



NC611 (Sn/Ag/Cu)
NO CLEAN LEAD-FREE
DELTA[®] SOLDER WIRE

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

Flux Core

Qualitek has developed new NC611, which is a no clean solder, specifically designed for lead-free applications. NC611 has improved activity over other no clean solder wire for fast spreading action. NC611 has a clear residue and is shown to have virtually no spattering. NC611 is available with several SAC alloys, such as SAC305 and SAC405.

Main Features

- Designed for lead-free applications
- Improved activity
- Clear residue
- Low spattering

Technical Data (Flux Extract)

Specification	Test Method
Color & Appearance	Visual
Flux Classification	J-STD-004
Copper Mirror	IPC-TM-650 2.3.32
Silver Chromate	IPC-TM-650 2.3.33
Corrosion	IPC-TM-650 2.6.15
SIR	
J-STD-004, Pattern Up	IPC-TM-650 2.6.3.3
Post Reflow Flux Residue	TGA Analysis
Acid Value (mgKOH/g)	IPC-TM-650 2.3.13
Flux Residue Dryness	IPC-TM-650 2.4.47
Spitting of Flux-Cored Solder	IPC-TM-650 2.4.48
Solder Spread	IPC-TM-650 2.4.46

Wire Diameter

Delta Solder Wire NC611 with 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.

Standard wire 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

Qualitek 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

Solder Composition

Qualitek has developed a no clean resin based core flux, NC611, with tin/silver/copper (SAC) alloys. Qualitek SAC alloys conform to and exceed the impurity requirements of IPC-J-STD-006C.

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

NC611 is a no clean formulation; therefore, residue removal is not required 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) de-ionized water will aid in residue removal.

Storage & Shelf Life

Delta® Solder Wire should be stored in a dry environment away from direct heat. We recommend using gloves when handling solder wire directly. Solder wire has an indefinite shelf life.

Disposal

SAC alloy NC611 lead-free solder should be disposed of in accordance with federal, state & local authority requirements.

Packaging

Qualitek flux-core wire and solid wire are packed in

12.5lb -box of ½ lb spools
25 lb -box of 1 lb spools
12.5kg -box of ½ kg spools
8 kg -box of 1kg spools
40 lb -box of 5 lb spools
20 lb -box of 20 lb spools