fillet at intersection points of part leads to the circuit board. Thick coatings reduce these sharp outlines and show fillets where part leads intersect with the board. Coatings thinner than 0.064 cm [0.025 in] are considered thin. Coatings thicker than 0.064 cm [0.025 in] are classed as thick.

   The specific coating to be removed may have one or more of these characteristics and consequently the removal method selected should consider the composite characteristics.

   See Figure 1 for Conformal Coating Identification.
   See Table 1 for Conformal Coating Characteristics.
   See Table 2 for Conformal Coating Removal Methods.

INSPECTION GUIDANCE

1. Visual examination or UV light may be used to verify removal of coating.
2. Visually inspect PWA for damage from removal of conformal coating.

NOTES

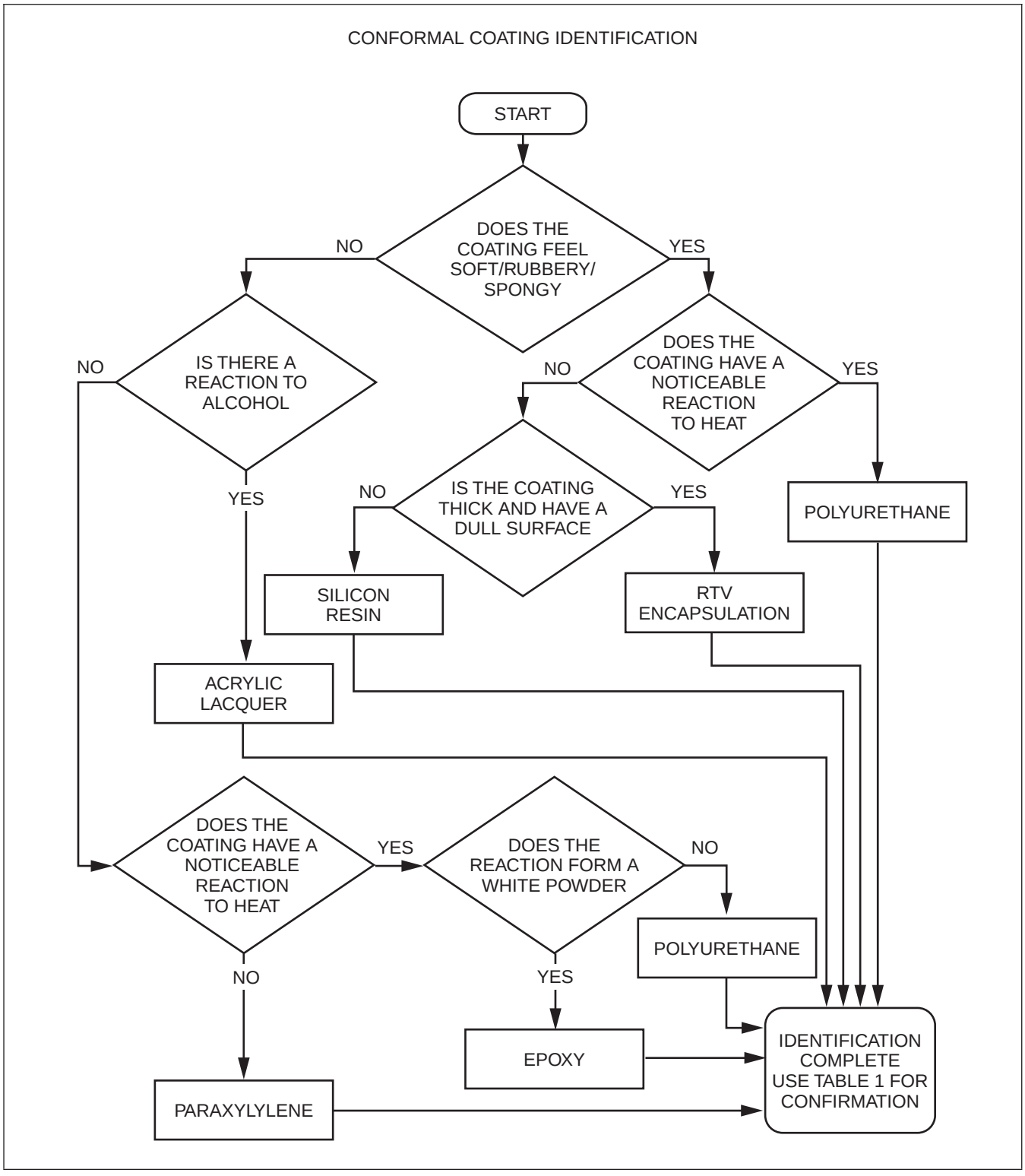

Figure 1 Conformal Coating Identification

Table 1 Conformal Coating Characteristics

Characteristics	Conformal Coating Type				
	Epoxy	Acrylic	Poly-urethane	Silicone Resin	Para-xylylene
Hard	✓		✓		✓
Medium Hard		✓	✓		
Soft			✓	✓	
Heat Reaction	✓	✓	✓		
Surface Bond - Very Strong	✓			✓	✓
Surface Bond - Strong		✓		✓	
Surface Bond - Medium			✓	✓	
Surface Bond - Light				✓	
Solvent Reaction		✓			
Non-porous Surface	✓	✓	✓		✓
Glossy Surface	✓	✓	✓		
Semi-glossy Surface	✓			✓	
Dull Surface					✓
Rubbery Surface				✓	
Brittle	✓	✓			
Chips	✓	✓			
Peels and Flakes		✓	✓		✓
Stretches			✓	✓	
Scratch, Dent, Bend, Tear			✓	✓	✓

Table 2 Conformal Coating Removal Methods

Conformal Coating	Removal Method				
	2.3.2 Solvent Method	2.3.3 Peeling Method	2.3.4 Thermal Method	2.3.5 Grinding Scrap-ing Method	2.3.6 Micro Blasting Method
Paraxylyene			1	2	3
Epoxy			1	2	3
Acrylic	1		2	3	4
Polyurethane	3		1	2	4
Silicone Thin	1		2	3	4
Silicone Thick		1		2	

NOTE: The preferred order for applying removal methods to specific coatings is numerically indicated. These removal methods are listed in ascending order. More than one method may be required.