WARTON METALS LIMITED

MATERIAL APPLICATION & SAFETY DATASHEET

High Purity™ SOLDER ALLOYS

Product Name:

High Purity Soldering Products
Incorporating: Bar, Tinmans, Blowpipe, Ingot Solder,Pellets, Chunks and Chips (all alloys).

Manufactured By:

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

High Purity Soldering Products are manufactured from a grade of solder alloy with purity levels far exceeding the requirements of all national and international standards. Warton Metals Ltd manufacture all high purity solder alloys using the finest raw materials available world-wide.

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In 1994 a single European standard, EN 29453 (ISO 9453), superseded all other European national standards, BS 219, DIN 1707, NFC 90-550.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

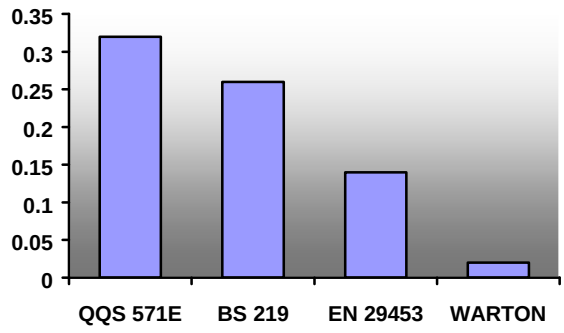
Warton Part No:	EN 29453	QQS 571E	BS 219 *DIN 1707
63/37	1a	Sn63Pb37	AP
60/40	2a	Sn60Pb40	KP
60/40 DIS*	-	-	-
50/50	3a	Sn50Pb50	F
45/55	4	-	R
40/60	5	Sn40Pb60	G
35/65	6	Sn35Pb65	H
30/70	7	Sn30Pb70	J
20/80	-	Sn20Pb80	V
15/85	-	-	W
99C	23	-	99C
97C	24	-	-
Alloy No.1	26	-	*Sn50PbCu
Alloy No. 2	25	-	*Sn60PbCu2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

*DIS dross inhibiting solder

The table above illustrates the equivalent Warton High Purity solder alloy in relationship to EN 29453, QQS 571E, BS-219 and DIN-1707.

Purity of solder alloy

The chart below compares the impurity levels permitted by Warton in relation to BS EN 29543, BS 219 and U.S. QQS 571E.



Warton High Purity Solder Alloys are manufactured using only the 'Highest purity raw materials' available world-wide.

Typical batch analysis: High Purity Virgin 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 Virgin 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

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	-	-	-
60/40 DIS*	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	-

*DIS Dross Inhibiting Solder

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	-
SAC!	Rem	0.5-0.7	0.3-0.7	-

Working temperatures & strengths

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 below 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. The solder alloys were tested at 20°C at 1/16 inch per minute strain rate.

Warton Part No	Melting range ºC	Min junction temp ºC	N/mm²	Tons/In²
63/37	183	245	67	4.3
60/40	183-188	248	48	3.1
60/40 DIS*	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	-	-
95A	236-243	303	31	2.0
TIN	232	-	-	-
TSC	217	-	-	-
SAC3	217-219	-	-	-
SAC2	217-219	-	-	-
SAC1	217-219	-	-	-

*DIS dross inhibiting solder

Analytical Service

Warton Metals Ltd. offer customers the opportunity of regularly monitoring the quality of the solder in use, with Wartons skilled technical personnel advising on the analytical results if required. For customer assays **Warton Metals Ltd** use an independent, Namas approved test facility (Testing No: 0012/0963). This provides accurate unbiased results traceable to international standards.

Waste Removal

Agitation of solder by wave soldering or dipping will cause oxidisation (known as `dross'). Dross must be regularly removed and placed carefully into metal containers supplied free from Warton Metals on request. Contact Customer Services for more information.

Duty Of Care

Under the Environmental Protection Act 1990, it is necessary to complete a Duty Of Care Transfer Note with all waste solder from your company. Rather than complete a transfer note every time we collect your waste, you can save administration costs by simply signing one transfer note. We then hold all relevant details on our central database, which is open to inspection by the regulatory authorities to help you meet your legal obligations. This service is free to all customers.

Packaging

High Purity Bar Solder is supplied in nominal weights of 60 grams (Blowpipe), 0.25 kilo (Tinman sticks), 0.5 kilo bar, 1 kilo bar and 5 kilo Ingots.

Material Safety Datasheet

High Purity Solder Products

(Bar,Tinmans,Blowpipe, Ingot, Pellets, Chunks & Chips- all alloys)

Section 1. Identification of the substance / preparation and of the company / undertaking	
Product Name:	High Purity Solder Products (Bar, Tinmans, Blowpipe, Ingot, Pellets, Chunks & Chips)
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

Section 2. Composition / Information on Ingredients

Ingredient	CAS No:	Classification Symbol	Risk phrases	Safety Phrases	% Present
Lead (dusts, heated vapours, fumes). R20/22 - Harmful by inhalation and if swallowed R33 - Danger of cumulative effects. R61 - May cause harm to unborn child.	7439-92-1	T	20/22-33-61		See alloy table below

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	-	-	-
60/40 DIS*	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
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	0.3-0.7	-

*DIS Dross Inhibiting Solder

Section 3. Hazards Identification	
	Solder alloys containing lead give off negligible lead fume at soldering temperatures and at temperatures up to 500ºC.

Section 4. First Aid Measures	
Inhalation:	(Dust). Remove patient to fresh air and seek medical attention.
Skin Contact:	Wash hands with soap and warm water after handling solder.
Eye Contact:	(Dust) Irritating - 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. Also make sure that the contaminated water runs off the face away from the eyes. Seek medical attention.
Ingestion:	Not applicable
Burns:	Cool burn site immediately with clean cold water and seek medical attention.

Section 5. Fire Fighting Measures	
Suitable extinguishing media:	Dry chemical, carbon dioxide, water spray or foam.
Do not use:	Water in a 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:	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.

Section 8. Exposure Controls & Personal Protection

Occupational Exposure Limits:-

Substance:	Long Term Exposure Limits (8 Hour TWA)	Short Term Exposure Limit (15 min)
Lead *	0.15 mg/m³	-

Personal Protection:-	
Respiratory protection	Not generally required unless there is inadequate extraction during reflow work.
Eye Protection:	Use of safety glasses or goggles is recommended.
Protective Clothing:	When handling dross or molten metal the following clothing should be used: overalls, leather apron, heat resistant gloves.
Biological Standards:	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 concentration 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.
References:	EH40 Occupational Exposure Limits (published annually). * - 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 Solder	pH/Concentration:	N/D
Odour:	N/A	Melting PointºC:	See table below
Boiling point (Solvent)ºC:	N/A	Auto ignition temperature ºC:	N/A
Flash point (Solvent) ºC:	N/A	Explosive limits (% vol):	N/A
Explosive / oxidising:	N/A	Solubility/miscibility:	Insoluble in water
Viscosity:	N/D	Volatile content (V.O.C):	N/D
Vapour pressure:	N/A	Vapour density (air = 1):	N/A
Evaporation rate:	N/A	Conductivity	N/D
Flammability:	N/A	Specific Gravity:	N/A

Warton Part No	Melting range ºC	Warton Part No	Melting range ºC
63/37	183	99C	227
60/40/60/40 DIS	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
TIN	-	TSC	217
SAC3	217-219	SAC2	217-219
		SAC1	217-219

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.
Reactivity:	Do not place wet or damp metal into a molten bath of solder, this could cause an explosion.

Section 11. Toxicological Information (toxic effects arising from exposure based on experimental and non experimental data)

Acute Toxicity:	Lead can cause weakness, pains in the joints, vomiting, loss of appetite and stupor.
Chronic Toxicity:	Lead can cause weakness , insomnia, headache and possible paralysis. 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) i.e. evidence for carcinogenity is a adequate in animals but inadequate for humans. Severe lead toxicity has long been known to cause sterility, abortion and neonatal mortality and morbidity.

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. For this reason lead in small quantities is often disposed of in landfill sites, however this is not recommended. (See section 13. Disposal Considerations).

Section 13. Disposal Considerations

(Safe disposal of product, its residues and packaging materials):	Waste solder should be placed 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 is not classified as hazardous for transportation.

Section 15. Regulatory Information	
	Not applicable

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. 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:	October 2006 / VHM 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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