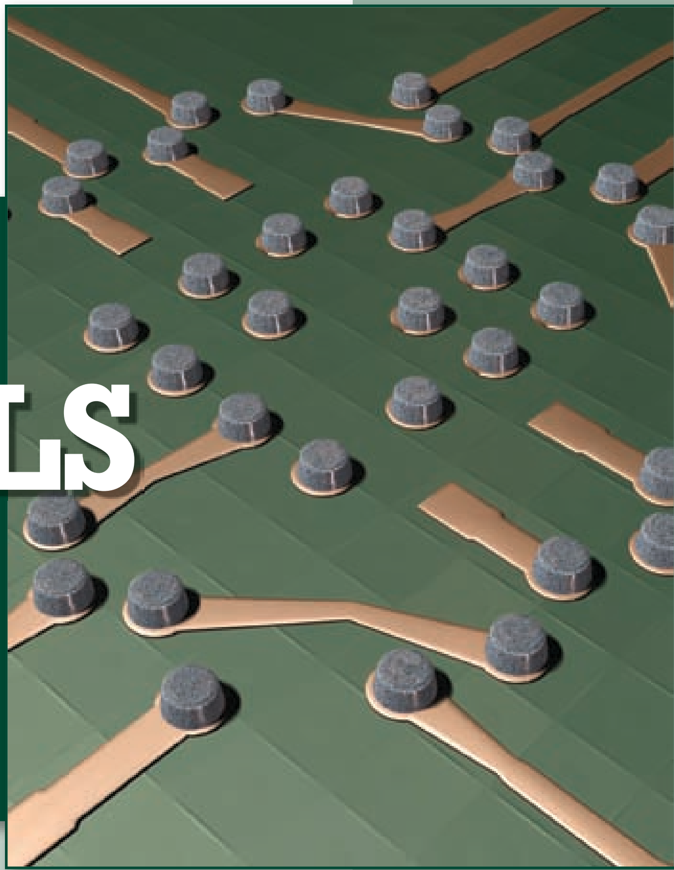
Indium5.8LS

Pb-Free Solder Paste



- Ultra-low flux/solder spatter
- Outstanding print characteristics
- Halogen-free

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Product Information

Indium5.8LS Pb-Free Solder Paste

Features

- Ultra-low flux spattering (ideal for applications with Au finger connectors)
- Ultra-low solder beading
- Halogen-free
- Superior stencil life
- Outstanding print characteristics
- Extremely wide process window

Introduction

Indium5.8LS is a halogen-free, no-clean solder paste specifically formulated for low flux spatter. This material is designed to accommodate the higher processing temperatures required by the Sn/Ag/Cu, Sn/Ag, and other Pb-Free alloy systems in an air or nitrogen reflow atmosphere. This product formulation offers consistent, repeatable printing performance combined with long stencil and tack times to handle the rigors of today's high speed, as well as, high mix surface mount lines.

Alloys

Indium Corporation manufactures low-oxide spherical powder composed of a variety of Pb-Free alloys that cover a broad range of melting temperatures. Type 4 and Type 3 powder are standard offerings with SAC305 & SAC387 alloys. The metal percent is the weight percent of the solder powder in the solder paste and is dependant upon the powder type and application. Standard product offerings are detailed in the following table below.

Standard Product Specifications

Alloy	Metal Load	IPN
96.5Sn/3.0Ag/0.5Cu (SAC305)	88.5% (Type 4)	800105
96.5Sn/3.0Ag/0.5Cu (SAC305)	89.0% (Type 3)	83753

Packaging

Standard packaging for stencil printing applications includes 4 oz. jars and 6 oz. or 12 oz. cartridges. Packaging for enclosed print head systems is also readily available. For dispensing applications, 10cc and 30cc syringes are standard. Other packaging options may be available upon request.

Storage and Handling Procedures

Refrigerated storage is recommended throughout the shelf life of solder paste. The shelf life of **Indium5.8LS** is 6 months when stored at <10°C. Store syringes and cartridges tip down.

Remove solder paste from refrigeration at least two hours before use to allow the solder paste to reach an ambient working temperature. As the time to reach thermal equilibrium will vary with container size, verify solder paste temperature prior to use. Label jars and cartridges with the date and time of opening. For optimal solder paste performance, storage at ambient temperatures (21-25°C) should not exceed two weeks in duration.

Material Safety Data Sheets

The MSDS for this product can be found online at http://www.indium.com/techlibrary/msds.php .

Bellcore and J-STD Tests & Results

J-STD-004A (IPC-TM-650)	Result
Flux Type (per J-STD-004A)*	ROL0
Flux Induced Corrosion: Copper Mirror	L
Presence of Halide	
Silver Chromate	Pass
Fluoride Spot Test	Pass
Quantitative Halide Content	0%
Post Reflow Flux Residue: ICA Test	46%
SIR	Pass

J-STD-005 (IPC-TM-650)	Result
Typical Solder Paste Viscosity: Malcom (10rpm)	
88.5% metal load (Type 4)	1400 poise†
89.0% metal load (Type 3)	1600 poise†
Slump Test	Pass
Solder Ball Test	Pass
Typical Tackiness	34 grams
Wetting Test	Pass

Bellcore GR-78	Result
SIR	Pass
Electromigration	Pass

* *J-STD-004A has replaced J-STD-004 and is more stringent in its requirements.*
† *Pending statistical validation*

All information is for reference only. Not to be used as incoming product specifications.

Indium5.8LS Pb-Free Solder Paste

Printing

Stencil Design:

Electroformed and laser cut/electropolished stencils produce the best printing characteristics among stencil types. Stencil aperture design is a crucial step in optimizing the print process. The following are a few general recommendations:

- Discrete components — A 10-20% reduction of stencil aperture has significantly reduced or eliminated the occurrence of mid-chip solder beads. The “home plate” design is a common method for achieving this reduction.
- Fine pitch components — A surface area reduction is recommended for apertures of 20 mil pitch and finer. This reduction will help minimize solder balling and bridging that can lead to electrical shorts. The amount of reduction necessary is process dependent (5-15% is common).
- For adequate release of solder paste from stencil apertures, a minimum aspect ratio of 1.5 is required. The aspect ratio is defined as the width of the aperture divided by the thickness of the stencil.

Printer Operation:

The following are general recommendations for stencil printer optimization. Adjustments may be necessary based on specific process requirement:

- Solder Paste Bead Size: 20-25mm diameter
- Print Speed: 25-150mm/sec
- Squeegee Pressure: 0.018-0.027kg/mm of blade length
- Underside Stencil Wipe: Once every 10-25 prints
- Solder Paste Stencil Life: >8 hrs. @ 30-60% RH & 22°-28°C

Cleaning

Indium5.8LS is designed for no-clean applications, however the flux can be removed if necessary by using a commercially available flux residue remover.

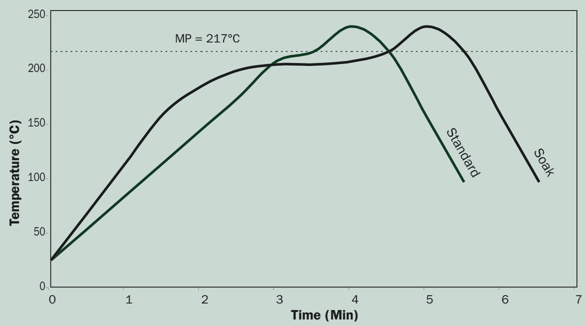
Stencil Cleaning: This is best performed using isopropyl alcohol (IPA) as a solvent. Most commercially available stencil cleaners work well.

Compatible Products

- Rework Flux: **TACFlux® 018, TACFlux® 020B**
- Wave Flux: **WF-7742, WF-9942**
- Cored Wire: **CW-801**

Reflow

Recommended Profile:



The stated profile recommendations apply to most Pb-Free alloys in the Sn/Ag/Cu (SAC) alloy system, including SAC305 (96.5Sn/3.0Ag/0.5Cu). This can be used as a general guideline in establishing a reflow profile when using **Indium5.8LS** Solder Paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements, including board size, thickness & density.

Heating Stage:

A linear ramp rate of 0.5°- 2.0°C/second allows gradual evaporation of volatile flux constituents and helps minimize defects such as solder balling and/or beading and bridging resulting from hot slump. It also prevents unnecessary depletion of fluxing capacity when a high peak temperature and extended time above liquidus is used. A profile with a soak between 200°-210°C for up to 2 minutes can be implemented to reduce void formation on BGA & CSP type devices. A short soak of 20-30 seconds just below the melting point of the solder can help minimize tombstoning.

Liquidus Stage:

A peak temperature of 12° to 43°C above the melting point of the solder alloy is recommended to achieve acceptable wetting and form a quality solder joint. The time above liquidus (TAL) should be 30–90 seconds. A peak temperature and TAL above these recommendations can result in excessive intermetallic formation that can decrease solder joint reliability.

Cooling Stage:

A rapid cool down (4-6°C/second) is desired to form a fine grain structure. Slow cooling will form a large grain structure, which typically exhibits poor fatigue resistance.

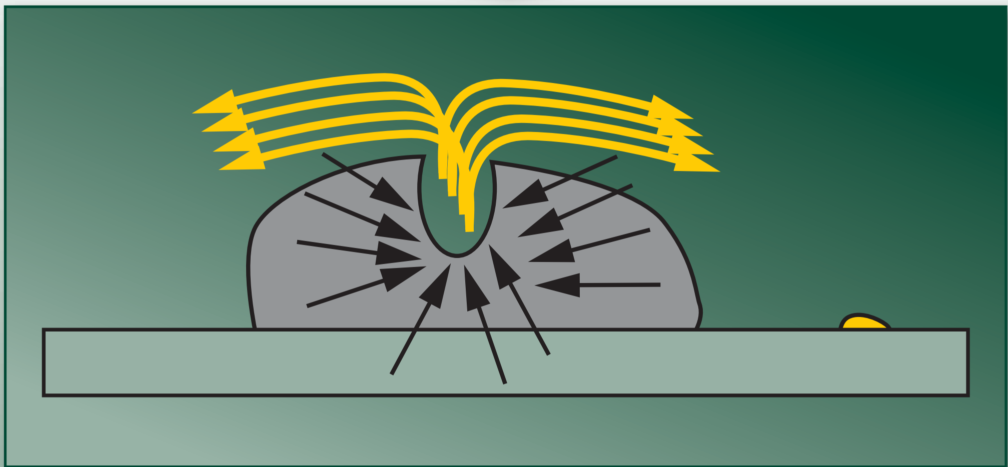
This product data sheet is provided for general information only. It is not intended, and shall not be construed, to warrant or guarantee the performance of the products described which are sold subject exclusively to written warranties and limitations thereon included in product packaging and invoices.

5.8LS Product Level Testing

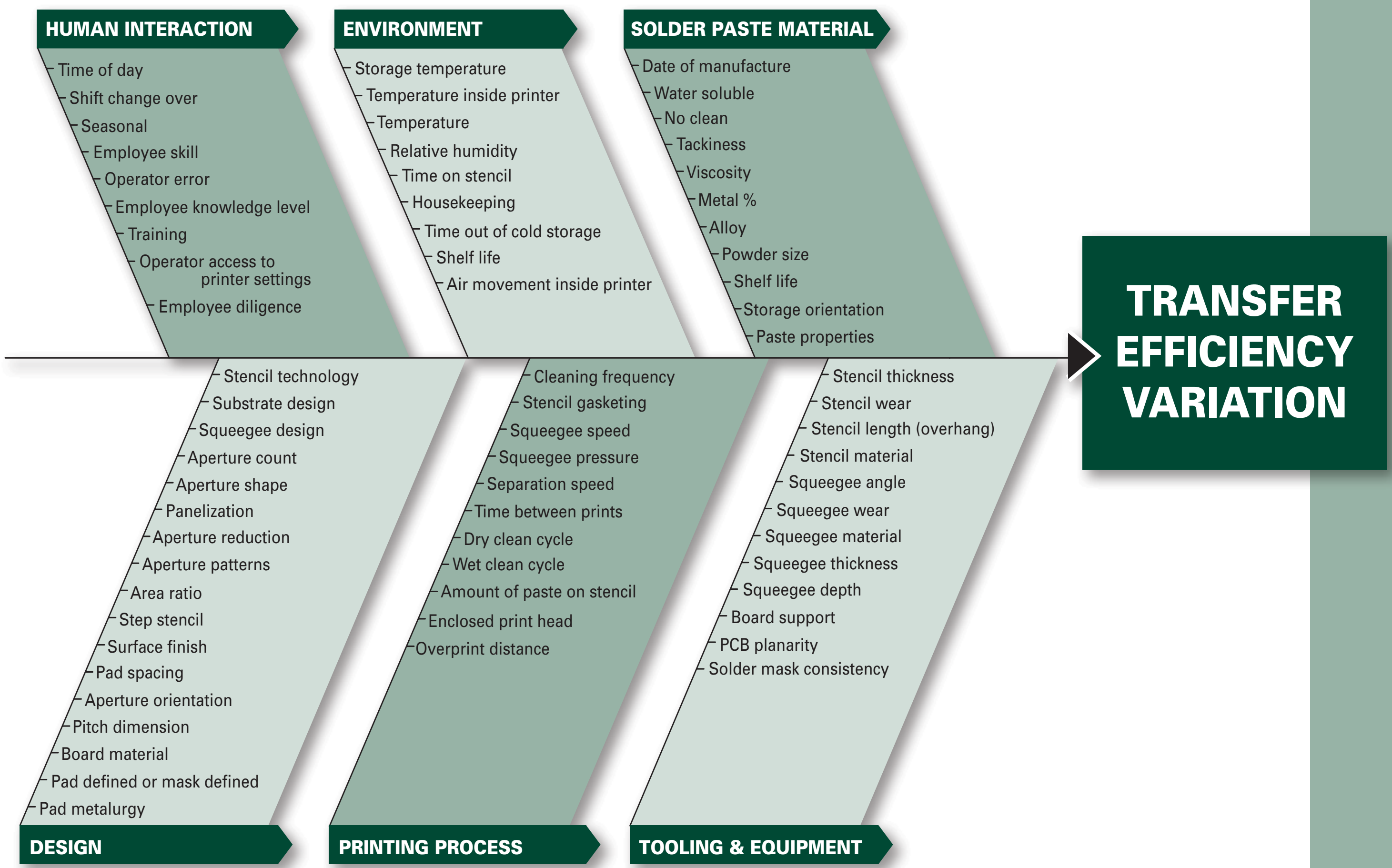
Low Flux and Solder Spatter

A major memory module manufacturer was able to reduce their flux/solder spatter defects from 10% to 1% through the implementation of **Indium5.8LS** and process optimization.

One major cause of flux and solder spatter occurs at the point of solder paste reflow. As the solder coalesces, it can cause flux remnant to “explode” outward and land onto nearby Au fingers. Solder paste fluxes designed with unique solvents and activators, such as **Indium5.8LS**, can provide a significant reduction in flux/solder spatter.



Ultra-Fine Pitch Printing



Solder Powder Reference

Solder Powder Size			Stencil Printing				Dispensing		
J-STD-005 Designation	Diameter Range (microns)		Aperture Width		Particles to Span Width		Needle Size		# of Large Particles
			Microns	Inches	Smallest	Largest	Gauge	ID (microns)	
3	25	45	250	0.010	10.00	5.60	22	410	9.1
4	20	38	225	0.009	11.25	6.00	23	330	8.6
5	15	25	200	0.008	13.30	8.00	25	250	10.0
6	5	15	175	0.007	35.00	11.67	27	200	13.3

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Ultra-Fine Pitch Printing

To ensure that a consistent volume of solder paste is printed onto the board, it is essential to design the stencil according to industry guidelines:

Area Ratio ≥ 0.66
Minimum number of solder particles spanning an aperture should be at least 4-5

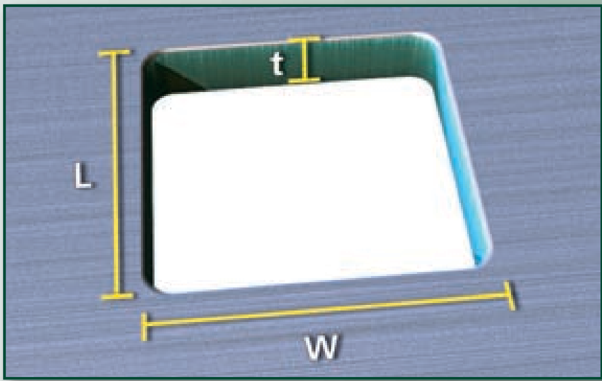
Area Ratio For Square/ Rectangular Apertures

$$\text{Area Ratio} = \frac{\text{Area Opening}}{\text{Area Walls}}$$

$$\text{Area Opening} = L \times W$$

$$\text{Area Walls} = 2t(L + W)$$

$$\text{Area Ratio} = \frac{L \times W}{2t(L + W)}$$



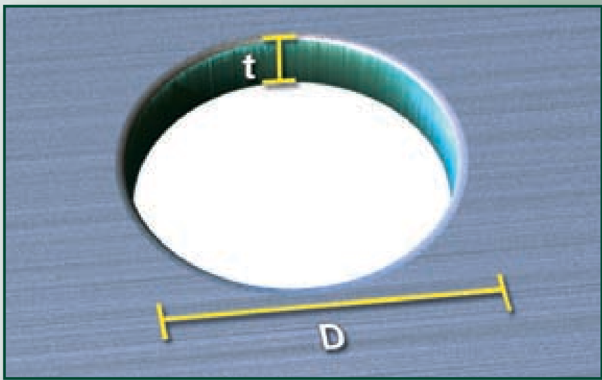
Area Ratio For Circular Apertures

$$\text{Area Ratio} = \frac{\text{Area Opening}}{\text{Area Walls}}$$

$$\text{Area Opening} = \frac{\pi D^2}{4}$$

$$\text{Area Walls} = \pi D t$$

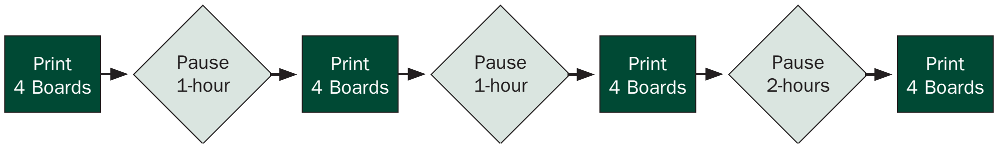
$$\text{Area Ratio} = \frac{D}{4t}$$



Sample Area Ratio Chart

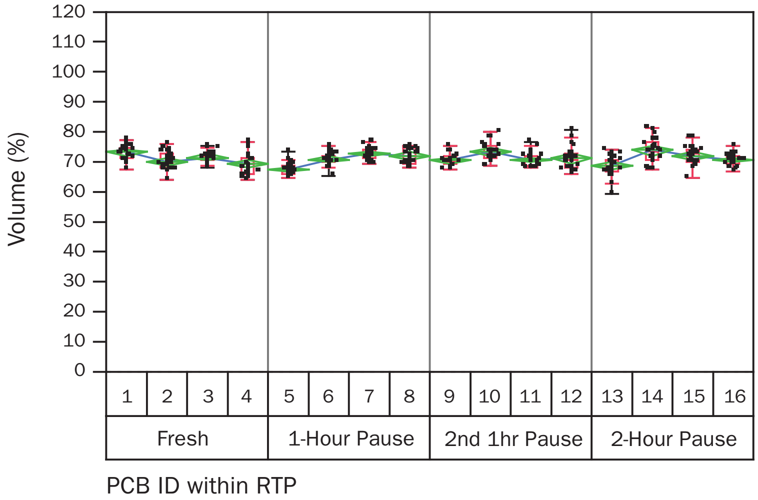
Pad Size (mm)	0.05	0.10	0.15	01005	0.20	0.25	0201	0.30	0.35	0.40	0.45	0.50
Aperture Width (mil)	2.0	3.9	5.9	7 x 8	7.9	9.8	10 x 12	11.8	13.8	15.7	17.7	19.7
Stencil Thickness (5.0 mil)	0.10	0.20	0.30	0.37	0.39	0.49	0.55	0.59	0.69	0.79	0.89	0.98
Stencil Thickness (4.5 mil)	0.11	0.22	0.33	0.41	0.44	0.55	0.61	0.66	0.77	0.87	0.98	1.09
Stencil Thickness (4.0 mil)	0.12	0.25	0.37	0.47	0.49	0.62	0.68	0.74	0.86	0.98	1.11	1.23
Stencil Thickness (3.5 mil)	0.14	0.28	0.42	0.53	0.56	0.70	0.78	0.84	0.98	1.12	1.27	1.41
Stencil Thickness (3.0 mil)	0.16	0.33	0.49	0.62	0.66	0.82	0.91	0.98	1.15	1.31	1.48	1.64
Stencil Thickness (2.5 mil)	0.20	0.39	0.59	0.75	0.79	0.98	1.09	1.18	1.38	1.57	1.77	1.97

Response-to-Pause Procedure



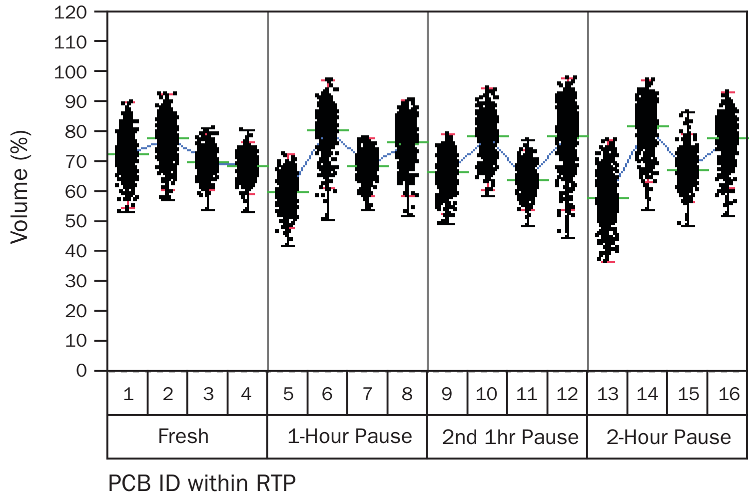
Indium5.8LS

Variability Test Trials: C16_SMD (5-mil Stencil)



Component ID	C16_SMD
A.R.	0.80
E.R.	1003
A.V.	714
Vol%	71
Std Dev (Vol%)	3.3
VMR (Vol%)	0.2

Variability Test Trials: CSP12 (5-mil Stencil)



Component ID	CSP12
A.R.	0.60
E.R.	564
A.V.	404
Vol%	72
Std Dev (Vol%)	9.6
VMR (Vol%)	1.3

Wide Reflow Process Window

Section #1 – Preheat:

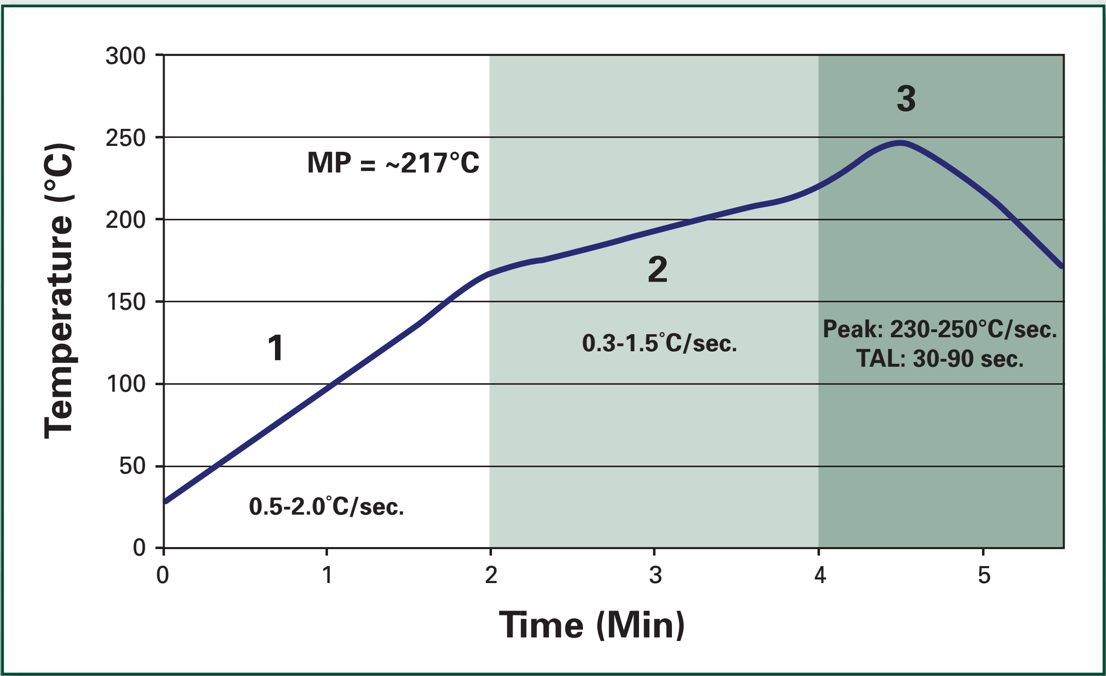
- **Slow Ramp Rate** – Minimizes paste slump and flux spattering. Fewer shorts, solder balls, and solder beads.
- **Fast Ramp Rate** – Minimizes additional oxidation on parts and boards. May help soldering of highly oxidized components.

Section #2 – Soak:

- **Short Soak Time** – Minimizes oxidation and provides best opportunity for good wetting and shiny solder joints.
- **Long Soak Time** – Minimizes tombstoning and voiding. Could negatively impact wetting.

Section #3 – Time Above Liquidus (TAL)/Peak:

- **Short TAL/Low Peak** – Minimizes voiding and thermal damage to components/substrates.
- **Long TAL/High Peak** – Improves solder coalescence but could result in dewetting if too long/high.



5.8LS Product Level Testing

Copper Mirror (Test #2.3.32)

Objective: The purpose of this test is to determine the corrosive (free-halide) properties of a flux.

Procedure: Flux is applied to a copper-coated glass slide and sits in a controlled environment for 24 hours. The flux is cleaned and the copper inspected for corrosion.

Results:
Pass, (L)

Quantitative Halides (Cl, Br, Fl) (Test #2.3.28.1)

Objective: The purpose of this test is to determine the total halide concentration of a flux.

Procedure: Flux is dissolved to a pre-determined concentration. Extracted solutions are then analyzed using an Ion Chromatograph with 3 to 5 level calibration. Total halide content is calculated and reported at Cl^- equivalent.

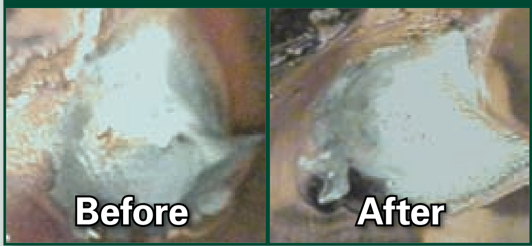
Results:
Total Halides =
0.0% Cl^- Equivalent

Qualitative Corrosion (Test #2.6.15)

Objective: The purpose of this test is to determine the corrosive properties of the flux residues under extreme environmental conditions.

Procedure: Solder paste is reflowed onto a sheet of copper and exposed to 40°C and 93% RH for 10 days. Coupon is then investigated for any signs of Cu corrosion.

Results and Image: Pass



5.8LS Product Level Testing

Surface Insulation Resistance (Test #2.6.3.3)

Objective: The purpose of this test is to determine the Surface Insulation Resistance (SIR) of the flux residue after paste reflow.

Procedure: Paste is stenciled onto the test board and reflowed. The un-cleaned board is then sent to outside laboratory for testing.

Results: Pass

Surface Insulation Resistance (SIR), IPC-TM-650 Method 2.6.3.3 Results

Coupon	Pattern	Initial	24 Hours	96 Hours	168 Hours	Final
1	A	1.2E+10	1.1E+09	1.9E+09	1.9E+09	8.2E+12
1	B	5.7E+11	1.4E+09	2.6E+09	2.9E+09	7.6E+12
1	C	1.2E+12	1.3E+09	2.4E+09	2.5E+09	8.2E+12
1	D	3.6E+10	1.5E+09	2.5E+09	2.8E+09	7.5E+12
2	A	4.1E+12	1.3E+09	2.2E+09	2.1E+09	9.1E+12
2	B	5.0E+12	1.6E+09	2.8E+09	3.2E+09	7.5E+12
2	C	1.2E+13	1.4E+09	2.3E+09	2.4E+09	7.0E+12
2	D	6.1E+12	1.5E+09	2.4E+09	2.7E+09	2.4E+12
3	A	1.6E+11	1.4E+09	2.2E+09	2.3E+09	9.5E+12
3	B	8.8E+12	1.0E+09	2.4E+09	2.6E+09	8.7E+12
3	C	1.3E+09	1.1E+09	2.2E+09	2.3E+09	8.6E+12
3	D	1.6E+09	1.4E+09	2.4E+09	2.7E+09	9.1E+12
Control 1	A	5.5E+12	3.6E+10	2.3E+10	2.0E+10	1.7E+13
Control 1	B	1.6E+12	4.1E+10	2.5E+10	2.3E+10	4.8E+13
Control 1	C	5.0E+12	3.9E+10	2.4E+10	2.2E+10	4.3E+12
Control 1	D	4.7E+12	3.8E+10	2.5E+10	2.3E+10	1.8E+13
Control 2	A	3.4E+12	3.4E+10	2.3E+10	2.0E+10	1.2E+13
Control 2	B	2.7E+12	3.5E+10	2.4E+10	2.2E+10	1.6E+12
Control 2	C	9.3E+10	2.4E+10	2.5E+10	2.1E+10	8.6E+12
Control 2	D	3.0E+13	3.7E+10	2.4E+10	2.2E+10	2.1E+12

Note: add rows for coupons as needed.

Electrochemical Migration (Test #2.6.14.1)

Objective: The purpose of this test is to determine the Electrochemical Migration and SIR of the flux residue after paste reflow.

Procedure: Paste is stenciled onto the test board and reflowed. The un-cleaned board is then sent to outside laboratory for testing.

Results: Pass

Electrochemical Migration Resistance, IPC-TM-650 Method 2.6.14.1 Results

Test Sample	Initial resistance value after 96 hour stabilization with no bias (Ohm)	Final resistance value after 500 hours at test conditions (Ohm)
1	1.3E+11	5.78E+10
2	1.84E+11	1.87E+10
3	1.71E+11	7.62E+10
4	1.23E+11	5.50E+10
5	8.46E+09	1.50E+10
6	4.66E+11	9.04E+10
7	1.93E+11	1.16E+10
8	1.34E+09	2.71E+09
9	1.56E+11	7.48E+10
10	2.11E+11	1.03E+11
11	1.51E+09	9.87E+09
12	2.12E+11	7.25E+10
Geometric Mean (IR_{avg})	6.49E+10	3.68E+10
Control	**Initial resistance value after 96 hour stabilization with no bias (Ohm)**	**Final resistance value after 500 hours at test conditions (Ohm)**
1	3.39E+10	1.36E+11
2	4.84E+10	1.85+E11
3	5.60E+10	1.86+E11
4	3.37E+10	1.34+E11
5	4.13E+10	1.28+E11
6	5.45E+10	1.83+E11
7	5.82E+10	1.81+E11
8	3.34E+10	1.27+E11
9	4.01E+10	1.16+E11
10	5.48E+10	1.64+E11
11	5.41E+10	1.85+E11
12	3.50E+10	1.10+E11
Geometric Mean (IR_{avg})	4.42E+10	1.48+E11

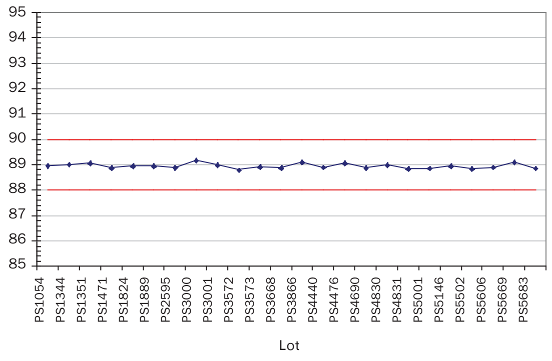
Note: add rows for coupons as needed.

Metal Content (Test #2.2.20)

Objective: The purpose of this test is to determine the weight percent of metal in the solder paste. The percentage should not deviate more than +/- 1% from the solder paste specification.

Procedure: A known weight of solder paste is reflowed in a glass beaker. A "button" of solder is formed from the coalescence of the solder. The "button" is cleaned and weighed. The ratio of "button" weight to original solder paste weight is the metal percent.

SAC305 Indium5.8LS Metal Load Chart



Viscosity (Test #2.4.34.2)

Objective: The purpose of this test is to determine the viscosity of a specific lot of solder paste. Viscosity testing is a fundamental test that ensures consistent performance from lot-to-lot.

Procedure: Approximately 500g of solder paste is stabilized at 25 +/- 1°C and the viscosity is measured using a Malcom spiral pump viscometer at 5rpm's. The results are measured and compared to the nominal value. Solder paste lots with values outside the expected variation (USL and LSL) need to be investigated for possible performance related issues.

Sample Results

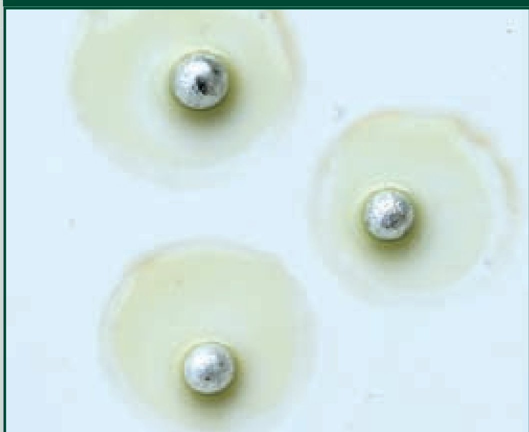
Lot Number	10 rpm (3 min)	3 rpm (6 min)	4 rpm (3 min)	5 rpm (3 min)	10 rpm (3 min)	20 rpm (1 min)	30 rpm (1 min)	10 rpm (1 min)	SSF
PS001	1530	4140	3290	2850	1660	1035	804	1629	.7117
PS002	1400	3680	2930	2470	1500	950	700	1430	.7207
PS003	1490	4800	3130	2700	1415	955	708	1402	.8312
PS004	1421	4220	3310	2750	1585	986	775	1552	.7360
PS005	1503	3860	3140	2680	1625	1021	792	1580	.6879

Solder Ball (Test #2.4.43)

Objective: The purpose of this test is to validate soldering performance of a specific lot of solder paste. Solder ball testing is a fundamental test that ensures consistent performance for lot-to-lot.

Procedure: Three small deposits of solder paste are printed onto a ceramic coupon and reflowed at a temperature of approximately 240°C (for Sn/Ag/Cu alloys). The coupon is then inspected to ensure complete coalescence of the solder paste, and that there are no extraneous solder balls in the flux pool. Results are compared to images in the J-STD-005 to determine whether it passes or fails.

Typical Result and Image: Pass, Preferred



5.8LS Product Level Testing

Slump (Test #2.4.35)

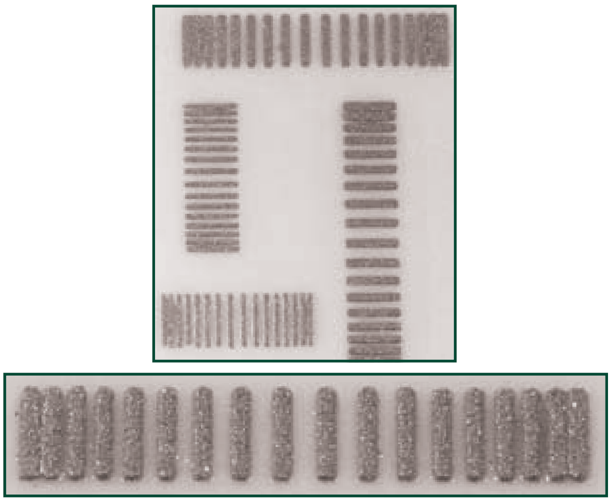
Objective: The purpose of this test is to determine the potential for slumping with a given solder paste.

Procedure: For cold slump, solder paste is printed using an IPC-A-20 stencil on an alumina substrate and examined for maximum spacing bridged. Samples are stored at 47% relative humidity at room temperature (approx. 25 +/- 5°C) for 20 minutes. Samples are then re-examined for maximum spacing bridged. For hot slump, samples are again printed with an IPC-A-20 stencil on an alumina substrate and examined for maximum spacing bridged. Samples are then heated to 180°C for 15 minutes and allowed to cool. Samples are re-examined immediately, and again after 2-hours and 4-hours, for maximum spacing bridged.

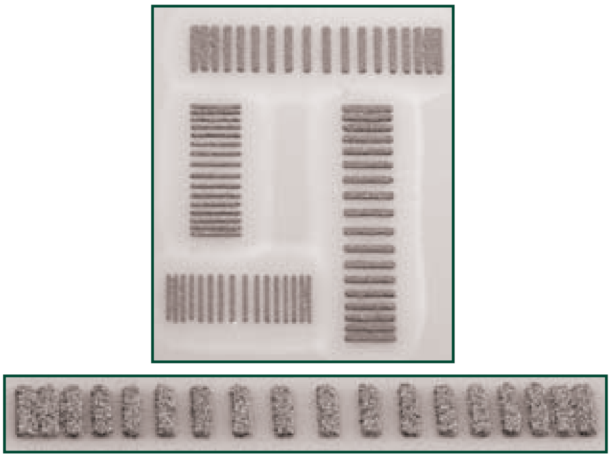
Result: Pass

Solder Paste - Slump Test (IPC-TM-650 2.4.35)

180°C



Room Temperature



Wetting (Test #2.4.45)

Objective: The purpose of this test is to ensure that the solder paste has sufficient capability to wet to a copper substrate.

Procedure: Solder paste is printed onto a clean copper coupon and reflowed using the manufacturers recommended reflow profile. The coupon is then inspected to ensure uniform wetting and no evidence of de-wetting or non-wetting.

Results and Image: Pass

Example of Certificate of Analysis and Conformance for Solder Powder Products

PRODUCT CERTIFICATION

Product: 96.5Sn 3.0Ag .5Cu / -325+500

Alloy Integrity

Major Elements:

Sn	96.390 %	
Ag	3.068 %	
Cu	0.507 %	

Reported by: *LAZ*
Test Method(s): *AC*

RoHS Compliance:	*Actual*	*RoHS Max*
Pb	*0.0132%*	*0.1000%*
Cd	*Not Detected*	*0.0100%*
Total Cr	*Not Detected*	*0.1000%*
Hg	*Not Detected*	*0.1000%*

Indium certifies that this product meets RoHS requirements if Pb or Cd is not a part of the alloy constituency. Any product that is <99.9% pure is not certified to be RoHS compliant. Review ROHS directive for any applicable exemptions. Indium does not use any flame retardant in its product.

Impurities

0.0021%	Bi
0.0026%	Fe
0.003%	In
0.0132%	Pb
0.0118%	Sb

Total: 0.0327% (327 PPM) >99.9% Pure

Powder Size Distribution:

+270	-	0%
-270/+325	-	1.1%
-325/+400	-	36.1%
-400/+450	-	31.5%
-450/+500	-	30.5%
-500/+635	-	0.6%
-635	-	0%

Reported by: PR
Test Method(s): SA

Oxide: 0.069 %

Reported by: KMB
Test Method(s): BD

Visual Inspection: ☑ Acceptable

Reported by: KMB
Test Method(s): MS @ 100x

Comments:

CONFORMANCE STATEMENT

Indium Corporation of America certifies that all the material used in the manufacture of this order has been made in accordance with its standard procedures and practices. Test reports to substantiate the same are retained in Indium Corporation's files and are available for your examination during the agreed upon time.

Director, Corporate Quality

APPROVING OFFICER

Nicole A. Palma
Quality Technician

This signature was created electronically

Indium5.8LS Halogen-Free Testing

Ion Chromatography and Titration do not Guarantee Halogen-free

Much of the electronics manufacturing industry agrees that the best method for determining the halogen content of a flux or solder paste is through the use of an oxygen bomb combustion followed by ion chromatography (IC) test. Particularly for solder paste, there is still some disagreement as to the best way to conduct this test. When running an oxygen bomb combustion, you cannot have any metal in the test chamber (i.e. solder powder). Therefore proposed methods are all based on the EN 14582 Test Method with variations only in pre-preparation of the solder paste.

Oxygen Bomb Combustion Followed by Ion Chromatography (EN 14582)

This test method involves subjecting a sample of flux to an oxygen bomb combustion in which all of the organic material is burnt off at very high temperatures. The remaining ash consists of the halogens and other inorganic materials. That ash is the run through ion chromatography in which a true reading of halide content can be determined. Any covalently bonded halides have those bonds broken through the oxygen bomb process.

Testing the Raw Flux

The flux is obtained prior to the manufacturing process in which it is mixed with the powder or the flux can be separated from the powder if already in the paste form. Approximately 1 g of the flux is placed into the oxygen bomb crucible and the test is run and followed by IC. This is the simplest of all proposed procedures but does not assess the real concern which is the amount of halogens remaining on the circuit board following reflow. However, assuming that none of the halogen volatilizes (safe assumption), then you can calculate the total halogens based on the flux residue remaining after reflow (typically 40-50%). The percentage of flux residue can be determined gravimetrically (weigh the flux, reflow it, and weigh the remaining residue) or through TGA.

Test Method #1 (Raw Flux)

Analyses	Result N/D	EMT Reporting Limit	Units	Date Analyzed	Weight
Anions by Ion Chromatography	Method: EN 14582				
Bromide	<105	105	mg/Kg	2/1/08	<0.0000525 g
Chloride	<118	118	mg/Kg	1/31/08	<0.000059 g
Sample Weight as Received: 0.5 g Total Weight of Compounds Analyzed: <0.0001 g					

Testing the Reflowed Flux Residue

A sample of solder paste is reflowed in an aluminum pan and approximately 1 g of the residue is scraped into the oxygen bomb crucible. The advantage of this test is that you don't have to run an additional calculation since the IC results will assess exactly the amount of halogens in the flux residue. The assumption with this test is that the flux residue is homogeneous. Also the process of scraping the residue may remove other materials, particularly if this test is adapted to testing residue on the PCB.

Test Method #2 (Reflowed Flux)

Analyses	Result N/D	EMT Reporting Limit	Units	Date Analyzed	Weight
Anions by Ion Chromatography	Method: EN 14582				
Bromide	<82.6	82.6	mg/Kg	1/31/08	<0.0000165 g
Chloride	<186	186	mg/Kg	1/31/08	<0.0000372 g
Sample Weight as Received: 0.2 g Total Weight of Compounds Analyzed: <0.0001 g					

HALOGEN FREE

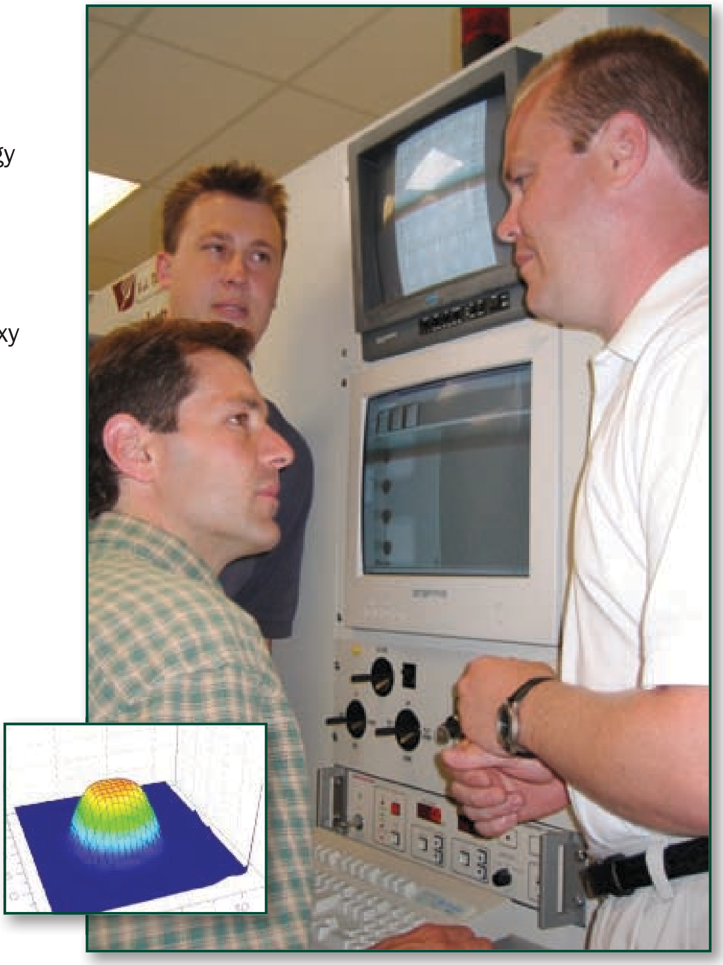
For more information on Halogen-free issues visit: www.halogen-free.com

Technical Support

Indium's Process Simulation Lab

provides Applications Engineers with the tools to work with you and industry partners on designed experiments to fully characterize SMT assembly materials and their use in leading-edge technology applications, including:

- Solder paste response-to-pause testing and transfer efficiency calculations
- Voiding analysis and characterization on BGA and CSP components using solder paste, epoxy flux, and no-flow underfill materials in micro via-in-pad applications
- Feasibility studies for new technologies and materials
- Reflow profile optimization



Indium's Process Simulation Lab Capabilities:

- Stencil printing
- Precision syringe dispensing
- Fully automated 3D solder paste inspection
- Component placement
- Forced air convection and infrared reflow
- Wave soldering
- X-ray analysis
- Acoustic microscope inspection
- Temperature-humidity-bias testing (SIR & ECM)
- Mechanical strength testing
- TG/DTA & DSC analysis
- Wetting balance testing
- Thermal cycling
- And more...

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