



E-Qual 96TSC LEAD FREE SOLDER ALLOY (ISURF US Patent No. 5,527,628)

- Licence 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)

Applications

E-Qual 96TSC alloy is designed to be substituted for tin/lead alloys in 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.

Recommended Operating Conditions

E-Qual 96TSC is a proprietary alloy of composition 95.5% tin/3.8% silver/0.7% copper. It may be regarded as a refinement of the established Sn96.5/Ag3.5 (Sn96, 96S) binary eutectic alloy. Although many solutions have been proposed to meet the requirements for a lead free alloy to replace standard tin-lead solders, E-Qual 96TSC offers significant benefits to users over the main alternatives, as indicated in the following comparison table:

Alternative Alloy	Potential problems in implementation
Tin-Copper eutectic	Viable option but poorer wetting characteristics, and inferior mechanical properties.
Tin-Silver eutectic	Viable option but higher melting temperature than TSC and no inhibition to copper dissolution.
Tin-Antimony	Suitable for engineering soldering but melting temperature too high for electronics assembly.
Tin-Silver-Copper-Antimony	Antimony addition has no proven value and raises melting point.

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.

Technical Specification

Test data indicate that the physical and mechanical properties and wetting behaviour of E-Qual 96TSC alloy are comparable to those of tin/lead eutectic or near eutectic alloys, and in most cases considerably improved over other lead-free alloys.

Alloy Composition:

Element	Typical Content %	Maximum Content %
Zn	0.0005	0.001
Al	0.0002	0.001
Cd	0.0003	0.001
Au	0.0005	0.001
Ni	<0.001	0.005
Fe	0.004	0.008
As	0.005	0.01
In	0.004	0.01
Pb	0.02	0.05
Sb	0.02	0.05
Bi	0.002	0.01
Cu	0.7 ± 0.1	
Ag	3.8 ± 0.2	
Sn	Remainder	

Physical and mechanical properties of E-Qual 96TSC alloy compared to other lead-free alloys and Sn63Pb37

Property	E-Qual 96TSC	Sn63 Pb37	Sn96.5 Ag3.5	Sn99.3 Cu0.7
Melting Point	°C	217	183	221
	°F	423	361	430
Electrical conductivity, %IACS	13	11.9	14	-
Electrical resistivity, $\mu\Omega\text{cm}$	13	14.5	12.3	-
Brinell hardness, HB	15	17	15	-
Density, g mm ³	7.5	8.4	7.5	7.3
Tensile strength, 20°C N mm ⁻² at 0.004s ⁻¹ strain rate	48	40	58	-
Joint shear strength N mm ⁻² at 0.1mm min ⁻¹ , 20°C	27	23	27	23
	N mm ⁻² at 0.1mm min ⁻¹ , 100°C	17	14	17
Creep strength + N mm ⁻² 20°C	13.0	3.3	13.7	8.6
	N mm ⁻² 100°C	5.0	1.0	5.0

+ Shear stress for 10³ hours to failure

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 EN140001. Samples are retained from every batch of solder for a minimum three 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	-	-	15kg Carton

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

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