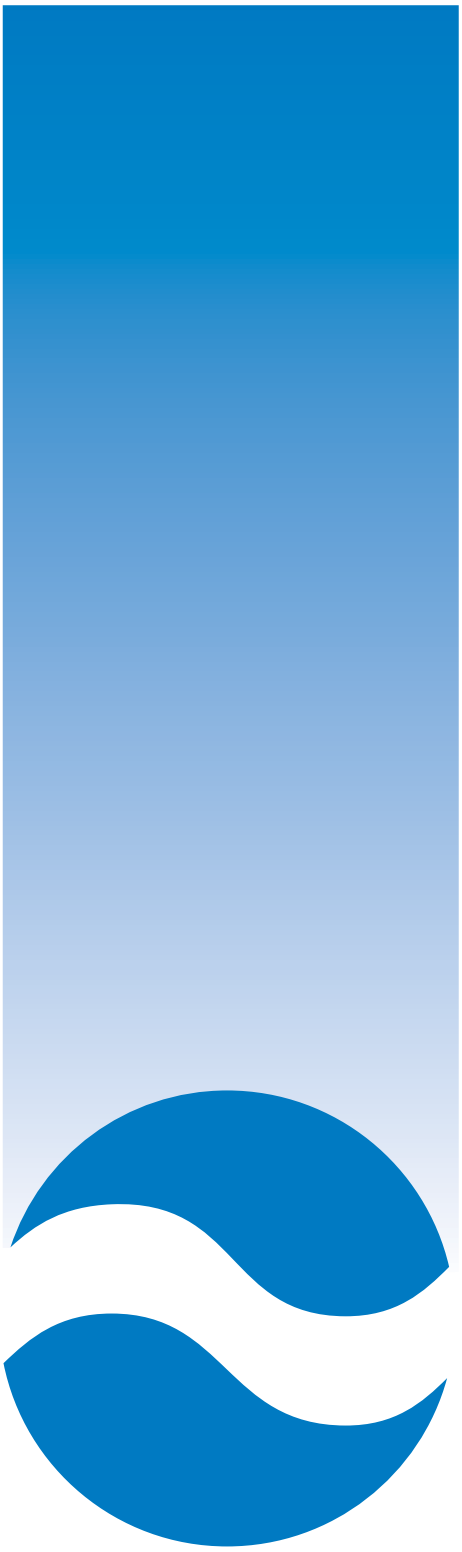
IPC/ECA J-STD-002C
AMENDMENT 1
OCTOBER 2008

JOINT INDUSTRY STANDARD

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

Amendment 1



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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.

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

3.2.1 Solder

Replace all of this section with the following:

For tin/lead testing, the solder composition **shall** be Sn60Pb40 or Sn63Pb37 per J-STD-006. The composition of the solder, including contamination levels, **shall** be maintained during testing per 3.5.2.

The composition of the tin/lead solder paste to be used in Test S **shall** be Sn60Pb40 or Sn63Pb37 for tin/lead per J-STD-005, mesh size of -325/+500, flux type ROL1. The solder paste **shall** meet the storage and shelf life requirements of the manufacturer's specification. The user's specific production solder paste product may be used for Test S upon agreement between user and supplier.

For lead-free testing, the solder composition **shall** be Sn96.5Ag3.0Cu0.5 (SAC305) per J-STD-006. Other lead-free solder alloys may be used upon agreement between user and vendor.

The composition of the lead-free solder paste to be used in Test S1 **shall** be Sn96.5Ag3.0Cu0.5 (SAC305) per J-STD-005, mesh size of -325/+500, flux type to be agreed upon between user and vendor. The solder paste **shall** meet the storage and shelf life requirements of the manufacturer's specification. Other lead-free solder pastes may be used upon agreement between user and vendor. The user's specific production solder paste product may be used for Test S1 upon agreement between user and supplier.

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

Add the following into this section:

4.3.1.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol Appendix H contains a suggested GR&R protocol that may be used by the supplier and user to ensure that the respective wetting balance equipment are correctly calibrated.

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

Add the following into this section:

4.3.2.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol Appendix H contains a suggested GR&R protocol that may be used by the supplier and user to ensure that the respective wetting balance equipment are correctly calibrated.

Table 4-6 Dipping Angle and Immersion Depth for Components (Directly from IEC 60068-2-69)

Change the last row of the table to the following:

Component [a]		Dipping angle [b]	Figure (See Fig. 4-12)	Immersion depth (mm)	Pin size (mm)	Globule weight (mg)	Remarks
	Any BGA,CSP or LGA [e]	Horizontal	2G	0.10	1	10	Only peripheral balls can be tested, and only test down to 1.0 mm pitch

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

Add the following into this section:

4.3.4.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol Appendix H contains a suggested GR&R protocol that may be used by the supplier and user to ensure that the respective wetting balance equipment are correctly calibrated.

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

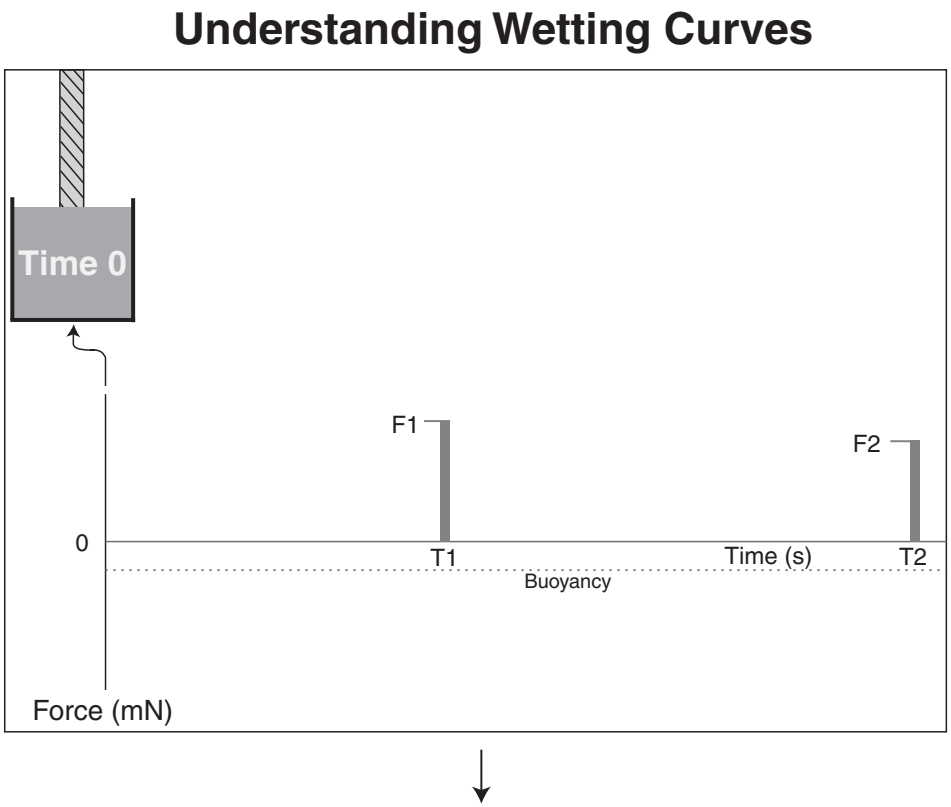
Add the following into this section:

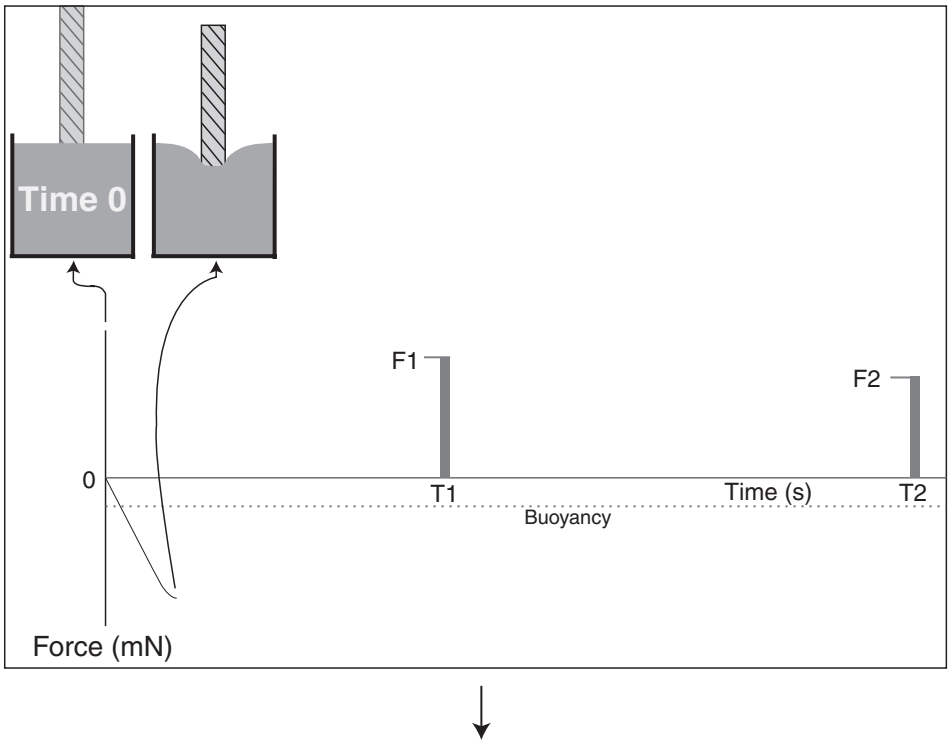
4.3.5.4.3 Gauge Repeatability and Reproducibility (GR&R) Protocol Appendix H contains a suggested GR&R protocol that may be used by the supplier and user to ensure that the respective wetting balance equipment are correctly calibrated.

Appendix G

Replace the header information and the first two figures in this Appendix G with the following:

Graphical Representations: Progression of Solder Wetting Curve Parameters As Measured By Wetting Balance Testing





Add this new Appendix H to the document:

APPENDIX H
Test Protocol for Wetting Balance Gauge Repeatability and Reproducibility (GR&R) Using Copper Foil Coupons

1. All coupons for these tests **shall** be prepared individually just prior to testing. Do NOT batch clean the samples.
2. Copper foil of 35 microns nominal thickness (''1 oz'' copper) **shall** be used for the test.
3. The copper foil **shall** have NO surface treatment and is expected to have an oxidized appearance upon receipt from the supplier. Do not use the copper foil if it is bright and shiny. This is indicative of surface anti tarnish treatments being used. Surface treatments/ preservatives can interfere with the ability to make a consistent ''known good coupon'' necessary for this test.
4. The copper foil coupons **shall** be die cut to ensure repeatability of the samples being tested and **shall** be of the following width dimensions;
   a. 2 mm
   b. 5 mm
   c. 10 mm
5. Create a file for each foil width and for each individual person that is involved performing the GR&R.
6. Test parameters **shall** be:
   a. Solder temperature **shall** be the as recommended for the alloy and the specification being used, i.e., for SnPb and ANSI-J-STD-003 it **shall** be 235 °C, for ANSI-J-STD-002 it **shall** be 245 °C. For SAC 305 it **shall** be 255 °C, regardless of the specification.
   b. Immersion depth **shall** be 0.4 mm.
   c. Immersion speed **shall** be 2 mm/sec.
   d. Dwell time in the solder **shall** be 10 seconds.
   e. Immersion angle **shall** be 90 degrees incident to the solder.
   f. No preheat **shall** be used.
7. Sample preparation for the ''known good coupon'' **shall** be as follows:
   a. Use a tweezers to immerse a foil sample into a beaker of Acetone and gently agitate for 20 seconds.
   b. Remove sample and blot both sides dry with ''Kim wipes'' or other suitable lab tissue.
   c. Again using a tweezers, immerse the above sample into a 20% v/v Nitric acid/DI water solution and gently agitate for 20 seconds.
   d. Immerse the sample immediately into DI water and gently agitate for 20 seconds.
   e. Blot the sample dry as in step ''b'' above.
8. Dip sample into the ''standard activated flux'' normally used for solderability testing for 5 seconds.
9. Holding the samples vertically, blot to remove excess flux.
10. Place sample into tool holder.
11. Run the test.
12. Repeat ten times for each foil width and each test person. It is recommended that three people should be used for the GR&R study.
13. For ease of data manipulation it is recommended to convert the wetting forces obtained into mN/mm of the coupon's wettable length (perimeter). For example, the 10 mm wide coupon has a total wettable length (perimeter) = [(2 x 10 mm) + (2 x 0.035 mm)] = 20.07 mm.
14. For the ''standard activated'' flux of nominal 0.2% activation, the wetting force used for the calculations **shall** be 0.31 mN/mm. If a more active flux is being used, a large sample **shall** be run to obtain the mean value and this used for the calculations.
15. Calculate the standard deviation for each of the foil widths and the people running the test.
16. Multiply the standard deviation value by 6 (this represents the plus - minus 3 standard deviations of a normal distribution)
17. Divide this number by 0.31 and multiply by 100 to obtain a percentage value.
18. Tabulate the three values per person.
19. For an acceptable GR&R, the values obtained should be below 10%.
20. There should be excellent R&R results with the 10 mm coupon the first time this protocol is performed with an increasing spread from test person to test person when using the smaller coupons. The test may need to be repeated or individuals may require some ''practice time'' prior to running the full GR&R.
21. In addition to testing the individual, this protocol also tests the machine and will show linearity and any bias if it exists. Because the wetting forces have been normalized to mN/mm, the readings for each coupon width should be the same. If they are clearly different but the standard deviations produced by the individual test people are below 10%, then there is a problem with the wetting balance and the equipment manufacturer should be notified.