



Qualitek Group Of Companies

# DSP XP692 NO CLEAN SOLDER PASTE

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**Physical Properties**

**Solder Composition**

Sn63 alloy is the conventional eutectic solder used in most electronic assemblies. The Sn63 alloy conforms and exceeds the impurity requirements of J-Std-006 and all other relevant international standards.

<b>Typical Analysis</b>													
Sn	Pb	Cu	Ag	Sb	Bi	In	As	Fe	Ni	Cd	Al	Zn	Au
62.5-63.5	Bal.	0.030 Max	0.020 Max	0.050 Max	0.050 Max	0.050 Max	0.010 Max	0.010 Max	0.005 Max	0.001 Max	0.001 Max	0.001 Max	0.002 Max

	<b>Sn63</b>
Melting Point, °C	183 E
Hardness, Brinell	14HB
Coefficient of Thermal Expansion	24.7
Tensile Strength, psi	4442
Density, g/cc	8.42
Electrical Resistivity, (μohm-cm)	14.5
Electrical Conductivity, 10 <sup>4</sup> /ohm-cm	6.9

	<b>Sn63</b>
Yield Strength, psi	3950
Total Elongation,%	48
Joint Shear Strength, at 0.1mm/min 20 °C	23
Joint Shear Strength, at 0.1mm/min 100 °C	14
Creep Strength, N/mm <sup>2</sup> at 0.1mm/min 20 °C	3.3
Creep Strength, N/mm <sup>2</sup> at 0.1mm/min 100 °C	1
Thermal Conductivity, W/m.K	50.9

**Particle Size**

Sn63 alloy is available in Type 2 (75-45μm), 3(45-25μm), 4(38-20μm), and 5 (25-15μm) J-STD-005 powder distribution. 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.

**Classification of Solder Powders by Particle Size**

Powder Type	Fines	Majority			Coarse		Typical Mesh
		<10%	>80%	>90%	<1%	0%	
1	20	20	75-150		150	160	100/200
2	20	20	45-75		75	80	200/325
3	20	20	25-45		45	50	325/500
4	20	20		20-38	38	40	400/635
5	15	15		15-25	25	30	500
6	5	5		5-15	15	20	

**Metal Loading**

Typical metal loading for stencil printing application is **89.0-90.2 %**.

**Solder Paste**

Qualitek XP692 is a new generation no clean solder paste for surface mount and other electronic assembly applications. XP692 provides features such as fine pitch capability (<16 mil), high-speed printing, and probable residues. In addition, XP692 leaded solder paste exhibits excellent wettability, extraordinary print definition and tack life. The post soldering residues of XP692 are non-conductive, non-corrosive and highly insulated.

Main Features

- ❑ Low residues
- ❑ Extended stencil life
- ❑ Long tack time
- ❑ Excellent wettability
- ❑ Soft, non-tacky post solder residue

<b>Flux Classification</b>	<b>Specification</b>	<b>Test Method</b>
	ROLO	JSTD-004
<b>Copper Mirror</b>	No removal of copper film	IPC-TM-650 2.3.32
<b>Silver Chromate Corrosion</b>	Pass	IPC-TM-650 2.3.33
<b>SIR</b>	Pass	IPC-TM-650 2.6.15
JSTD-004	8.2 x 10 <sup>11</sup> ohms	IPC-TM-650 2.6.3.3
Bellcore (Telecordia)	2.72 x 10 <sup>11</sup> ohms	Bellcore GR-78-CORE 13.1.3
<b>Electromigration</b>	Pass	Bellcore GR-78-CORE 13.1.4
<b>Post Reflow Flux Residue Acid Value</b>	45%	TGA Analysis
<b>Metal Loading</b>	96	IPC-TM-650 2.3.13
<b>Viscosity</b>	90-90.2%	IPC-TM-650 2.2.20
Brookfield <sup>(1)</sup> , kcps	900+/-10% kcps	IPC-TM-650 2.4.34 modified
Malcom <sup>(2)</sup> , poise	1600-2100	IPC-TM-650 2.4.34.3 modified
Thixotropic Index	0.50-0.60	
<b>Slump Test</b>		
25 C, 0.63 vertical/horizontal	No bridges all spacings	IPC-TM-650 2.4.35
150 C, 0.63 vertical/horizontal	No bridges all spacings	IPC-TM-650 2.4.35
25 C, 0.33 vertical/horizontal	0.15 /0.15	IPC-TM-650 2.4.35
150 C, 0.33 vertical/horizontal	0.20/0.20	IPC-TM-650 2.4.35
<b>Solder Ball Test</b>	Pass	IPC-TM-650 2.4.43
<b>Tack</b>		
Initial	110 gm	JIS Z 3284
Tack retention @ 24 hr	120 gm	JIS Z 3284
Tack retention @ 72 hr	98 gm	JIS Z 3284
<b>Stencil Life</b>	>8 hrs	QIT 3.44.5
<b>Abandon Time</b>	60-90 min	QIT 3.44.6
<b>ICT</b>	100% contact	QIT 3.44.7

## Printing

### Stencil

Use of chemical etched/electroformed stencil is preferred however XP692 has been used successfully with chemical etch, electroformed, and laser cut stencils.

### Squeegee

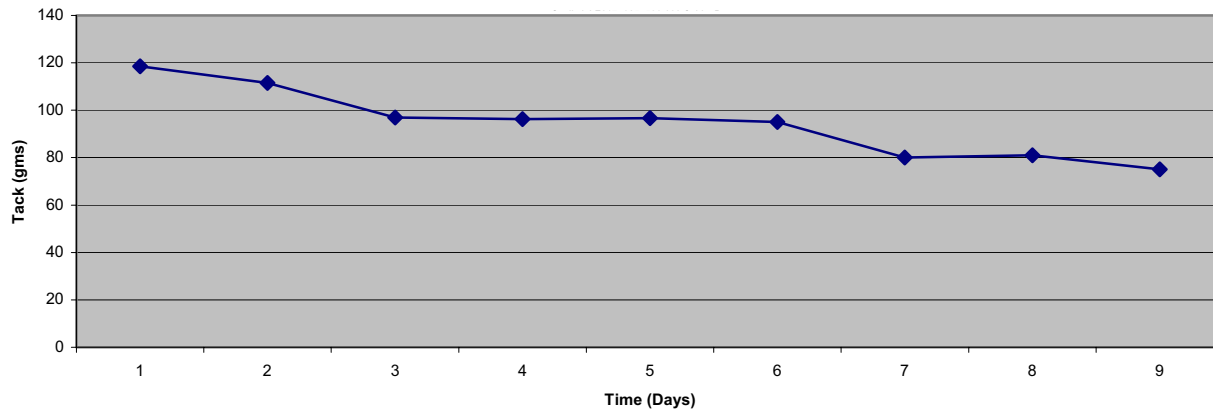
*Blades:* Metal (stainless steel) squeegee blades angled from 45-60° give the best print definition. Metal (nickel) squeegee blades angled from 45-60° give the best performance. 90 durometer polyurethane may also be used.

*Pressure:* Pressure should be adjusted at the point where the paste leaves a relatively clean stencil after each print pass. Typical pressure setting 0.6-1.5lb per linear inch of blade.

*Speed:* Normal print speeds are 1.0-2.5 (25-50mm) per second. As print speeds increase pressure will need to be increased. XP692 solder paste is capable of printing up to 6 in/sec.

### Print Definition

XP692 provides excellent print definition characterized by brick-like prints. Good release is seen on 12-9 mil apertures. Tack values are high even after extended open time in both normal and high humidity environments.



### Open & Abandon Time

Tests have proven that XP692 will perform during continuous printing for up to 10 hrs. Field test have shown that an abandon time of at least 1 hr is possible, resulting in a perfect 1st pass print on resumption of printing.

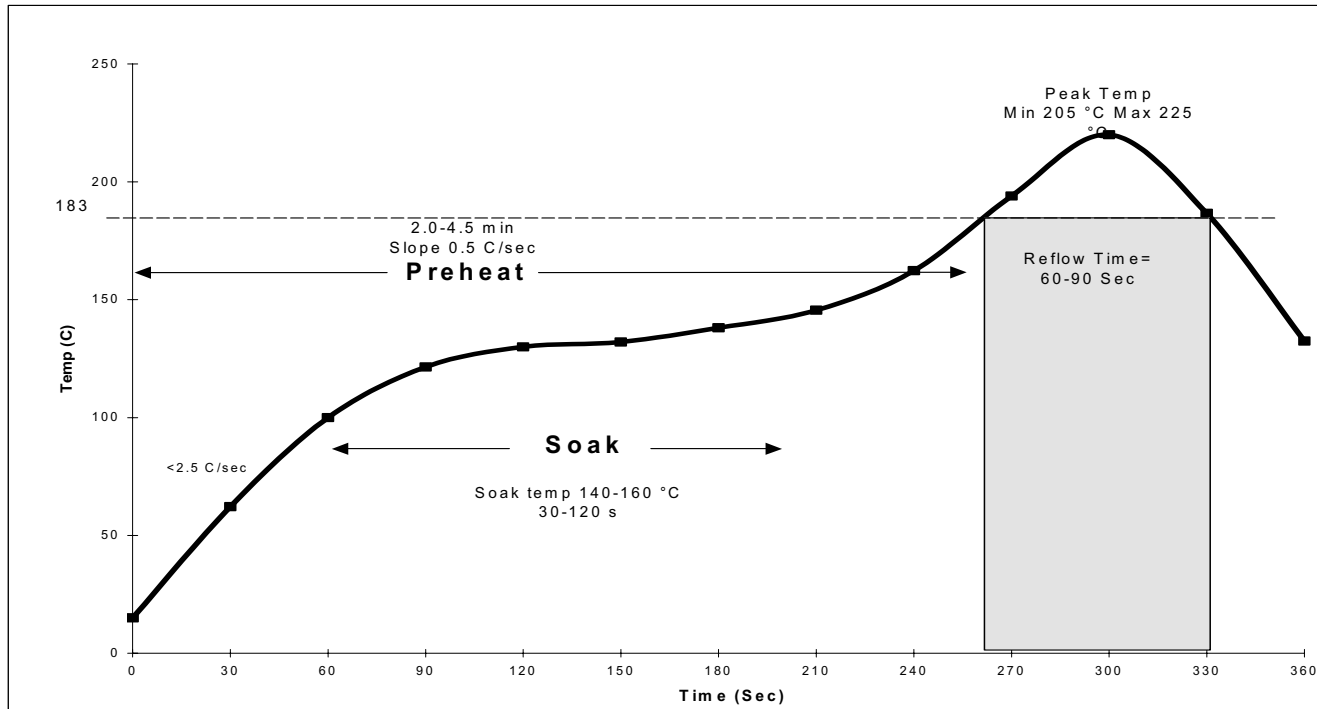
### Paste Application

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. Also, any fresh jar of solder paste should be gently mixed for at least one minute with a spatula. Be sure not to mix the paste too vigorously, as this will destroy the paste's viscosity characteristics and introduce entrapped air into the paste. The purpose of the mixing is to insure that the paste is smooth and consistent. If solder paste is supplied in cartridges pre-mixing is not necessary due to the shear action produced from the dispensing.

## Reflow

Best results have been achieved when XP692 is reflowed in a **forced air convection** oven with a minimum of 8 zones (top&bottom), however reflow is possible with a 4 zone oven (top & 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, is also referred to as the ramp zone, and is used to elevate the temperature of the PCB to the desired soak temperature. In the preheat zone the temperature of the PCB is constantly rising, at a rate that should not exceed 2.5 C/sec. The oven's preheat zone should normally occupy 25-33% of the total heated tunnel length.

**The Soak Zone-** normally occupies 33-50% of the total heated tunnel length exposes the PCB to a relatively steady temperature that will allow the components of different mass to be uniform in temperature. The soak zone also allows the flux to concentrate and the volatiles to escape from the paste.

**The Reflow Zone-** or spike zone is to elevate the temperature of the PCB assembly from the activation temperature to the recommended peak temperature. The activation temperature is always somewhat below the melting point of the alloy, while the peak temperature is always above the melting point.

## CLEANING

XP692 is a no clean formulation therefore the residues do not need to be removed for typical applications. If residue removal is desired, the use of Everkleen 1005 Buffered Saponifier with a 5-15% concentration in hot 60 °C (140 °F) will aid in residue removal.

## **Storage & Shelf Life**

It is recommended that solder paste be stored at a temperature of between 35-50 °F (2-10 °C) to minimize solvent evaporation, flux separation, and chemical activity. If room temperature storage is necessary it should be maintain between 68-77 °F (20-25 °C).

### ***Shelf life***

Unopened Container (35-50°F/2-10 °C) 6 months (from DOM)

Unopened Container (68-77°F/20-25 °C) 1 month (from DOM)

Opened Container (68-77°F/20-25 °C) 24 hours

## **Reusing Solder Paste**

This is not normally recommended, because it typically generates more problems than it is worth. If you do decide to reuse solder paste, these pointers may be helpful. First, Qualitek recommends putting any used solder paste in an empty jar, so any fresh paste will not become contaminated. This paste should be tightly sealed and refrigerated. Then, the paste may be reused at a later date, provided that the paste has not separated or thickened significantly compared to its original properties. If you have success in printing the reused paste, the paste is acceptable for use. If significant printing problems occur, discard the paste. You also may want to mix 50% "used" and 50% new to get maximum utility of the paste. This will keep the paste relatively fresh while consuming the used paste.

## **Working Environment**

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

## **Cleaning Misprint Boards**

If you should have a misprinted board, the paste may be cleaned off manually with alcohol (IPA) or Qualitek stencil cleaner, SK-11. If you have a more elaborate board cleaner, the paste may be easily removed with use of a 5% saponifier solution in hot DI water. Qualitek SK-44 saponifier could be used in this process.

## **Stencil Cleaning**

Periodic cleaning of the stencil during production is recommended to prevent any paste from being deposited in unwanted areas of the board. Without stencil cleaning, solder balling will increase. We recommend a periodic dry wipe (every 5 to 10 boards) with an occasional wet wipe (every 15 to 25 boards). When running fine pitch boards, the cleaning may need to become more frequent. The wet wipes should be performed with either alcohol or a stencil cleaner. Qualitek SK-11 stencil cleaner is designed for this purpose. When cleaning the stencil at the end of a job, the cleaning should be more thorough. If you have stencil cleaning equipment Qualitek SK- 44 Stencil Cleaner Saponifier is highly recommended for stencil cleaning purposes.

## **Disposal**

XP692 should be stored in a sealed container and disposed of in accordance with state & local authority requirements.

## **Packaging**

6 oz. Jar	250-500 gm
6 oz. Cartridge	500-700 gm
12 oz. Cartridge	1000-1400gm