

E-Qual 96TSC LEAD FREE SOLDER ALLOY

IOWA State University Research Foundation "ISURF" US Patent No: 5,527,628

- **License Paid Product**
- **An all-round, lead free alternative**
- **Proven in production use for electronics manufacturing**
- **Lowest melting, high-tin, lead-free alloy without undesirable additions**
- **Eutectic alloy (no melting range)**
- **Compatible with all flux types**

Description

E-Qual 96TSC alloy is designed to be substituted for tin/lead alloys in *all* electronics assembly soldering operations. Some adjustment to equipment settings will be required but the resulting soldered joints will perform as well as tin/lead solder joints, in most respects.

E-Qual 96TSC alloy eliminates the handling and waste management hazards due to lead for operators using conventional lead-containing alloys. Where lead has also been eliminated from other coating and soldering processes in PCB and component manufacture the use of **E-Qual 96TSC** will ensure that RoHS compliant lead-free assemblies are produced.

Temperature profiles designed for tin/lead alloys will need to be revised accordingly to cater for the melting point of **E-Qual 96TSC** being 34°C higher than that of tin/lead eutectic alloy, though the superheat needed has been found to be less than that required for tin-lead.

Physical & Mechanical Properties

	E-Qual 96TSC
Density	7.4g/cm ³
Melting Point	217°C
Electrical conductivity	0.15uΩm
Tensile Strength	52 N/mm ²
Fracture strain	27%
Creep strength (with 180°C 1kg load)	>300h

Process Parameter Guidelines

Wave soldering with contact time of 3 - 4 seconds.

PCB Type	Topside Board Temp	Solder Bath Temp Range
Single sided	100°C	250 – 260 °C
Double sided	115°C	255 - 265°C
Multilayer	130°C	260 - 270°C

For selective and dipping applications a pot temperature of 245 – 300C will be required.

Recommended Operating Conditions

To ensure the continued optimum performance of E-Qual 96TSC solder in your manufacturing process it is important that periodic analysis of the solder bath contents is undertaken to verify that the alloy composition is maintained within strict limits. Any build-up of undesirable impurity elements or an increase in the copper content may lead to poor flow characteristics potentially compromising joint structure, with a consequent rise in defect rates.

Verification of bath copper content is easy with our free solder bath analysis programme which gives you full analysis along with trend graphs allowing you to track copper and other contaminant levels over time.

In most applications rising copper levels can be controlled by topping-up bath levels with **E-Qual 96TS** copper-free alloy. If dilution of impurity levels with the top-up alloy is not sufficient to maintain levels within recommended limits then a partial drain of the solder bath and replacing with fresh solder may be required.

E-Qual 96TSC Specification/Operating Guidelines

Element	Typical E-Qual 96TSC	Typical E-Qual 96TS	Max Suggested Impurity levels
Tin (Sn)	Bal	Bal	Bal
Silver (Ag)	3.8 ± 0.2	3.8 ± 0.2	<3.5 – <4.5
Copper (Cu)	0.7 – 0.85	<0.02	<0.65 - >1.25
Zinc (Zn)	0.0001 – 0.001	0.0001 – 0.001	>0.003
Nickel (Ni)	0.0001 – 0.008	0.0001 – 0.008	>0.025
Antimony (Sb)	0.02 – 0.03	0.02 – 0.03	>0.05
Lead (Pb)	0.01 – 0.04	0.01 – 0.04	>0.10
Cadmium (Cd)	0.0001 – 0.001	0.0001 – 0.001	>0.002
Bismuth (Bi)	0.002 – 0.015	0.002 – 0.015	>0.05
Iron (Fe)	0.001 – 0.01	0.001 – 0.01	>0.015
Arsenic (As)	<0.0025	<0.0025	>0.02
Aluminium (Al)	0.0002 – 0.0005	0.0002 – 0.0005	>0.002
Gold (Au)	0.0002 – 0.002	0.0002 – 0.001	>0.08

Manufacturing Control

All **E-Qual 96TSC** bar solders are made with fully traceable batches of virgin metals within a Quality Management System that has been approved to BS.EN.ISO9001:2000 and Environmental Management System approved to BS.EN.140001. Samples are retained from every batch of solder for a minimum two year period.

Availability

STYLE	NOM. WEIGHT	DIMENSIONS	PACKING
Bar	1kg	300 x 32 x 12mm	20kg Carton
Autofeed Ingot	4kg	500 x 45 x 33mm	Ingot
Chunks (chopped bar)	-	-	20kg Tub

Please contact us with any specific non standard bar or ingot size to check on availability.

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