

SOLDER CONNECTION

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QUALITEK® Technical Bulletin

Delta WS700 SAC305 Water Soluble Solder Wire

DESCRIPTION

WS700 is a Lead-free water soluble cored solder wire designed for electronic applications. WS700 has rapid wetting action and flux residues are easily removed with water rinse or in-line cleaning systems. WS700 cored solder wire will not decompose or carbonize under prolonged heat. WS700 meets IPC-J-STD-004B specifications.

FEATURES AND BENEFITS

- Excellent wettability
- Flux does not carbonize or decompose under prolonged heat
- Residues easily removed with water
- RoHs compliant

FEATURES AND BENEFITS

Colour & Appearance	Specification	Test Method
Flux Classification	Pale yellow opaque solid	Visual
Copper Mirror	ORH1	J-STD-004
Silver Chromate	Complete removal of copper film	IPC-TM-650 2.3.32
Corrosion	Fail	IPC-TM-650 2.3.33
SIR	Pass (cleaned coupons)	IPC-TM-650 2.6.15
JSTD-004, Pattern Down	1.49 x 10 ¹⁰	IPC-TM-650 2.6.3.3
Post Reflow Flux Residue	65%	TGA Analysis
Acid Value (mgKOH/g sample)	160 - 180	IPC-TM-650 2.3.13
Flux Residue Dryness	Pass	IPC-TM-650 2.4.47
Spitting of Flux-Cored Solder	0.4%	IPC-TM-650 2.4.48
Solder Spread	120 mm ²	IPC-TM-650 2.4.46

WIRE DIAMETER

Delta Solder Wire WS700 tin/silver/copper alloys is available in a variety of diameters. The chosen diameter is based on application methods, pad size, and desired solder joint volume. Generally, the diameter of the wire should be slightly larger than the width/diameter of the joint or connection to be soldered. Below is a list of standard diameters.

Diameter/Inch	0.125	0.092	0.062	0.050	0.040	0.032	0.028	0.025	0.020	0.015	0.010
Diameter/mm	3.18	2.33	1.57	1.27	1.01	0.81	0.71	0.63	0.51	0.38	0.25
Std.Wire Gauge	11	13	16	18	19	21	22	23	25	28	31
Tolerance, in.	+/-0.006	+/-0.005	+/-0.003	+/-0.003	+/-0.002	+/-0.002	+/-0.002	+/-0.002	+/-0.002	+/-0.002	+/-0.002

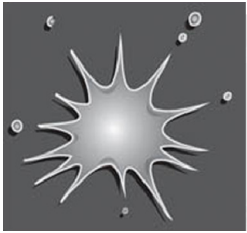
FLUX PERCENTAGE

Utilizes a state-of-the-art automatic wire extrusion and wire drawing machines to manufacture consistent solder. The introduction of flux core in the wire extrusion process involves continual monitoring of flux percentage to ensure minimal flux voids and irregular wire. Typical flux percentage for high temperature lead-free SAC-containing alloy solder is 1.1 – 3.3%.

PHYSICAL PROPERTIES

A water-washable based core flux within tin/silver/copper (SAC) alloys. SAC alloys conform to and exceed the impurity requirements of IPC-J-STD-006C.

Issue 1 - 25/02/20



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TYPICAL ANALYSIS

Typical Analysis														
	Sn	Ag	Cu	Pb	Sb	Bi	In	As	Fe	Ni	Cd	Al	Zn	Au
LF955-38	Bal	3.6-4.0	0.5-0.9	0.070 Max	0.200 Max	0.100 Max	0.100 Max	0.030 Max	0.020 Max	0.010 Max	0.002 Max	0.005 Max	0.003 Max	0.050 Max
LF958-35	Bal	3.3-3.7	0.5-0.9	0.070 Max	0.200 Max	0.100 Max	0.100 Max	0.030 Max	0.020 Max	0.010 Max	0.002 Max	0.005 Max	0.003 Max	0.050 Max
LF965-30	Bal	2.8-3.2	0.3-0.7	0.070 Max	0.200 Max	0.100 Max	0.100 Max	0.030 Max	0.020 Max	0.010 Max	0.002 Max	0.005 Max	0.003 Max	0.050 Max
LF217	Bal	3.8-4.2	0.3-0.7	0.070 Max	0.200 Max	0.100 Max	0.100 Max	0.030 Max	0.020 Max	0.010 Max	0.002 Max	0.005 Max	0.003 Max	0.050 Max

	Sn/Ag/Cu	Sn63/Pb37
Melting Point, °C	217-221	183 E
Hardness, Brinell	15HB	14HB
Coefficient of Thermal Expansion	Pure Sn= 23.5	24.7
Tensile Strength, psi	4312	4442
Density, g/cc	7.39	8.42
Electrical Resistivity , (μohm-cm)	13.0	14.5
Electrical Conductivity, %IACS	16.6	11.9

	Sn/Ag/Cu	Sn63/Pb37
Yield Strength, psi	3724	3950
Total Elongation,%	27	48
Joint Shear Strength, at 0.1mm/min 20 °C	27	23
Joint Shear Strength, at 0.1mm/min 100 °C	17	14
Creep Strength, N/mm ² at 0.1mm/min 20 °C	13.0	3.3
Creep Strength, N/mm ² at 0.1mm/min 100 °C	5	1
Thermal Conductivity, W/m.K	58.7	50.9

FLUX RESIDUES & CLEANING

WS700 is a water-soluble formulation; therefore, the residues must be removed for typical applications. Residue removal is easily achieved, with the use of hot 60 °C (140 °F) de-ionized water in either a batch or conveyor-style cleaner. Spray pressures so be maintained at 20-30 psi and conveyor speed of 3-6ft/min.

STORAGE & SHELF LIFE

Solder wire storage should be in a 65-80 °F environment away from direct heat. We recommend using gloves when handling solder wire directly. Solder wire has an indefinite shelf life.

DISPOSAL

SAC alloy WS700 lead-free solder should be disposed of in accordance with federal, state & local authority requirements.

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