

PRODUCT DATA SHEET

Core 230-RC

No-Spatter, No-Clean, REACH-Compliant Robotic Soldering Wire

Introduction

Indium Corporation's **Core 230-RC** is a formula developed to meet the demanding requirements of robotic and laser soldering. It incorporates a highly effective activator package with new "no-spatter" technology in a high-reliability flux media. **Core 230-RC** is fully REACH compliant, containing no REACH Substances of Very High Concern (SVHCs). **Core 230-RC** is not used solely for robotic and laser soldering since it also performs exceptionally well in hand soldering applications. The no-spatter feature eliminates flux spatters that can burn operators' hands.

Features

- Low spatter formulation
- Light-colored residue
- Compatible with Pb-free and SnPb alloys
- Compatible with HASL, Immersion Silver, ENIG, and OSP surface finishes

Physical Properties

IPC J-STD-004 Classification	RELO
IPC J-STD-004B Classification	REL1
Spatter	0.09%
Acid Value (mgKOH/gram of flux)	165

Wetting

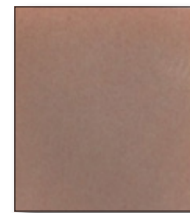
Spread Test	Spread Area (mm ²)		
	Copper	Brass	Nickel
SAC305 - 10% Solution	48	36	34

Process Recommendations

- Match the tip size to the part to be soldered
- Apply the solder wire to the joint, not to the soldering iron tip
- Use the lowest temperature possible
- 600–750 °F (315–400 °C) for SnPb and Pb-free
- Surface mount (SMT) soldering should be completed in 1–2 seconds
- Plated through-hole (PTH) soldering should be completed in 1–3 seconds

Silver Chromate Free Halide

Core 230-RC was tested per the IPC-TM-650 method 2.3.33, halide content in soldering fluxes and pastes. Silver chromate test paper will turn white if there is more than 0.05% free halide in the flux test solution. **Core 230-RC** does not turn the paper white, passing the test as having less than 0.05% free halide.



10% Solution

Form No. 99327 R1

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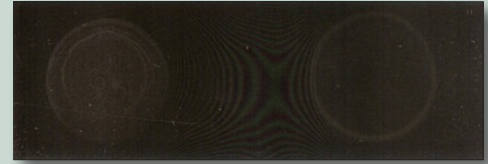
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Test Data

Copper Mirror

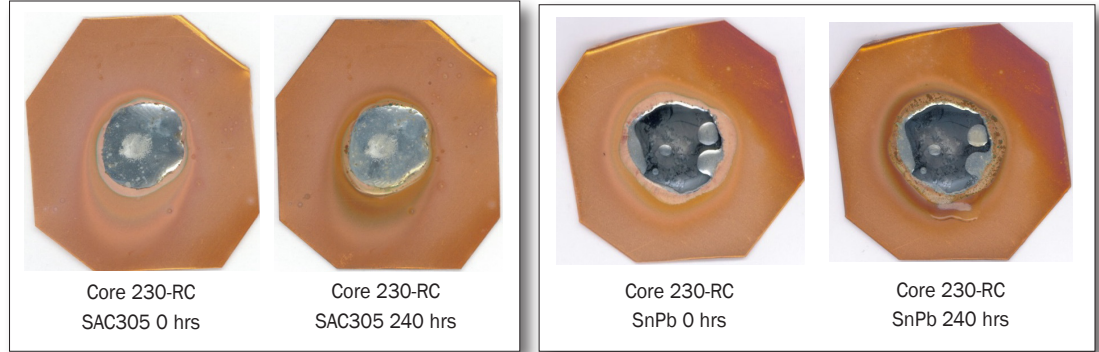
The J-STD-004B copper mirror test is performed per IPC-TM-650 method 2.3.32. To be classified as an "L" type flux, there should be no complete removal of the mirror surface. **Core 230-RC** shows almost no removal of the mirror surface, therefore, can be classified an "L" type flux.



Core 230-RC 10% Solution Standard Rosin

Copper Corrosion

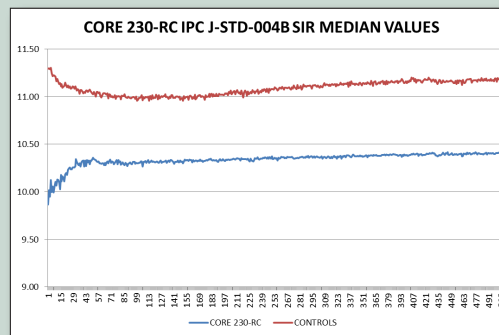
Copper corrosion is tested per IPC-TM-650 method 2.6.15. This test gives an indication of any visible reactions that take place between the flux residue after soldering and copper surface finishes. In particular, green copper corrosion (formed as copper-chloride) should not be seen. With **Core 230-RC**, some of the residue darkens over time, but no corrosion is observed.



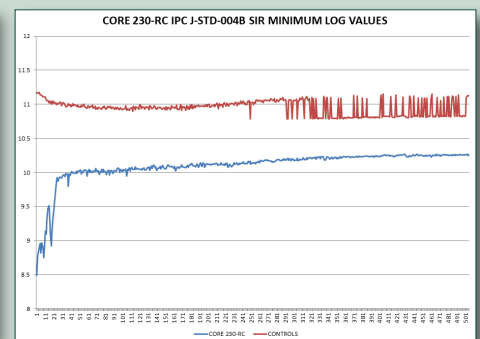
Surface Insulation Resistance (SIR)

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 **Core 230-RC** pass the requirements of having exhibited no dendritic growth, no visible corrosion, and a minimum insulation resistance of 100 megohms (1×10^8). The values presented on the 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.

SIR Minimum Values		
	24 Hours	All Data
Core 230-RC	9.95	8.49
Control	10.78	10.78



SIR Medians

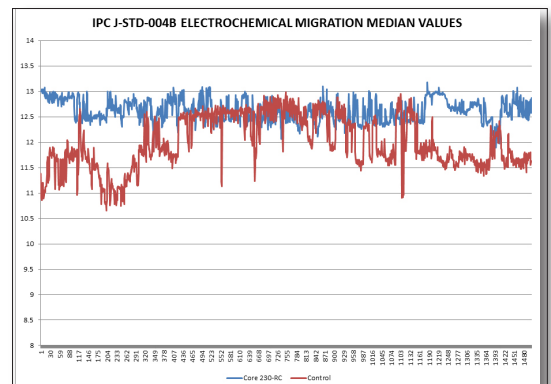


SIR Minimums

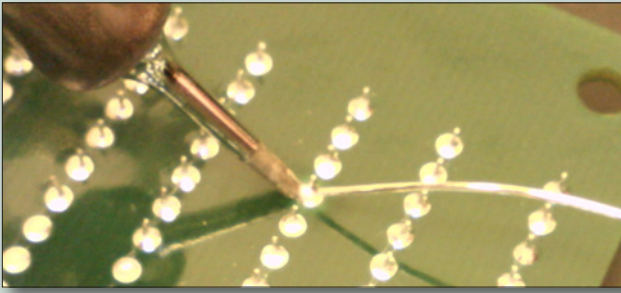
Electromigration (ECM)

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 $65^\circ\text{C} \pm 2^\circ\text{C}$ and $88.5\% \pm 3.5\% \text{ RH}$. 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. Indium Corporation's **Core 230-RC** easily passes the ECM requirements of IPC J-STD-004B.

Minimum Values		
	Initial	Final
Core 230-RC	9.71E+12	6.25E+12
Control	1.89E+11	9.27E+11



General Application Recommendations



Soldering Iron Temperature		
Alloy Family	Alloy Melting Range	Soldering Iron Temperature
Tin-Lead	170°C to 190°C	340°C to 370°C
Lead-Free	210°C to 250°C	370°C to 400°C
High-Lead	280°C to 320°C	400°C to 425°C

Cored Wire for Robotic and Laser Soldering

Indium Corporation specializes in making fine diameter wire, typically between 0.008" (0.2mm) and 0.015" (0.375mm) diameter for robotic and laser soldering. To make robotic and laser soldering most effective and eliminate peaking and bridging, it is easiest to use an active flux such as **Core 230-RC** at 4.0% to 4.5% flux by weight.

Shelf Life

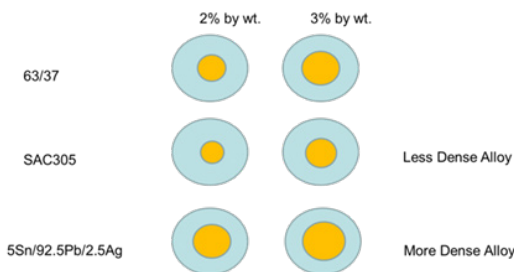
	Warranted	Practical*
Tin-Lead Alloys	3 years from DOM	Indefinite
Lead-Free Alloys	3 years from DOM	Indefinite
>90% Lead Alloys	1 year from DOM	Indefinite

*When stored at less than 40°C and less than 80% RH

When stored in a cool, dry environment, there is no reason that Indium Corporation's cored wire cannot retain its intended soldering properties for many years. The main causes of degraded cored wire reflow performance are the buildup of a thick oxide layer on the surface of the wire, caused by prolonged exposure to higher than normal temperature and humidity conditions, or the buildup of lead carbonate on high-lead (>90%) alloy cored wire shipped or stored under very high humidity conditions.

Cored Wire Flux Percent

Indium Corporation is capable of coring wire in a variety of flux percents. Flux cores are typically determined by weight percent of flux compared to weight percent of solder. As can be seen by the graphic below, 1% more flux by weight adds considerably more flux by volume. The trade-off: higher flux contents make soldering faster, easier, and reduce defects, but increase the amount of residue that can be seen cosmetically and that may interfere electrically. The most common nominal flux contents are 2% by weight and 3% by weight.



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-004B 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.

Indium Corporation Compatible Products

- Solder Paste: Indium8.9
- Wave Flux: WF-9940 (rosin-containing) or WF-9958 (low or no rosin)
- Flux Pen: FP-500 (rosin-containing)

Indium Corporation's cored wire has been designed to be fully compatible with our solder paste, wave fluxes, and rework fluxes, and is also expected to be compatible with many of our competitors' products. For example, **Core 230-RC** flux-cored wire is not only compatible with Indium8.9HF solder paste, but also with our 5.2LS, 8.9 series, 92 series, and 10 series products. Indium Corporation determines compatibility primarily by matching flux chemistry. However, a select number of wave, reflow, and rework product combinations have been thoroughly tested to ensure that the combined flux residues meet the electrical and reliability requirements of IPC J-STD-004B. Please contact Indium Corporation Technical Support if you are interested in knowing about these fully-tested combinations.

Core 230-RC Robotic Soldering Wire

Commonly Available Diameters and Packaging

Diameter	Spool Weight	63/37 Length	SAC305 Length
0.010" ± 0.002"	1/4 lb	966 ft	1097 ft
0.015" ± 0.002"	1/4 lb	429 ft	487 ft
0.020" ± 0.002"	1 lb	966 ft	1097 ft
0.025" ± 0.002"	1 lb	618 ft	702 ft
0.032" ± 0.002"	1 lb	377 ft	428 ft
0.040" ± 0.002"	1 lb	242 ft	274 ft
0.062" ± 0.002"	1 lb	101 ft	114 ft
<hr/>			
0.25mm ± 0.05	125 g	324 m	368 m
0.40mm ± 0.05	125 g	144 m	164 m
0.50mm ± 0.05	500 g	324 m	368 m
0.60mm ± 0.05	500 g	208 m	236 m
0.80mm ± 0.05	500 g	127 m	144 m
1.00mm ± 0.05	500 g	81 m	92 m
1.55mm ± 0.05	500 g	34 m	38 m

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.

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. All Indium Corporation's products and solutions are designed to be commercially available unless specifically stated otherwise.

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