



MATERIAL APPLICATION & SAFETY DATASHEET



Product Name:

Autosol High Speed Cored Solder Wire for Manual and Automated Soldering

Manufactured By:

Warton Metals Limited
Grove Mill Commerce Street
Haslingden Lancashire BB4 5JT
ENGLAND

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Description

Autosol is a unique flux "core" contained in Warton's High Purity Solder Wire. Autosol is a precision manufactured solder wire dedicated for manual (hand soldering), automated and high speed soldering applications. Autosol is available in three flux formulations:- SRA (1% Halide), RA (0.5% Halide) & RMA (Trace Halide). All three formulations offer efficient soldering of Copper, Brass, Nickel and Zinc. Applications include lamp and Component technology and sensitive electronic assembly. Autosol is available in all Warton High Purity Solder Alloys and offers three

flux percentages to allow the user to balance flow rate with residue

levels. All flux residues are clear and conform with the most stringent of international and commercial specifications.

High Purity Solder Alloy

Standardisation is important to reduce variety and to promote the quality of products by defining features and characteristics governing their fitness for purpose. The standards promote clear unambiguous communication between purchasers and suppliers for quotation ordering and supply purposes. In 1994 a single European standard, EN 29453 (ISO 9453), superseded all other European national standards, BS 219, DIN 1707, NFC 90-550. Other equivalent international standards include QQS 571E, ASTM B32 and JIS-Z-3382.

Warton Part No:	EN 29453	QQS 571E	BS 219 *DIN 1707
63/37	1a	Sn63Pb37	AP
60/40	2a	Sn60Pb40	KP
50/50	3a	Sn50Pb50	F
45/55	4	-	R
40/60	5	Sn40Pb60	G
35/65	6	Sn35Pb65	H
30/70	7	Sn30Pb70	J
20/80	-	Sn20Pb80	V
15/85	-	-	W
99C	23	-	99C
97C	24	-	-
Alloy No 1	26	-	*Sn50PbCu
Alloy No 2	25	-	*Sn60PbCu2
HMP 5S	34	-	5S
LMP 62S	30	Sn62Pb36Ag2	62S
96S	28	Sn96Ag04	96S
95A	18	Sn95Sb5	95A
TLS/5	-	-	-
TSC	-	-	-
Sn10Pb88Ag2	-	-	-
SAC3	-	-	-
SAC2	-	-	-
SAC1	-	-	-

The table above illustrates the equivalent **Warton High Purity Solder Alloy** in relationship to EN 29453, QQS-571E, BS-219 and DIN-1707. **Warton Autosol** is available in all **Warton High Purity Solder Alloys** including: Improved quality 63/37, Non toxic (lead free), Low melting point alloys, High melting point alloys and all alloys to EN 29453, BS 219, DIN 1707 & QQS 571E.

Typical batch analysis: High Purity Tin.

Sn	Sb	Pb	Cu	Zn
99.95	0.009	0.002	0.0002	0.0001
Fe	As	Ag	Bi	In
0.002	0.002	0.0001	0.0001	0.0003

Typical batch analysis: High Purity Lead.

Sn	Sb	Pb	Cu	Zn
0.001	0.002	99.99	0.003	0.0001
Fe	As	Ag	Bi	In
0.002	0.0005	0.002	0.005	0.0003

Typical batch analysis: Warton High Purity 63/37.

Sn	Sb	Pb	Cu	Zn
63.0	0.0095	rem	0.0007	0.0002
Fe	As	Ag	Bi	In
0.002	0.001	0.0005	0.0003	0.0003

Warton High Purity 63/37 offers the final step in production consistency and no clean solder alloy technology. These consistent high standards apply to all **Warton High Purity Solder Alloys**.

Solder Alloys Containing Lead

Warton Part No	Sn % Tin	Pb % Lead	Cu % Copper	Ag % Silver	Sb % Antimony
63/37	62.5-63.5	Rem	-	-	-
60/40	59.5-60.5	Rem	-	-	-
50/50	49.5-50.5	Rem	-	-	-
45/55	44.5-45.5	Rem	-	-	-
40/60	39.5-40.5	Rem	-	-	-
35/65	34.5-35.5	Rem	-	-	-
30/70	29.5-30.5	Rem	-	-	-
20/80	19.0-20.0	Rem	-	-	-
15/85	14.0-15.0	Rem	-	-	-
Alloy No 1	49.5-50.5	Rem	1.2-1.6	-	-
Alloy No 2	59.5-60.5	Rem	1.6-2.0	-	-
HMP 5S	4.8 - 5.2	Rem	-	1.2-1.8	-
LMP 62S	61.5-62.5	Rem	-	1.8-2.2	-
TLS/5	4.8-5.2	Rem	-	0.8-1.2	-
Sn10Pb88Ag2	10	88	-	2	-

Lead Free Solder Alloys

In response to increasing environmental awareness and the drive for new legislation (forcing greater end of product life responsibility), Warton Metals offer a complete range of 'lead free' alloys to suit all applications. See table below.

Warton Part No	Sn % Tin	Cu % Copper	Ag% Silver	Sb % Antimony
99C	Rem	.45 - .9	-	-
97C	Rem	2.5-3.5	-	-
96S	Rem	-	3.5-4.0	-
95A	Rem	-	-	4.5-5.5
TIN	100	-	-	-
TSC	95.5-96	0.5-1	3.3-4	-
SAC3	Rem	0.5-0.7	2.8-3.2	-
SAC2	Rem	0.5-0.7	1.8-2.2	-
SAC1	Rem	0.5-0.7	0.3	-

Rem – Remainder

Apart from the purity of the solder alloy, other important properties when selecting the correct alloy are the working temperatures and the ultimate strength of the soldered joint.

The following table shows both working temperatures and ultimate tensile strength of Warton material. The table indicates that a maximum in tensile strength exists in the eutectic composition. The ultimate tensile strengths listed refer to the bulk solder. The values are only a guide to the relative strength of identical joints

made with the solder alloys at room temperature. The table should not be used to calculate exact joint strengths, which depend on a number of factors.

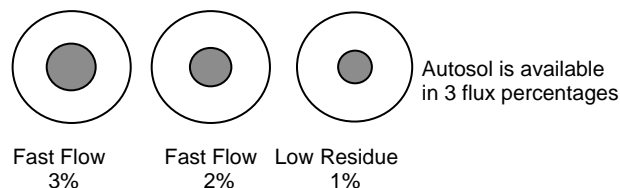
Warton Part No	Melting range °C	Min junction temp °C	N/mm ²	Tons/In ²
63/37	183	245	67	4.3
60/40	183-188	248	48	3.1
50/50	183-212	272	47	3.1
45/55	183-224	284	47	3.1
40/60	183-234	294	47	3.1
35/65	183-244	304	-	-
30/70	183-255	315	49	3.2
20/80	183-275	335	51	3.3
15/85	227-288	348	49	3.2
95A	236-243	303	31	2.0
97C	230-250	310	-	-
Alloy No. 1	183-215	275	55	3.5
Alloy No.2	183-190	250	-	-
HMP 5S	296-301	361	36	2.3
LMP 62S	179	239	92	5.9
96S	221	281	54	3.5
TLS/5	296-301	361	-	-
TSC	217	-	-	-
Sn10Pb88Ag2	268-290	-	-	-
SAC3	217-219	-	-	-
SAC2	217-219	-	-	-
SAC1	217-219	-	-	-

Autosol Flux Type

Flux Name	Flux Type	Halide Max. %	Specification IPC J STD 004
Autosol SRA	HA	1	ROM1
Autosol RA	RA	0.5	ROM1
Autosol RMA	RMA	Trace	ROL1

Autosol Flux Percentage

Warton Autosol is available with three variations of flux percentage (3% - 1%) offering an improved level of control and greater flexibility when balancing the level of residue after soldering and the speed at which the solder will flow.



Wire gauge (Diameter)

The wire gauge (diameter) for **Warton Autosol** is represented as swg (Standard wire gauge). The equivalent imperial and metric values are shown below.

Swg	10	11	12	13	14	16	18	19
mm	3.25	2.95	2.64	2.34	2.03	1.63	1.22	1.02
Inch	0.128	0.116	0.104	0.092	0.080	0.064	0.04	0.040

Swg	20	21	22	24	26	28	30	32
mm	0.914	0.813	0.711	0.599	0.457	0.376	0.315	0.274
Inch	0.036	0.032	0.028	0.022	0.018	0.014	0.012	0.010

Packaging

Automated & High Speed Soldering supplied on 0.25Kg, 0.5Kg, 2.5Kg, 3Kg, 5Kg, 10Kg, 15Kg and 25Kg reels.

Material Safety Datasheet

Autosol Cored Solder Wire

(All alloys, gauges and flux percentages)

Section 1. Identification of the substance / preparation and of the company / undertaking	
Product Name:	Autosol Cored Solder Wire For Automated & High Speed Soldering
Manufactured By:	Warton Metals Limited Grove Mill, Commerce Street. Haslingden. Lancashire. BB4 5JT. ENGLAND.
Emergency Telephone:	+ 44 (0)1706 218888
Emergency Fax:	+44 (0)1706 221188
Warton's product coding system precisely defines the features of a particular type of solder wire. For example: Autosol Fast Flow 2% 63/37 22 swg No Clean Cored Solder. 'Autosol' denotes the product name and flux type, 'Fast Flow 2%' is the percentage of flux in the wire, '63/37' is the alloy (please see table below) and '22swg' is the standard wire gauge size.	

Section 2. Composition / Information on Ingredients					
Flux cored solder wire is considered to be an article and is not subject to the classification (Hazard Information and Packaging for Supply) Regulations 1994, because it is not hazardous as supplied. However this product may be hazardous in use and the information in this datasheet - reflects the hazards associated with the solder reflow operations.					
Ingredient	CAS No:	Classification Symbol	Risk phrases	Safety Phrases	% Present
Lead (dusts, heated vapours, fumes).	7439-92-1	T	20/22-33-61		See alloy table below
Modified Rosins approx 99% in flux	8050-09-7	Xn	42/43	dependent on flux %	
R20/22 - Harmful by inhalation and if swallowed.					
R33 - Danger of cumulative effects.					
R42/43 - May cause sensitisation by inhalation and skin contact.					
R61 - May cause harm to unborn child.					
Please use table below to determine the elements present in the alloy.					
Warton Part No	Tin (Sn) %	Lead (Pb) %	Copper (Cu) %	Silver (Ag) %	Antimony (Sb) %
63/37	62.5-63.5	Rem	-	-	-
60/40	59.5-60.5	Rem	-	-	-
50/50	49.5-50.5	Rem	-	-	-
45/55	44.5-45.5	Rem	-	-	-
40/60	39.5-40.5	Rem	-	-	-
35/65	34.5-35.5	Rem	-	-	-
30/70	29.5-30.5	Rem	-	-	-
20/80	19.0-20.0	Rem	-	-	-
15/85	14.0-15.0	Rem	-	-	-
99C	Rem	-	.45 - .9	-	-
97C	Rem	-	2.5-3.5	-	-
Alloy No 1	49.5-50.5	Rem	1.2-1.6	-	-
Alloy No 2	59.5-60.5	Rem	1.6-2.0	-	-
HMP 5S	4.8 - 5.2	Rem	-	1.2-1.8	-
LMP 62S	61.5-62.5	Rem	-	1.8-2.2	-
96S	Rem	-	-	3.5-4.0	-
TLS/5	4.8-5.2	Rem	-	0.8-1.2	-
95A	Rem	-	-	-	4.5-5.5
TSC	95.5-96	-	0.5-1	3.3-4	-
Sn10Pb88Ag2	10	88	-	2	-
SAC3	Rem	-	0.5-0.7	2.8-3.2	-
SAC2	Rem	-	0.5-0.7	1.8-2.2	-

Section 3. Hazards Identification	
	Inhalation of the flux fumes given off at soldering temperatures will irritate the nose and throat. Repeated or prolonged exposure to flux fumes may cause an allergic reaction leading to occupational asthma. Solder alloys containing lead give off negligible lead fume at normal soldering temperatures and at temperatures up to 500°C. Lead is harmful if absorbed into the body and can cause birth defects and other reproductive harm.

Section 4. First Aid Measures	
Inhalation:	Flux fumes emitted during soldering will irritate the nose and throat and may cause an asthmatic type reaction. Remove affected person to fresh air, obtain medical attention if there is any respiratory distress.
Skin Contact:	Rosin and rosin derivatives can cause a rash to develop. If any skin irritation develops seek medical advice. Wash hands with soap and warm water after handling solder wire.
Eye Contact:	Flux fumes may irritate the eyes. The flux may spit during soldering. Flush immediately with plenty of water, ensure that the eyeball and the inside of the eyelids are properly bathed by gently prising open the eyelids.
Ingestion:	Not relevant

Section 11. Toxicological Information (toxic effects arising from exposure based on experimental and non experimental data)	
Acute Toxicity:	The flux fumes produced during soldering will irritate the nose and throat. For personnel that have become sensitised to rosin fumes, exposure can cause symptoms of asthma attacks of wheezing), chest tightness and breathlessness - alveolitis breathlessness and flu like symptoms), or rhinitis and conjunctivitis (runny or stuffy nose and watery or prickly eyes typical of hay fever). Rosin can also cause sensitisation by skin contact causing dermatitis.
Chronic Toxicity:	Lead can cause weakness, vomiting, loss of appetite, convulsions and stupor. Prolonged and / or repeated exposure to flux fumes may cause some workers to develop an allergic reaction to them (become sensitised).
Reproductive Toxicity:	Lead can cause weakness, insomnia, hypertension, headaches and pains in the joints. Chronic exposure to lead may result in damage to the blood - forming, nervous, urinary and reproductive systems. Lead is classified as a 2B carcinogen by the IARC (1987). Evidence for carcinogenicity is adequate in animals but inadequate in humans.
LD50 (Oral rat):	The placenta offers no barrier to the transport of lead from the mothers blood stream to that of the foetus. Modified rosin >2500mg/Kg.

Section 12. Ecological Information	
(Possible environmental effects and behaviour /ODP/aquatic toxicity):	Lead is not degradable and will persist in the environment. Lead is insoluble in water and is not attacked by most inorganic acids and bases. (See section 13. Disposal Considerations).

Section 13. Disposal Considerations	
(Safe disposal of product, its residues and packaging materials):	Waste solder wire (if any) should be put in metals tins and returned to Warton for disposal. Disposal should be in accordance with the relevant local and national legislation. In the UK this is the Control Of Pollution Act 1974, the Environmental Protection Act 1990 and regulations made under them. See also Sections 7 & 8 for handling precautions and personal protection where applicable.

Section 14. Transport Information	
	Solder Wire is not classified as hazardous for transportation.

Section 15. Regulatory Information	
	Flux cored solder wire is considered to be an article and is not subject to the classification (Hazard Information and Packaging for Supply) Regulations 1994, because it is not hazardous as supplied. However this product may be hazardous in use and the information in this datasheet - reflects the hazards associated with the solder reflow operations.

Section 16. Other Information	
Recommended uses and restrictions: Publications references:	Use only as directed. Compiled in accordance with CHIP 2 Regulations 1994. HSE Approved Code Of Practise, document L62. Dangerous Substances Directive 57/548/EEC as amended by directive 92/32/EEC. Dangerous Preparations Directive 88/379/EE as amended by Directive 90/492/EEC Lead at Work Directive 82.605/EEC. The Health & Safety at Work Act 1974. The Control Of Lead at Work Regulations 1980. The Control of Substances Hazardous to Health Regulations 1994. The Management of Health and Safety at Work Regulations 1992. The Management of Health and Safety at Work (Amendment) Regulations 1994. HS (G) 37: An Introduction to Local Exhaust Ventilation. HS (G) 53: Respiratory Protective Equipment - A practical guide for users. HS (G) 65: Successful Health & Safety Management's. HS (G) 97: A Step by step Guide to the Coshh Regulations. EH26: Occupational Skin Diseases: health and safety Precautions. EH40: Occupational exposure limits. Revised annually. MS24: Health Surveillance of Occupational Skin Disease. MS25: Medical aspects of occupational asthma. IND (G) 95 (L) Respiratory Sensitises: A Guide For Employers. Health Surveillance under COSHH: Guidance for employers Approved Code of Practise - Management of Health & Safety at Work.

Section 17. Revision Dates	
Revised Date / Initials: Replacing: Legend:	June 2010 / vhw All previous health and safety datasheets N/A = Not applicable or available at time of printing. N/D = Not determined or not determinable. Est. = Estimated Rem= Remainder

The information and recommendations on this sheet relate to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. The information is given in good faith and the best of Warton Metals Ltd knowledge, information and believed accurate and reliable at the time of preparation. Nothing herein is to be construed as a guarantee, express or implied in all cases it is the responsibility of the user to determine the applicability of this information or the suitability of the products for his own particular purposes.
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