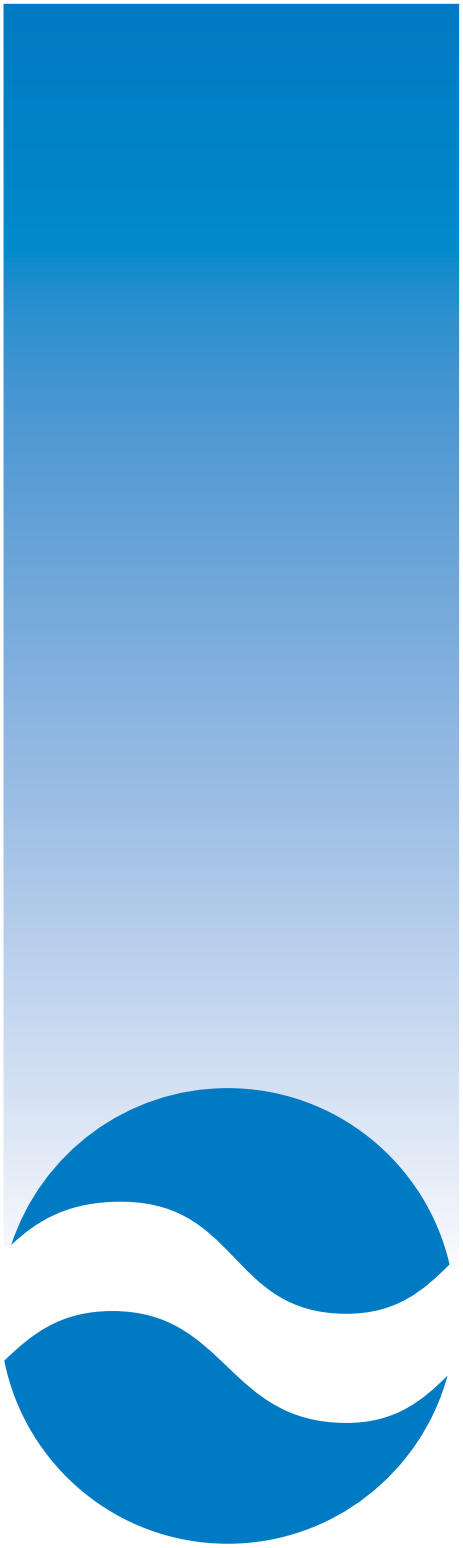
IPC J-STD-005A

February 2012

Supersedes J-STD-005
January 1995

JOINT INDUSTRY STANDARD

Requirements for Soldering Pastes



The Principles of Standardization

In May 1995 the IPC's Technical Activities Executive Committee (TAEC) adopted Principles of Standardization as a guiding principle of IPC's standardization efforts.

Standards Should:

- Show relationship to Design for Manufacturability (DFM) and Design for the Environment (DFE)
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feedback system on use and problems for future improvement

Standards Should Not:

- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

Notice

IPC 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 from manufacturing or selling products not conforming to such Standards and Publication, nor shall the existence of such Standards and Publications preclude their voluntary use by those other than IPC members, whether the standard is to be used either domestically or internationally.

Recommended Standards and Publications are adopted by IPC without regard to whether their adoption may involve patents on articles, materials, or processes. By such action, IPC does 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.

IPC Position Statement on Specification Revision Change

It is the position of IPC's Technical Activities Executive Committee that the use and implementation of IPC publications is voluntary and is part of a relationship entered into by customer and supplier. When an IPC publication is updated and a new revision is published, it is the opinion of the TAEC that the use of the new revision as part of an existing relationship is not automatic unless required by the contract. The TAEC recommends the use of the latest revision. Adopted October 6, 1998

Why is there a charge for this document?

Your purchase of this document contributes to the ongoing development of new and updated industry standards and publications. Standards allow manufacturers, customers, and suppliers to understand one another better. Standards allow manufacturers greater efficiencies when they can set up their processes to meet industry standards, allowing them to offer their customers lower costs.

IPC spends hundreds of thousands of dollars annually to support IPC's volunteers in the standards and publications development process. There are many rounds of drafts sent out for review and the committees spend hundreds of hours in review and development. IPC's staff attends and participates in committee activities, typesets and circulates document drafts, and follows all necessary procedures to qualify for ANSI approval.

IPC's membership dues have been kept low to allow as many companies as possible to participate. Therefore, the standards and publications revenue is necessary to complement dues revenue. The price schedule offers a 50% discount to IPC members. If your company buys IPC standards and publications, why not take advantage of this and the many other benefits of IPC membership as well? For more information on membership in IPC, please visit www.ipc.org or call 847/597-2872.

Thank you for your continued support.

IPC J-STD-005A

Requirements for Soldering Pastes

A standard developed by the Solder Paste Task Group (5-24b) of the Assembly and Joining Committee (5-20) of IPC

Supersedes:
J-STD-005 - January 1995
Amendment 1 - April 1996

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

Contact:

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, Illinois 60015-1249
Tel 847 615.7100
Fax 847 615.7105

This Page Intentionally Left Blank

Acknowledgment

Any document involving a complex technology draws material from a vast number of sources. While the principal members of the Solder Paste Task Group (5-24b) of the Assembly and Joining Committee (5-20) are shown below, it is not possible to include all of those who assisted in the evolution of this standard. To each of them, the members of the IPC extend their gratitude.

Assembly and Joining Committee

Chair
Leo P. Lambert
EPTAC Corporation

Vice-Chair
Renee J. Michaelkiewicz
Trace Laboratories

Solder Paste Task Group

Chair
Brian Toleno
Henkel Corporation

Technical Liaisons of the IPC Board of Directors

Dongkai Shangguan
Flextronics International

Shane Whiteside
TTM Technologies

Solder Paste Task Group

Constantino, Gonzalez, ACME Training & Consulting
Karl Seelig, AIM, Inc.
Leslie Guth, Alcatel-Lucent
Leigh William Gesick, Amtech, Inc.
Greg Alexander, Ascentech, LLC
Patricia Amick, Boeing - Integrated Defense Systems
Thomas Carroll, Boeing - Integrated Defense Systems
Jay Messner, Boeing Company
Mary Bellon, Boeing Research & Development
Sam Armstrong, Canfield Technologies
Prakash Kapadia, Celestica
Kevin Weston, Celestica
Gerjan Diepstraten, Cobar Europe BV
Ineke Van Tiggelen, Cobar Europe BV
Mark Fulcher, Continental Automotive Systems
Jan Dekker, Cookson Electronics
Mitchell Holtzer, Cookson Electronics
Rahul Raut, Cookson Electronics
Karen Tellefsen, Cookson Electronics
Peter Lu, Curtiss-Wright Controls Embedded Computing
John Rohlfing, Delphi Electronics and Safety
Glenn Dody, Dody Consulting
Allan Beikmohamadi, DuPont
Victor Balasbas, Electronic Assembly Services
Rex Breunsbach, Electronic Controls Design Inc.
Victor Barba, Endicott Interconnect Technologies Inc.
Karl Wengenroth, Enthone Inc. - Cookson Electronics
Benny Nilsson, Ericsson AB
Graham Naisbitt, Gen3 Systems Limited
Brian Wardhaugh, Gen3 Systems Limited
Deepak Pai, General Dynamics Information Systems, Inc.
Michael Nadreau, Henkel Corporation
Hector Steen, Henkel Ltd.
Anton Miric, Heraeus Materials Technology GmbH & Co. KG
Helen Holder, Hewlett-Packard Company
Kristen Troxel, Hewlett-Packard Company
Lowell Brosch, Honeywell Inc.
Dewey Whittaker, Honeywell Inc. Air Transport Systems
Jennie Hwang, H-Technologies Group
Sheila (Ailan) Zhu, Huawei Technologies Co., Ltd.
Eric Bastow, Indium Corporation of America
Ross Berntson, Indium Corporation of America
Tim Jensen, Indium Corporation of America
Ning-Cheng Lee, Indium Corporation of America
Runsheng Mao, Indium Corporation of America
Brook Sandy-Smith, Indium Corporation of America
Quan Sheng, Indium Corporation of America
James Slattery, Indium Corporation of America
John Sovinsky, Indium Corporation of America
James Maguire, Intel Corporation
Mark Kwoka, Intersil Corporation
Mike Kaminsky, Inventec Performance Chemical
Anne-Marie Laugt, Inventec Performance Chemicals
Celine Puechagut, Inventec Performance Chemicals
David Sbiroli, Jabil Circuit, Inc.

George Oxx, Jabil Circuit, Inc. (HQ)

Alan Gickler, Johnson Manufacturing Co.

Stephen Santangelo, Kester

David Scheiner, Kester

Xiang Wei, Kester

David Lober, Kyzen Corporation

Charles Han, Lace Technologies

Gregory Daly, Lockheed Martin Maritime Systems & Sensors

Paul Roselle, Lockheed Martin Maritime Systems & Sensors

Gary Yan, Lockheed Martin Maritime Systems & Sensors

Vijay Kumar, Lockheed Martin Missile & Fire Control

Hue Green, Lockheed Martin Space Systems Company

Kevin Therault, Lockheed Martin Space Systems Company

Dung (Young) Tiet, Lockheed Martin Space Systems Company

Tom Fujikawa, Malcomtech International

Gary Nicholls, Metalor Technologies USA

Rigo Garcia, NASA Goddard Space Flight Center

Jeannette Plante, NASA Goddard Space Flight Center

Christopher Hunt, National Physical Laboratory

Keith Sweatman, Nihon Superior Co., Ltd.

Jeremy Xu, Nordson EFD, LLC

Toshiyasu Takei, NSK Co., Ltd.

Gene Dunn, Plexus Corporation

Richard Kraszewski, Plexus Corporation

Bill Barthel, Plexus Manufacturing Solutions

Srinivas Chada, Power-One Renewable Energies Inc.

Richard Iodice, Raytheon Company

Royce Taylor, Raytheon Company

Bill Vuono, Raytheon Company

Karen Walters Walters Ebner, Raytheon Identification Systems

Mradul Mehrotra, Raytheon Missile Systems

Martin Scionti, Raytheon Missile Systems

Beverley Christian, Research In Motion Limited

Laura Turbini, Research In Motion Limited

Christian Klein, Robert Bosch GmbH

Scott Anson, Rochester Institute of Technology

David Adams, Rockwell Collins

Robert Bagsby, Rockwell Collins

David Hillman, Rockwell Collins

Eddie Hofer, Rockwell Collins

Gaston Hidalgo, Samsung Telecommunications America

Derek Daily, Senju Comtek Corp.

Satoru Akita, Senju Comtek Corp.

Kelvin Low, Sigma Ming Goa Electronics (Shenzhen) Co., Ltd.

Frank Hules, Stellar Microelectronics Inc.

Gary Ewell, The Aerospace Corporation

Renee Michalkiewicz, Trace Laboratories

Debora Obitz, Trace Laboratories

Keith Sellers, Trace Laboratories

Donald Karp, Trace Laboratories

John Radman, Trace Laboratories

Robert Cormack, U.S. Navy

Table of Contents

Figures

Tables

This Page Intentionally Left Blank

Requirements for Soldering Pastes

1 GENERAL

1.1 Scope This standard prescribes general requirements for the characterization and testing of solder pastes used to make high quality electronic interconnections. This specification is a material quality control document and is not intended to relate directly to the material's performance in the assembly process. Solder paste users are referred to 6.3 for a listing of requirements information and options that should be addressed when procuring solder paste.

1.1.1 Purpose This standard defines the characteristics of solder paste through the definitions of properties and specification of test methods and inspection criteria. The materials include solder powder and solder paste flux blended to produce solder paste. Solder powders are classified by the shape of the particles and size distribution of the particles. It is not the intent of this standard to exclude particle sizes or distributions not specifically listed. The flux properties of the solder paste, including classification and testing, **shall** be based on J-STD-004, or equivalent. The requirements for solder paste are defined in general terms. In practice, where more stringent requirements are necessary, additional requirements **shall** be as agreed between user and supplier (AABUS). Users are cautioned to perform tests (beyond the scope of this specification) to determine the acceptability of the solder paste for specific processes.

2 APPLICABLE DOCUMENTS

The following documents of the issue currently in effect, form a part of this specification to the extent specified herein.

2.1 Joint Standards[1]

J-STD-001 Soldering Requirements for Electronic Interconnections

J-STD-004 Requirements for Soldering Fluxes

J-STD-006 Requirements for Alloys and Solder Products

2.2 International Organization for Standardization[2]

ISO 9001 Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing.

2.3 IPC[3]

IPC-A-20 Fine pitch stencil pattern for slump (artwork)

IPC-A-21 Standard pitch stencil pattern for slump (artwork)

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

IPC-TM-650 Test Methods Manual[4]

2.2.14.3 Determination of Maximum Solder Powder Particle Size

2.2.20 Solder Paste Metal Content by Weight

2.4.34 Solder Paste Viscosity—T-Bar Spin Spindle Method (Applicable for 300,000 to 1,600,000 centipoise)

2.4.34.1 Solder Paste Viscosity—T-Bar Spindle Method (Applicable at less than 300,000 centipoise)

2.4.34.2 Solder Paste Viscosity—Spiral Pump Method (Applicable for 300,000 to 1,600,000 centipoise)

2.4.34.3 Solder Paste Viscosity—Spiral Pump Method (Applicable at less than 300,000 centipoise)

2.4.35 Solder Paste—Slump Test

1. www.ipc.org
2. www.iso.org
3. www.ipc.org
4. Current and revised IPC Test Methods are available on the IPC Web site (www.ipc.org/html/testmethods.htm)

2.4.43 Solder Paste—Solder Ball Test

2.4.44 Solder Paste—Tack Test

2.4.45 Solder Paste—Wetting Test

2.4 American Society for Testing Materials[5]

ASTM D-1210 Fineness of Dispersion of Pigment Vehicle Systems

3 REQUIREMENTS

3.1 General Requirements

3.1.1 Conflict In the event of conflict between the requirements of this specification and other requirements of the applicable acquisition documents, the precedence in which documents **shall** govern in descending order is as follows:

1. The applicable acquisition document
2. The applicable specification sheet/drawing
3. This standard
4. Applicable referenced documents (see Section 2)

3.1.2 Terms and Definitions Definitions applicable to this specification **shall** conform to referenced documents and as follow. Items marked with an * are quoted from IPC-T-50.

3.1.2.1 *Centipoise CGS unit of the dynamic measurement of viscosity equal to 1/100 poise. See viscosity.

3.1.2.2 *Drying Ambient or heating process to evaporate volatile components from solder paste which may or may not result in melting of rosin/resin.

3.1.2.3 *Micron A linear dimension equal to 1 x 10^{-6} meters or 39.4 x 10^{-6} inches.

3.1.2.4 *Rheology The study of the change in form and the flow of matter, generally characterized by elasticity, viscosity and plasticity.

3.1.2.5 Thinner (Paste) A solvent or flux system with or without activator which is added to solder paste to replace evaporated solvents, adjust viscosity, or reduce solids content.

3.1.2.6 Viscosity The internal friction of a fluid, caused by molecular attraction, which makes it resist a tendency to flow.

3.2 Description of Product The description of a solder paste product should identify all applicable characteristics, such as: alloy, flux, powder, metal content, viscosity, unit package size, etc. The description system in Table 3-1 may be used to concisely describe standard solder paste products and to partially describe non-standard solder paste products. Complete description of non-standard solder paste products usually requires the use of tabular or narrative format, because the number of possible variations in characteristics cannot be easily coded into a concise format.

3.2.1 Alloy Composition The percentage of each element in an alloy **shall** be determined by any standard analytical procedure with sufficient resolution. Wet chemistry **shall** be used as the reference procedure. The tolerance & impurity levels of the alloy must conform to the current version of J-STD-006, or equivalent. All manufacturer's designed alloy additions AABUS **shall** be identified as a fraction of the weight of the alloy.

3.2.2 Flux Characterization and Inspection The fluxes in solder pastes **shall** be inspected and characterized by the manufacturer in accordance with the flux characterization requirements specified in J-STD-004, or equivalent. The results of these inspections should be recorded on the report form included in J-STD-004, or equivalent, and the flux type **shall** be recorded on the solder paste report form.

5. www.astm.org

Table 3-1 System to Describe Solder Paste Products Description

Alloy Short name from Appendix A of J-STD-006, or equivalent
Solder Form[1] - P for all solder paste products
Flux designator from Table 1 of J-STD-004, or equivalent
Powder size designation from Table 3-2
Metal content in percent by mass (e.g., 91, 92)
Viscosity (Reference Manufacturer's Product Data Sheet)
Package unit mass in kilogram (e.g., 0.5, 0.001, 0.010)

Note 1: The Solder Form code is used to distinguish between various solder forms which use similar description formats.

3.3 Solder Powder Particle Size

3.3.1 Powder Size Determination Powder size determination using laser diffraction or alternate test procedures **shall** be AABUS. Powder size **shall** be by weight percent, not by population.

3.3.2 Powder Size When tested in accordance with 3.3.2.1, the powder size **shall** be classified by type per a standard sieve size or nearest sieve size shown which matches Table 3-2 dimensions. Powder used for testing should be from virgin powder, not extracted from solder paste.

Table 3-2 Percent of Sample by Weight—Nominal Size

Type	Less than 0.5% larger than	10% Max. between	80% Min. Between	10% Max. Less Than
1	160	150-160	75-150	75
2	80	75-80	45-75	45
3	60	45-60	25-45	25
4	50	38-50	20-38	20
5	40	25-40	15-25	15
6	25	15-25	5-15	5
7	15	11-15	2-11	2

3.3.2.1 Maximum Powder Size (Fineness of Grind) The maximum powder size **shall** be determined with a fineness of grind gauge (Hegmann) type CMA 185, or equivalent, in accordance with ASTM D-1210 or IPC-TM-650, Test Method 2.2.14.3.

3.3.2.2 Solder Powder Powder particle size distribution **shall** be determined by IPC-TM-650, Test Method 2.2.14, Test Method 2.2.14.1, or Test Method 2.2.14.2.

3.3.3 Solder Powder Particle Shape

3.3.3.1 Powder Shape Solder powder shape **shall** be spherical with maximum length-to-width ratio of 1.25 when tested in accordance with 3.3.3.1.1. Other shapes **shall** be acceptable AABUS.

3.3.3.1.1 Determination of Solder Powder Particle Shape Solder powder particle shape should be spherical and **shall** be determined by AABUS.

3.4 Metal Percent The metal content should be between 65-96% as specified in weight percent when tested in accordance with IPC-TM-650, Test Method 2.2.20. The metal percent **shall** be within ± 1% of the nominal value specified on the user's purchase order.

3.5 Viscosity The measured viscosity **shall** be within ± 15% of the value specified by the user. The measurement and test conditions **shall** be in accordance with 3.5.1.

3.5.1 Methods of Determining Viscosity The methods for determining the viscosity of solder paste in the range of 300,000 to 1,600,000 centipoise **shall** be in accordance with IPC-TM-650, Test Method 2.4.34, or Test Method 2.4.34.2. The method for determining viscosity of solder paste in the range of 50,000-300,000 centipoise **shall** be in accordance with IPC-TM-650, Test Method 2.4.34.1, or Test Method 2.4.34.3.

3.6 Slump Test Unless otherwise specified in the contract or purchase order, slump is assessed using two stencil thicknesses and three pad (deposit) sizes in accordance with 3.6.1 and 3.6.2. Unless AABUS, ceramic coupons, as specified in IPC-TM-650, Test Method 2.4.35, **shall** be used as the test substrates for slump. For purposes of this test, a bridge is defined as any location where there are 2 or more solder spheres or particles touching each other and the solder bricks to either side.

3.6.1 Test with 0.2 mm Thick Stencil The 0.63 x 2.03 mm pads of IPC-A-21 (see Figure 3-1) when tested in accordance with 5.2.1 in IPC-TM-650, Test Method 2.4.35, **shall** show no evidence of bridging between pads when spacing is 0.56 mm or greater. When tested in accordance with 5.2.2 in IPC-TM-650, Test Method 2.4.35, the specimen **shall** show no evidence of bridging between pads when the spacing is 0.63 mm or greater. (For higher melting solders than eutectic tin-lead, e.g., lead free alloys, the sample will be tested at a temperature of 35 °C below the melting point when tested as per 5.2.2.) The 0.33 x 2.03 mm pads (see Figure 3-1) of the IPC-A-21 pattern when tested as per 5.2.1 in IPC-TM-650, Test Method 2.4.35, **shall** show no evidence of bridging at spacing of 0.25 mm or greater and when tested as per 5.2.2 of IPC-TM-650, Test Method 2.4.3 5, **shall** show no evidence of bridging at spacing of 0.30 mm or greater.

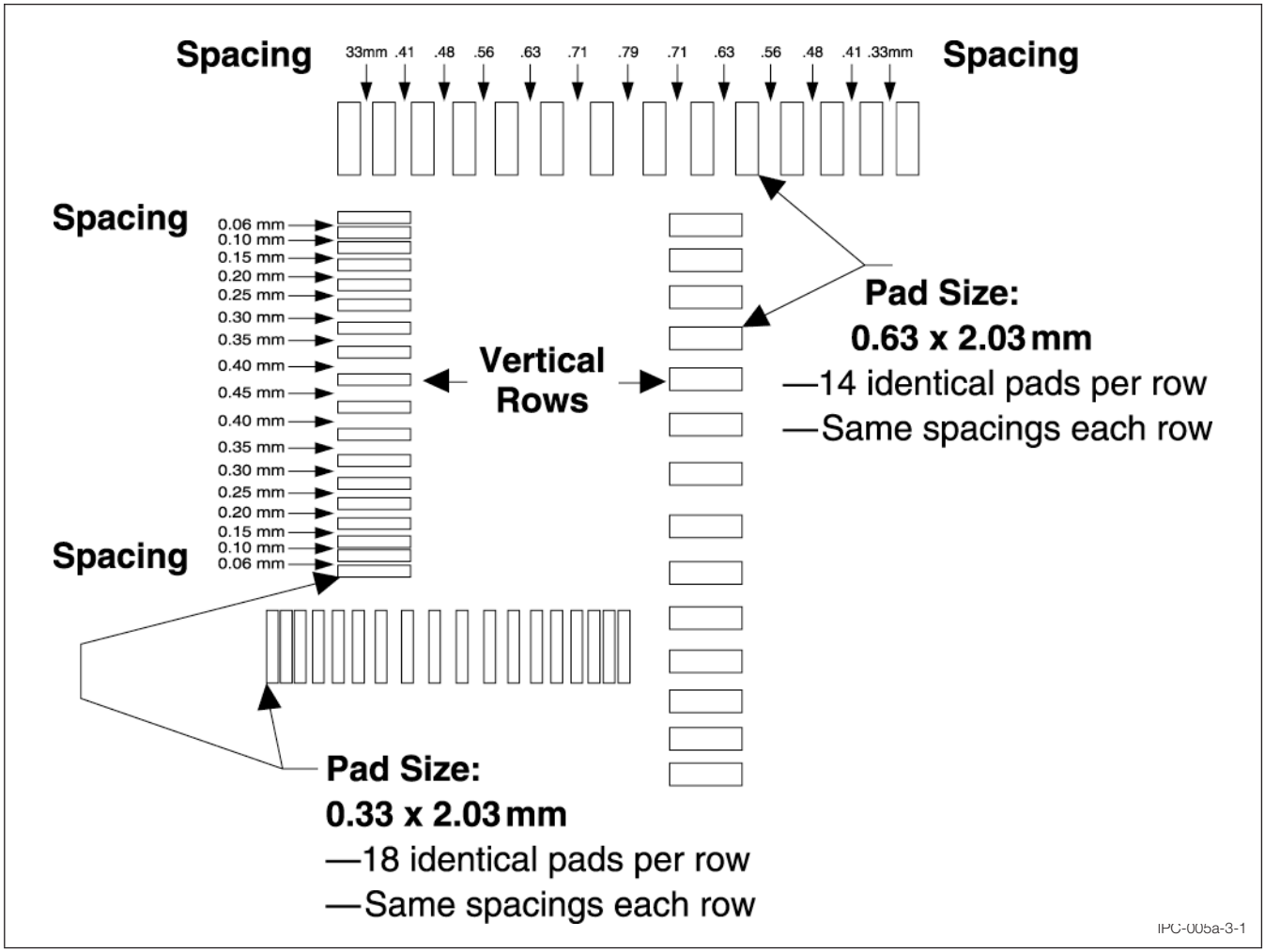


Figure 3-1 Slump Test Stencil Thickness – 0.20 mm

3.6.2 Test with 0.1 mm Thick Stencil The 0.33 mm x 2.03 mm pads of IPC-A-20 (see Figure 3-2) when tested in accordance with 5.2.1 in IPC-TM-650, Test Method 2.4.3 5, **shall** show no evidence of bridging at spacing of 0.25 mm or greater and when tested as per 5.2.2 of IPC-TM-650, Test Method 2.4.35, **shall** show no evidence of bridging at spacing at 0.30 mm or greater. (For higher melting solders than eutectic tin-lead, e.g. lead free alloys, the sample will be tested at a temperature of 35 °C below the melting point when tested as per 5.2.2.)

The 0.2 mm x 2.03 mm pads (see Figure 3-2) of the IPC-A-20 pattern when tested in accordance with 5.2.1 in IPC-TM-650, Test Method 2.4.35, **shall** show no bridging at spacing of 0.175 mm or greater and when tested in accordance with 5.2.2 of IPC-TM-650, Test Method 2.4.35, **shall** show no evidence of bridging at spacing of 0.20 mm or greater.

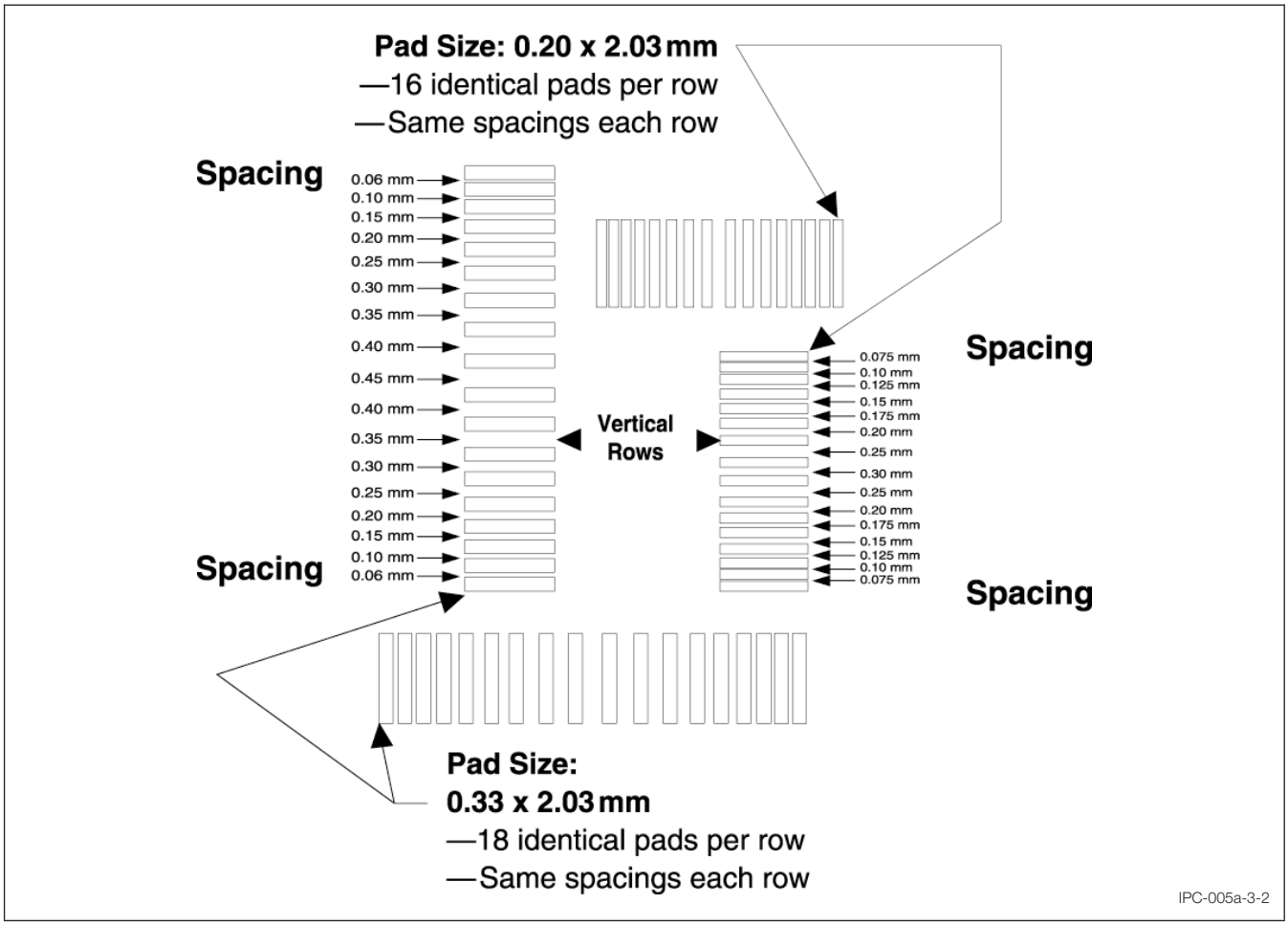


Figure 3-2 Slump Test Stencil Thickness – 0.10 mm

3.7 Solder Ball Test The solder paste when tested in accordance with 3.7.1 **shall** meet the requirements specified.

3.7.1 Type 1-6 Powder The solder paste with Type 1 through 4 type powders defined in IPC-TM-650, Test Method 2.4.43, **shall** meet the acceptance criteria presented in Figure 3-3.

3.7.2 Type 7 Powder The solder paste with type 7 powders does not require testing and should be determined AABUS.

3.8 Tack Test The solder paste **shall** be tested in accordance with IPC-TM-650, Test Method 2.4.44. Minimum holding force and time **shall** be AABUS.

3.9 Wetting When tested in accordance with IPC-TM-650, Test Method 2.4.45, the solder paste **shall** uniformly wet the copper coupon without evidence of dewetting or non-wetting.

3.10 Labeling The manufacturer **shall** label each container of solder paste with the following:

a. The manufacturer's name and address.

b. The solder paste classification (type designation), and the manufacturer's designation of the solder paste, if different. (See 3.2, Table 3-1.)

c. The net mass of solder paste.

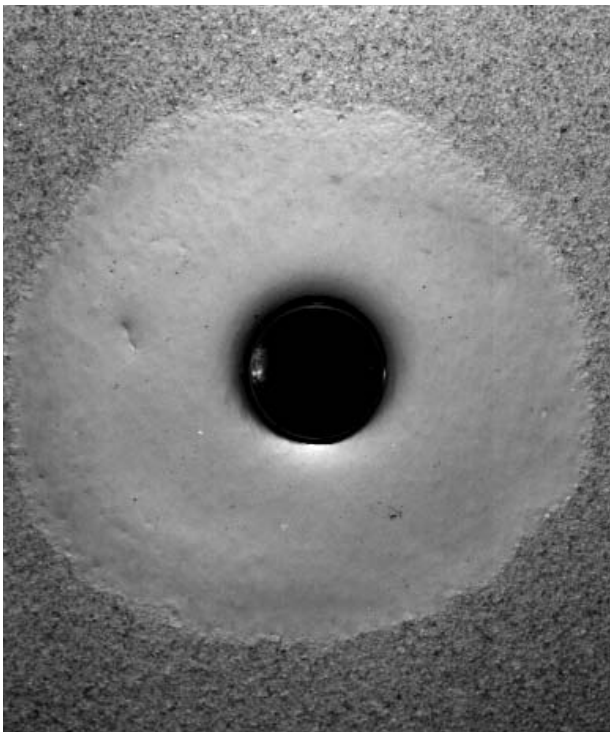
d. The batch number.

e. The date of manufacture.

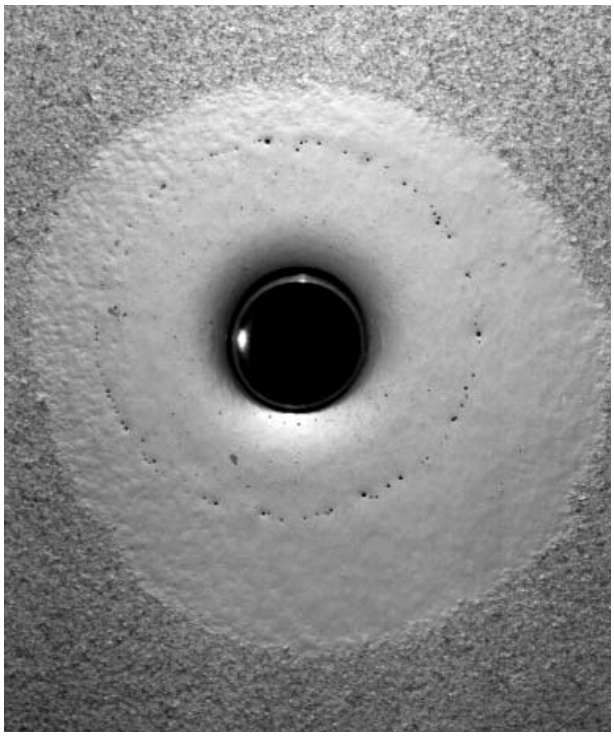
f. All required health and safety warnings.

g. Additional information **shall** comply with J-STD-609.

h. Expiration date at recommended storage temperatures.

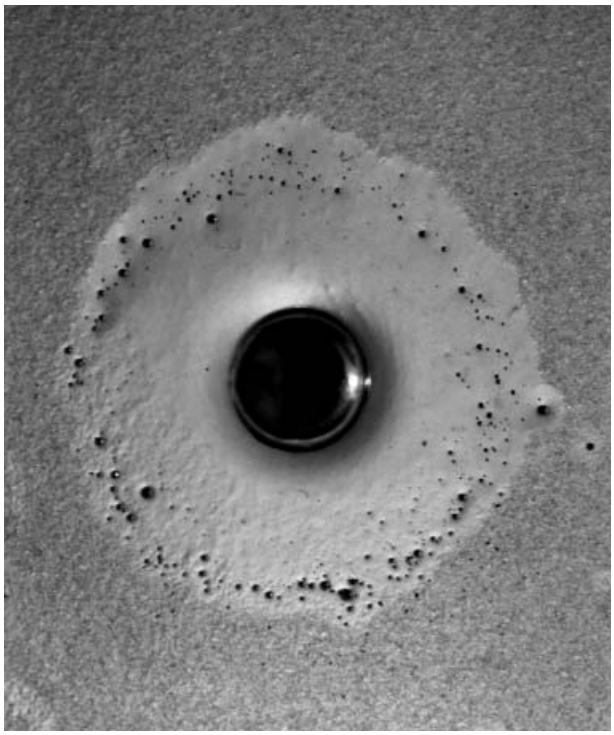


Preferred



Acceptable

Unacceptable; Clusters



Unacceptable

Figure 3-3 Solder Ball Test Standards

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection The solder paste manufacturer is responsible for the performance of all inspections specified herein except the performance inspections which are the responsibility of the user. The solder paste manufacturer may use its own or any other facilities suitable for the performance of the inspections specified herein, unless disapproved by the user. It is the responsibility of the supplier to ascertain that all solder products or supplies delivered to the user or submitted for user acceptance conform to the requirements of the contract or purchase order and Section 3, herein. The absence of any inspection requirements **shall not** relieve the supplier of this responsibility. The user reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure that supplies and services conform to prescribed requirements.

4.1.1 Responsibility for Compliance Materials covered by this specification **shall** meet all requirements of Section 3. The inspection(s), excluding the performance inspections defined in this specification, **shall** become a part of the contractor's overall inspection system or quality program. The supplier has responsibility of ensuring that all products or supplies submitted to the user for acceptance comply with all requirements of the purchase order contract.

4.1.1.1 Quality Assurance Program When required by the user, a quality assurance program for material furnished under this specification **shall** be established and maintained in accordance with ISO 9001 or AABUS, and **shall** be monitored by the qualifying activity.

4.1.2 Test Equipment and Inspection Facilities Test/measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection(s) **shall** be established and maintained or designated by the supplier. Establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment **shall** be in accordance with ISO 10012 Part 1, or equivalent.

4.1.3 Inspection Conditions Unless otherwise specified herein, all inspections **shall** be performed in accordance with the test conditions specified in Section 3 and in test methods listed herein.

4.2 Classification of Inspections The inspections specified herein are as follows:

1. Qualification Inspection (4.4)
2. Quality Conformance (4.5)

4.3 Inspection Report Form Appendix A is a recommended report form suitable for recording the results of solder paste inspections. Where definitive test results are not required or appropriate, successful completion of inspections should be indicated by checkmarks on the solder paste report form. Permission is hereby granted for this report form to be locally copied or reproduced.

4.4 Qualification Inspection Qualification inspections **shall** be performed at a laboratory acceptable to the user and inspections **shall** consist of examinations and tests of materials, processes, and products needed to ascertain that a solder paste manufacturing facility has the necessary facilities and expertise to make acceptable solder paste. In determining the acceptability of a manufacturing facility as a source for solder paste, users are encouraged to utilize the documented results of product inspections previously performed by the manufacturing facility to the maximum extent possible in lieu of requiring new qualification inspections. Solder paste samples that have been produced using the materials equipment, processes, and procedures used in production, **shall** be subjected to the qualification inspections specified. The standard qualification inspections for solder paste covered by this standard are listed in Table 4-1. Unless otherwise specified, the qualification inspections **shall** be conducted using the procedures specified herein.

4.4.1 Sample Size A minimum of two 300 to 500 g containers of solder paste **shall** be submitted for qualification inspection.

4.4.2 Inspection Routine The samples **shall** be subjected to the inspections specified in Table 4-1 and **shall** be performed to verify the ability of a solder paste manufacturer to meet the qualification and/or quality conformance requirements of this standard.

4.5 Quality Conformance The material manufacturer **shall** perform those inspections necessary to ensure that the process is in control and the product is within specification limits.

Table 4-1 Qualification, Quality Conformance and Performance Testing for Solder Paste

Test Method		Reference Paragraph	Qualification	Quality Conformance	User Performance Inspection
Name	IPC-TM-650 or Other Method				
Visual			R		R
Material			R		
Metal Content	2.2.20	3.4	R	R	
Viscosity	2.4.34, 2.4.31.1, 2.4.34.2, 2.4.34.3	3.5	R	R	R
Solder Ball	2.4.43	3.7	R	R	R
Slump	2.4.35	3.6	R	O	R
Alloy Composition	J-STD-006, or equivalent		R	R*	
Flux Designation	J-STD-004, or equivalent		R	R*	
Powder Class	2.2.14, 2.2.14.2, 2.2.14.1, 2.2.14.3	3.3	R	R*	
Maximum Powder Size	2.2.14.3	3.3.2.1	R		
Powder Shape		3.3.3.1	R		
Tack	2.4.44	3.8	R		R
Wetting	2.4.45	3.9	R		R

*Quality conformance testing on the powder and flux which are used in the batch of paste being tested.

4.5.1 Sampling Plan Statistical sampling and inspection **shall** be in accordance with an approved quality program (see 4.1.1.1).

4.5.2 Rejected Lots If an inspection lot is rejected the supplier may rework it to correct the defects or screen out the defective units and resubmit for reinspection. Resubmitted lots **shall** be inspected using tightened inspection. Such lots **shall** be separated from new lots and **shall** be clearly identified as reinspected lots.

5 PREPARATION FOR DELIVERY

Preservation packaging, packing and marking for shipment and identification **shall** be as specified in the contract or purchase order (see Section 6).

6 NOTES

6.1 Applicability This document is intended to be applicable to all types of solder paste as used for soldering in general and to soldering in electronics in particular. The solder pastes involved relate to all application types.

6.2 Shelf Life Any use of the material beyond the stated shelf life on the product should be AABUS.

6.3 Acquisition Requirements Acquisition documents should specify the following:

a. Number, revision, title, and date of this standard
b. Alloy designation (see 3.2)
c. Flux type (see 3.2.2)
d. Standard powder size number (see 3.3.2, Table 2), or size characteristics of non-standard powder
e. Powder shape if different (see 3.3.3)
f. Metal percent
g. Viscosity (see 3.5)
h. Slump test if required (see 3.6)
i. Solder ball test if required (see 3.7)
j. Tack test if required (see 3.8)
k. Wetting test if required (see 3.9)
l. Labeling requirements if different (see 3.10)
m. Qualification and quality conformance inspections (see 4.1)
n. Preservation, packing, packaging, and exterior marking requirements (see Section 5)

APPENDIX A
Test Report on Solder Paste

Enter appropriate information in top portion of report and complete report by entering the test results or checkmarks in the appropriate spaces.

Inspection Purpose:

____ Qualification

____ Shelf-Life Extension

____ Performance

Manufacturer's Identification: _____

Manufacturer's Batch Number: _____

Date of Manufacture: _____

Original USE-By Date: _____

Revised USE-BY Date: _____

Date Inspection Completed: _____ Overall Results: ___ Pass ___ Fail

Inspection Performed By: _____ Witnessd By: _____

Inspections	Requirement Paragraph	Test Method	User's Actual Requirement	Test Result	P/F (*)	Tested by and Date
Material						
Visual						
Metal Content	3.4	2.2.20				
Viscosity	3.5	2.4.34, 2.4.34.1, 2.4.34.2, 2.4.34.3				
Solder Ball	3.7	2.4.43				
Slump	3.6	2.4.35				
Alloy						
Flux						
Powder Size	3.3	2.2.14, 2.2.14.2, 2.2.14.1, 2.2.14.3				
% in Top Screen						
% in Next Screen						
% in Bottom Screen						
% in Receiver Bottom						
Max. Powder Size	3.3.2.1	2.2.14.3				
Powder Shape	3.3.3.1					
Tack	3.8	2.4.44				
Wetting	3.9	2.4.45				

*P/F = Pass/Fail; enter P if test results are within tolerance of actual requirement; otherwise, enter F.

This solder paste report may be freely copied/reproduced.

ANSI/IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits Definition Submission/Approval Sheet

The purpose of this form is to keep current with terms routinely used in the industry and their definitions. Individuals or companies are invited to comment. Please complete this form and return to:

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, IL 60015-1249
Fax: 847 615.7105

SUBMITTOR INFORMATION:

Name: _____

Company: _____

City: _____

State/Zip: _____

Telephone: _____

Date: _____

❑ This is a **NEW** term and definition being submitted.
❑ This is an **ADDITION** to an existing term and definition(s).
❑ This is a **CHANGE** to an existing definition.

Term	Definition

If space not adequate, use reverse side or attach additional sheet(s).

Artwork: ❑ Not Applicable ❑ Required ❑ To be supplied
❑ Included: Electronic File Name: _____

Document(s) to which this term applies: _____

Committees affected by this term: _____

Office Use

IPC Office	Committee 2-30
Date Received: _____	Date of Initial Review: _____
Comments Collated: _____	Comment Resolution: _____
Returned for Action: _____	Committee Action: ❑ Accepted ❑ Rejected
Revision Inclusion: _____	❑ Accept Modify

IEC Classification

Classification Code • Serial Number

Terms and Definition Committee Final Approval Authorization:
Committee 2-30 has approved the above term for release in the next revision.

Name: _____ Committee: IPC 2-30 Date: _____

Put IPC MEMBERSHIP to WORK for your COMPANY

A trusted leader for more than 50 years, IPC is the premier source for industry standards, training, market research and public policy advocacy — supporting the needs of the estimated $1.7 trillion global electronics industry.

For less than $3.00 a day, IPC members enjoy unlimited access to the tools, information and forums needed to thrive in an ever-changing electronic interconnect industry.

"I have a responsibility to my customers and my shareholders. Between the savings on standards, training materials, APEX and industry data, IPC membership provides immediate 100% return on investment for us. It would be irresponsible not to be a member."

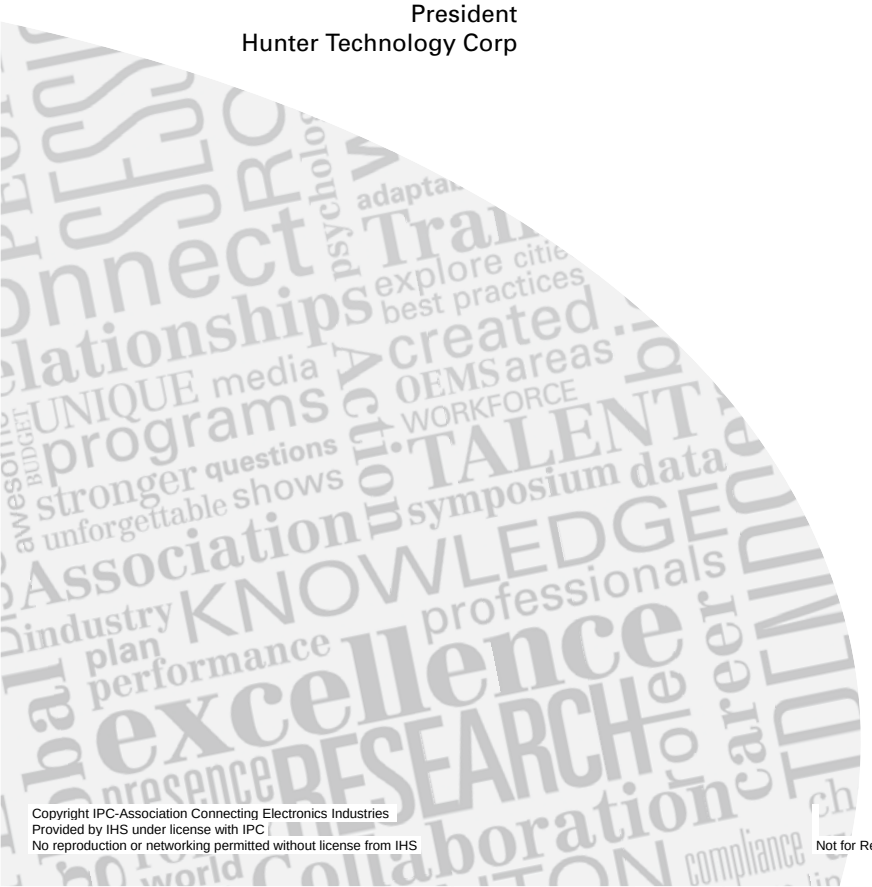
Joseph F. O'Neil
President
Hunter Technology Corp

Keep on top of industry developments … and how they will affect your company

- Enjoy 24/7 privileges to FREE members-only online resources, including a searchable archive of original articles and presentations on the latest technical issues and industry/market trends.
- Receive FREE exclusive statistical reports available for the EMS, PCB, laminate, process consumables, solder and assembly equipment industries.
- IPC events, including IPC APEX EXPO™, technical conferences, workshops, training and certification programs and executive management summits provide unparalleled educational and networking opportunities.
- Stay abreast of global environmental directives, legislation and regulations, and how these specifically impact each segment of our industry's supply chain.

Save enough money to easily pay for your membership

- Get discounts of up to 50 percent on IPC standards, publications and training materials.
- Save money on online subscription licenses of IPC standards through the world's largest standards reseller — IHS.
- Enjoy dramatic discounts on registration fees for meetings, technical conferences, workshops and tutorials.
- Benefit from preferred pricing on exhibit space at IPC trade shows and events.



"Graphic PLC has enjoyed the privilege of being an IPC member for more than 30 years and the technical benefits derived to focus us as a world player in the manufacture of PCBs have superceded the cost of membership many times."

Rex Rozario, OBE
Chairman
Graphic Plc.,UK

"Being a part of the fast-changing global electronics marketplace requires constant intelligence about market trends, standards and solutions to the challenges throughout the supply chain. IPC is an invaluable partner in providing that intelligence through conferences, white papers and technical standards."

Andy Hyatt
Executive Vice President
Business Development
Creation Technologies

Increase your knowledge and train your people

- IPC workshops and international conferences provide an exchange of technical information that is unequalled.
- IPC's training and certification programs offer a cost-effective, industry-recognized way to demonstrate your commitment to quality.
- Facilitate your staff's continuous learning through IPC's award-winning CD- and DVD-based training materials.

"IPC's role in defining industry technical standards, addressing industry concerns, and promoting knowledging sharing through conferences and training, significantly benefits member companies and the industry as a whole, especially in today's global outsourcing environment."

Dongkai Shangguan, Ph.D.
Vice President
Flextronics International

Expand your network and build your visibility

- Network with your peers through IPC committees, PCB/EMS management councils and IPC events.
- Participate in problem-solving exchanges through IPC's technical e-forums.
- Get answers to your technical questions from IPC's technical staff.

"Juki gets tremendous value from our IPC membership … we get quarterly market data which would cost us thousands of dollars if we commissioned it on our own. The industry standards generated by IPC committees allow us to design our equipment with certainty that it will meet industry requirements. The returns for our company are so great, they are beyond calculable."

Bob Black
President and CEO
Juki Automation Systems Inc.

Help shape the industry

- Participate in developing or updating the global industry standards that your company, customers, competitors and suppliers use.
- Take an active role in IPC-organized environmental and public policy activities to advocate for regulations and legislation favorable to your company and the global electronics community.

Market your business

- Use the IPC member logo to highlight your company's leadership in the industry.
- Build your brand visibility through IPC's Products and Services Index (PCB and EMS companies only), and IPC's annual trade shows and conferences, including IPC APEX EXPO.
- Gain valuable exposure by sponsoring market research conferences and executive management meetings.

Put the resources of the entire industry behind your company by joining IPC today!

To learn more about IPC membership or to apply online, visit www.ipc.org.

IPC — Association Connecting Electronics Industries® Headquarters
3000 Lakeside Drive, Suite 309 S, Bannockburn, IL 60015
www.ipc.org
+1 847-615-7100 **tel**
+1 847-615-7105 **fax**

Visit www.IPC.org/offices for the locations of IPC offices worldwide.

Association Connecting Electronics Industries

Application for Site Membership

Thank you for your decision to join IPC. Membership is **site specific**, which means that IPC member benefits are available to all individuals employed at the site designated on this application.

To best serve your specific needs, please indicate the most appropriate member category for your facility.
(Check one box only.)

☐ Printed Circuit Board Manufacturer

Facility manufactures and sells printed circuit boards (PCBs) or other electronic interconnection products to other companies.
What products do you make for sale? (check all that apply)

☐ One and two-sided rigid, multilayer printed boards ☐ Flexible printed boards ☐ Other interconnections

☐ Printed electronics

_____

☐ Electronics Manufacturing Services (EMS) Company

Facility manufactures printed circuit assemblies, on a contract basis, and may offer other electronic interconnection products for sale.

_____

☐ OEM — Original Equipment Manufacturer

Facility purchases, uses and/or manufactures printed circuit boards or other interconnection products for use in a final product, which we manufacture and sell.

What is your company's primary product line? _____

_____

☐ Industry Supplier

Facility supplies raw materials, equipment or services used in the manufacture or assembly of electronic products.

Which industry segment(s) do you supply? ☐ PCB ☐ EMS ☐ Both ☐ Printed electronics

What products do you supply? _____

☐ Government, Academia, Nonprofit

Organization is a government agency, university, college or technical or nonprofit institution which is directly concerned with design, research and utilization of electronic interconnection devices.

☐ Consulting Firm

What services does the firm provide? _____

_____

Association Connecting Electronics Industries

Application for Site Membership

Site Information

Company Name

Street Address

City | State | Zip/Postal Code | Country

Main Switchboard Phone No. | Main Fax

Company E-mail address | Website URL

Name of Primary Contact

Title | Mail Stop

Phone | Fax | E-mail

Payment Information (Purchase orders not accepted as a form of payment)

Membership Dues

Membership will begin the day the application and dues payment are received, and will continue for one or two years based on the choice indicated below. All fees are quoted in U.S. dollars.

Please check one:

Primary facility: ☐ One year $1,050.00 ☐ Two years $1,890.00 **(SAVE 10%)**	**Government agency, academic institution, nonprofit organization** ☐ One year $275.00 ☐ Two years $495.00 **(SAVE 10%)**
Additional facility: Membership for a facility of an organization that already has a different location with a primary facility membership ☐ One year $850.00 ☐ Two years $1,530.00 **(SAVE 10%)**	**Consulting firm (employing less than 6 individuals)** ☐ One year $625.00 ☐ Two years $1,125.00 **(SAVE 10%)**
Company with an annual revenue of less than $5,000,000 ☐ One year $625.00 ☐ Two years $1,125.00 **(SAVE 10%)**	

Enclosed is a check for $_____

Bill credit card: (check one) ☐ MasterCard ☐ American Express ☐ Visa ☐ Diners Club

Card No. | Expiration Date | Security Code

Authorized Signature

Mail application with check or money order to:

IPC
3491 Eagle Way
Chicago, IL 60678-1349

***Fax/Mail application with credit card payment to:**

3000 Lakeside Drive, Suite 309 S
Bannockburn, IL 60015
Tel: +1 847-615-7100
Fax: +1 847-615-7105
www.ipc.org

**Overnight deliveries to this address only.*

Contact membership@ipc.org for wire transfer details

Please attach business card of primary contact here

10/10

Association Connecting Electronics Industries

Standard Improvement Form

IPC J-STD-005A

The purpose of this form is to provide the Technical Committee of IPC with input from the industry regarding usage of the subject standard.

Individuals or companies are invited to submit comments to IPC. All comments will be collected and dispersed to the appropriate committee(s).

If you can provide input, please complete this form and return to:

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, IL 60015-1249
Fax 847 615.7105
E-mail: answers@ipc.org

1. I recommend changes to the following:

___ Requirement, paragraph number _____

___ Test Method number _____, paragraph number _____

The referenced paragraph number has proven to be:

___ Unclear ___ Too Rigid ___ In Error

___ Other _____

2. Recommendations for correction:

3. Other suggestions for document improvement:

Submitted by:

Name Telephone

Company E-mail

Address

City/State/Zip Date

Association Connecting Electronics Industries

3000 Lakeside Drive, Suite 309 S
Bannockburn, IL 60015

847-615-7100 **tel**
847-615-7105 **fax**
www.**ipc**.org

ISBN #1-978-1-61193-038-2