Sn63Pb37 No Clean Solder Paste 4860P Technical Data Sheet

Description

The 4860P *Sn63Pb37 No Clean Solder Paste* is made from a blend of high purity, non-recycled tin and lead alloy powder blended with a no clean flux to form a paste. It is designed for surface mount applications and provides high tack force and good wettability. The post soldering residues are transparent, non-conductive, non-corrosive, and highly insulated. No clean means that residues are not harmful to assemblies.

Applications & Usages

The solder paste is designed to accommodate high speed printing. It can yield brick-like prints even when using an ultra-fine pitch stencils down to 0.3 mm.

Benefits and Features

- **Alloy exceeds J-STD-006C and meets ASTM B 32 purity requirements**
- **Flux meets J-STD-004B**
- **Non-corrosive**
- **Non-conductive residue**
- **Halide free**
- **Good wettability**
- **Type 3 (45-25 µm)**

COMPLIANCE
✓ Dobb Frank (DRC conflict free)
✓ REACH (compliant)
× RoHS (non-compliant)

Solder Alloy Composition

Properties	*Value*	*Properties*	*Value*
MAIN INGREDIENTS		*IMPURITIES*	a)
Sn	63.5 to 63.5%	Sb	≤0.20% Max
Pb	36.5 to 37.5%	Ag	≤0.10% Max
		Bi	≤0.10% Max
		In	≤0.10% Max
		Cu	≤0.08% Max
		Au	≤0.05% Max
		As	≤0.03% Max
		Fe	≤0.02% Max
		Ni	≤0.01% Max
		Al	≤0.005% Max
		Zn	≤0.003% Max
		Cd	≤0.002% Max
Because this product contains lead, it is not RoHS compliant. The following RoHS exemptions are applicable 7(b), 15, 24, 31, 33.			

a) Exceeds the requirements of J-STD-006C and meets ASTM B 32.

Sn63/Pb37 Alloy Typical Literature Properties

Physical Properties	***Value*** [a]
Color	Metallic grey
Tensile Strength	54 N/mm^2 [7 800 lb/in^2]
Elongation	37%
Hardness	14 HB
Shear Strength	37 N/mm^2 [5 400 lb/in^2]
Electrical Properties	***Value***
Volume Resistivity	14.5 μΩ·cm
Electrical Conductivity [b]	11.9% IACS
Thermal Properties	***Value***
Melting Point, Solidus	183 °C [361 °F]
Melting Point, Liquidus	183 °C [361 °F]
Tip Temperature Upper Limit	Do not exceed 260 °C [500 °F]
Coefficient of Thermal Expansion (CTE) [c]	24.7 ppm/°C
Thermal Conductivity	50 W/(m·K)

Note: This table present typical literature values for 63/37 alloys.
a) N/mm^2 = mPa; lb/in^2 = psi;
b) International Annealed Copper Standard: 100% give 5.8×10^7 S/m.
c) Units conversions: ppm/°C = μm/(m·K) = in/in/°C × 10^{-6} = unit/unit/°C × 10^{-6}

4860P Properties

Flux Properties	***Method***	***Value***
Flux Classification	J-STD-004B	REL0
Flux Type		Resin
Flux Activity		Low
Halides %(wt)		<0.05%
Acid Number (mgKOH/g sample)	IPC-TM-650 2.3.13	110
Copper Mirror	IPC-TM-650 2.3.32	No removal of copper film
Corrosion Test	IPC-TM-650 2.6.15	Pass
Surface Insulation Resistance (SIR)	IPC-TM-650 2.6.3.3	2.4 x 10^{10} Ω
Bellcore (Telecordia)	Bellcore GR-78-CORE 13.1.3	4.1 x 10^{10} Ω
Electromigration	Bellcore GR-78-CORE 13.1.4	Pass
Post Reflow Flux Residue	TGA Analysis	45%

Paste Properties	*Method*	*Value*
Metal Loading	IPC-TM-650 2.2.20	88%
Viscosity		
Brookfield(1), kcps	IPC-TM-650 2.4.34.3 modified	400 ±10%
Malcom(2), poise	IPC-TM-650 2.4.34 modified	850-1 100
Slump Test		
25 °C, 0.63 vertical/horizontal	IPC-TM-650 2.4.35	No bridges all spacings
150 °C, 0.63 vertical/horizontal	"	"
25 °C, 0.33 vertical/horizontal	"	0.20/0.20
150 °C, 0.33 vertical/horizontal	"	"
Solder Ball Test	IPC-TM-650 2.4.43	Pass
Tack		
Initial	JIS Z 3284	85 g
Tack retention @24 h	"	90 g
Tack retention @72 h	"	92 g

Particle Size

The powder distribution complies with the J-STD-005 Type 3 (45-25 µm) particle size. Solder powder distribution is measured utilizing laser diffraction, optical analysis and sieve analysis. Careful control of solder powder manufacturing processes ensures the particles' shape are 95% spherical minimum (aspect ratio <1.5) and that the alloy contains a typical maximum oxide level of 80 ppm.

Pressure

The pressure applied in the syringe should be kept at a minimum, and the proper head pressure kept in the range of 105-176 g/cm [15-25 lb/in] according to the length of the blade. The external air pressure supply should be maintained constant.

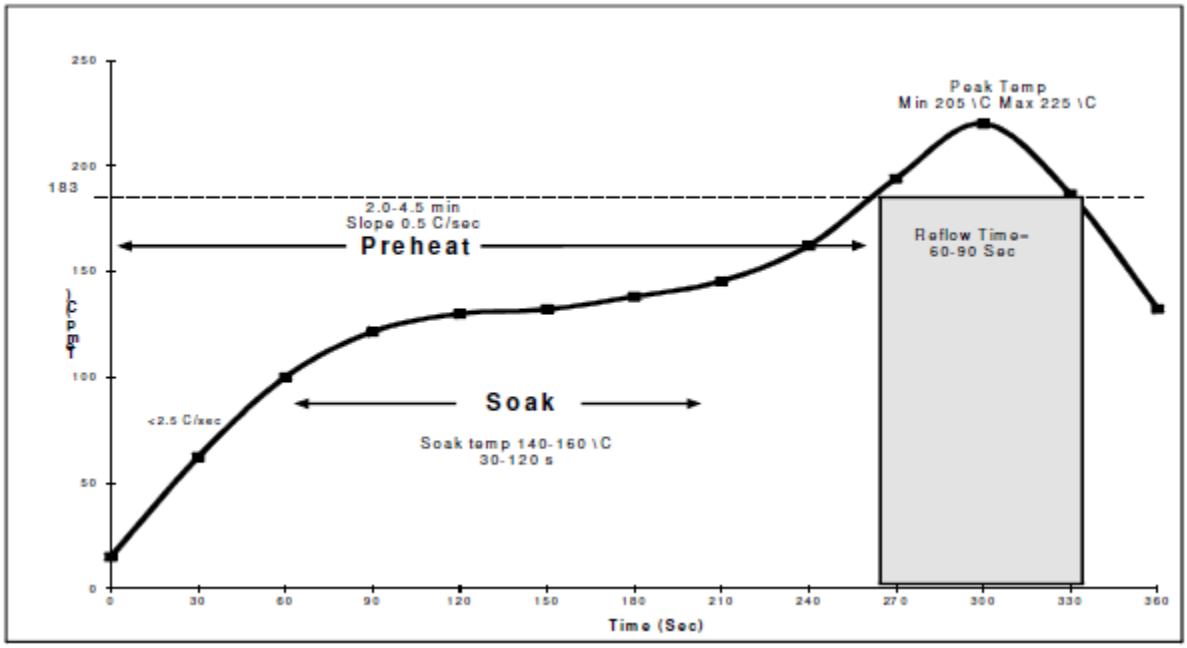
Solder Paste Application

Solder paste should be taken out of the refrigerator at least 3 to 6 hours prior to use. This will give the paste enough time to come to thermal equilibrium with the environment. The flow rate of paste in a dispensing application depends on viscosity, which can be altered by temperature change. If solder paste is purchased in syringes pre-mixing is not necessary due to the shear action produced from the dispensing.

Reflow

Best results have been achieved when the 4860P is reflowed in a forced air convection oven with a minimum of 8 zones (top and bottom).

The following is a recommended profile for a forced air convection reflow process. The melting temperature of the solder, the heat resistance of the components, and the characteristics of the PCB (i.e. density, thickness, etc.) determine the actual reflow profile.



Preheat Zone—The preheat zone, which is also referred to as the ramp zone, is used to elevate the temperature of the PCB to the desired soak temperature. In the preheat zone, the rate of temperature rise should not exceed 2.5 °C/s to avoid thermal chock stresses. The oven preheat zone normally occupies 25–33% of the heated tunnel length.

The Soak Zone—normally occupies 33–50% of the heated tunnel length. It exposes the PCB to a relatively stable temperature that allows the components of different mass to reach a uniform temperature. The soak zone also allows the flux to concentrate and the volatiles to escape from the paste.

The Reflow Zone—or spike zone, elevates the temperature of the PCB assembly from the activation temperature to the recommended peak temperature. The activation temperature is always slightly below the alloy melting point, while the peak temperature is always above its melting point.

Cleaning

The 4860P is a no clean formulation therefore the residues do not need to be removed for typical applications. If residue removal is desired, use MG 8241-T or 8241-W Isopropyl Alcohol Wipes.

Storage and Shelf Life

Store refrigerated between 2-10 °C [35-50 °F] to minimize solvent evaporation, flux separation, and chemical activity. Storage of syringes is preferred in an upright position with tip down to prevent flux separation and air entrapment. Use at room temperature, warm up can be achieved by removing from refrigerator 3 hours before use, faster warm up can also be achieved by placing in a sealed container in a water bath at near ambient temperature for 30 minutes.

Unopened Container 2–10 °C [35–50 °F] 24 months from date of manufacture.

Unopened Container 20–25 °C [68–77 °F] 12 months from date of manufacture.

Reusing Solder Paste

Reusing solder paste is not normally recommended because it typically generates more complications than it is worth. If you do decide to reuse solder paste, keep the following pointers in mind:

- Keep the paste tightly sealed and refrigerated when not in use.
- Store syringes upright position with tip down to prevent flux separation and air entrapment.
- Before reuse, check that the paste hasn't separated or thickened relative to its usual state.

Working Environment

Solder paste performs best when used in a controlled environment. Maintaining ambient temperature of between 20–25 °C [68-77 °F] at a relative humidity of 40–65% will ensure consistent performance and maximum life of paste.

Cleaning Misprint Boards

In case of a misprinted board, the paste may be cleaned by hand using the MG 8241 Alcohol Wipes.

Stencil Cleaning

Periodic cleaning of the stencil during production is recommended to prevent unwanted deposits outside the print areas. Insufficient stencil cleaning increases solder balling. After printing 5 to 10 boards, we therefore recommend a dry wipe. And after every 15 to 25 boards, we recommend a wet wipe with MG 8241-T or 8241-W Alcohol Wipe. For fine pitch boards, the cleaning frequency generally needs to be increased.

Disposal

The 4860P should be stored in a sealed container and disposed of in accordance with state & local authority requirements.

Health and Safety

Please see the 4860P *Sn63/Pb37 No Clean Solder Paste* **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

Health and Safety: This product may cause serious eye irritation. May damage fertility or the unborn child. Causes damage to central nervous system, blood and kidneys through prolonged or repeated exposure. Suspected of causing cancer.

HMIS® RATING

HEALTH:	* 2
FLAMMABILITY:	0
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA® 704 CODES

Approximate HMIS and NFPA Risk Ratings Legend:
0 (Low or none); 1 (Slight); 2 (Moderate); 3 (Serious); 4 (Severe)

Packaging and Supporting Products

Cat. No.	*Packaging*	*Net Weight*	
4860P-35G	Syringe	35 g	1.23 oz
4860P-250G	Jar	250 g	8.81 oz
4860P-500G	Jar	500 g	1.1 lb

Technical Support

Contact us regarding any questions, improvement suggestions, or problems with this product. Application notes, instructions, and FAQs are located at www.mgchemicals.com.

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Warranty

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