Technical Datasheet

WARTON METALS LIMITED

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 In 1994 a single European standard, EN 29453 (ISO 9453), superseded all other European national standards, BS 219, DIN 1707, NFC 90-550.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	-	-	-

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 cl ean 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 enviro nmental awareness and the drive f or new legislation (forcing greater end of product life respons ibility), Warton Metals offer a complete range of `lead free' alloys to suit all appl ications. 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	-

Apart from the purity of the solder al loy, other important properties when s electing the correct alloy are the working tem peratures and the ultimate strength of the soldered joint.
The following table shows both work ing temperatures and ultimate tensile str ength of Warton material. The table indicates that a maximum in tensile strength exis ts in the eutectic composition. The ultimate tens ile strengths listed refer to the bulk solder. The values are on ly a guide to the relative strength of identical joints made with the solder alloys at room temper ature. The table should not be used to calculate exac t joint strengths, which depend on a number of factors.

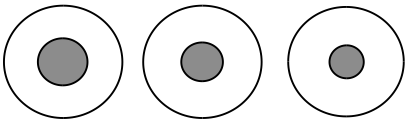
War ton Part No	Melting range °C	Min junction temp °C	N/mm²	Tons/In ²
63/37	183	245	67	4.3
60/40	183-188	248	48	3.1
50/50	183-212	272	47	3.1
45/55	183-224	284	47	3.1
40/60	183-234	294	47	3.1
35/65	183-244	304	-	-
30/70	183-255	315	49	3.2
20/80	183-275	335	51	3.3
15/85	227-288	348	49	3.2
99C	227	287	-	-
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	-	-	-

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 var iations of flux percentage (3% - 1%) offering an improved level of control and gr eater flexibility when balancing the level of residue af ter soldering and the speed at which the solder will flow.



Autosol is available in 3 flux percentages

Fast Flow 3% | Fast Flow 2% | Low Residue 1%

Wire gauge (Diameter)

The wire gauge (diameter) for Warton Autosol is represented as swg (Standard wire gaug e). The equivalent imperial and metr ic 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 Health & Safety Datasheet

WARTON METALS LIMITED

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. Compos ition / Inf ormation 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 b e 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:	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	-

Section 3. Hazards Identification	
	Inhalation of the flux fumes given off at soldering temperatures will irritate the nose and throat. Repeated or pro longed exposure to flux fumes may cause an allergic reaction leading to occupational asthma. Solder alloys containing lead give of negligible lead fum e at normal soldering temperatures and at temperatures up to 500ºC. 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 asthmat ic 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 devel op. If any skin irritation develops seek m edical 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 5. Fire Fighting Measures	
Suitable extinguishing media:	Dry chemical, carbon dioxide, water spray or foam.
Do not use:	Water jet
Exposure hazards:	High temperatures above 500ºC may produce heavy metal dust, fumes and/or vapours. The medium will give rise to irritating fumes.
Protective measures:	Fire fighters should wear full protective clothing and breathing apparatus operated in positive pressure mode.

Section 6. Accidental Release Measures	
Personal precautions:	Refer to Section 8, Personal Protection.
Environmental precautions:	Refer to Section 13, Disposal.
Methods of clearing up:	Place in closed container for subsequent disposal.

Section 7. Handling & Storage	
Handling:	The fumes produced during use should be extracted away from the breathing zone of the operators. Ensure that the general area is well ventilated. Wash the hands with soap and warm water after handling soldering products, particularly before eating and drinking or smoking.
Storage:	These products should be stored in a cool dry area. Keep out of the reach of children and away from food and drink.

Section 8. Exposure Controls & Personal Protection		
Maximum Exposure Limits (MEL's) :-		
Substance:	Long Term Exposure Limits (8 Hour TWA)	Short Term Exposure Limit (15 min)
Rosin based solder flux fume	0.05 mg/m³	0.15 mg/m³ Sen
Lead *	0.15 mg/m³	-
Personal Protection: -		
Respiratory protection:	Necessary if there is a risk of exposure to high concentrations of flux fumes.	
Eye Protection:	Operators should wear safety goggles to protect the eyes from spitting flux.	
Skin Protection:	Suitable work wear should be worn to protect clothing. For blood lead monitoring and medical surveillance requirements, refer to the HSC Approved code of Practise supporting the Control of Lead at Work Regulations. Employees should be under medical surveillance if the risk assessment made under the Control of lead at Work regulations indicate they are likely to be exposed to significant concentrations of lead, or if an employment medical adviser or appointed doctor certifies that an employee should be under medical surveillance. A woman employed on work which exposes her to lead should notify her employer as soon as possible if she becomes pregnant. The employment medical advisor/appointed doctor should be informed of the pregnancy. Under the Management of Health & Safety at Work (Amendment) Regulations 1994, employers should assess the risks at work to the health of pregnant workers and workers who have recently given birth or are breast feeding. Adequate extraction methods to remove fumes from work area where this product is being used.	
References:	EH40 Occupational Exposure Limits (published annually). Sen - denotes material capable of causing respiratory sensitisation. * - From Appendix 1 of the HSC Approved Code of Practice Supporting The Control of Lead at Work Regulations.	

Section 9. Physical & Chemical Properties.			
Appearance / colour:	Grey alloy wire	pH/Concentration: N/D	N/D
Odour:	odourless at ambient temperatures	Melting RangeºC:See table below	See table below
Boiling point ºC:	N/A	Auto ignition temperature ºC: N/A	N/A
Flash point ºC:	N/A	Explosive limits (% vol):N/A	N/A
Explosive / oxidising:	N/A	Solubility/miscibility:N/A	Insoluble in water
Viscosity:	N/D	Volatile content (V.O.C): N/A	N/D
Vapour pressure:	N/A	Vapour density (air = 1):N/A	N/A
Evaporation rate:	N/A	Conductivity: N/A	N/D
Flammability:	N/A	Specific Gravity:N/A	N/A
Warton Part No	Melting range ºC	Warton Part No	Melting range ºC
63/37	183	99C	227
60/40	183-188	97C	230-250
50/50	183-212	Alloy No. 1	183-215
45/55	183-224	Alloy No.2	183-190
40/60	183-234	HMP 5S	296-301
35/65	183-244	LMP 62S	179
30/70	183-255	96S	221
20/80	183-275	TLS/5	296-301
15/85	227-288	95A	236-243
TSC	217	Sn10Pb88Ag2	268-290

Section 10. Stability & Reactivity	
Conditions to avoid:	If solder is exposed to temperature over 500ºC lead dust, fume and /or vapours may be produced.
Materials to avoid:	Solder will react with concentrated acid to release poisonous fumes of nitric oxide. This will in turn oxidise to nitrogen dioxide, a red gas with a pungent odour. If personnel are extensively exposed to these gases then immediate medical attention should be sought, as symptoms can be delayed for a considerable time period and can be fatal. Solder may react with other strong acids to release highly flammable / explosive hydrogen gas.

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 nos e and throat. For personnel that have become sensitised to rosin fumes, exposure can cause symptoms of as thma attacks of wheezing), chest tightness and breathlessness - alveolitis breathlessness and flu like symptoms), or rhinit is 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. Lead can cause weakness, vomiting, loss of appetite, convulsions and stupor. Prolonged and / or repeated exposure to flux fumes may caus e some workers to develop an allergic reaction to them (become sensitised).
Chronic Toxicity:	Lead can cause weakness, insomnia, hypertension, headaches and pains i n 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 carcinogenity is adequate in animals but inadequate in humans.
Reproductive Tox icity:	The placenta offers no barrier to the transport of lead from the mothers blood stream to that of the foetus.
LD50 (Oral rat):	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 i s 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 W arton 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:	Use only as directed.
Publications references:	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.

S ection 17. Revision Dates	
Revised Date / Initials:	April 2002 / VHM
Replacing:	All previous health and safety datasheets
Legend:	N/A = Not applicable or available at time of printing. N/D = Not determined or not determinable. Est. = Estimated Rem= Remainder

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