

# Technical Datasheet



Slump Free Solder Paste from  
*Warton*

## Product Name

Microprint No Clean Solder Paste

## Manufactured By

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

Tel: + 44 (0) 1706 218888

Fax : + 44 (0) 1706 221188

## All the Difference

Microprint is a colophony (rosin) based solder paste range, which allows a previously unseen level of repeatability and consistency. Not only can this new paste technology offer the next step in process yield optimization, this technology heralds the way for lead free ready flux activation and gel / temperature stability.

Microprint is carefully formulated to offer the maximum in performance on tin/lead, copper; gold/nickel and silver based substrate materials, to ensure optimum solderability and minimum process difficulties when using either Sn62, Sn63 or Lead Free alternatives Sn96 and Warton's Lead Free TSC Alloy (Sn/Ag/Cu - melting point 217 C).

The Microprint range is available in various formulation types to suit user specification and process requirements.

Formulations include type 'L0' (Halide Free) and 'L1' (Halide containing), with various 'Particle Size' and 'Rheology' options to suit all printing and reflow operations.

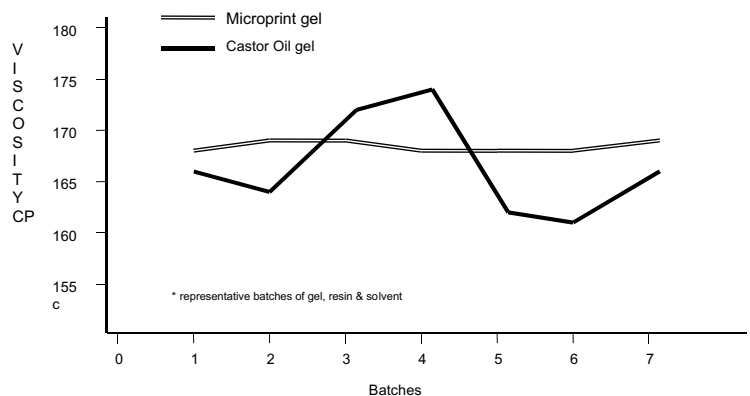


## Lead Free Ready

Microprint offers a range of Lead Free Alloys and Various Flux Medium Formulations suitable for Nitrogen and Air reflow operations.

## Improved Batch Consistency

Microprint utilizes the latest synthetic gelling principles. Microprint has been found to offer a better than previously achieved level of manufacturing consistency, This consistency is reflected in the following graph which shows a study of the repeatability achieved from the synthetic Microprint gel and the conventional Solder Paste gel types.



## Independently Tested

Microprint Flux Type	Surface Insulation Resistance	10 Day Corrosion	Copper Mirror Corrosion	Fluoride Spot Test	J-STD-004 Rating
P2004*	Pass	Pass	Pass	Pass	ROL1
P2005-L1	Pass	Pass	Pass	Pass	ROL1
NCJW0	Pass	Pass	Pass	Pass	ROL0
NCJW1	Pass	Pass	Pass	Pass	ROL1

Tested by a recognised industry test house, to ensure No-Clean status in accordance with J-STD 004.

## Slump Free - Eliminates Solder Balling

Microprint eliminates solder balling and mid-chip balling. One of the main difficulties with conventional gel systems is temperature instability or de-structuring of the gel matrix, this is evident not only in manufacturing of solder paste but during the reflowing of assemblies. If the gel matrix de-structures before sufficient solvent is volatilized, a washing effect takes place displacing solder particles between component legs or Mid-Chip.

Even though activator performance or Solderability issues can magnify this phenomenon Gel instability can be clearly demonstrated when high boiling point solvents are used to improve tack and stencil life.

The synthetic gel system adopted by Microprint offers stability at least 60 C higher than conventional gel. This yet again adds to the compatibility of Microprint with eco friendly 'lead free' applications as the problems with solder balling, with standard Sn/Pb formulations are intensified when using lead free alternatives.

## Profile Friendly

By carefully monitoring activator performance at different profile temperatures, Warton have succeeded, not only in making Microprint profile friendly for conventional Sn62 and Sn63 alloys. With careful manipulation, the same activator package can provide excellent activation at lower temperatures and can offer sustained activity for higher or longer temperature profiles. This profile friendly approach allows the engineer to set the profile optimally for the process and defect minimization-and not the solder paste.

### Formulations P2004 and P2005 L1

The most effective profile for Microprint P2004 and P2005 can be achieved by ramping the temperature to 160 C at a maximum rate of 2 C/sec. Holding a soak temperature of 160 C for between 90-240 seconds before entering the reflow zone for 30-90 seconds.

### Formulations NCJW0 and NCJW1

Due to the superior heat stability and performance of the propriety activation system used in both NCJW formulations almost any profile can be used, including, 'Soak Profiles' as described above with the P2004 and P2005 formulations and simple 'Linear Profiles' ensuring best component and assembly conditions.

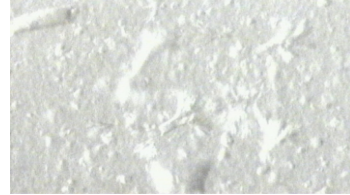
For more information on profiling, see the attached 'Useful Profiles for Microprint No Clean Solder Paste'.

## Printer Friendly

Another advantage of the unique chemistry adopted for Microprint is the reduction of flux medium separation, offering greater pot stability and reduction of solvent leakage during the printing process - leading to a greater number of prints before underside wiping is necessary.

The tendency for flux mediums to form crystals holds great bearing on the printing process and general stability of Solder Paste.

This is demonstrated with the comparison of Microprint flux medium and a standard rosin based medium after only a short storage time at room temperature.

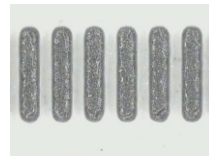


Heterogeneous nature of rosin based flux medium with evidence of rapid crystal formulation.

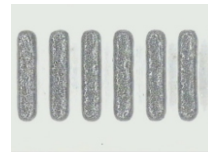


Homogenous flux medium with low crystal formation

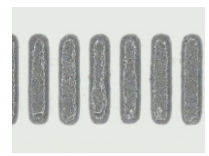
This can be demonstrated further by the printing longevity of Microprint Sn62 90 15-32 when printing 0.5mm devices using a 0.15mm stencil.



0.5mm Print 1



0.5mm Print 5



0.5mm Print 15

## VOC Free Printing Operations

Advancement in solvent package technology means that during the printing and placement process Microprint is rated as VOC FREE in accordance to the European Solvent Directive, by which a VOC is defined by vapor pressure. This definition defines a VOC as having a vapor pressure of >0.1mbar. This definition applies to all industry sectors and is aimed at minimizing emissions of VOC's.

## Cleanable after Reflow?


Yes. Cleaning agents can readily remove the residues of Microprint. Saponifiers such as Warton Metals Ltd TOTAL CLEAN 500 can easily remove all residues without leaving white staining or crystals normally associated with traditional Rosin based pastes, recommended conditions can vary from 25-60 C for 2-5 minutes. Solvent cleaners can also be used such as TOTAL CLEAN 440 or aerosol cleaner TOTAL CLEAN 200. Stencil cleaning is simple with either TOTAL CLEAN Stencil wipes or TOTAL CLEAN 130 Stencil Cleaner.



## Microprint 'Flux Medium' Formulations

### Microprint P2004

Suitable for all 'No Clean' applications P2004 offers improved activation whilst exhibiting the absolute minimum of clear post soldering residue. Microprint P2004 no clean, is tested in accordance with J-STD 004 type ROL1. Type 'L1' (Halide 0.48%)

Reflow Type	Available Particle Sizes
Sn62/Sn63 Air and Nitrogen Reflow	15-32 m (-450+635 mesh)
Sn96/TS C/95A Nitrogen Reflow	20-38 m (-400 +500 mesh)
	20-45 m (-325 +500 mesh)

### Microprint P2005-L1

J-STD 004 rating 'ROL1' (0.48% Halide) P2005-L1 offers a reduced viscosity version of the Microprint P2004 20-45 m Solder Paste.


P2005-L1 exhibits the same soldering performance and excellent post soldering residue appearance as P2004.

Reflow Type	Available Particle Sizes
Sn62/Sn63 Air and Nitrogen Reflow	20-45 m (-325 +500 mesh)

### Microprint NCJW1

J-STD 004 rating 'ROL1'


The unique proprietary activation system used with the NCJW Solder Paste allows the maximum in soldering performance with both 'Lead Free' and conventional lead based applications. For use with Air and Nitrogen ovens NCJW is proven to reduce costs and improve process yield by eliminating soldering defects

Reflow Type	Available Particle Sizes
Sn96/TSC/95A Air and Nitrogen Reflow	20-45 m (-325 +500 mesh) 
Sn62/Sn63 Air and Nitrogen Reflow	20-45 m (-325 +500 mesh)

### Microprint NCJW0

J-STD 004 rating 'ROL0'

Microprint NCJW0 is formulated using the same high performance activation system of NCJW1, whilst offering greater resistance to humidity. This makes NCJW0 an ideal material for customers without environmentally controlled production facilities, or factories in areas of the world where humidity is a concern. Microprint NCJW0 is suitable for Air and Nitrogen reflow applications.

Reflow Type	Available Particle Sizes
Sn96/TSC/95A Air and Nitrogen Reflow	20-45 m (-325 +500 mesh) 
Sn62/Sn63 Air and Nitrogen Reflow	20-45 m (-325 +500 mesh)

## Microprint Performance

Microprint	P2004	P2005L1	NCJW1	NCJW0
Tack Life	72Hrs	72Hrs	48Hrs	48Hrs
Wetting after 72 Hours open Time	3	4	5	5
Stencil Life	48Hrs	48Hrs	24Hrs	24Hrs
Cleaning Time Total Clean 440 @ 50 C	12min	12min	4min	4min
Humidity / Stability	4	4	4	5
Fine Pitch wetting	3	4	5	4
Lead Free Performance	3	3	5	5

Key: 5-Excellent, 4-Good, 3-Average,

## Formulations to Suit All Applications

We hope the standard formulations available will suit most situations, however it is possible to modify features of Microprint to suit a particular application. If you have a requirement that Warton Metals can help you with, contact our technical department for advice on Tel: 01706 218888.

## Storage conditions

Store paste in at a temperature of -20 C to +5 C. Allow paste to achieve ambient temperature before use.

## Shelf Life

Solder Paste in Pro- Flow cassettes, tubs and cartridges that are stored correctly, will offer a shelf life of 12 months. Syringes will offer a shelf life of 6 months.

## Technical Information

For further technical advice either by telephone or on-site, please do not hesitate to contact Customer Services on: + 44(0)1706 218888 or email: support@warton-metals.co.uk.

## Packaging

Microprint No Clean Solder Paste is available in 0.25Kg & 0.5Kg tubs, 40g and 75g syringes, 0.5Kg & 1Kg cartridges, Pro Flow and Paste Puck systems.

# Material Health & Safety Datasheet



## Section 1. Identification of the substance / preparation and of the company / undertaking

Product Name:	Microprint No Clean Solder Paste
Manufactured By:	Warton Metals Limited Grove Mill, Commerce Street. Haslingden. Lancashire. BB4 5JT. ENGLAND.
Emergency Telephone & Fax:	+44 (0)1706 218888 +44 (0)1706 221188
Warton's product coding system precisely defines the features of a particular grade of solder paste. For example: Microprint Sn62 90 15-32. 'Microprint' denotes the product name and flux type, 'Sn62' is the alloy present in the solder paste, '90' is the nominal metal content of the paste (w/w %) and the '15-32' is the solder powder size range. The solder powder size range and the metal content do not affect the health and safety properties of the paste.	

## Section 2. Composition / Information on Ingredients

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:	*	Xn		42/43		60-70
*CAS No: is variable and depends on the exact identity of the modified rosin used. The classification symbol and risk phrases are only a requirement for rosin (colophony CAS No: 8050-09-7) but are used by Warton for all modified rosins in the absence of data indicating that they are not sensitises. 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) %	
Sn63	62.5-63.5	Rem	-	-	-	
Sn62	61.5-62.5	Rem	-	1.8-2.2	-	
Sn96	Rem	-	-	3.5-4.0	-	
Lead Free TSC	95.5-96	-	0.5-1	3.3-4	-	
95A	Rem	-	-	-	4.5-5.5	

## Section 3. Hazards Identification

Rosin or Modified Rosin	This product contains rosin or modified rosin; prolonged or repeated skin contact can cause an allergic reaction to develop. Inhalation of the fumes produced during reflow will irritate the respiratory system. Prolonged or repeated exposure to the fumes emitted during reflow may cause sensitization, which could lead to occupational asthma.
Lead	Lead, if absorbed into the body of a pregnant woman can cause developmental abnormalities in the nervous system of the foetus.
Solvent	Irritating to eyes, skin and respiratory system.

## Section 4. First Aid Measures

Inhalation:	Irritates nose and throat, can 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. Wash hands with soap and warm water after handling solder pastes. If any skin irritation develops seek medical advice.
Eye Contact:	Irritating and abrasive. 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:	Will irritate gastric tract. If the casualty is unconscious but breathing, place on one side in the recovery position. If breathing has stopped apply artificial respiration or give oxygen by mask. If the patient is conscious, then encourage the patient to rinse the mouth out several times with water but do not induce vomiting. Do not give anything to drink if the patient finds it difficult to swallow. *Obtain urgent 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 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:	Avoid contact with the skin. Scrape up and place in closed container for subsequent disposal.

## Section 7. Handling & Storage

Handling/Storage	The fumes produced during reflow should be extracted away from the breathing zone of the operators. Ensure that the general area is well ventilated. Avoid inhaling the flux fumes. Wash the hands with soap and warm water after handling soldering products, particularly before eating and drinking or smoking. 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)
Rosin core solder pyrolysis products (as formaldehyde).	0.1 mg/m <sup>3</sup>	0.3 mg/m <sup>3</sup> Sen
Lead *	0.15 mg/m <sup>3</sup>	-

### Personal Protection:-

Respiratory protection

Eye Protection:

Skin Protection:

Biological Standards:

Engineering Measures:

References:

Not generally required unless there is inadequate extraction during reflow work.

Use of safety glasses or goggles is recommended.

Rubber gloves, (latex or nitrile) suitable work wear should be worn to protect clothing.

For blood lead monitoring and medical surveillance requirements, refer to the HSC Approved code of Practice 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.

Adequate extraction methods to remove fumes from reflow work area where this product is being used.

EH40 Occupational Exposure Limits (published annually)

Sen - denotes material capable of causing respiratory sensitization.

\* - From Appendix 1 of the HSC Approved Code of Practice Supporting The Control of Lead at Work Regulations.

Cases of occupational asthma caused by exposure to rosin fume are negotiable under the reporting Of injuries, Diseases and Dangerous Occurrences Regulations.

## Section 9. Physical & Chemical Properties.

Appearance / colour:	Pale/dark grey paste.	Melting Point°C:	Sn62 – 179, Sn63 - 183
Odour:	Mild.		Sn96 – 221 Lead Free TSC
Boiling point (Solvent)°C:	217-218		-217, N/A 95A -236-243
Flash point (Solvent) °C:	89		
Explosive / oxidising:	N/A	Auto ignition temperature °C:	N/A
Viscosity:	N/D	Explosive limits (% vol):	Insoluble in water
Vapour pressure:	N/A	Solubility/miscibility:	N/D
Evaporation rate:	N/A	Volatile content (V.O.C):	N/A
Flammability:	N/A	Vapour density (air = 1):	N/D
pH/Concentration:	N/D	Conductivity	-
		Specific Gravity:	

The Solder Paste density can be determined using the following formula:  $SG = \frac{100p}{(100-M)p+M}$

Where p=alloy specific gravity and M=metal content

## Section 10. Stability & Reactivity

Conditions to avoid:

Materials to avoid:

If solder is exposed to temperature over 500°C lead dust, fume and /or vapours may be produced.

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.

Solder paste will react with strong oxidising agents, possibly with explosive violence.

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

Inhalation:	Main route of exposure for flux fumes, providing soldering temperature is below 500°C the amount of lead in the fume should be negligible.
Eye contact:	The flux fumes may irritate the eyes. The paste is both irritant and abrasive.
Skin contact:	Rosin and rosin derivatives can cause an allergic skin reaction. The absorption of lead through the skin is not significant.
Ingestion:	Not normally regarded as an industrial hazard, but lead can be transferred from the skin onto food, cigarettes etc. If a high standard of personal hygiene is not exercised.
Acute toxicity:Flux	The flux fumes produced during soldering will irritate the nose and throat. For personnel that have become sensitized 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 sensitization by skin contact causing dermatitis. Note that personnel that are sensitized to rosin may also react to modified rosins or vice versa.
Acute toxicity: Lead	Lead can cause weakness, vomiting, loss of appetite, convulsions and stupor.
Chronic Toxicity:	Prolonged and / or repeated exposure to flux fumes may cause some workers to develop an allergic reaction to them (become sensitized). 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.
Reproductive Toxicity:	

Section 13. Disposal Considerations	
	Waste solder paste should be put in metal 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 Paste is not classified as hazardous for transportation.

Section 15. Regulatory Information	
Labelling Information Indication of Danger: Contains: Risk Phrases/ Safety phrases:	St. Andrews Cross Harmful (Xn) Modified Rosins 23- Do not breathe fumes, 24- Avoid contact with skin 37 – Wear Suitable Gloves

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:	07/02 / 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

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.

**Sales & Technical Enquiries: Tel: +44 (0)1706 218888 Fax:+44 (0)1706 221188**