Table of Contents

1.0 SCOPE ................................................................................. 1
1.1 Scope ........................................................................ 1
1.2 Purpose ................................................................. 1
1.3 Objective .................................................................. 1
1.4 Performance Classes ............................................... 1
1.5 Method Classification ............................................ 1
1.5.1 Tests with Established Accept/Reject Criterion .......... 1
1.5.2 Test(s) without Established Accept/Reject Criterion .......... 1
1.6 Test Method Selection ............................................. 1
1.7 Test Specimen Requirements .................................... 2
1.8 Coating Durability .................................................. 2
1.9 Limitation .............................................................. 2

2.0 APPLICABLE DOCUMENTS .................................. 2
2.1 Industry .................................................................. 3
2.1.1 IPC .......................................................................... 3
2.2 Government ............................................................ 3
2.2.1 Federal ............................................................... 3

3.0 REQUIREMENTS ..................................................... 3
3.1 Terms and Definitions ............................................ 3
3.2 Materials ............................................................... 3
3.2.1 Solder .................................................................... 3
3.2.2 Flux ................................................................. 3
3.2.3 Flux Removal Material .......................................... 3
3.3 Equipment ............................................................... 3
3.3.1 Steam Aging Apparatus ....................................... 3
3.3.2 Solder Pot/Bath .................................................... 4
3.3.3 Optical Inspection Equipment ............................... 4
3.3.4 Dipping Equipment ............................................ 4
3.3.5 Timing Equipment ................................................ 4
3.4 Preparation for Testing ...................................... 4
3.4.1 Specimen Preparation and Conditioning For Test........... 4
3.4.2 Steam Aging ....................................................... 4
3.4.3 Baking .............................................................. 4
3.5 Solder Bath Requirements ....................................... 4
3.5.1 Solder Temperatures ............................................. 4
3.5.2 Solder Contamination Control ............................ 4

4.0 TEST PROCEDURES ............................................... 4
4.1 Test Procedure Limitations ................................... 4
4.1.1 Application of Flux .............................................. 5
4.2 Tests with Established Accept/Reject Criterion ..... 5
4.2.1 Test A—Edge Dip Test ........................................ 5
4.2.2 Test B—Rotary Dip Test ....................................... 5
4.2.3 Test C—Solder Float Test ................................. 8
4.2.4 Test D—Wave Solder Test .................................. 10
4.3 Test(s) without Established Accept/Reject Criterion .......... 11
4.3.1 Test E—Wetting Balance Test ............................... 11

5.0 EVALUATION AIDS .................................................. 12
5.1 Evaluation Aids—Surface ........................................ 12
5.2 Evaluation Aids—For Class 3 Plated Through-holes ... 12

6.0 NOTES .......................................................................... 12
6.1 Test Equipment Sources ........................................ 14
6.1.1 Edge Dip Solderability Test Apparatus ................. 14
6.1.2 Rotary Dip Test Apparatus ................................ 14
6.1.3 Wetting Balance Test Apparatus ........................ 14
6.1.4 Steam Aging Equipment .................................... 14
6.2 Wetting Times ....................................................... 15
6.3 Correction for Buoyancy ....................................... 15
6.4 Preheat ................................................................. 15
6.5 Baking/Testing Time Delay ................................... 15
6.6 Prebaking ............................................................. 15
6.7 Safety Note ........................................................... 16
6.8 Use of Non-Activated Flux ................................. 16
6.9 Other Fluxes ......................................................... 16
6.10 Solder Contact ....................................................... 16
6.11 Steam Aging ........................................................ 16

Tables
Table 1 Test Method Selection .......................................... 2
Table 2 Accelerated Aging and Test Requirements .......... 2
Table 3 Maximum Limits of Solder Bath Contaminant .... 3
Table 4 Steam Temperature Requirements .................. 4

Figures
Figure 1 Contact angle .................................................... 3
Figure 2 Edge dip solderability test .................................. 6
Figure 3a Suggested test specimen—for plated through-holes... 7
Figure 3b Suggested test specimen—for surface mount features... 8
Figure 4 Rotary dip test ...................................................... 8
Figure 5 Effectiveness of solder wetting of plated-through holes—Class 3 ... 9
Figure 6 Wetting balance apparatus .................................. 12
Figure 7a Wetting time acceptance criteria ....................... 13
Figure 7b Wetting force acceptance criteria ...................... 13
Figure 8 Wetting balance curve ...................................... 14
Figure 9 Aid to evaluation ............................................. 15
Solderability Tests for Printed Boards

1.0 SCOPE

1.1 Scope This standard prescribes the recommended test methods, defect definitions and illustrations for assessing the solderability of printed board surface conductors, attachment lands, and plated through-holes. This standard is intended for use by both vendor and user.

1.2 Purpose The solderability determination is made to verify that the printed board fabrication processes and subsequent storage have had no adverse effect on the solderability of those portions of the printed wiring board intended to be soldered. This is determined by evaluation of the solderability specimen portion of a board or representative coupon which has been processed as part of the panel of boards and subsequently removed for testing per the method selected.

1.3 Objective The objective of the solderability test methods described in this standard is to determine the ability of printed board surface conductors, attachment lands, and plated through-holes to wet easily with solder and to withstand the rigors of the printed board assembly processes.

1.4 Performance Classes Three general classes have been established to reflect progressive increases in sophistication, functional performance requirements and testing/inspection frequency. It should be recognized that there may be an overlap of equipment categories in different classes. The user has the responsibility to specify in the contract or purchase order the performance class required for each product and shall indicate any exceptions to specific parameters, where appropriate.

Class 1 General Electronic Products
Includes consumer products, some computer and computer peripherals, as well as general military hardware suitable for applications where cosmetic imperfections are not important and the major requirement is function of the completed printed board.

Class 2 Dedicated Service Electronic Products
Includes communications equipment, sophisticated business machines, instruments and military equipment where high performance and extended life is required and for which uninterrupted service is desired but not critical. Certain cosmetic imperfections are allowed.

Class 3 High Reliability Electronic Products
Includes the equipment for commercial and military products where continued performance or performance on demand is critical. Equipment downtime cannot be tolerated and must function when required such as in life support items or missile systems. Printed boards in this class are suitable for applications where high levels of assurance are required and service is essential.

1.5 Method Classification This standard describes test methods by which both the surface conductors (and attachment lands) and plated through-holes may be evaluated for solderability.

Provisions are made for this determination to be performed at the time of manufacture, at the receipt of the boards by the user, or just prior to assembly and soldering. User and vendor shall agree to the appropriate method to be used and their correlation.

Standard dwell times are defined in some of the methods called out in this standard. Variations in board heat capacity may necessitate the use of longer solder dwell times (see paragraph 6.2). Any change in solder dwell shall be agreed upon by user and vendor.

1.5.1 Tests with Established Accept/Reject Criterion

Test A — Edge Dip Test (For surface conductors and attachment lands only)

Test B — Rotary Dip Test (For plated through-holes, surface conductors and attachment lands, solder source side)

Test C — Solder Float Test (For plated through-holes, surface conductors and attachment lands, solder source side)

Test D — Wave Solder Test (For plated through-holes, surface conductors and attachment lands, solder source side)

1.5.2 Test(s) without Established Accept/Reject Criterion

Test E — Wetting Balance Test (For surface conductors and attachment lands only)

Please forward all test data generated using this test method, including type of board tested (such as Type 2 or 12 layer, Type 3), dimensions of coupon tested, and any pretreatment, to:

IPC
Wetting Balance Task Group (PWB)
2215 Sanders Road
Northbrook, IL 60062-6135

1.6 Test Method Selection For appropriate test selection refer to paragraph 1.5 and Tables 1 & 2. The test selection...