EPTAC CORPORATION

ELECTRONICS TRAINING Webinar Series

THE LEADER IN HI-TECH TRAINING

800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Classification - Part 2

Selecting the Right Flux for Your Application

Sponsored by:

STANLEY Supply & Services

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Attendee Quick Reference

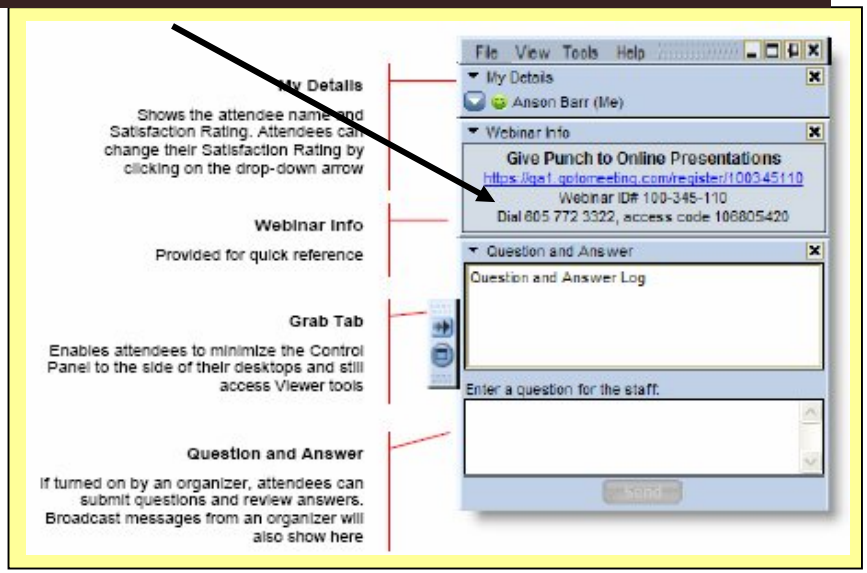
You need to use your phone for the audio.
The number is on the bottom right hand side of your screen as shown in this example, along with the access code.

Control Panel Features:

Once you have joined our Webinar, you will see this GoToWebinar Control Panel and Grab Tab. The control panel contains three panes that can be expanded or collapsed by clicking the arrow on the left side of each pane.

To Leave a Webinar:

1. From the Attendee Control Panel ***File*** Menu, select ***Exit – Leave Webinar***.
2. On the ***Leave Webinar?*** Confirmation dialog box, click ***Yes.***



THE LEADER IN
HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Purposes of Fluxes

- Prepares surfaces for soldering
- Protects the surfaces until it is soldered
- Enhance heat transfer

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Residues

- MUST NOT:
  - Impact functionality
  - Impact reliability

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Typical Metal Combinations to be Soldered

- Cu to Cu
- Cu to Sn/Pb
- Pd to Sn/Pb
- Au to Sn/Pb
- Ag to Ag
- Sn to Ni
- SS to SS
- SAC to Sn/Pb
- ImAg to SAC
- ImSn to Sn/Pb
- ENIG to SAC & SnPb
- Etc.

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Selection Process

- Two types of tests:
  - Flux Performance
  - Flux Characteristics

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Selection Process

Recommended sequences for the selection process.

- First, check its performance to cull out fluxes that don't perform on your product.
- Second, check the fluxes to make sure they are chemically as advertised.

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Performance: Qualification Specifications

- IPC/EIA J-STD-002, Solderability Tests for Component Leads, Terminations, Lugs, Terminals, and Wires.
- J-STD-003, Solderability Tests for Printed Boards.

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Performance: Application Specifications

- The 002 and 003 documents provide information relative to physically conducting the solderability testing.
- They support the statement -

<u>This is How it is Done</u>

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

J-STD-002 Par. 4.2.1.4.2 Accept/Reject Criterion

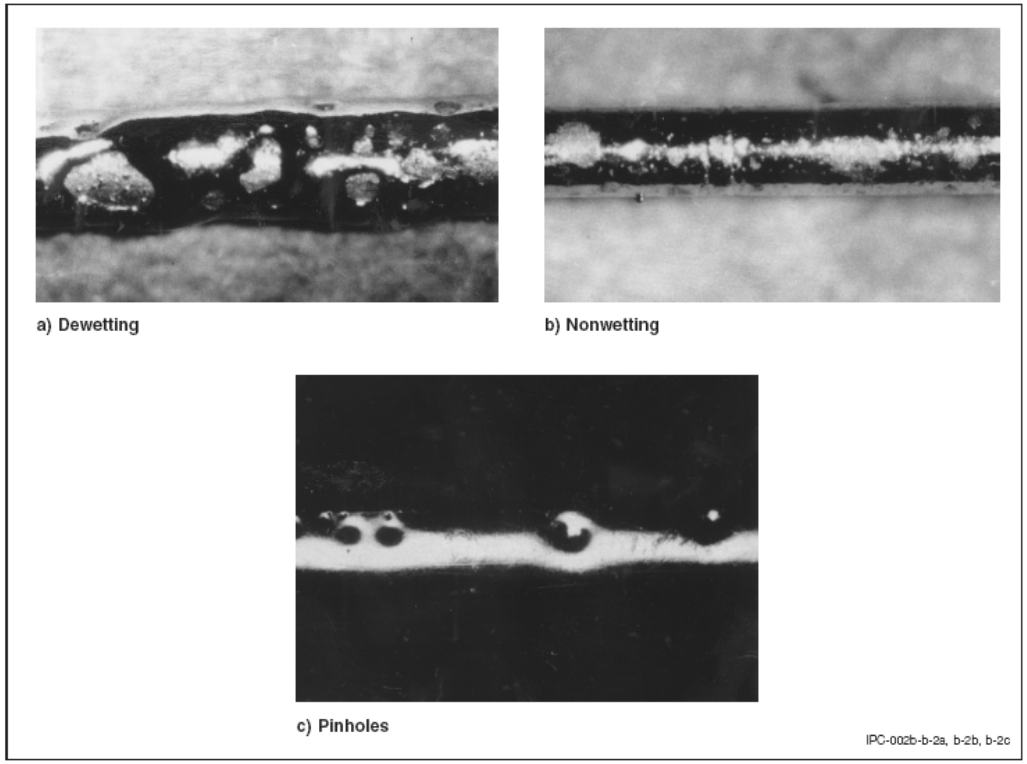
All leads **shall:**

- Exhibit a continuous solder coating free from defects for a minimum of 95% of the critical area of any individual lead.
- Anomalies other than dewetting, non-wetting, and pin holes are not cause for rejection.

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

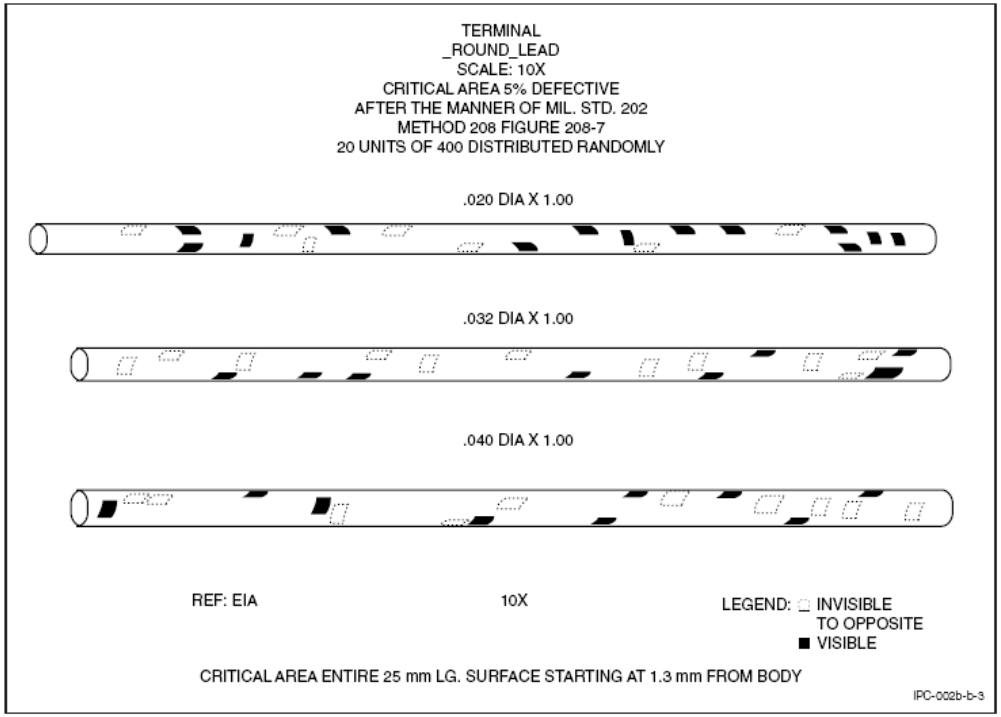
Evaluation Aids



THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Evaluation Aids



THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Wetting Balance Graph

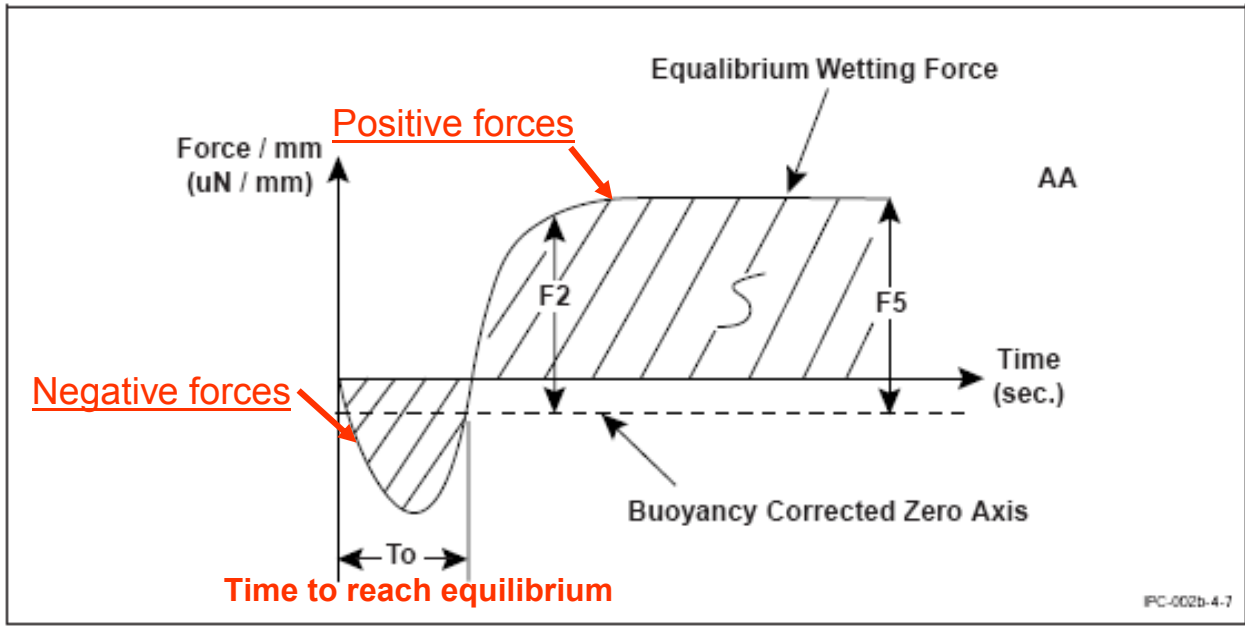


Figure 4-7 Set A Wetting Curve

Y FORCE

Time typically in seconds

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Performance: Application Specifications

- **These IPC specifications mention:**
  - The solder alloy and bath to be used
  - The activity level of the flux to use
  - The application of flux to the specimen
  - The flux removal process
  - Steam aging apparatus
  - Specimen surface preparation
  - Dipping methodology

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Performance: Application Specification

- Dipping methodology are:
  - Wetting Balance
  - Wave Solder
  - Solder Dip
  - Dip and Look
- Solder spread
- Cleaning ability

EPTAC CORPORATION

ELECTRONICS TRAINING Webinar Series

THE LEADER IN HI-TECH TRAINING

800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Qualification J-STD-004

Paragraph 3.3

Classification System

Sponsored by:

STANLEY Supply & Services

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Qualification Characteristics

3.3.1 Material of Composition

- Rosin
- Resin
- Organic
- Inorganic

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Qualification Characteristics

3.3.2 Flux Type

Fluxes **shall** be classified according to the corrosive or conductive properties of the flux.

3.3.2.1 Activity

L = Low or no flux/flux residue activity

M= Moderate flux/flux residue activity

H = High flux/flux residue activity

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Type Classification Test Requirements

Table 3-1 Test Requirements for Flux Type Classification

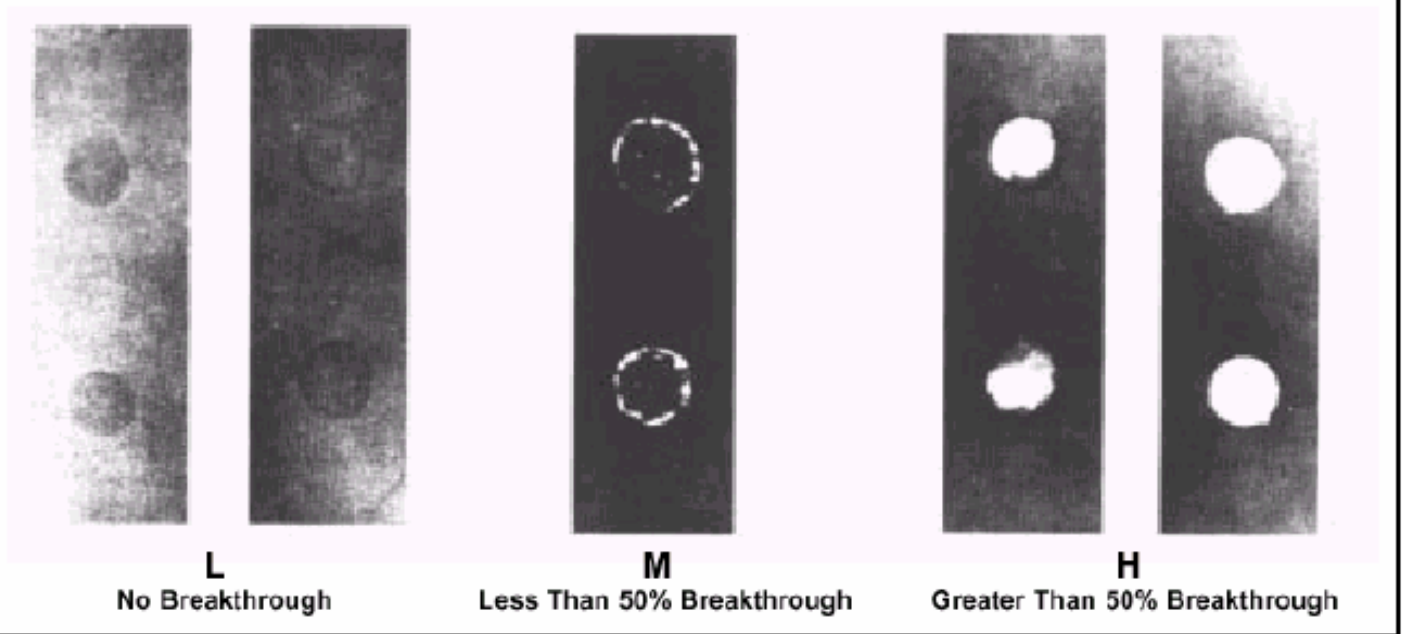
Flux Type	Qualitative Copper Mirror[2]	Qualitative Halide (Optional)		Quantitative Halide	Qualitative Corrosion Test	Conditions for Passing 100 MΩ SIR Requirements[6]	Conditions for Passing ECM Requirements[6]
		Silver Chromate (Cl, Br)	Spot Test (F)	(Cl, Br, F)[5] (by weight)			
L0	No evidence of mirror breakthrough	Pass[3]	Pass[3]	0.0%[1]	No evidence of corrosion	Uncleaned[6,7]	Uncleaned[6,7]
L1		Pass[3]	Pass[3]	<0.5%			
M0	Breakthrough in less than 50% of test area	Pass[3]	Pass[3]	0.0%[1]	Minor corrosion acceptable	Cleaned[7] or uncleaned[8]	Cleaned[7]or uncleaned[8]
M1		Fail[4]	Fail[4]	0.5 to 2.0%			
H0	Breakthrough in more than 50% of test area	Pass[3]	Pass[3]	0.0%[1]	Major corrosion acceptable	Cleaned	Cleaned
H1		Fail[4]	Fail[4]	>2.0%			

1. 0.0% halide is defined as <0.05% by weight in flux solids and may be known as halide-free.
2. Refer to Figure 3-1.
3. False failure could result from non-halide constituents.
4. Depending on the type of halide, one or both tests will be failed.
5. If the total absence of covalently bonded halogens is required by the user, the Beilstein Test should be performed. (See *A New Dictionary of Chemistry*, Stephen Miall, Editor, Longmans Green & Co., 1940, p. 68)
6. If an assembly using low-solids, "no-clean" flux that has been tested and proven to pass SIR and ECM only in the uncleaned state by the flux manufacturer is to be cleaned prior to conformal coating, then the user should verify the SIR and ECM values for that flux after cleaning.
7. Fluxes that are not meant to be removed require testing only in the uncleaned state.
8. If the M0 or M1 flux passes SIR and ECM when cleaned, but fails when not cleaned, this flux **shall** always be cleaned. If the flux meets all other requirements for an L0 or L1 flux but doesn't pass SIR and ECM uncleaned, it is M0 or M1.

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Type Classification Test Requirements



THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Flux Qualification Characteristics

3.3.2.2 Halide

- Shall be characterized by 0 or 1

3.3.3 Flux forms

- Solid (S)
- Paste (P)
- Liquids (L)

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

3.4 Flux Qualification Testing

Corrosivity

- 3.4.1 Copper Mirror
- 3.4.2 Qualitative Halide
  - Test Chlorides, Bromides and Fluorides
- 3.4.3 Quantitative Halide
- 3.4.5 SIR
- 3.4.6 ECM
- 3.5.1 Acid Value
- 3.5.2 Specific Gravity

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

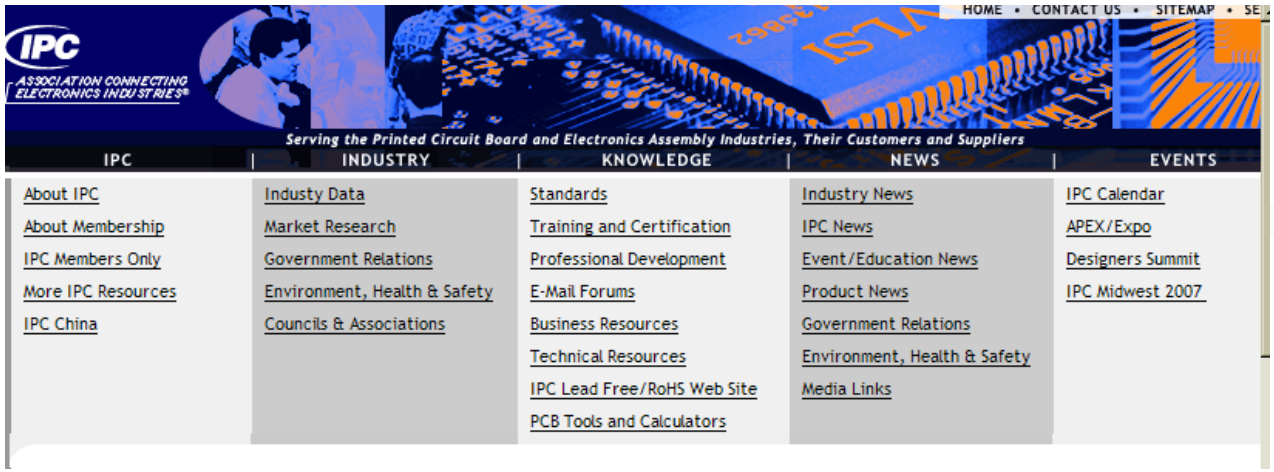
ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Qualification Responsibility

Section 4.1 states:

The flux manufacturer is responsible for all inspection specified herein except the performance inspections which are the responsibility of the user.

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director



Standards Documents Standards Development

IPC-TM-650 Test Methods Download Page

Section 2.3	Chemical Test Methods
2.3.13A	Determination of Acid Value of Liquid Solder Flux-Potentiometric and Visual Titration Methods- *6/04*

IPC
ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES ®

2215 Sanders Road
Northbrook, IL 60062-6135

IPC-TM-650
TEST METHODS MANUAL

Number **2.3.13**	
Subject **Determination of Acid Value of Liquid Solder Flux - Potentiometric and Visual Titration Methods**	
Date **06/04**	Revision **A**
Originating Task Group **Flux Specifications Task Group (5-24a)**	

1 Scope This test method specifies two methods for the determination of the acid value of a flux of type L, M or H.

Method A is a potentiometric titration method and is to be considered the reference method.

Method B is an alternative, visual end-point, titration method.

2 Applicable Documents

ISO 9455 Soft Soldering Fluxes, Test Methods

IPC-TM-650 Test Methods Manual

2.3.34 Solids Content, Flux

IPC J-STD-004 Requirements for Soldering Fluxes

3 Test Specimen A minimum of 2.0 grams of liquid flux, 10 grams of solder paste, 150 grams of cored wire or 10 grams of solder preforms.

4.2.3 Ethanol, anhydrous. Neutralized with tetrabutyl ammonium hydroxide solution (4.2.1) to a faint pink color using phenolphthalein as an indicator.

4.2.4 Toluene. Neutralized with tetrabutyl ammonium hydroxide solution (4.2.1) to a faint pink color using phenolphthalein as an indicator.

4.2.5 Ethanol/toluene mixture. Mix equal volumes of the neutralized anhydrous ethanol (4.2.3) and neutralized toluene (4.2.4).

4.2.6 Phenolphthalein Indicator.

4.2.7 Millivoltmeter or pH meter.

4.2.8 Glass electrode.

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Performance Testing for Fluxes

Table 4-1 Classification, Quality Conformance and Performance Testing for Flux

Test Method		Reference Paragraph	Classification Test R=Required O=Optional	Quality Conformance	Performance
Name	IPC-TM-650				
Copper Mirror	2.3.32	3.4.1	R		
Qualitative Halides, Silver Chromate	2.3.33	3.4.2.1	O		
Qualitative Halides, Fluoride Spot	2.3.35.1	3.4.2.2	O		
Quantitative Halides, Chloride, Bromide	2.3.35 or 2.3.28.1	3.4.3.1 or 3.4.3.3	R		
Quantitative Halides, Fluoride	2.3.35.2 or 2.3.28.1	3.4.3.2 or 3.4.3.3	R		
Quantitative Halides, Nonvolatile Determination	2.3.34	3.4.8	R		
Qualitative Corrosion	2.6.15	3.4.4	R		
Surface Insulation Resistance	2.6.3.3	3.4.5.1	R		
	*	3.4.5.2	O		
	**	3.4.5.2	O		
Electrochemical Migration	2.6.14.1	3.4.6	R		
Fungus	2.6.1	3.4.7	O		
Acid Value Determination	2.3.13	3.5.1		R	
Flux Specific Gravity Determination		3.5.2		R	
Viscosity-Paste Flux	2.4.34.4	3.5.3		R	
Visual		3.5.4		R	
Wetting Balance	2.4.14.2	3.6.1	O		O
Spread Test, Liquid Flux	2.4.46	3.6.2	O		O

*DIN 32513 **GR-78-CORE Section 13.1.3

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Upcoming . . .

November 14th

- Q & A on Solder Resists and Conformal Coating

December 12th

- Lead Protrusion and Damaged Pins

THE LEADER IN HI-TECH TRAINING
800-643-7822
www.eptac.com

ABOUT THE PRESENTER
Leo Lambert
Vice President,
Technical Director

Further Information

For questions regarding this webinar, please contact Leo Lambert at leo@eptac.com

For information on any of EPTAC's or IPC's Certification Courses, please visit our website at http://www.eptac.com