PRODUCT DATA SHEET

VOC-Free, No-Clean Wave Solder Flux
WF-7745

Introduction

WF-7745 is a water-based, VOC-free, halogen-free, no-clean wave solder flux designed for wave soldering through-hole, bottom-side surface mount and mixed-technology circuit boards. It performs well with both Pb-free and SnPb solders and processes. **WF-7745** is non-flammable, dramatically reducing volatile organic compound emissions and eliminating special flammable storage conditions. **WF-7745** easily passes the IPC TM-650 copper mirror test. It also passes the IPC TM-650 copper corrosion test, showing no evidence of green. This high degree of corrosion resistance is virtually unheard of with water-based no-clean fluxes. Even with this high degree of corrosion resistance, **WF-7745** solders as well as many halogen-containing, low solids, no-clean fluxes, yielding superior hole-fill and reduced solder balling.

Features

- **ORL0 per J-STD-004A**
- **Compatible with all common Pb-free and SnPb wave soldering alloys**
- **Superior hole fill**
- **No post-soldering green corrosion**
- **Low degree of solder balling**
- **Non-flammable and non-corrosive**
- **Can be shipped as non-hazardous**

Physical Properties

WF-7745 is a colorless liquid, containing no rosin. The blend of water and VOC-free surfactants ensures even distribution of flux solids both during storage and during spray flux deposition. The specific gravity of **WF-7745**, 1.013 @ 25°C, is just slightly higher than that of pure water. However, in contrast to higher solids content fluxes, specific gravity is not the best method to assign quality standards for **WF-7745**. This is because the flux solids content is relatively low. While in-process quality control of **WF-7745** is not generally required, the best method is to ensure both solids content and activity level is by acid value titration.

Test	Result
Color:	Clear
Specific Gravity: @25°C (77°F) @15°C (60°F)	 1.013 1.013
Acid Value: mgKOH/g flux mgKOH/g flux solids	 39.5 936
Solids Content	4.22%
Flash Point (°F TCC)	None
J-STD-004A Flux Type	ORL0

Form No. 99282 R0

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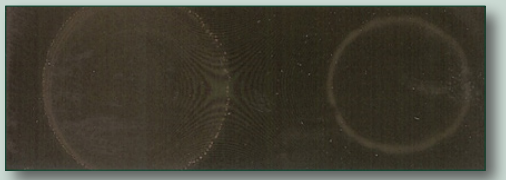
ISO 9001 REGISTERED

Wave Solder Flux WF-7745

Test Data

Copper Mirror

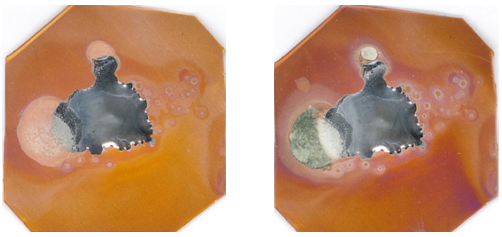


WF-7745 Std Rosin

The J-STD-004A copper mirror test is performed per IPC-TM-650 method 2.3.32. To be classified as an "L" type flux, there should be no complete removal of the mirror surface. **WF-7745** shows only very minor removal of the copper mirror and, therefore, is classified as a ORL0.

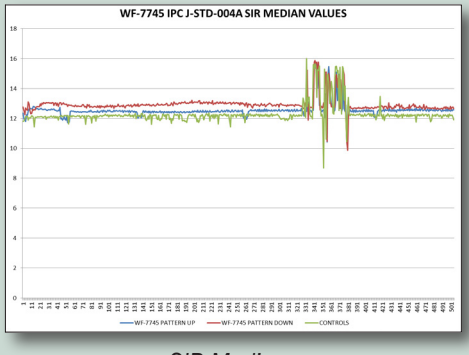
Copper Corrosion

Copper corrosion is tested per IPC-TM-650 method 2.6.15. This test gives an indication of any visible reactions that take place between the flux residue after soldering and copper surface finishes. In particular, green copper corrosion should not be seen.

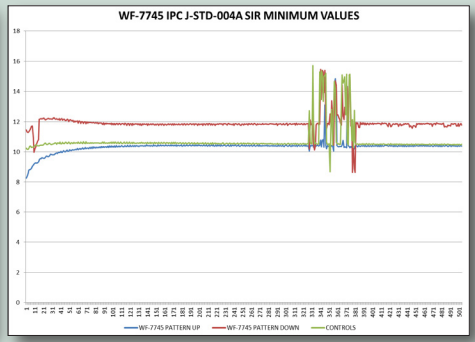


WF-7745 SnPb 0 hrs WF-7745 SnPb 240 hrs

Surface Insulation Resistance (SIR)



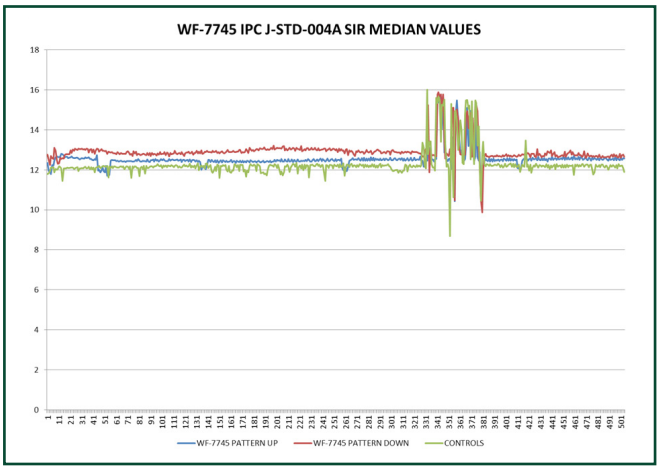
SIR Medians



SIR Minimums

The Surface Insulation Resistance test is performed per IPC-TM-650 Method 2.6.3.7, using boards prepared per IPC-TM-650 method 2.6.3.3. All boards soldered with **WF-7745** pass the requirements of having exhibited no dendritic growth, no visible corrosion, and a minimum insulation resistance of 100 megaohms (1×10^8). The values shown on the two adjacent graphs show the number of ohms times ten to the power of the vertical axis. The IPC-TM-650 SIR is a 7-day test and gives a general idea of the effect of the flux residue on the electrical properties of the surface of the circuit board.

Electromigration (ECM)



IPC J-STD-004A SIR			
	24 Hours	96 Hours	168 Hours
Pattern Up Mean	6.47E+12	5.00E+12	1.14E+13
Pattern Down Mean	9.81E+12	9.96E+12	9.04E+12
Control Mean	1.62E+13	1.37E+13	7.42E+12

The electromigration test is performed to IPC-TM-650 method 2.6.14.1 with boards prepared using IPC-TM-650 method 2.6.3.3. The test conditions for this test are 496 hours at 65°C ± 2°C and 88.5% ± 3.5% RH. To pass this test, there should be no visible corrosion and no dendritic growth that decreases line spacing by more than 20%. In addition, the insulation resistance should not drop more than one order of magnitude after the first 96-hour stabilization period when a bias voltage is applied.

Wave Solder Flux WF-7745

Performance and Process Data

Hole Fill

Soldering Performance*		
	Pb-Free	SnPb
100% PTH Fill Yield	96%+	99%+
*0.062-inch Indium test board 7 mil to 20 mil diameter PTH		

Indium Corporation uses several of its own tests, based on IPC workmanship standards, for determining hole fill. Depending on the design criteria for the flux, Indium Corporation uses holes of varying sizes and circuit board finishes. However, we always look for 100% hole fill, even though the IPC recognizes that a smaller degree of hole fill is acceptable for its workmanship standards. Testing is typically performed with both lead-free (Indium Corporation's Sn995 alloy) and tin-lead (63Sn/37Pb) solders.

Shelf Life

The shelf life for this product is **18 months** in an unopened container stored at less than 40°C. Shelf life for an opened container will vary depending on storage conditions, including open time, temperature, and humidity. For longest shelf life of an opened container, replace cap to reduce evaporation and store in a cool, dry environment.

Process Recommendations

Indium Corporation profiles all of its wave soldering fluxes on its own lead-free and tin-lead wave soldering machines prior to making them available to the market.

62 mil-thick Circuit Board Process Recommendations

Flux Deposition Rate µg/in² solids	Preheat Temp		Preheat Time (sec)	Alloy	Contact Time (sec)	Pot Temp °C
	Top °C	Bottom °C				
1000–1700	110–135	135–150	75–150	SnCu	4–5	265–270
500–1000	100–125	125–135	75–150	SnPb	2–3	250–260

Residue Removal Recommendations

All of Indium Corporation's no-clean fluxes, including this formula, are designed to be electrically safe under normal consumer electronic and telecommunication operating conditions. Unless otherwise specified, electrically safe means that the post soldering residues pass J-STD-004A SIR and ECM testing. However, it is understood that some customers desire to remove residues for cosmetic reasons, improved in-circuit testing, improved compatibility with specific conformal coatings, or where the operating parameters of the circuit board may be in extreme conditions for a prolonged period.

If the removal of no-clean flux residues is desired, most commercially available cleaning agents will be effective. Indium Corporation's Technical Support Engineers work closely with cleaning agent vendors and have confirmed flux residue removal capabilities from several vendors using their recommended products and parameters. It is unlikely that users of Indium Corporation's no-clean products will need to change their current residue removal materials and parameters from those currently used. However, when establishing a new process or desiring confirmation of process recommendations, please contact Indium Corporation's Technical Support staff for assistance.

Wave Solder Flux WF-7745

Indium Corporation Compatible Products

- Solder Paste: Indium8.9HF
- Cored Wire: CW-807
- Flux Pen: NC-771 (or FP-500)

Indium Corporation has a long history of testing soldering product compatibility and has designed its solder pastes, wave fluxes, cored wires, and rework fluxes so that they are compatible with each other. Based on our experience, we have learned that Indium Corporation's products, which have been individually designed to meet the requirements of a certain specification such as IPC J-STD-004B, when combined, will yield test results meeting the same requirements, as typically determined by Surface Insulation Resistance (SIR) and Electromigration (ECM) testing. It is also possible that competitors' products and those that cross different specification revisions; such as an Indium Corporation solder paste tested to J-STD-004, a competitor Wave flux tested to J-STD-004A and an Indium Corporation Cored Wire tested to the requirements of J-STD-004B, will also be compatible when tested under one of the above versions, but it is not as certain. In these cases, where there is doubt, we prefer to run actual testing to confirm compatibility. Indium maintains a small library of these test results, which are made available to its customers. While the safest way to ensure product compatibility is by using a complete line of Indium Corporation compatible products, if you have questions, regarding the compatibility of a specific set of products not listed below, please contact Indium Corporation's Technical Service Department.

Health, Safety, Environmental, and Shipping

RoHS

This product complies with the requirements set under the EU Directive 2002/95/EC. This product does not contain any metals or flame retardants.

Hazard Label

WHMIS Label

WHMIS:
Not classified

DOT Classification

- Transport in accordance with applicable regulations and requirements.
- Non-hazardous for shipping.
- North America Emergency Guide Book: Not applicable.
- UN: None

Additional Information

*J-STD-004B is the IPC Joint Industry Standard for classifying and testing soldering fluxes. It varies from the prior versions, J-STD-004 and J-STD-004A, in two very important ways. J-STD-004B uses a modified electromigration (ECM) test battery which is designed to better test the effects of the flux in high humidity conditions at normal operating temperatures and voltages. The environmental test is specifically designed to try to create dendritic growth and create failure in marginal flux formulas, unlike the prior version of J-STD-004 which used higher temperatures and voltages that did not grow dendrites as easily. Also, J-STD-004B halogen testing now reveals the total amount of halogen in a flux by first using an oxygen bomb to disassociate any halogen from the chemical compounds that they are bound to, and then collecting and quantifying them. Prior versions of J-STD-004 were unable to detect halogens that were present, but only disassociated at high temperatures (such as soldering temperature). As such, prior testing methods might give the user a false sense that no halogens are present in the flux, when in fact they are. Indium Corporation strongly supports the enhanced features of J-STD-004B because it better serves the users need for information.

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