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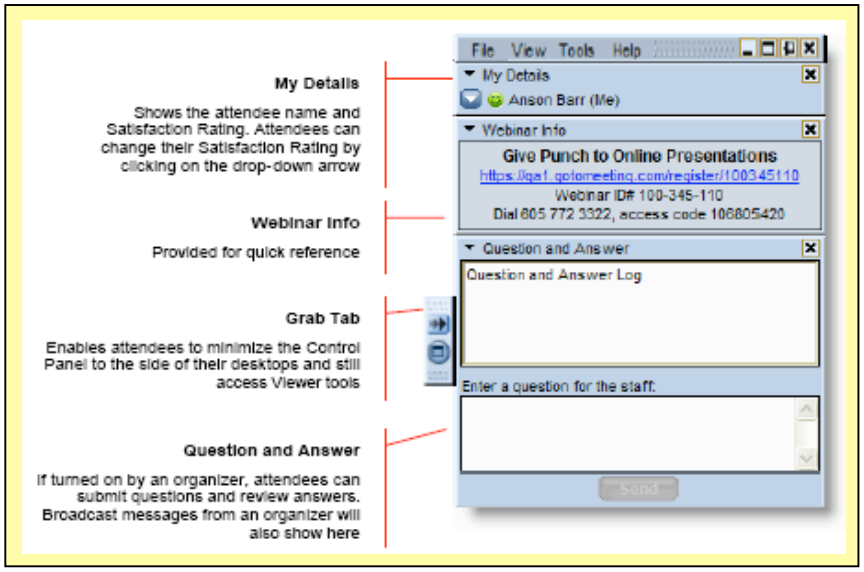

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J-STD-001

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The Specs as Mentioned J-STD-001

2.3 Joint Industry Standards[4]

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

J-STD-003 Solderability Tests for Printed Boards

J-STD-004 Requirements for Soldering Fluxes

J-STD-005 Requirements for Soldering Paste

J-STD-006 Requirements for Electronic Grade Solder Alloys and Fluxed and Non-Fluxed Solid Solders for Electronic Soldering Applications

IPC/JEDEC J-STD-020 Moisture/Reflow Sensitivity Classification for Plastic Integrated Circuit Surface Mount Devices

IPC/JEDEC J-STD-033 Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

IPC/JEDEC-9701 Performance Test Methods and Qualification Requirements for Surface Mount Solder Attachments

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How 002 and 003 are mentioned in and used in J-STD-001

3.9.1 Solderability Electronic/mechanical components (including PCBs) and wires to be soldered **shall**[11] meet the solderability requirements of J-STD-002 or equivalent and printed boards **shall**[11] meet the requirements of J-STD-003 or equivalent. When a solderability inspection operation or pretinning and inspection operation is performed as part of the documented assembly process, that operation may be used in lieu of solderability testing (see 3.9.2).

(11) Class 1-Defect
Class 2-Defect
Class 3-Defect

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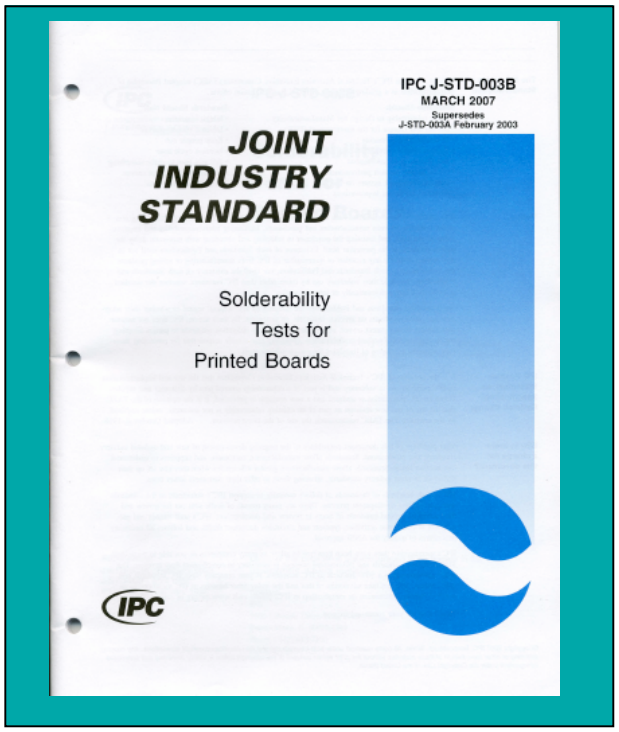
What Are J-STD-002 and 003



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J-STD-002

1.3.1 Tests with Established Accept/Reject Criterion

Test A – Solder Bath/Dip and Look Test (Leaded Components and Stranded Wire)

Test B – Solder Bath/Dip and Look Test (Leadless Components)

Test C – Wrapped Wire Test (Lugs, Tabs, Hooked Leads, and Turrets)

Test D – Resistance to Dissolution/Dewetting of Metallization Test

Test S – Surface Mount Process Simulation Test

1.3.2 Test without Established Accept/Reject Criterion

Test E – Wetting Balance Test (Leaded Components)

Test F – Wetting Balance Test (Leadless Components)

These methods are included for evaluation purposes only. Data collected should be submitted to the IPC Wetting Balance Task Group for correlation and analysis.

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J-STD-002 Coating Durability

Category 1 — Minimum Coating Durability Intended for surfaces that will be soldered within a short period of time (e.g., up to six months) from the time of testing and are likely to experience a minimum of thermal exposures before soldering (see 5.8).

Category 2 — Typical Coating Durability (for non-tin and non tin-lead finishes) Intended for surfaces finished with other than Sn or Sn/Pb coatings that will be soldered after an extended time from the time of testing and which may see limited thermal exposures before soldering (see 5.8).

Category 3 – Typical Coating Durability (default for tin and tin-lead finishes) Intended for surfaces finished with Sn or Sn/Pb coatings that will be soldered after an extended storage (e.g., greater than four months) from the time of testing and/or which see multiple thermal exposures before soldering (see 5.8).

Table 1-1 Steam Conditioning Categories for Component Leads and Terminations

Category 1	Category 2	Category 3
No Steam Conditioning Requirements	1 Hour ± 5 min. Steam Conditioning	8 hours ± 15 min. Steam Conditioning

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IPC J-STD-003

- 1.5.1 Visual Acceptance Criteria Tests
  - Test A – Edge Dip Test
  - Test B – Rotary Dip Test
  - Test C – Solder Float Test
  - Test D – Wave Solder Test
  - Test E – Surface Mount Simulation Test
  - Test A1, B1, C1, D1 and E1 are for Lead-free products

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IPC J-STD-003

3.2.2 Flux The flux for tin/lead solderability tests **shall** be a standard activated rosin flux #1 having a composition of 25% ± 0.5% by weight of colophony and 0.15% ± 0.01% by weight diethylammonium hydrochloride (CAS 660-68-4), in 74.85% ± 0.5% by weight of isopropyl alcohol (see Table 3-1).

The flux for lead-free solderability tests **shall** be standard activated rosin flux #2 having a composition of 25% ± 0.5% by weight of colophony and 0.39% ± 0.01% by weight diethylammonium hydrochloride (CAS 660-68-4), in 74.61% ± 0.5% by weight of isopropyl alcohol (see Table 3-1).

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How 001 discusses 004

3.3 Flux Flux **shall**[2] be in accordance with J-STD-004 or equivalent.

(2) Class 1-Defect
Class 2-Defect
Class 3-Defect
(3) Class 1-Not Est
Class 2-Not Est
Class 3-Defect

Flux **shall**[3] conform to flux activity levels L0 and L1 of flux materials rosin (RO), resin (RE), or organic (OR), except organic flux activity level L1 **shall not**[3] be used for no-clean soldering.

When other activity levels or flux materials are used, data demonstrating compatibility **shall**[3] be available for review (see 3.1).

Note: Flux or solder paste soldering process combinations previously tested or qualified in accordance with other specifications do not require additional testing.

Type H or M fluxes **shall not**[2] be used for tinning of stranded wires.

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IPC J-STD-004

Table 1-1: Flux Identification System

Flux Composition	Flux/Flux Residue Activity Levels	% Halide[1] (by weight)	Flux Type[2]	Flux Designator
Rosin (RO)	Low	<0.05%	L0	ROL0
		<0.5%	L1	ROL1
	Moderate	<0.05%	M0	ROM0
		0.5-2.0%	M1	ROM1
	High	<0.05%	H0	ROH0
		>2.0%	H1	ROH1
Resin (RE)	Low	<0.05%	L0	REL0
		<0.5%	L1	REL1
	Moderate	<0.05%	M0	REM0
		0.5-2.0%	M1	REM1
	High	<0.05%	H0	REH0
		>2.0%	H1	REH1
Organic (OR)	Low	<0.05%	L0	ORL0
		<0.5%	L1	ORL1
	Moderate	<0.05%	M0	ORM0
		0.5-2.0%	M1	ORM1
	High	<0.05%	H0	ORH0
		>2.0%	H1	ORH1
Inorganic (IN)	Low	<0.05%	L0	INL0
		<0.5%	L1	INL1
	Moderate	<0.05%	M0	INM0
		0.5-2.0%	M1	INM1
	High	<0.05%	H0	INH0
		>2.0%	H1	INH1

1. Halide measuring <0.05% by weight in flux solids and may be known as halide-free. This method determines the amount of ionic halide present (See Appendix B-10).

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IPC J-STD-004, Flux Type

- Fluxes **shall** also be classified according to the corrosive or conductive properties of the flux or flux residues as shown in the following table

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IPC J-STD-004, Test Requirements

Table 3-2 Test Requirements for Flux Classification

Flux Type	Copper Mirror	Corrosion	Quantitative Halide[1] (Cl⁻,Br⁻,F⁻,I⁻) (by weight)	Conditions for Passing 100 MΩ SIR Requirements[2]	Conditions for Passing ECM Requirements
L0	No evidence of mirror breakthrough	No evidence of corrosion	<0.05%[3]	No-clean state	No-clean state
L1			≥0.05 and <0.5%		
M0	Breakthrough in less than 50% of test area	Minor corrosion acceptable	<0.05%[3]	Cleaned or No-clean state[4]	Cleaned or No-clean state[4]
M1			≥0.5 and <2.0%		
H0	Breakthrough in more than 50% of test area	Major corrosion acceptable	<0.05%[3]	Cleaned	Cleaned
H1			>2.0%		

1. This method determines the amount of ionic halide present (See Appendix B-10).
2. If a printed circuit board is assembled using a no-clean flux and it is subsequently cleaned, the user should verify the SIR and ECM values after cleaning. J-STD-001 may be used for process characterization.
3. Halide measuring <0.05% by weight in flux solids and may be known as halide-free. If the M0 or M1 flux passes SIR when cleaned, but fails when not cleaned, this flux **shall** always be cleaned.
4. Fluxes that are not meant to be removed, require testing only in the no-clean state.

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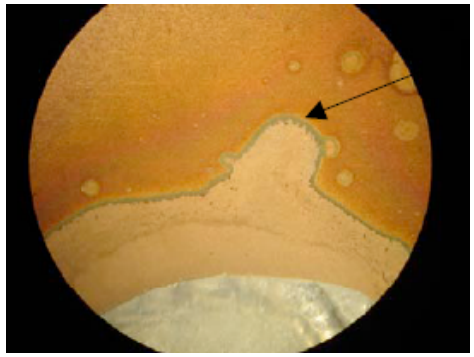
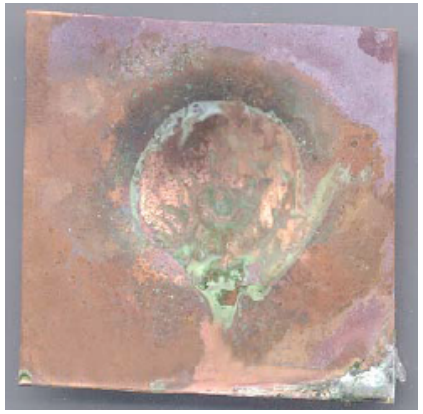
IPC J-STD-004, Corrosion Testing





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How 001 discusses 005

3.4 Solder Paste Solder paste **shall**[5] be in accordance with J-STD-005 or equivalent. Solder paste **shall**[5] also meet the requirements of 3.2 and 3.3.

(5) Class 1-Defect
Class 2-Defect
Class 3-Defect

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IPC J-STD-005, Requirements for Solder Paste

- There are two (2) documents involved with solder paste.
  - J-STD-005 *Requirements for Solder Paste*
  - IPC-HDBK-005, *Guide to Solder Paste Assessment*
- Each documents is helpful to provide the correct information to qualify solder paste.

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IPC J-STD-005, Requirements for Solder Paste

- This standard provides information on:
  - Characterizing solder paste
  - Testing solder paste
- It discusses:
  - Solder powder
  - Paste flux
  - Powder shapes
  - Etc.

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IPC J-STD-005, Requirements for Solder Paste

- Section 3.3.2 Powder Size is shown in table form for Type 1 through Type 6
- Each type is based upon the size of the powder
- Must be used in conjunction with the flux specification 004.

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How 001 discusses 006

3.2 Solder Solder alloys **shall**[3] be in accordance with J-STD-006 or equivalent. Solder alloys other than Sn60A, Pb36B, and Sn63A which provide the required electrical and mechanical attributes may be used if all other conditions of this standard are met and objective evidence of such is available for review. Flux that is part of flux-cored solder wire **shall**[3] meet the requirements of 3.3. Flux percentage is optional.

(3) Class 1-Defect
Class 2-Defect
Class 3-Defect

3.2.1 Solder - Lead Free Solder alloys less than 0.1% lead by weight not listed by J-STD-006 may be used when such use is agreed upon by the manufacturer and the user.

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IPC J-STD-006, Requirements for Solder

- This is the specification that replaced QQ-S-571, the military solder material specification.

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IPC J-STD-006, Requirements for Solder

- Section 1.2.3 Solder Forms

P – Paste (Cream)
B – Bar
D – Powder
R – Ribbon
W – Wire
S – Special
H - Sphere

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IPC J-STD-006, Requirements for Solder

Covers:

- Alloy composition
- Alloy impurities
- Solder forms

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IPC J-STD-006, Requirements for Solder

Table 4-1 Requirements and Inspection Routine

Requirement Paragraph	Inspections	Inspection Method	Qualificati on Inspection	Quality Conformance Inspection
3.1	Material		All Solder Products	All Solder Products
3.2	Alloy Composition	Standard Analytical Procedures	All Solder Products	All Solder Products
3.3	Alloy Impurities	Standard Analytical Procedures	All Solder Products	All Solder Products
3.4.1	Cross-sectional Area, Length, Mass	Standard Measurement Procedures	Bar Solder	Bar Solder
3.4.2	Diameter, Mass	Standard Measurement Procedures	Wire Solder	Wire Solder
3.4.3	Thickness, Width, Mass	Standard Measurement Procedures	Ribbon Solder	Ribbon Solder
3.4.4.1	Powder Size	IPC-TM-650 2.2.14.3	Solder Powder	Solder Powder
3.4.4.1	Powder Particle Size Distribution	IPC-TM-650 2.2.14 2.2.14.1 2.2.14.2	Solder Powder	Solder Powder
3.4.4.2	Powder Shape	Visual Light Beam Scatter Microscopic Imaging	Solder Powder	Solder Powder
3.5.1	Solder Core	Visual	Flux Cored Solder	Flux Cored Solder
3.5.1.1	Spitting	IPC-TM-650 2.4.48	Flux Cored Solder	
3.5.2	Flux Coating	Visual	Flux Coated Solder	Flux Coated Solder
3.6.1.	Flux Percentage	IPC-TM-650 2.3.34.1	Fluxed Solder	Fluxed Solder
3.6.2	Flux Classification	IPC/EIA J-STD-004	Fluxed Solder	Fluxed Solder
3.6.3	Solder pool	IPC-TM-650 2.4.49	Fluxed Solder	
3.6.4	Flux Residue Dryness	IPC-TM-650 2.4.47	Fluxed Solder	
3.7	Packaging and Labeling	Visual	All Solder Products	

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IPC J-STD-006, Requirements for Solder

Table A-1 Composition, and Temperature Characteristics of Lead-free Solder Alloys[1,2]

Alloy Name	Former Name[3]	Sn %	Ag %	Bi %	In %	Sb %	Cu %	Other Elements %	Celsius		°Fahrenheit	
									SOL	LIQ	SOL	LIQ
In52Sn48		REM-48.0			52.0				118	e	244.4	e
Sn42Bi58		REM-42.0		58.0					138	e	280.4	r
Sn95.5Ag3.9Cu0.6		Rem-95.5	3.9				0.6		217	221	422.6	430
Sn95.5 Ag3.8Cu0.7		REM-95.5	3.8				0.7		217	221	422.6	430
Sn95Ag5		REM-95.0	5.0						221	245	429.8	473.0
Sn95Sb5[4]	Sb5	REM-95.0				4.0 to 6.0			235	240	455.0	464.0
Sn96Ag2.5Cu0.5Bi1		REM-96.0	2.5	1.0			0.5		214	218	417.2	424.4

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IPC J-STD-006, Requirements for Solder

- Composition and Temperature Characteristics of Common Tin-Lead Alloys

Alloy Name	Former Name [3]	Sn %	Pb %	Ag %	Bi %	In %	Sb %	Other Elements %	°Celsius		°Fahrenheit	
									SOL	LIQ	SOL	LIQ
Sn50Pb50	Sn50	50.0	REM-50.0						183	216	361.4	420.8
Sn50Pb50Sb0.4 [4]	Sn50*	50.0	REM-50.0				0.2 to 0.5		183	216	361.4	420.8
In20Sn54Pb26		54.0	REM-26.0			20.0			136	152	276.8	305.6
Sn60Pb37.5Bi2.5		60.0	REM-37.5		2.5				180	185	356.0	365.0
Sn60Pb38Cu2		60.0	REM-38.0					Cu: 2.0	183	191	361.4	375.8
Sn60Pb40	Sn60	60.0	REM-40.0						183	191	361.4	375.8
Sn60Pb40Sb0.4 [4]	Sn60*	60.0	REM-40.0				0.2 to 0.5		183	191	361.4	375.8
Sn62Pb36Ag2	Sn62	62.0	REM-36.0	2.0					179	e	354.2	e
Sn62Pb36Ag02Sb0.4 [4]	Sn62*	62.0	REM-36.0	2.0			0.2 to 0.5		179	e	354.2	e
Sn63Pb37	Sn63	63.0	REM-37.0						183	e	361.4	e
Sn63Pb37Sb0.4 [4]	Sn63*	63.0	REM-37.0				0.2 to 0.5		183	e	361.4	e
Sn70Pb30	Sn70	70.0	REM-30.0						183	193	361.4	379.4

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Conclusion

- The specifications mentioned discuss important information which needs to be understood
- Let us know of your interest in having session covering these topics

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