

**IPC/ECA J-STD-002C**  
**w/Amendment 1**  
**NOVEMBER 2008**  
Supersedes J-STD-002C  
December 2007

# ***JOINT INDUSTRY STANDARD***

Solderability Tests for  
Component Leads,  
Terminations, Lugs,  
Terminals and Wires



---

**Notice**

IPC and ECA Standards and Publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining, with minimum delay, the proper product for his particular need. Existence of such Standards and Publications shall not in any respect preclude any member or nonmember of IPC or ECA from manufacturing or selling products not conforming to such Standards and Publications, nor shall the existence of such Standards and Publications preclude their voluntary use by those other than IPC or ECA members, whether the standard is to be used either domestically or internationally.

Recommended Standards and Publications are adopted by IPC or ECA without regard to whether their adoption may involve patents on articles, materials, or processes. By such action, IPC or ECA do not assume any liability to any patent owner, nor do they assume any obligation whatever to parties adopting the Recommended Standard or Publication. Users are also wholly responsible for protecting themselves against all claims of liabilities for patent infringement. The material in this joint standard was developed by the IPC Component and Wire Solderability Specification Task Group (5-23b) and the ECA Soldering Technology Committee (STC).

*For Technical Information Contact:*

**ECA**  
2500 Wilson Boulevard  
Arlington, VA 22201  
Phone (703) 907-8024  
Fax (703) 875-8908

**IPC**  
3000 Lakeside Drive, Suite 309S  
Bannockburn, IL 60015-1249  
Phone (847) 615-7100  
Fax (847) 615-7105

Please use the Standard Improvement Form shown at the end of this document.



IPC/ECA J-STD-002C with Amendment 1



# Solderability Tests for Component Leads, Terminations, Lugs, Terminals and Wires

A joint standard developed by IPC Component and Wire Solderability Specification Task Group (5-23b) of the Assembly and Joining Processes Committee (5-20) and the Electronic Components, Assemblies and Materials Association (ECA) Soldering Technology Committee (STC)



**Supersedes:**

J-STD-002C - December 2007  
Amendment 1 - October 2008  
J-STD-002B - February 2003  
J-STD-002A - October 1998  
J-STD-002 - April 1992

Users of this publication are encouraged to participate in the development of future revisions.

Contact:

**ECA**  
2500 Wilson Boulevard  
Arlington, VA 22201  
Phone (703) 907-8024  
Fax (703) 875-8908

**IPC**  
3000 Lakeside Drive, Suite 309S  
Bannockburn, IL 60015-1249  
Phone (847) 615-7100  
Fax (847) 615-7105

## Acknowledgment

Any document involving a complex technology draws material from a vast number of sources. While the principal members of the IPC Components and Wire Solderability Specification Task Group (5-23b) of the Assembly and Joining Processes Committee (5-20) and the Electronic Components, Assemblies and Materials Association (ECA) Soldering Technology Committee (STC) are shown below, it is not possible to include all of those who assisted in the evolution of this joint industry standard. To each of them, the members and staffs of IPC and ECA Associations extend their gratitude.

---

### IPC Assembly & Joining Processes Committee

Chair  
Leo P. Lambert  
EPTAC Corporation

Vice Chair  
Renee J. Michalkiewicz  
Trace Laboratories - East

### Component & Wire Solderability Specification Task Group

Chair  
David D. Hillman  
Rockwell Collins

Vice Chair  
Dennis Fritz  
MacDermid, Inc.

### ECA Soldering Technology Committee

Chair  
Douglas W. Romm  
Texas Instruments Inc.

---

### IPC Component & Wire Solderability Specification Task Group and ECA Soldering Technology Committee

Dr. Donald Abbott, Sensata Technologies	Laya Chen, Microtek (Changzhou) Laboratories	Shirley He, CEPREI
David C. Adams, Rockwell Collins	Phillip Chen, L-3 Communications Electronic Systems	Steven A. Herrberg, Raytheon Systems Company
Dale Albright, Winslow Automation aka Six Sigma	Dr. Beverley Christian, Research In Motion Limited	Dr. Christopher Hunt, National Physical Laboratory
Greg Alexander, Ascentech, LLC	Ted Coler, Vishay Dale	Prakash Kapadia, Celestica International Inc.
Francis Anglade, Metronelec	David J. Corbett, Defense Supply Center Columbus	Dr. Christian Klein, Robert Bosch GmbH
Gail Auyeung, Celestica International Inc.	Charles Dal Currier, Ambitech Inc.	Connie M. Korth, Kimball Electronics Group
Chris Ball, Valeo Inc.	Gordon Davy, Best Manufacturing Practices Center of Excellence	Richard E. Kraszewski, Kimball Electronics Group
Mary Carter Berrios, Kemet Electronics	Mary Dinh, Northrop Grumman Space Systems Division	Vijay Kumar, Lockheed Martin Missile & Fire Control
James D. Bielick, IBM Corporation	Glenn Dody, Dody Consulting	Mark A. Kwoka, Intersil Corporation
Joseph Biernacki, Stackpole Electronics, Inc.	Richard M. Edgar, Tec-Line Inc.	Patrick Kyne, Defense Supply Center Columbus
Christine Blair, STMicroelectronics Inc.	Theodore Edwards, Dynaco Corp.	Harjinder Ladhar, Solectron Corporation
Gerald Leslie Bogert, Bechtel Plant Machinery, Inc.	Robert Furrow, Alcatel-Lucent	Leo P. Lambert, EPTAC Corporation
Dr. Edwin Bradley, Motorola Inc.	Gerald Gagnon, Bose Corporation	Michael Lauri, IBM
Jason Bragg, Celestica International Inc.	Dr. Reza Ghaffarian, Jet Propulsion Laboratory	Carl Lindquist, SOC America, Inc.
Dr. Peter Bratin, ECI Technology, Inc.	Andrew Giamis, Andrew Corporation	Laird Macomber, Cornel Dubilier Electronics
Michael Cannon, TDK	Jean Gordon, Fairchild Semiconductor	James F. Maguire, Intel Corporation
Dennis Cantwell, Printed Circuits Inc.	Hue T. Green, Lockheed Martin Space Systems Company	Karun Malhotra, Murata Electronics
Thomas Carroll, Boeing Aircraft & Missiles	Michael Griffith, KOA Speer Electronics, Inc.	Jack McCullen, Intel Corporation
Dr. Srinivas Chada, Medtronic Microelectronics Center	Gerald J. Griswold, Texas Instruments, Inc.	Len Metzger, Panasonic Industrial Company
Calette Chamness, U.S. Army Aviation & Missile Command	Dr. Carol A. Handwerker, Purdue University	Renee J. Michalkiewicz, Trace Laboratories - East

---

Michael Milbrath, BH Electronics	Jim R. Reed, Dell Inc.	David Toomey, Vishay Sprague
Dr. Kil-Won Moon, NIST	Chris Reynolds, AVX Corporation	Sanford
David E. Moore, Defense Supply Center Columbus	David Richardson, Vishay	William Lee Vroom, Thomson Consumer Electronics
Terry L. Munson, Foresite, Inc.	John H. Rohlfing, Delphi Electronics and Safety	Karl F. Wengenroth, Enthone Inc. - Cookson Electronics
Suzanne F. Nachbor, Honeywell Aerospace Minneapolis	William R. Russell, Raytheon Professional Services LLC	George Wenger, Andrew Corporation
Graham Naisbitt, Gen3 Systems Limited	David F. Scheiner, Kester	Robert Wettermann, BEST Inc.
Gary Nicholls, Enthone Inc. - Cookson Electronics	Jeff Seekatz, Raytheon Company	Vicka White, Honeywell Inc.
Benny Nilsson, Ericsson AB	William Sepp, Technic Inc.	Keith Whitlaw, Consultant
Debora L. Obitz, Trace Laboratories - East	Joseph L. Sherfick, NSWC Crane	Maureen Williams, NIST
Gerard A. O'Brien, Solderability Testing & Solutions, Inc.	Lowell Sherman, Defense Supply Center Columbus	Russell T. Winslow, Winslow Automation aka Six Sigma
Stephen Olster, Mini-Systems, Inc.	Bradley Smith, Allegro MicroSystems Inc.	Jere Wittig, HFK Precision Metal Stamping Corporation
Michael Paddack, Boeing Company	Paco Solis, Foresite, Inc.	Linda Woody, Lockheed Martin Missile & Fire Control
Dr. J. Lee Parker, JLP	Roger Su, L-3 Communications	Yung-Herng Yau, Enthone Inc. - Cookson Electronics
Mel Parrish, STI Electronics	Fujiang Sun, Huawei Technologies Co., Ltd.	Jason Young, Kemet Electronics Corporation
Bihari Patel, MacDermid, Inc.	Keith Sweatman, Nihon Superior Co., Ltd.	Michael W. Yuen, Microsoft Corporation
Michael Pavlov, ECI Technology, Inc.	Michael Toben, Rohm and Haas Electronic Materials	Dr. Adam Zbrzezny, AMD
John W. Porter, Multicore Solders Ltd.	Dr. Brian J. Toleno, Henkel Corporation	
John M. Radman, Trace Laboratories - East		

## Table of Contents

<b>1 SCOPE</b> .....	1	<b>4 TEST PROCEDURES</b> .....	6
1.1 Scope .....	1	4.1 Application of Flux .....	6
1.2 Purpose .....	1	4.2 Visual Acceptance Criteria Tests .....	8
1.2.1 Shall and Should .....	1	4.2.1 Test A – Tin/Lead Solder – Solder Bath/Dip and Look Test (Leads, Wires, etc.) .....	8
1.2.2 Document Hierarchy .....	1	4.2.1.1 Apparatus .....	8
1.3 Method Classification .....	1	4.2.1.1.1 Solder Pot/Bath .....	8
1.3.1 Visual Acceptance Criteria Tests .....	1	4.2.1.1.2 Dipping Device .....	8
1.3.2 Force Measurement Tests .....	1	4.2.1.2 Preparation .....	8
1.4 Coating Durability .....	2	4.2.1.3 Procedure .....	8
1.5 Referee Verification Solder Dip for Tests A, B, C, A1, B1, C1 .....	2	4.2.1.4 Evaluation .....	8
1.6 Limitations .....	2	4.2.1.4.1 Magnification .....	8
1.7 Contractual Agreement .....	2	4.2.1.4.2 Accept/Reject Criteria .....	9
<b>2 APPLICABLE DOCUMENTS</b> .....	2	4.2.2 Test B – Tin/Lead Solder – Solder Bath/Dip and Look Test (Leadless Components) .....	10
2.1 Industry .....	2	4.2.2.1 Apparatus .....	10
2.1.1 IPC .....	2	4.2.2.1.1 Solder Pot/Bath .....	10
2.1.2 International Electrotechnical Commission .....	2	4.2.2.1.2 Vertical Dipping Device .....	10
2.2 Government .....	2	4.2.2.2 Preparation .....	10
2.2.1 Federal .....	2	4.2.2.3 Procedure .....	10
<b>3 REQUIREMENTS</b> .....	2	4.2.2.4 Evaluation .....	10
3.1 Terms and Definitions .....	2	4.2.2.4.1 Magnification .....	10
3.2 Materials .....	3	4.2.2.4.2 Accept/Reject Criteria .....	10
3.2.1 Solder .....	3	4.2.3 Test C – Tin/Lead Solder – Wrapped Wires Test (Lugs, Tabs, Terminals, Large Stranded Wires) .....	11
3.2.2 Flux .....	3	4.2.3.1 Apparatus .....	11
3.2.2.1 Flux Maintenance .....	3	4.2.3.1.1 Solder Pot/Bath .....	11
3.2.3 Flux Removal .....	3	4.2.3.1.2 Dipping Device .....	11
3.2.4 Standard Copper Wrapping Wires .....	3	4.2.3.2 Preparation .....	11
3.2.5 Water .....	4	4.2.3.3 Procedure .....	11
3.3 Equipment .....	4	4.2.3.4 Evaluation .....	12
3.3.1 Steam Conditioning Apparatus .....	4	4.2.3.4.1 Magnification .....	12
3.3.2 Solder Vessel .....	4	4.2.3.4.2 Accept/Reject Criteria .....	12
3.3.3 Optical Inspection Equipment .....	4	4.2.4 Test D – Tin/Lead or Lead-Free Solder – Resis- tance to Dissolution of Metallization Test .....	13
3.3.3.1 Referee Magnification .....	5	4.2.4.1 Apparatus .....	13
3.3.4 Dipping Equipment .....	5	4.2.4.1.1 Solder Pot/Bath .....	13
3.3.5 Timing Equipment .....	5	4.2.4.1.2 Dipping Device .....	13
3.4 Preparation for Testing .....	5	4.2.4.1.3 Attitude (Angle of Immersion) .....	13
3.4.1 Specimen Preparation and Surface Condition .....	5	4.2.4.2 Preparation .....	13
3.4.1.1 Steam Conditioning Categories .....	5	4.2.4.3 Procedure .....	13
3.4.2 Steam Conditioning .....	5	4.2.4.4 Evaluation .....	13
3.4.2.1 Post Conditioning Drying .....	6	4.2.4.4.1 Magnification .....	13
3.4.2.2 Equipment Maintenance .....	6	4.2.4.4.2 Accept/Reject Criteria .....	13
3.4.3 Surfaces to be Tested .....	6	4.2.5 Test S – Tin/Lead Solder – Surface Mount Process Simulation Test .....	14
3.5 Solder Bath Requirements .....	6	4.2.5.1 Apparatus .....	14
3.5.1 Solder Temperatures .....	6		
3.5.2 Solder Contamination Control .....	6		

4.2.5.1.1 Stencil/Screen .....	14	4.2.9.4.1 Magnification .....	18
4.2.5.1.2 Paste Application Tool .....	14	4.2.9.4.2 Accept/Reject Criteria .....	18
4.2.5.1.3 Test Substrate .....	14	4.3 Force Measurement Tests .....	19
4.2.5.1.4 Tin/lead Reflow Equipment .....	14	4.3.1 Test E – Tin/Lead Solder – Wetting Balance Solder Pot Test (Leaded Components) .....	19
4.2.5.2 Preparation .....	14	4.3.1.1 Apparatus .....	19
4.2.5.3 Procedure .....	14	4.3.1.1.1 Dipping Device .....	19
4.2.5.4 Evaluation .....	14	4.3.1.2 Preparation .....	19
4.2.5.4.1 Magnification .....	14	4.3.1.3 Procedure .....	19
4.2.5.4.2 Accept/Reject Criteria .....	14	4.3.1.4 Evaluation .....	19
4.2.6 Test A1 – Lead-free Solder – Solder Bath/Dip and Look Test (Leads, Wires, etc.) .....	15	4.3.1.4.1 Magnification .....	19
4.2.6.1 Apparatus .....	15	4.3.1.4.2 Accept/Reject Criteria .....	19
4.2.6.1.1 Solder Pot/Bath .....	15	4.3.1.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol .....	19
4.2.6.1.2 Dipping Device .....	15	4.3.2 Test F – Tin/Lead Solder – Wetting Balance Solder Pot Test (Leadless Components) .....	22
4.2.6.2 Preparation .....	15	4.3.2.1 Apparatus .....	22
4.2.6.3 Procedure .....	15	4.3.2.1.1 Dipping Device .....	22
4.2.6.4 Evaluation .....	15	4.3.2.2 Preparation .....	22
4.2.6.4.1 Magnification .....	15	4.3.2.3 Procedure .....	22
4.2.6.4.2 Accept/Reject Criteria .....	15	4.3.2.4 Evaluation .....	22
4.2.7 Test B1 – Lead-free Solder – Solder Bath/Dip and Look Test (Leadless Components) .....	16	4.3.2.4.1 Magnification .....	22
4.2.7.1 Apparatus .....	16	4.3.2.4.2 Accept/Reject Criteria .....	22
4.2.7.1.1 Solder Pot/Bath .....	16	4.3.2.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol .....	22
4.2.7.1.2 Vertical Dipping Device .....	16	4.3.3 Test G – Tin/Lead Solder – Wetting Balance Globule Test .....	23
4.2.7.2 Preparation .....	16	4.3.3.1 Apparatus .....	23
4.2.7.3 Procedure .....	16	4.3.3.1.1 Dipping Device .....	23
4.2.7.4 Evaluation .....	16	4.3.3.2 Materials .....	23
4.2.7.4.1 Magnification .....	16	4.3.3.2.1 Flux .....	23
4.2.7.4.2 Accept/Reject Criteria .....	16	4.3.3.2.2 Solder .....	23
4.2.8 Test C1 – Lead-free Solder – Wrapped Wires Test (Lugs, Tabs, Terminals, Large Stranded Wires) .....	17	4.3.3.2.3 Test Specimen .....	23
4.2.8.1 Apparatus .....	17	4.3.3.3 Procedure .....	23
4.2.8.1.1 Solder Pot/Bath .....	17	4.3.3.3.1 Temperature of the Solder .....	23
4.2.8.1.2 Dipping Device .....	17	4.3.3.3.2 Fluxing .....	23
4.2.8.2 Preparation .....	17	4.3.3.3.3 Dipping Angle, Immersion Depth, and Immersion Rates .....	23
4.2.8.3 Procedure .....	17	4.3.3.3.4 Preheat .....	23
4.2.8.4 Evaluation .....	17	4.3.3.4 Evaluation .....	23
4.2.8.4.1 Magnification .....	17	4.3.3.4.1 Magnification .....	23
4.2.8.4.2 Accept/Reject Criteria .....	17	4.3.3.4.2 Suggested Criteria .....	23
4.2.9 Test S1 – Lead-free Solder – Surface Mount Process Simulation Test .....	18	4.3.4 Test E1 – Lead-free Solder – Wetting Balance Solder Pot Test (Leaded Components) .....	26
4.2.9.1 Apparatus .....	18	4.3.4.1 Apparatus .....	26
4.2.9.1.1 Stencil/Screen .....	18	4.3.4.1.1 Dipping Device .....	26
4.2.9.1.2 Paste Application Tool .....	18	4.3.4.2 Preparation .....	26
4.2.9.1.3 Test Substrate .....	18	4.3.4.3 Procedure .....	26
4.2.9.1.4 Lead-Free Reflow Equipment .....	18	4.3.4.4 Evaluation .....	26
4.2.9.2 Preparation .....	18	4.3.4.4.1 Magnification .....	26
4.2.9.3 Procedure .....	18	4.3.4.4.2 Accept/Reject Criteria .....	26
4.2.9.4 Evaluation .....	18		

4.3.4.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol .....	26	Figure 4-3 Solder Dipping Depth for Through-Hole Components .....	9
4.3.5 Test F1 – Lead-free Solder – Wetting Balance Solder Pot Test (Leadless Components) .....	27	Figure 4-4 Leadless Component Immersion Depth .....	10
4.3.5.1 Apparatus .....	27	Figure 4-5 Illustration of Acceptable Solderable Terminal .....	11
4.3.5.1.1 Dipping Device .....	27	Figure 4-6 Illustration of Unsolderable Terminal .....	11
4.3.5.2 Preparation .....	27	Figure 4-7 Illustration of Acceptable Solderable Stranded Wire .....	11
4.3.5.3 Procedure .....	27	Figure 4-8 Illustration of Partially Solderable Stranded Wire Showing Incomplete Fillet .....	12
4.3.5.4 Evaluation .....	27	Figure 4-9 Wetting Balance Apparatus .....	19
4.3.5.4.1 Magnification .....	27	Figure 4-10 Set A Wetting Curve .....	20
4.3.5.4.2 Accept/Reject Criteria .....	27	Figure 4-11 Set B Wetting Curve .....	21
4.3.5.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol .....	27	Figure 4-12 Component and Dipping Angle (Directly from IEC 60068-2-69) .....	25
4.3.6 Test G1 – Lead-free Solder – Wetting Balance Globule Test .....	28	Figure A-1 “J” Leaded Components .....	30
4.3.6.1 Apparatus .....	28	Figure A-2 Passive Components .....	31
4.3.6.1.1 Dipping Device .....	28	Figure A-3 Gull Wing Components .....	32
4.3.6.2 Materials .....	28	Figure A-4 Leadless Chip Carrier .....	33
4.3.6.2.1 Flux .....	28	Figure A-5 “L” Leaded Components .....	34
4.3.6.2.2 Solder .....	28	Figure A-6 Through-Hole Components – Flat Pin .....	35
4.3.6.2.3 Test Specimen .....	28	Figure A-7 Through-Hole Components – Round Pin .....	36
4.3.6.3 Procedure .....	28	Figure A-8 Exposed Pad Package .....	37
4.3.6.3.1 Temperature of the Solder .....	28	Figure A-9 Bottom-Only Termination Component .....	37
4.3.6.3.2 Fluxing .....	28	Figure A-10 Area Array Component Critical Surface .....	38
4.3.6.3.3 Dipping Angle, Immersion Depth, and Immersion Rates .....	28	Figure B-1 Defect Size Aid .....	39
4.3.6.3.4 Preheat .....	28	Figure B-2 Types of Solderability Defects .....	40
4.3.6.4 Evaluation .....	28	Figure B-3 Aids in Evaluation of 5% Allowable Area of Pin Holes .....	41
4.3.6.4.1 Magnification .....	28	Figure B-4 Aid in Evaluation of 5% Allowable Area of Pin Holes .....	42
4.3.6.4.2 Suggested Criteria .....	28	Figure B-5 Solderability Coverage Guide .....	43
<b>5 NOTES</b> .....	29	Figure C-1 Lead Periphery and Volume for a 132 I/O PQFP .....	45
5.1 Use of Activated Flux .....	29		
5.2 Massive Components .....	29		
5.3 Sampling Plans .....	29		
5.4 Safety Notes .....	29		
5.5 Correction for Buoyancy .....	29		
5.6 Accelerated Steam Conditioning Limitations .....	29		
<b>Appendix A</b> .....	30		
<b>Appendix B</b> .....	39		
<b>Appendix C</b> .....	44		
<b>Appendix D</b> .....	46		
<b>Appendix E</b> .....	47		
<b>Appendix F</b> .....	48		
<b>Appendix G</b> .....	50		
<b>Appendix H</b> .....	53		
<b>Figures</b>		<b>Tables</b>	
Figure 3-1 Example Reticle .....	4	Table 1-1 Steam Conditioning Categories for Component Leads and Terminations .....	2
Figure 4-1 Dipping Schematic .....	8	Table 3-1 Flux Compositions .....	3
Figure 4-2 Solder Dipping Angle for Surface Mount Leaded Components .....	9	Table 3-2 Steam Temperature Requirements .....	4
		Table 3-3 Solderability Test Selection Component Type .....	5
		Table 3-4 Maximum Limits of Solder Bath Contaminant ..	6
		Table 4-1 Stencil Thickness Requirements .....	14
		Table 4-2 Reflow Parameter Requirements .....	14
		Table 4-3 Stencil Thickness Requirements .....	18
		Table 4-4 Lead-free Reflow Parameter Requirements .....	18
		Table 4-5 Wetting Balance Parameter and Suggested Evaluation Criteria .....	20
		Table 4-6 Dipping Angle and Immersion Depth for Components (Directly from IEC 60068-2-69) ..	24
		Table 4-7 Wetting Parameters and Suggested Evaluation Criteria .....	25
		Table 3-1 Flux Compositions .....	48

# Solderability Tests for Component Leads, Terminations, Lugs, Terminals and Wires

## 1 SCOPE

**1.1 Scope** This standard prescribes test methods, defect definitions, acceptance criteria, and illustrations for assessing the solderability of electronic component leads, terminations, solid wires, stranded wires, lugs, and tabs. This standard also includes a test method for the Resistance to Dissolution/Dewetting of Metallization. This standard is intended for use by both vendor and user.

**1.2 Purpose** Solderability evaluations are made to verify that the solderability of component leads and terminations meets the requirements established in this standard and to determine that storage has had no adverse effect on the ability to solder components to an interconnecting substrate. Determination of solderability can be made at the time of manufacture, at receipt of the components by the user, or just before assembly and soldering.

The resistance to dissolution of metallization determination is made to verify that metallized terminations will remain intact throughout the assembly soldering processes.

**1.2.1 Shall and Should** The word “shall” is used in the text of this document wherever there is a requirement for materials, preparation, process control or acceptance of a soldered connection or a test method. The word “should” reflects recommendations and is used to reflect general industry practices and procedures for guidance only.

**1.2.2 Document Hierarchy** In the event of conflict, the following decreasing order of precedence applies:

1. Procurement as agreed between user and supplier.
2. Master drawing or master assembly drawing reflecting the user’s detailed requirements.
3. When invoked by the customer or per contractual agreement, this document, J-STD-002.
4. Other documents to extent specified by the customer.

**1.3 Method Classification** This standard describes methods by which component leads or terminations may be evaluated for solderability. Test A, Test B, Test C, Test D and Test S for tin/lead solder processes and Test A1, Test B1, Test C1, Test D and Test S1 for lead-free solder processes, unless otherwise agreed upon between vendor and user, are to be used for each application as a default.

### 1.3.1 Visual Acceptance Criteria Tests

Test A – Solder Bath/Dip and Look Test (Leaded Components and Stranded Wires) Tin/Lead Solder (paragraph 4.2.1)

Test B – Solder Bath/Dip and Look Test (Leadless Components) Tin/Lead Solder (paragraph 4.2.2)

Test C – Wrapped Wires Test (Lugs, Tabs, Hooked Leads, and Turrets) Tin/Lead Solder (paragraph 4.2.3)

Test D – Resistance to Dissolution/Dewetting of Metallization Test Tin/Lead Solder and Lead-free Solder (paragraph 4.2.4)

Test S – Surface Mount Process Simulation Test Tin/Lead Solder (paragraph 4.2.5)

Test A1 – Solder Bath/Dip and Look Test (Leaded Components and Stranded Wires) Lead-free Solder (paragraph 4.2.6)

Test B1 – Solder Bath/Dip and Look Test (Leadless Components) Lead-free Solder (paragraph 4.2.7)

Test C1 – Wrapped Wires Test (Lugs, Tabs, Hooked Leads, and Turrets) Lead-free Solder (paragraph 4.2.8)

Test S1 – Surface Mount Process Simulation Test Lead-free Solder (paragraph 4.2.9)

### 1.3.2 Force Measurement Tests

Test E – Wetting Balance Solder Pot Test (Leaded Components) Tin/Lead Solder (paragraph 4.3.1)

Test F – Wetting Balance Solder Pot Test (Leadless Components) Tin/Lead Solder (paragraph 4.3.2)

Test G – Wetting Balance Globule Test Tin/Lead Solder (paragraph 4.3.3)

Test E1 – Wetting Balance Solder Pot Test (Leaded Components) Lead-free Solder (paragraph 4.3.4)

Test F1 – Wetting Balance Solder Pot Test (Leadless Components) Lead-free Solder (paragraph 4.3.5)

Test G1 – Wetting Balance Globule Test Lead-free Solder (paragraph 4.3.6)

These methods (1.3.2) are included for evaluation purposes only. Data collected should be submitted to the IPC Wetting Balance Task Group for correlation and analysis. Tests E, F, G, E1, F1 and G1 **shall not** be used for acceptance/rejection without user and vendor agreement.