Lead Free No Clean Solder Paste
4900P Technical Data Sheet

Description

The 4900P *No Clean Solder Paste* is made from a blend of high-purity, non-recycled tin, silver, and copper metal powder mixed with a no clean flux. This lead-free and halogen-free solder paste is designed for extreme flux activity and enhanced printing characteristics needed for ultra-fine pitch applications. It provides excellent wetting on copper OSP-coatings. Wide reflow process windows combined with high thermal stability yield solder joints with smooth surfaces.

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

- **Repeatable and consistent print characteristics**
- **Long stencil and tack life to accommodate high speed printing**
- **Excellent wettability**
- **Suitable for air or nitrogen atmosphere**
- **Medium soft, non-cracking residues**

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

Solder Alloy Composition

Properties	*Value*	*Properties*	*Value*
MAIN INGREDIENTS		*IMPURITIES*	a)
Sn	96.8 to 95.7%	Pb	≤0.05% Max
Ag	2.8 to 3.2%	Sb	≤0.05% Max
Cu	0.4 to 0.6%	Bi	≤0.05% Max
		In	≤0.05% Max
		As	≤0.01% Max
		Fe	≤0.01% Max
		Ni	≤0.005% Max
		Au	≤0.002% Max
		Al	≤0.001% Max
		Cd	≤0.001% Max
		Zn	≤0.001% Max

a) Exceeds impurity requirements of J-STD-006

Particle Size

The powder distribution complies with the J-STD-005 Type 5 (25-15 µm) particle sizes. 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.

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Properties of Type 5 SAC305 Lead Free Solder Paste

Flux Properties	*Method*	*Value*
Flux Classification	J-STD-004	ROL0
Flux Type		Rosin
Flux Activity		Low
Halides %(wt)		<0.05%
Acid Number (mgKOH/g sample)	IPC-TM-650 2.3.13	117
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	2.01×10^{10} Ω
Bellcore (Telecordia)	Bellcore GR-78-CORE 13.1.3	5.25×10^{11} Ω
Electromigration	Bellcore GR-78-CORE 13.1.4	Pass
Post Reflow Flux Residue	TGA Analysis	5.5%

Paste Properties	*Method*	*Value*
Metal Loading	IPC-TM-650 2.2.20	88.5%
Viscosity		
Malcom(2) poise	IPC-TM-650 2.4.34.3 modified	1600-1900
Thixotropic Index		0.50-0.60
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	"	"
150 °C, 0.33 vertical/horizontal	"	"
Solder Ball Test	IPC-TM-650 2.4.43	Pass
Tack		
Initial	JIS Z 3284	124 gf
Tack retention @ 24 h	"	111 gf
Tack retention @ 72 h	"	98 gf
Stencil Life	QIT 3.44.5	>8 h
Abandon Time	QIT 3.44.6	60 min

Note: The force in grams is denoted with the unit gf.

Pressure

The pressure applied in the syringe should be kept at a minimum, and the head pressure kept in the range of 107–270 g/cm [0.6-1.5 lb/in] according to the length of the blade. The external air pressure supply should be maintained constant.

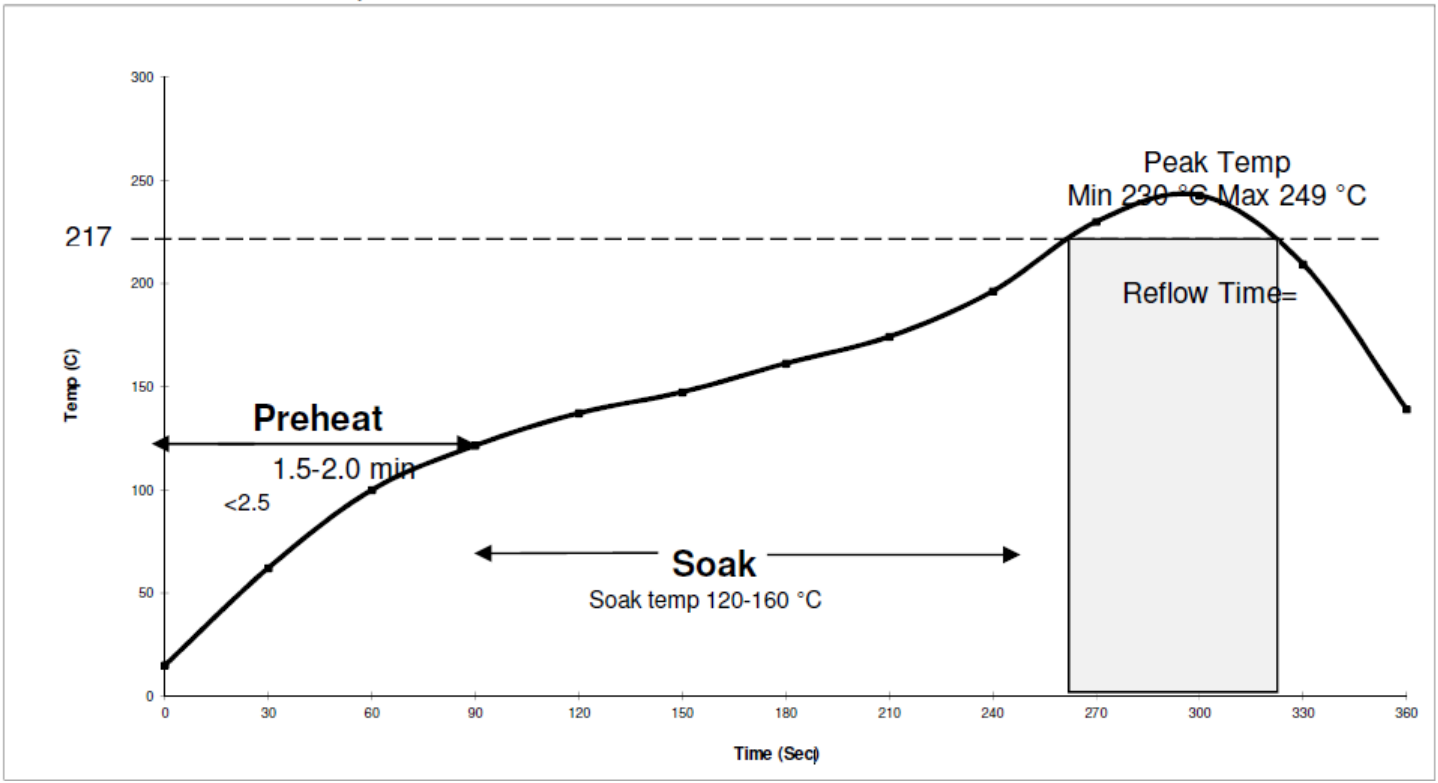
Solder Paste Application

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 reach 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 4900P is reflowed in a forced air convection oven with a minimum of 7 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.



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 4900P is a no clean formulation; therefore, the residues do not need to be removed for typical applications. For spot residue removal, you may 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. Store syringes in an upright position with tip down to prevent flux separation and air entrapment.

Bring the paste to room temperature prior to use. To warm the refrigerated paste, let stand 3 hours at ambient temperature before use. For faster warm up, place the sealed container in a water bath at 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 4900P should be stored in a sealed container and disposed of in accordance with state & local authority requirements.

Health and Safety

Please see the 4900P *Lead Free No Clean Solder Paste* **Safety Data Sheet** (SDS) for more details on transportation, storage, handling and other security guidelines.

Environmental Impact: Very toxic to aquatic life with long lasting effects.

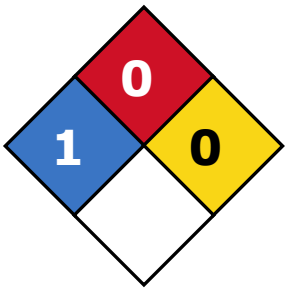
This product meets the European Directive 2011/65/EU Annex II (ROHS); recasting 2002/95/EC.

Health and Safety: This product may cause serious eye irritation. It is widely used in the packing and food industry.

HMIS® RATING

HEALTH:	* 1
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 Volume*		*Net Weight*	
4900P-25G	Syringe	3.38 mL	0.11 fl oz	25 g	0.88 oz
4900P-250G	Jar	33.8 mL	1.14 fl oz	250 g	8.81 oz

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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