



DSP 717D (Sn63/Pb37)
WATER SOLUBLE
DISPENSING DELTA®
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

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Description

Delta® Solder Paste 717D is a halogen free, water-soluble solder paste designed for surface mount applications using a syringe dispensing method. DSP 717D solder paste exhibits superior joint strength and excellent wettability. DSP 717D is available with Sn/Pb and Pb-free alloys, such as Sn96.5/Ag3.5.

Main Features

- Halogen-free
- Low foaming
- Easily dispensed
- Available with both leaded and lead-free alloys

Technical Data

	Specification	Test Method
Flux Classification	ORL0	IPC-J-STD-004B
Copper Mirror	No removal of copper film	IPC-TM-650 2.3.32
Corrosion	Pass	IPC-TM-650 2.6.15
SIR	>1.0 x 10 ⁸ ohms	IPC-TM-650 2.6.3.3
Post Reflow Flux Residue	60%	TGA Analysis
Metal Loading	87%	IPC-TM-650 2.2.20
Viscosity		
Brookfield ⁽¹⁾ , kcps	400+/-10% kcps	IPC-TM-650 2.4.34 modified
Malcom ⁽²⁾ , poise	850-1100	IPC-TM-650 2.4.34.3 modified
Slump Test	Pass	IPC-TM-650 2.4.35
Solder Ball Test	Pass	IPC-TM-650 2.4.43
Tack		
Initial	97 gm	JIS Z 3284
Tack retention @ 24 hr.	85 gm	JIS Z 3284

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.

Typical Analysis													
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

	Sn63/Pb37
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 ⁴ /ohm-cm	6.9

	Sn63/Pb37
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 ² at 0.1mm/min 20 °C	3.3
Creep Strength, N/mm ² 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 dispensing application is **86.0-87.0 %**.

Printing of Solder Paste

Dispensing

Needle Gauge	Needle inner diameter		Applicable powder (mesh cut)
	in.	µm	
18	0.033	838	-200+325
20	0.023	584	-325+500
21	0.020	508	-325+500
22	0.016	406	-325+500
23	0.013	330	-325+500
25	0.010	254	-400+635
27	0.008	203	-500

The clearance gap between the needle and the substrate affects the shape and quality of the dot dispensed. If the clearance is too little, the dot tends to be flattened out, and if too large, the dot tends to have long tailing.

Pressure

The pressure applied in the syringe should be kept at a minimum, and the proper head pressure kept in the range of 15-25 lb/in² (1.05-1.76 kg/cm²). In cases where a paste requires much higher pressure (more than 40 lb/in² or 2.82 kg/cm²) to dispense, the paste will become inconsistent and clogging may be expected. The external air pressure supply should be maintained constant.

Open & Abandon Time

DSP 717D may be used for extended time periods without paste drying out. . If extended downtime is expected (>4 hrs) , the whole dispensing system should be flushed without leaving any paste in any part of the system.

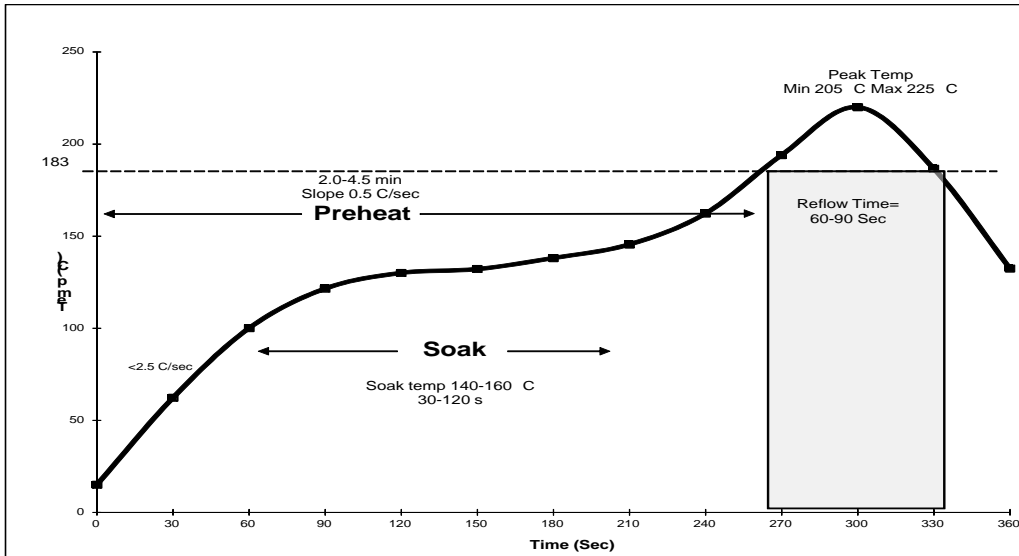
Paste Application

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 supplied in syringes pre-mixing is not necessary due to the shear action produced from the dispensing.

Reflow

Best results have been achieved when DSP 717D 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 717D is water soluble formulation, therefore, the residues need to be removed. Residue removal is easily achieved, with the use of hot 60 °C (140 °F) de-ionized water in either a batch or conveyor cleaner. Spray pressures should be maintained at 20-30 psi and conveyor speed of 3-6ft./min

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. For syringes, we recommend storage with the tips down. Shelf life is 6 months from date of manufacture.

Working Environment

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

Packaging

10cc	35 gm
30cc	100 gm

Disposal

DSP 717D 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.