



DSP 670I (Sn63/Pb37)  
NO CLEAN  
DELTA<sup>®</sup> SOLDER PASTE

**CORPORATE HEADQUARTERS** USA: 315 Fairbank St. Addison, IL • 630-628-8083 • FAX 630-628-6543

**EUROPE** UK: Unit 9 Apex Ct. Bassendale Rd. Bromborough, Wirral CH62 3RE • 44 151 334 0888 • FAX 44 151 346 1408

**ASIA-PACIFIC HEADQUARTERS** SINGAPORE: 6 Tuas South St. 5 Singapore 637790 • 65 6795 7757 • FAX 65 6795 7767

**PHILIPPINES:** Phase 1 Qualitek Ave. Mariveles, Bataan Philippines C-2106 • 6347 935 4163 • FAX 63475613717

**CHINA:** 3B/F, YiPa Print Bldg. 351 # JiHua Rd., Buji Shenzhen, China 518112 • 86 755 28522814 • FAX 86 755 28522787

This data is based on information that the manufacturer believed to be reliable and offered in good faith. Qualitek International, Inc. makes no warranties expressed or implied as to its accuracy and assumes no responsibilities and liabilities arising out of its use by others as conditions and methods of use of the products is beyond the control of Qualitek International, Inc. The user must determine the suitability of the product before using it on a commercial basis. The warranties extend only to the conformity of the product to the physical descriptions. In no event will Qualitek International, Inc. be responsible for special, incidental and consequential damages whether the claim is in contract, negligence or otherwise. Qualitek specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.

**Description**

Delta® Solder Paste 670I is a halide-free, drop in ready, no clean solder paste designed for surface mount and other electronic assembly applications. DSP 670I is a high tack formula for use in high speed component placement systems. In addition, DSP 670I leaded solder paste exhibits excellent wettability and print definition. The post soldering residues of DSP 670I are non-conductive, non-corrosive and highly insulated.

**Main Features**

- ❑ Drop in ready Sn/Pb paste
- ❑ Non-conductive residues
- ❑ Halide-free
- ❑ Excellent printing properties
- ❑ Low residue

**Technical Data**

	<b>Specification</b>	<b>Test Method</b>
<b>Flux Classification</b>	RELO	IPC-J-STD-004B
<b>Copper Mirror</b>	No removal of copper film	IPC-TM-650 2.3.32
<b>Corrosion</b>	Pass	IPC-TM-650 2.6.15
<b>SIR</b>	>1.0 x 10 <sup>8</sup> ohms	IPC-TM-650 2.6.3.3
Bellcore (Telecordia)	3.12 x 10 <sup>12</sup> ohms	Bellcore GR-78-CORE 13.1.3
<b>Electromigration</b>	Pass	Bellcore GR-78-CORE 13.1.4
<b>Metal Loading</b>	90%	IPC-TM-650 2.2.20
<b>Viscosity</b>		
Brookfield <sup>(1)</sup> , kcps	900+/-10% kcps	IPC-TM-650 2.4.34 modified
Malcom <sup>(2)</sup> , poise	1750-2050	IPC-TM-650 2.4.34.3 modified
Thixotropic Index	0.50-0.60	
<b>Slump Test</b>	Pass	IPC-TM-650 2.4.35
<b>Solder Ball Test</b>	Pass	IPC-TM-650 2.4.43
<b>Tack</b>		
Initial	68.0 gm	JIS Z 3284
Tack retention @ 24 hr	70.4 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

**Physical Properties**

**Solder Composition**

Sn63/Pb37 alloy is the conventional eutectic solder used in most electronic assemblies. Qualitek® Sn63 alloy conforms and exceeds the impurity requirements of IPC-J-STD-006C and all other relevant international standards.

<b>Typical Analysis</b>													
Sn	Pb	Al	Ag	As	Au	Bi	Cd	Cu	Fe	In	Ni	Sb	Zn
62.5-63.5	Bal.	0.005 Max	0.100 Max	0.030 Max	0.050 Max	0.100 Max	0.002 Max	0.080 Max	0.020 Max	0.100 Max	0.010 Max	0.200 Max	0.003 Max

	<b>Sn63/Pb37</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/Pb37</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 20 °C	1
Thermal Conductivity, W/m.K	50.9

**Particle Size**

Sn63 alloy is available in Type 3(45-25μm) and 4(38-20μm) 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.

**Metal Loading**

Typical metal loading for stencil printing application is **89-90 %**.

## **Printing of Solder Paste**

### **Stencil**

Use of chemical etched/electroformed stencil is preferred however DSP 670I 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 is 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. Although slower print speeds are desirable, Qualitek solder paste is capable of printing up to 6 inches per second.

### **Print Definition**

DSP 670I provides excellent print definition characterized by brick-like prints. Good release is seen on 12-9 mil apertures with print speeds in the range of 1.0-6.0 inch per second (25mm-150mm).

### **Open & Abandon Time**

Tests have proven that DSP 670I will perform during continuous printing for up to 8 hrs. Field tests have shown that an abandon time of at least 1 hr is possible, resulting in a perfect 1st pass print on resumption of printing.

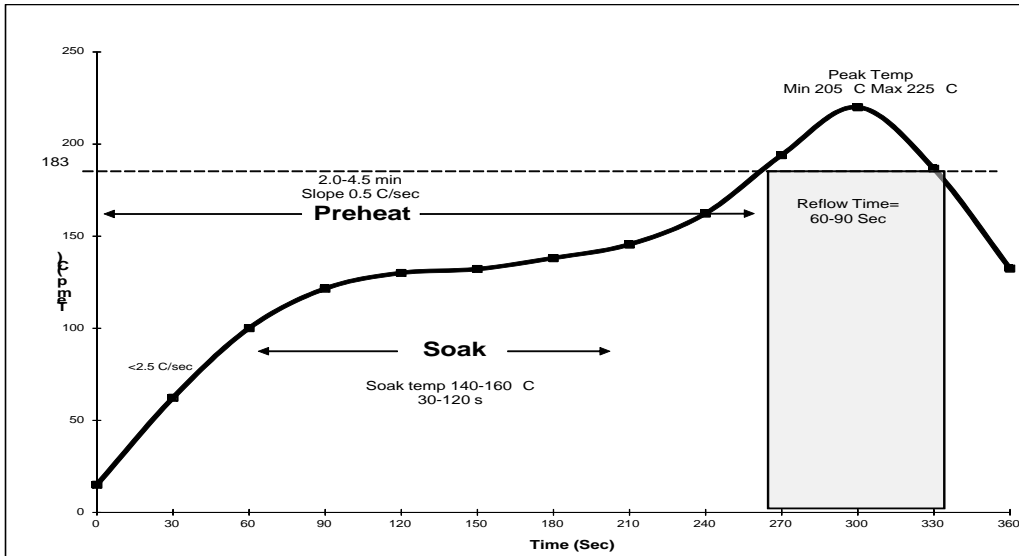
### **Paste Application**

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 degrade the paste's viscosity characteristics and introduce entrapped air into the paste. The purpose of the mixing is to ensure 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 DSP 670I 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.

**Flux Residues & Cleaning**

DSP 670I 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 Delta Solder Paste be stored at a temperature of between 35-50 °F (2-10 °C) to minimize solvent evaporation, flux separation, and chemical activity. Shelf life is 6 months from date of manufacture.

## **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.

## **Stencil Cleaning**

Periodic cleaning of the stencil during production is recommended to prevent any paste from being deposited in unwanted areas of the board and to eliminate solder balling. Qualitek offers Multi-Cleaner 1515 that may be used for this purpose. Qualitek SK- 45 Stencil Cleaner is highly recommended with stencil cleaning equipment.

## **Packaging**

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

## **Disposal**

DSP 670I should be stored in a sealed container and disposed of according to all local, regional, national and international regulations.

Delta® and Qualitek® are brands of Qualitek International, Inc. For Health and Safety information, refer to Safety Data Sheet.