

IPC Midwest 2011

Analytical Procedures for Portable Lead-Free Alloy Test Data: State of Merge of iNEMI and SPVC Documents

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Executive Summary:

The IPC Solder Products Value Council, in cooperation with iNEMI and a group of industry experts, has developed a protocol for testing the physical properties of lead free solder alloys. This presentation will review the status of the protocol's development, the status of a round robin of the protocol's test repeatability and then briefly discuss the prospect for developing better reliability models using creep data testing as described in the protocol.

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Why new “Alloy Test Method(s)?”

- Describes material tests that generate portable data
 - Apples to Apples comparisons between different sites
- Allowing for
 - direct comparison of different alloys
 - aiding in alloy acceptability determination for various applications,
 - development of reliability models

Goal

- To allow user to switch alloys on the basis of manufacturing need (a soldering “fix”) without reliability testing (ATC) every alloy
- Premise: If all physical properties of two alloys are the same within experimental limitations then it is probable that their reliability behavior in ATC will be the same
- This premise is based on input received from SMEs and published lead free reliability models

From IPC APEX 2011 Meeting

- iNEMI's Table 2.1 (on metal contamination levels) is in the document
- iNEMI's NIST based procedure for determining melting temperature and controls are now the test procedure
- Wetting test is now 003 only!
- CTE follows iNEMI recommendations

From IPC APEX 2011 Meeting

- SPVC dynamic modulus used
- iNEMI additional (optional) tests added

iNEMI June 28, 2011 Response to IPC Draft

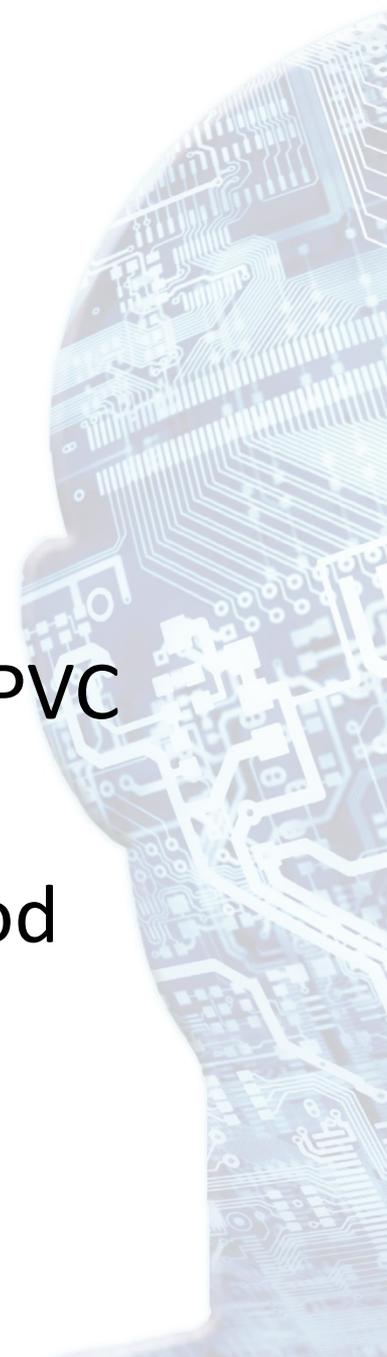
- Release document without a copper dissolution test at this time.
- Release the Basic Material Property Testing document without a creep test at this time.
- Refer to J-STD-002 rather than J-STD-003 as the method for wetting balance testing, as recommended by the SPVC.

iNEMI June 28, 2011 Response to IPC Draft

- Finalize the joint SPVC-iNEMI Basic Material Properties document as soon as possible and submit it to the appropriate committee within IPC
 - Binding standard (preferred)
 - Guideline (if necessary)
 - Not a white paper (already done).

Open Items

- Copper dissolution
- Creep testing
- J-STD-002 to replace J-STD-003 in SPVC document
- Confirmation of sample prep method



IPC Sample Preparation Round Robin: In Progress



Is the chosen sample method reproducible?

- Lowest common denominator/first place to start
- Auburn developed test method to be used
- Three sample preparation locations
 - Auburn
 - Benedictine University
 - Robisan



Sample Prep Round Robin

- Standard SAC 305 alloy provided by Cookson
- Glass sample tubes to be provided by Auburn (pre-tested for defects)
- Three locations will make 50 samples each for tensile testing by three (yet undetermined) test sites.
- Blind distribution of samples

Sample Prep Round Robin

- Tensile testing appears to be the easiest physical test
- Statistical analysis of test data should reveal:
 - Reproducibility of sample preparation by preparing location
 - Reproducibility of sample testing by test location

Open Items

- J-STD-002 to replace J-STD-003 in SPVC document (edit change only)
- Confirmation of sample prep method (in progress)
- Copper dissolution
- Creep testing

Copper Dissolution and Creep

- Procedures already in document using
 - NIST Special Publication 960-8, Section 13, “Liquid Solder Dissolution.”
 - National Physical Laboratory REPORT DEPC MPR 021 “The Measurement of Creep Rates and Stress Relaxation for Micro Sized Lead-free Solder Joints.”

When do we move on to these
round robins?

(ASAP?)



Questions?

Association Connecting Electronics Industries

