PRODUCT DATA SHEET

CW-818

Halide-Free, No-Clean Cored Wire with Spatter Control Technology

Introduction

CW-818 provides fast wetting speeds to minimize cycle times in manual and robotic soldering processes. This halide-free, no-clean formula leaves a clear, non-tacky residue even when using high tip temperatures. The heat resistant and low-spatter properties of this core flux provide an assembly with excellent visual appearance.

Features

- Fast wetting
- Light-colored non-tacky residue
- Reduced spatter formulation
- Works well for manual and robotic soldering processes
- Compatible with Pb-free and SnPb alloys
- Compatible with HASL, Immersion Silver, ENIG, and OSP surface finishes
- Good choice for legacy processes requiring an RMA strength product

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
- 320–370°C (610–700°F) for SnPb
- 370–425°C (700–800°F) for 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
- Lower cycle times may be possible using robotic soldering processes

Physical Properties

Formula	CW-818
IPC J-STD-004C	ROL0
Spatter %	3%
Acid Value (mgKOH/gram of flux)	142
Rosin Containing	Yes
Halide Content %	<0.05
Smoke	Minimal
Odor	Mild
Color	Clear
IPC J-STD-006 Compliance	Indium Corporation impurity levels conform to or exceed IPC J-STD-006
Compatible Alloys	All common and specialty alloys†
REACH Compliance	Pass
Copper Mirror IPC J-STD-004C	See Copper Mirror section
Copper Corrosion IPC J-STD-004C	See Copper Corrosion section
SIR J-STD-004C* **	Pass
Electromigration J-STD-004C* **	Pass

*** *Data available upon request.*

† *Common Alloys: SAC305; SACm®0510; Sn995; SAC105; SAC0307; SAC387; 96.5Sn/3.5Ag; 95Sn/5Sb; Indalloy®227; Indalloy®254; 63Sn/37Pb; 60Sn/40Pb; 93.5Pb/5Sb/1.5Ag; 43Sn/43Pb/14B, and all similar alloys.*

†† *High-Temp Alloys: 5Sn/95Pb, 5Sn/93.5Pb/1.5Ag, 5Sn/92.5Pb/2.5Ag, 10SN/88Pb/2Ag, and similar alloys.*

Board Thickness	**0.062"/1.58mm**	**0.093"/2.36mm**
Wire Used	SAC305, 0.020"/0.5mm	SAC305, 0.020"/0.5mm
Formula and Flux %	CW-818-RC, **3%**	CW-818, **3%**
Robot Speed	400–700mm/sec	400–700mm/sec
Iron Wattage	130 watt	130 watt
Tip Temperature	370–425°C	370–425°C
Tip Size	**1.6 x 0.6mm**	**2.4mm diameter**
Process Parameters:		
Solder Feed + Iron Tip Down	5.0–5.4mm @ 25–30mm/sec	5.0–5.6mm @ 25–30mm/sec
Preheat		0.2–3.6 seconds
Solder Feed		1.0–2.4mm @ 18mm/sec
Preheat	0–0.3 seconds	0–0.2 seconds
Solder Feed	1.6–2.3mm @ 18mm/sec	1.2–2.2mm @ 18mm/sec
Solder Retract	3.0mm @ 30mm/sec	3.0mm @ 30mm/sec
Post Heat/Dwell Time	0 seconds	0 seconds
	IRON TIP UP	
Amt. of Solder Used (mm/joint)	3.6–6.5	4.0–7.0
Solder Time (seconds/joint)	0.4–0.9	1.1–3.7
Tip Cleaning Frequency 370–425°C	Each 10 meters of wire/ or as needed	Each 10 meters of wire/ or as needed

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Test Data

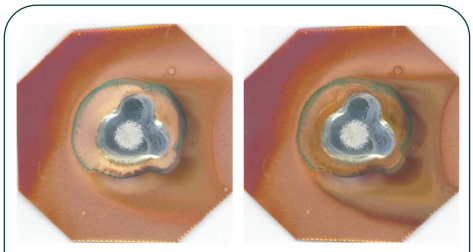
Copper Mirror

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. **CW-818** shows almost no removal of the mirror surface, therefore, can be classified an "L" type flux.

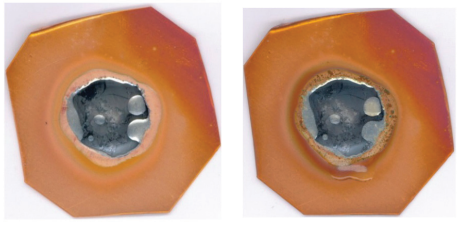
CW-818 10% Solution | Standard Rosin

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 **CW-818**, some of the residue darkens over time, but no corrosion is observed.



CW-818 SAC305 0 Hours | **CW-818 SAC305 240 Hours**

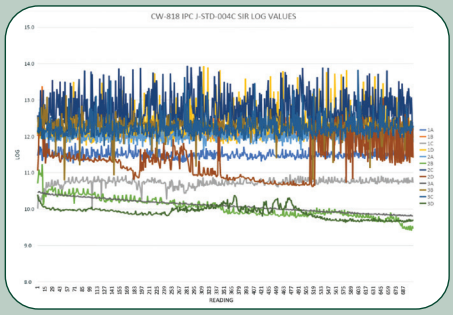


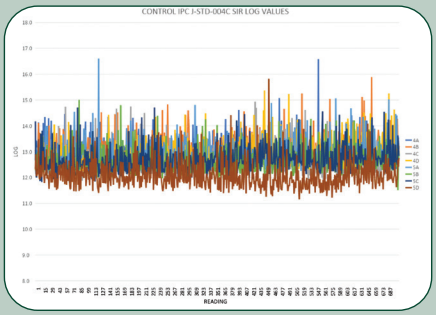
CW-818 SnPb 0 Hours | **CW-818 SnPb 240 Hours**

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 **CW-818** pass the requirements of having exhibited no dendritic growth, no visible corrosion, and a minimum insulation resistance of 100 megohms (1 x 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.

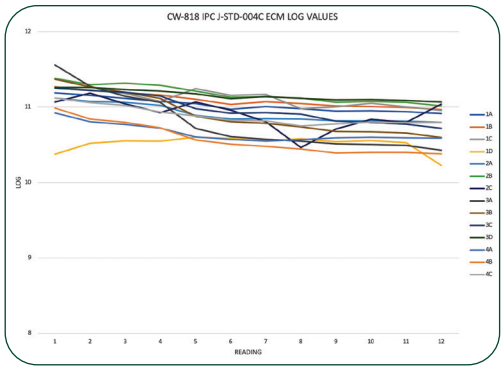
SIR Minimum Values		
	24 Hours	All Data
CW-818	9.41	9.41
Control	11.15	11.15





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°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. Indium Corporation's **CW-818** easily passes the ECM requirements of IPC J-STD-004B.



Insulation Resistance		
	Initial	Final
CW-818	1.42E+11	5.61E+10
Control	1.68E+11	1.43E+11

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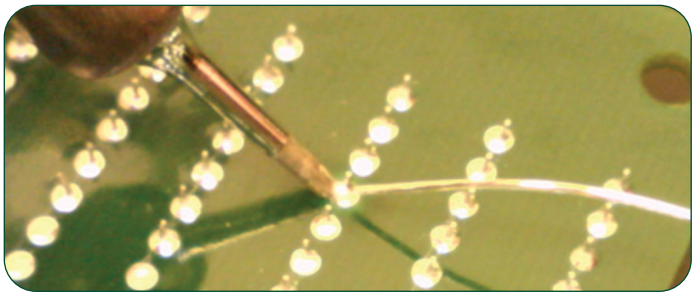
General Application Recommendations



Cored Wire for Robotic and Laser Soldering

Indium Corporation specializes in making fine-diameter wire, typically between 0.004" (0.1mm) and 0.015" (0.381mm) 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 **CW-818** at 4.0–4.5% flux by weight.

Shelf Life

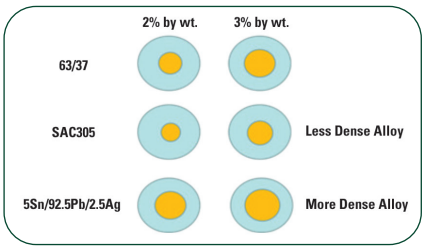
	Warranted	Practical*
Tin-Lead Alloys	10 years from DOM	Indefinite
Lead-Free Alloys	10 years from DOM	Indefinite
>85% High-Lead	2 years from DOM	Indefinite

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

Always store cored wire in a cool, dry environment. 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 (>85%) 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 percentages. Flux cores are typically determined by weight percent of flux compared to weight percent of solder. As can be seen by the graphic at right, 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.



Soldering Iron Temperature		
Alloy Family	**Alloy Melting Range**	**Soldering Iron Temperature**
Tin-Lead	170–190°C (338–374°F)	320–370°C (608–698°F)
Lead-Free	210–250°C (410–482°F)	320–425°C (608–797°F)
>85% High-Lead	280–320°C (536–608°F)	400–425°C (752–797°F)

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 Engineers for assistance.

Indium Corporation Compatible Products

- **Solder Paste**: Indium8.9, 8.9HFA, 8.9HF1, and 8.9HF
- **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, **CW-818** 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.

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Commonly Available Diameters and Packaging

Diameter	Spool Weight	63/37 Length	SAC305 Length
0.004" ± 0.002"*	50g	2,411ft	2,751ft
0.006" ± 0.002"*	100g	2,142ft	2,445ft
0.008" ± 0.002"*	1/4lb	1,366ft	1,560ft
0.010" ± 0.002"	1/4lb	966ft	1,097ft
0.015" ± 0.002"	1/4lb	429ft	487ft
0.020" ± 0.002"	1lb	966ft	1,097ft
0.025" ± 0.002"	1lb	618ft	702ft
0.032" ± 0.002"	1lb	377ft	428ft
0.040" ± 0.002"	1lb	242ft	274ft
0.062" ± 0.002"	1lb	101ft	114ft
0.10mm ± 0.05mm*	50g	735m	839m
0.15mm ± 0.05mm*	100g	653m	745m
0.20mm ± 0.05mm*	113g	416m	476m
0.25mm ± 0.05mm	113g	294m	334m
0.38mm ± 0.05mm	113g	131m	148m
0.51mm ± 0.05mm	454g	294m	334m
0.64mm ± 0.05mm	454g	188m	214m
0.81mm ± 0.05mm	454g	115m	131m
1.02mm ± 0.05mm	454g	74m	84m
1.57mm ± 0.05mm	454g	31m	35m

* This size can only be manufactured using select Pb-free alloys.

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 electrochemical migration (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.

All of Indium Corporation's solder paste and preform manufacturing facilities are IATF 16949:2016 certified.
Indium Corporation is an ISO 9001:2015 registered company.

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