ECO+PLUS® series
Lead Free SOLUTIONS you can TRUST

PAT. PEND.

Anti-Erosion Flux Cored Wire Solder

S03X7Ca-56M

■ Features

1) Greatly extends the life of the soldering iron tip.
2) Very fast and complete wetting.
3) Minimized solder/flux spattering.
4) No tailing or spiking and clean take away of soldering iron.
5) Compatible with various other solder alloys.

■ Specifications

Application			Hand, robot soldering
Product			**S03X7Ca-56M**
Alloy	Composition (%)		Sn0.7Cu0.3Ag0.03Co+ α
	Specific gravity		7.3
	Melting point (℃)		217 - 227
	Tensile stength (N/mm^2)		35
	Elongation (%)		36
Product	Flux content (wt%)		2.8 - 3.6
	Halide content (wt%)		0.12
	Surface insulation resistance	85℃ × 85%RH × 168Hr Out of oven	$> 2 \times 10^{12}$
		85℃ × 85%RH × 168Hr in oven	$> 1 \times 10^{9}$
	Aqueous solution resistivity *1 (Ω cm)		> 500
	Flux type *2		ROL1
	Copper plate corrosion *3		Passed
	Solder spread factor (%)		80
	Diameter (mm)		0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 1.0, 1.2, 1.6
	Shelf life (room temp.)		3 years

1. Aqueous solution resistivity ..... In accordance with MIL specifications.
2. Flux type ..... In accordance with ANSI/J-STD-004
3. Copper plate corrosion ..... In accordance with JIS.

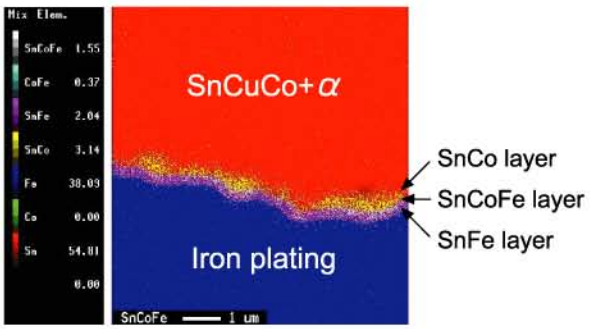
■ Anti-erosion effect

The normal alloy composition of the lead free rosin flux cored solder wires, is now dominated by SnAg3.0Cu0.5 (SAC305), resulting in a much higher Tin content compared to Tin/Lead wires. Whilst soldering, Tin enters the crevices or gaps between the crystal structures of the plating surface (normally Nickel and Iron) of the soldering tip, dissolves and erodes the Copper in the center, and the Copper is drawn out from the soldering tip.
Consequently, the Copper in the center of the soldering tip becomes thinner, and when external pressure is exerted, the plating surface becomes deformed and damaged.

As a corrective measure against such erosion of the soldering bit, simply thickening the tip plating (around 500 μm) may be one option, though it cannot be the complete solution due to the properties and crystal structures of the metals used. Furthermore it has been found that the iron content of the plating surface is also considerably eroded by the high tin content of normal lead free alloys, thus further enhancing the risk and rate or erosion of the copper beneath it.
In the case of S03X7Ca-56M, intermetallic compounds are formed over the plating surface during soldering in the same way as with the normal tin lead solders.
Uniquely S03X7Ca-56M forms a 3 layer barrier over the iron tip and restricts the erosion of the Iron content of the plating surface and thus further protects the copper bulk of the soldering tip.

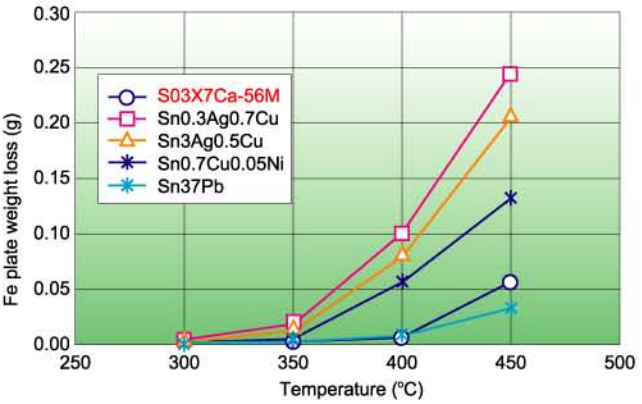
► Restriction Mechanism of Iron erosion

Cobalt melts into the metallic compounds, SnCu or SnFe, to be formed at the interface of the solder and Iron coating of the soldering tip, and restricts the diffusion of Iron into the solder.



► Iron erosion test

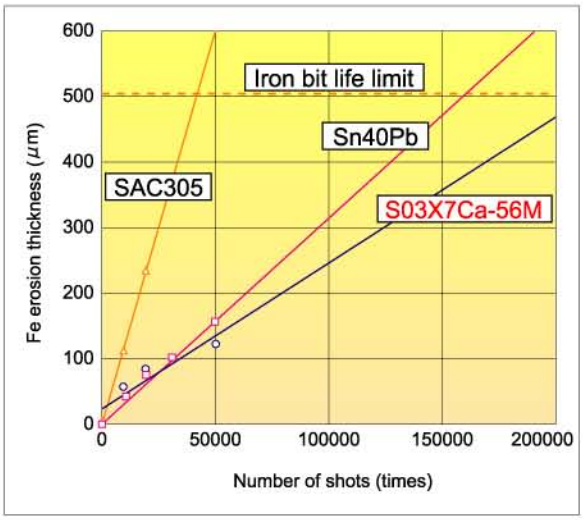
Test specimen: 25 × 70 × 2.2mmt, iron plate (SPC)
Test procedure: Dip iron plate 15mm into solder alloy and agitate at 30 rpm for 1 hour to measure the weight loss.

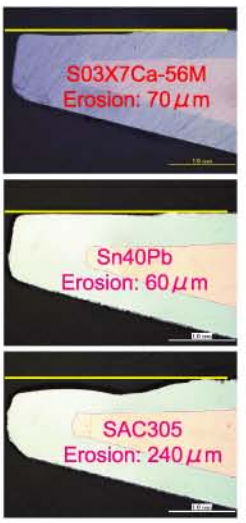


► Anti-Fe erosion test

By using an automatic soldering iron robot, the anti-Iron erosion property of Sn40Pb, SAC305 and S03X7Ca-56M alloys was conducted as shown below. At the 20,000th contact, erosion of the soldering tip using S03X7Ca-56M wire was only 25% of that in comparison to SAC305 alloy (see below pictures).

Test conditions
- Fe coating thickness: 500 micron
- Iron bit temp.: 390°C
- Wire diameter: 0.8mm
- Feed amount: 5mm/shot
- Soldering robot: Japan Unix





*Specifications are subject to change.

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