**Core 230-RC**

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

**Commonly Available Diameters and Packaging**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Spool Weight</th>
<th>6/37 Length</th>
<th>SAC305 Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.006&quot; ± 0.022&quot;*</td>
<td>1/4lb</td>
<td>2,142ft</td>
<td>2,445ft</td>
</tr>
<tr>
<td>0.008&quot; ± 0.022&quot;*</td>
<td>1/4lb</td>
<td>1,560ft</td>
<td>1,560ft</td>
</tr>
<tr>
<td>0.010&quot; ± 0.004&quot;</td>
<td>1/4lb</td>
<td>968ft</td>
<td>1,037ft</td>
</tr>
<tr>
<td>0.015&quot; ± 0.002&quot;</td>
<td>1lb</td>
<td>428ft</td>
<td>487ft</td>
</tr>
<tr>
<td>0.020&quot; ± 0.002&quot;</td>
<td>1lb</td>
<td>968ft</td>
<td>1,037ft</td>
</tr>
<tr>
<td>0.025&quot; ± 0.002&quot;</td>
<td>1lb</td>
<td>618ft</td>
<td>720ft</td>
</tr>
<tr>
<td>0.032&quot; ± 0.002&quot;</td>
<td>1lb</td>
<td>377ft</td>
<td>428ft</td>
</tr>
<tr>
<td>0.040&quot; ± 0.002&quot;</td>
<td>1lb</td>
<td>242ft</td>
<td>274ft</td>
</tr>
<tr>
<td>0.062&quot; ± 0.002&quot;</td>
<td>1lb</td>
<td>101ft</td>
<td>114ft</td>
</tr>
</tbody>
</table>

0.15mm ± 0.05mm*

0.18mm ± 0.05mm*

0.25mm ± 0.05mm

0.35mm ± 0.05mm

0.51mm ± 0.05mm

0.64mm ± 0.05mm

0.81mm ± 0.05mm

1.02mm ± 0.05mm

1.57mm ± 0.05mm

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

**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 substance 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

**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 dissociated 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.

**Physical Properties**

- **IPC-J-STD-004 Classification**: REL0
- **IPC-J-STD-004B Classification**: REL1
- **Spatter**: 0.09%
- **Acid Value (mgKOH/gram of flux)**: 165
- **IPC-J-STD-006 Compliance**: Indium Corporation impurity levels conform to or exceed IPC-J-STD-006

**Wetting**

- **Spatter Test**: Copper 48
- **Brass 36**: Nickel 34

**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.

**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**
- **The robotic soldering process set-up is highly customizable and depends on the assembly being soldered**
- **A smooth solder joint appearance requires the correct amount of temperature and time; fine-tuning the process parameters may be required to achieve the best possible outcome**
- **During robotic soldering, flux build-up and charring may occur; to avoid build-up, increase the iron tip cleaning frequency or reduce the iron tip temperature**

**Features**

- **Premium soldering wire**
- **No spatter or clean required**
- **REACH compliant**
- **100% free halide**

**Hazard Communication**

- **Material Safety Data Sheet (MSDS)**
- **Health and Safety Information**
- **Specific Hazardous Reactions**
- **First Aid Measures**
- **Fire Fighting Measures**
- **Accidental Release Measures**
- **Handling**
- **Storage**
- **Disposal**
- **Other Precautions**
- **Exposure Controls/Engineering Controls**
- **Personal Protection**
- **Other Information**

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Test Data

Core 230-RC 10% Solution Standard Rosin

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 2.8.3.3. 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 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.

<table>
<thead>
<tr>
<th>SIR Minimum Values</th>
<th>24 Hours</th>
<th>All Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core 230-RC</td>
<td>9.95</td>
<td>8.49</td>
</tr>
<tr>
<td>Control</td>
<td>10.78</td>
<td>10.78</td>
</tr>
</tbody>
</table>

Electromigration (ECM)

The electromigration test is performed to IPC-TM-650 method 2.6.14.1 with boards prepared using IPC-TM-550 method 2.6.3.3. The test conditions for this test are 496 hours at 85°C ± 2°C and 85% ± 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 86-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.

Contact our engineers: askus@indium.com
Learn more: www.indium.com

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General Application Recommendations

Core Wire for Robotic and Laser Soldering

Indium Corporation specializes in making fine-diameter wire, typically between 0.008" (0.2mm) and 0.035" (0.89mm) 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 4-8.5% flux 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 telecommunications 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 all 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.

Contact our engineers: askus@indium.com
Learn more: www.indium.com

Indium Corporation Compatible Products

- Solder Paste: Indium8.9
- Wave Flux: WF-9942 (rosin-containing) or WF-9958 (low or no rosin)
- Flux Pen: FP-500 (rosin-containing)

Indium Corporation’s core 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 Indium8.9 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, reref, 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.

Contact our engineers: askus@indium.com
Learn more: www.indium.com