



4942-4944 Sn100e RA Solder Wire

MG Chemicals UK Limited

Version No: A-1.01

Safety Data Sheet (Conforms to Regulation (EU) No 2015/830)

Issue Date: 23/07/2019

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L.REACH.GBR.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1. Product Identifier

Product name	4942-4944
Synonyms	SDS Code: 4942-4944; 4942-112G, 4942-454G, 4944-112G, 4944-454G
Other means of identification	Sn100e RA Solder Wire

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Lead free solder wire
Uses advised against	Not Applicable

1.3. Details of the supplier of the safety data sheet

Registered company name	MG Chemicals UK Limited	MG Chemicals (Head office)
Address	Heame House, 23 Bilston Street, Sedgely Dudley DY3 1JA United Kingdom	9347 - 193 Street Surrey V4N 4E7 British Columbia Canada
Telephone	+(44) 1663 362888	+(1) 800-201-8822
Fax	Not Available	+(1) 800-708-9888
Website	Not Available	www.mgchemicals.com
Email	sales@mgchemicals.com	Info@mgchemicals.com

1.4. Emergency telephone number

Association / Organisation	Verisk 3E (Access code: 335388)
Emergency telephone numbers	+(44) 20 35147487
Other emergency telephone numbers	+(0) 800 680 0425

SECTION 2 HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] [1]	Not Applicable
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2.2. Label elements

Hazard pictogram(s)	Not Applicable
SIGNAL WORD	NOT APPLICABLE

Hazard statement(s)

Not Applicable

Supplementary statement(s)

EUH210	Safety data sheet available on request.
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Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

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2.3. Other hazards

RECh - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substances

See 'Composition on ingredients' in Section 3.2

3.2. Mixtures

1.CAS No 2.EC No 3.Index No 4.REACH No	%[weight]	Name	Classification according to regulation (EC) No 1272/2008 [CLP]
1.7440-31-5 2.231-141-8 3.Not Available 4.01-2119486474-28-XXXX	97.3	<u>tin</u> *	EUH210 ^[1]
1.65997-05-9 2.500-163-2 3.Not Available 4.01-2119964093-37-XXXX	2.2	<u>rosin, polymerised</u>	Not Applicable
1.7440-50-8 2.231-159-6 3.Not Available 4.01-2119475516-31-XXXX 01-2119480154-42-XXXX 01-2119480184-39-XXXX 01-2120762783-45-XXXX	0.5	<u>copper</u>	EUH210 ^[1]
Legend:	1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; * EU IOELVs available		

SECTION 4 FIRST AID MEASURES

4.1. Description of first aid measures

Eye Contact	<p>If this product comes in contact with the eyes:</p> <ul style="list-style-type: none"> ▶ Wash out immediately with fresh running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel. ▶ DO NOT attempt to remove particles attached to or embedded in eye . ▶ Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. ▶ Seek urgent medical assistance, or transport to hospital. ▶ Particulate bodies from welding spatter may be removed carefully. ▶ DO NOT attempt to remove particles attached to or embedded in eye. ▶ Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. ▶ Seek urgent medical assistance, or transport to hospital.
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation. <p>In case of burns:</p> <ul style="list-style-type: none"> ▶ Immediately apply cold water to burn either by immersion or wrapping with saturated clean cloth. ▶ DO NOT remove or cut away clothing over burnt areas. DO NOT pull away clothing which has adhered to the skin as this can cause further injury. ▶ DO NOT break blister or remove solidified material. ▶ Quickly cover wound with dressing or clean cloth to help prevent infection and to ease pain. ▶ For large burns, sheets, towels or pillow slips are ideal; leave holes for eyes, nose and mouth. ▶ DO NOT apply ointments, oils, butter, etc. to a burn under any circumstances. ▶ Water may be given in small quantities if the person is conscious. ▶ Alcohol is not to be given under any circumstances. ▶ Reassure. ▶ Treat for shock by keeping the person warm and in a lying position. ▶ Seek medical aid and advise medical personnel in advance of the cause and extent of the injury and the estimated time of arrival of the patient.
Inhalation	<ul style="list-style-type: none"> ▶ If dust is inhaled, remove from contaminated area. ▶ Encourage patient to blow nose to ensure clear breathing passages. ▶ Ask patient to rinse mouth with water but to not drink water. ▶ Seek immediate medical attention.
Ingestion	<ul style="list-style-type: none"> ▶ IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. ▶ For advice, contact a Poisons Information Centre or a doctor. ▶ Urgent hospital treatment is likely to be needed. ▶ In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition. ▶ If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist. ▶ If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS.

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Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

- ▶ **INDUCE** vomiting with fingers down the back of the throat, **ONLY IF CONSCIOUS**. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

4.2 Most important symptoms and effects, both acute and delayed

See Section 11

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

Copper, magnesium, aluminium, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, brazing, galvanising or smelting operations all give rise to thermally produced particulates of smaller dimension than may be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce 'metal fume fever' in workers from an acute or long term exposure.

- ▶ Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
- ▶ Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
- ▶ Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
- ▶ The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
- ▶ Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology]

SECTION 5 FIREFIGHTING MEASURES

5.1. Extinguishing media

- ▶ **DO NOT** use halogenated fire extinguishing agents.

Metal dust fires need to be smothered with sand, inert dry powders.

DO NOT USE WATER, CO2 or FOAM.

- ▶ Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- ▶ Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- ▶ Chemical reaction with CO2 may produce flammable and explosive methane.
- ▶ If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.

5.2. Special hazards arising from the substrate or mixture

Fire Incompatibility

- ▶ Reacts with acids producing flammable / explosive hydrogen (H2) gas

5.3. Advice for firefighters

Fire Fighting

- ▶ Alert Fire Brigade and tell them location and nature of hazard.
- ▶ Wear breathing apparatus plus protective gloves in the event of a fire.
- ▶ Prevent, by any means available, spillage from entering drains or water courses.
- ▶ Use fire fighting procedures suitable for surrounding area.
- ▶ **DO NOT** approach containers suspected to be hot.
- ▶ Cool fire exposed containers with water spray from a protected location.
- ▶ If safe to do so, remove containers from path of fire.
- ▶ Equipment should be thoroughly decontaminated after use.

Fire/Explosion Hazard

- ▶ **DO NOT** disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.
- ▶ **DO NOT** use water or foam as generation of explosive hydrogen may result.

With the exception of the metals that burn in contact with air or water (for example, sodium), masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained - this means that it will require a lot of heat to ignite a mass of combustible metal. Generally, metal fire risks exist when sawdust, machine shavings and other metal 'fines' are present.

Metal powders, while generally regarded as non-combustible:

- ▶ May burn when metal is finely divided and energy input is high.
- ▶ May react explosively with water.
- ▶ May be ignited by friction, heat, sparks or flame.
- ▶ May **REIGNITE** after fire is extinguished.
- ▶ Will burn with intense heat.

Note:

- ▶ Metal dust fires are slow moving but intense and difficult to extinguish.
- ▶ Containers may explode on heating.
- ▶ Dusts or fumes may form explosive mixtures with air.
- ▶ Gases generated in fire may be poisonous, corrosive or irritating.
- ▶ Hot or burning metals may react violently upon contact with other materials, such as oxidising agents and extinguishing agents used on fires involving ordinary combustibles or flammable liquids.
- ▶ Temperatures produced by burning metals can be higher than temperatures generated by burning flammable liquids
- ▶ Some metals can continue to burn in carbon dioxide, nitrogen, water, or steam atmospheres in which ordinary combustibles or flammable liquids would be incapable of burning.

Decomposition may produce toxic fumes of:

metal oxides

May emit poisonous fumes.

May emit corrosive fumes.

Explosions can occur with coils of foil that have been submerged or partially submerged in water for an extended period of time. Water can penetrate between the layers of foil, react with the aluminum surface and generate heat and hydrogen gas. When the coils are removed from the cooling effects of the water, rapid temperature increases can occur causing steam explosions which result in the rupture of the coils and discharge of debris.

Coils of foil may be a potential hazard under the following conditions:

- Coil has been annealed (annealing removes residual oil that could prevent penetration of water

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- Foil is very thin gauge (5-9 µm thickness which increases surface area)
- Coil has been immersed for an extended period of time (several hours or more)
- Wetted coil has recently been removed from the cooling effects of the water

In such situations, the coils should be isolated (30 meters from any personnel) for at least 72 hours as soon as possible after removal from the water. Coils making crackling sounds or emitting steam should not be approached or transported in commerce. Wetted coils should not be charged into a furnace for remelting until completely dry.

SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

See section 8

6.2. Environmental precautions

See section 12

6.3. Methods and material for containment and cleaning up

Minor Spills	<ul style="list-style-type: none"> ▶ Remove all ignition sources. ▶ Clean up all spills immediately. ▶ Avoid contact with skin and eyes. ▶ Control personal contact with the substance, by using protective equipment. ▶ Use dry clean up procedures and avoid generating dust. ▶ Place in a suitable, labelled container for waste disposal.
Major Spills	<ul style="list-style-type: none"> · Do not use compressed air to remove metal dusts from floors, beams or equipment · Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation. · Use non-sparking handling equipment, tools and natural bristle brushes. · Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations · Cover and reseal partially empty containers. · Do not allow chips, fines or dusts to contact water, particularly in enclosed areas. <p>If molten:</p> <ul style="list-style-type: none"> ▶ Contain the flow using dry sand or salt flux as a dam. ▶ All tooling (e.g., shovels or hand tools) and containers which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. ▶ Allow the spill to cool before remelting scrap. <p>Moderate hazard.</p> <ul style="list-style-type: none"> ▶ CAUTION: Advise personnel in area. ▶ Alert Emergency Services and tell them location and nature of hazard. ▶ Control personal contact by wearing protective clothing. ▶ Prevent, by any means available, spillage from entering drains or water courses. ▶ Recover product wherever possible. ▶ IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal. ▶ ALWAYS: Wash area down with large amounts of water and prevent runoff into drains. ▶ If contamination of drains or waterways occurs, advise Emergency Services.

6.4. Reference to other sections

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

7.1. Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▶ Develop work practices and procedures that prevent particulate from coming in contact with worker skin, hair, or personal clothing. ▶ If work practices and/or procedures are ineffective in controlling airborne exposure or visual particulate from deposition on skin, hair, or clothing, provide appropriate cleaning/washing facilities. ▶ Procedures should be written that clearly communicate the facility's requirements for protective clothing and personal hygiene. These clothing and personal hygiene requirements help keep particulate from being spread to non-production areas or from being taken home by the worker. ▶ Never use compressed air to clean work clothing or other surfaces. ▶ Fabrication processes may leave a residue of particulate on the surface of parts, products or equipment that could result in employee exposure during subsequent material handling activities. ▶ As necessary, clean loose particulate from parts between processing steps. As a standard hygiene practice, wash hands before eating or smoking. ▶ To prevent exposure, remove surface scale or oxidation formed on cast or heat treated products in an adequately ventilated process prior to working the surface. ▶ Exposure to elements found in the metal, its alloys or recycled materials, may result as a result of inhalation, ingestion, and skin contact, when melting, casting, dross handling, pickling, chemical cleaning, heat treating, abrasive cutting, welding, grinding, sanding, polishing, milling, crushing, or otherwise heating or abrading the surface of this material in a manner which generates particulates. ▶ Exposure may also occur during repair or maintenance activities on contaminated equipment such as: furnace rebuilding, maintenance or repair of air cleaning equipment, structural renovation, welding, etc. ▶ Particulate depositing on hands, gloves, and clothing, can be transferred to the breathing zone and inhaled during normal hand to face motions such as rubbing of the nose or eyes, sneezing, coughing, etc. <p>For molten metals:</p> <ul style="list-style-type: none"> · Molten metal and water can be an explosive combination. The risk is greatest when there is sufficient molten metal to entrap or seal off water. Water and other forms of contamination on or contained in scrap or remelt ingot are known to have caused explosions in melting operations. While the products may have minimal surface roughness and internal voids, there remains the possibility of moisture contamination or entrapment. If confined, even a few drops can lead to violent explosions. · All tooling, containers, molds and ladles, which come in contact with molten metal must be preheated or specially coated, rust free and approved for such use. · Any surfaces that may contact molten metal (e.g. concrete) should be specially coated · Drops of molten metal in water (e.g. from plasma arc cutting), while not normally an explosion hazard, can generate enough flammable hydrogen gas to present an explosion hazard. Vigorous circulation of the water and removal of the particles minimise the hazard. <p>During melting operations, the following minimum guidelines should be observed:</p>
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	<ul style="list-style-type: none"> Inspect all materials prior to furnace charging and completely remove surface contamination such as water, ice, snow, deposits of grease and oil or other surface contamination resulting from weather exposure, shipment, or storage. Store materials in dry, heated areas with any cracks or cavities pointed downwards. Preheat and dry large objects adequately before charging in to a furnace containing molten metal. This is typically done by the use of a drying oven or homogenising furnace. The dry cycle should bring the metal temperature of the coldest item of the batch to 200 degree C (400 deg F) and then hold at that temperature for 6 hours.
Fire and explosion protection	See section 5
Other information	<ul style="list-style-type: none"> Store in original containers. Keep containers securely sealed. Store in a cool, dry area protected from environmental extremes. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS. <p>For major quantities:</p> <ul style="list-style-type: none"> Consider storage in banded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams). Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.

7.2. Conditions for safe storage, including any incompatibilities

Suitable container	<ul style="list-style-type: none"> Bulk bags: Reinforced bags required for dense materials. CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release Heavy gauge metal packages / Heavy gauge metal drums
Storage incompatibility	<p>The material is described as an electropositive metal.</p> <p>The activity or electromotive series of metals is a listing of the metals in decreasing order of their reactivity with hydrogen-ion sources such as water and acids. In the reaction with a hydrogen-ion source, the metal is oxidised to a metal ion, and the hydrogen ion is reduced to H₂. The ordering of the activity series can be related to the standard reduction potential of a metal cation. The more positive the standard reduction potential of the cation, the more difficult it is to oxidise the metal to a hydrated metal cation and the later that metal falls in the series</p> <p>Three notable groups comprise the series</p> <ul style="list-style-type: none"> very electropositive metals electropositive metals electronegative metals <p>Electropositive metals have electronegativities that fall between 1.4 and 1.9. Cations of these metals generally have standard reduction potentials between 0.0 and -1.6 V</p> <p>They:</p> <ul style="list-style-type: none"> do not react very readily with water to release hydrogen react with H⁺ (acids) <p>Electropositive metals do not burn in air as readily as do very electropositive metals. The surfaces of these metals will tarnish in the presence of oxygen forming a protective oxide coating. This coating protects the bulk of the metal against further oxidation (the metal is passivated).</p> <p>Reaction is reduced in the massive form (sheet, rod, or drop), compared with finely divided forms. The less active metals will not burn in air but:</p> <ul style="list-style-type: none"> can react exothermically with oxidising acids to form noxious gases. catalyse polymerisation and other reactions, particularly when finely divided react with halogenated hydrocarbons (for example, copper dissolves when heated in carbon tetrachloride), sometimes forming explosive compounds. Elemental metals may react with azo/diazo compounds to form explosive products <ul style="list-style-type: none"> Finely divided metal powders develop pyrophoricity when a critical specific surface area is exceeded; this is ascribed to high heat of oxide formation on exposure to air. Safe handling is possible in relatively low concentrations of oxygen in an inert gas Several pyrophoric metals, stored in glass bottles have ignited when the container is broken on impact. Storage of these materials moist and in metal containers is recommended. The reaction residues from various metal syntheses (involving vacuum evaporation and co-deposition with a ligand) are often pyrophoric <p>If the surface of the metal is in contact with both oxygen and water, corrosion can occur. In corrosion, the metal acts as an anode and is oxidised.</p> <p>Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid. Some electropositive metals do not react with nitric acid because they are passivated.</p> <p>http://www.wou.edu/las/physci/ch412/activity.htm</p> <p>Chips, fines and dust are considerably more reactive in the presence of:</p> <ul style="list-style-type: none"> Water - slowly generates flammable/explosive hydrogen gas and heat (generation rate is greatly increased with smaller particles (e.g., fines and dusts). Heat - oxidise at a rate dependent upon temperature and particle size. Strong oxidisers - violent reaction with considerable heat generation; an react explosively with nitrates (e.g., ammonium nitrate and fertilizers containing nitrate) when heated or molten. Acids and alkalis - reacts to generate flammable/explosive hydrogen gas; generation rate is greatly increased with smaller particles (e.g., fines and dusts). Halogenated compounds including halogenated fire extinguishing agents, which may react violently with finely divided or molten metals Iron oxide (rust) and other metal oxides (e.g., copper and lead oxides) which may produce a violent thermit reaction, initiated by a weak ignition source, generating considerable heat. Iron powder and water which may react explosively forming hydrogen gas when heated above 800 degrees C (1470 deg F). <p>Finely divided metals (e.g., powders or wire) may have enough surface oxide to produce thermit reactions/explosions</p> <ul style="list-style-type: none"> Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride. These trifluorides are hypergolic oxidisers. They ignite on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition. The state of subdivision may affect the results. Many metals may incandesce, react violently, ignite or react explosively upon addition of concentrated nitric acid.

7.3. Specific end use(s)

See section 1.2

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SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

DERIVED NO EFFECT LEVEL (DNEL)

Not Available

PREDICTED NO EFFECT LEVEL (PNEC)

Not Available

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELVs)	tin	Tin and inorganic tin compounds	2 mg/m ³	Not Available	Not Available	Not Available
UK Workplace Exposure Limits (WELs)	copper	Copper fume (as Cu)	0.2 mg/m ³	Not Available	Not Available	Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
tin	Tin	6 mg/m ³	67 mg/m ³	400 mg/m ³
copper	Copper	3 mg/m ³	33 mg/m ³	200 mg/m ³

Ingredient	Original IDLH	Revised IDLH
tin	Not Available	Not Available
rosin, polymerised	Not Available	Not Available
copper	100 mg/m ³	Not Available

MATERIAL DATA

A TLV-TWA is recommended so as to minimise the risk of stannosis. The STEL (4.0 mg/m³) has been eliminated (since 1986) so that additional toxicological data and industrial hygiene experience may become available to provide a better base for quantifying on a toxicological basis what the STEL should in fact be.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Metal dusts must be collected at the source of generation as they are potentially explosive.

- ▶ Avoid ignition sources.
- ▶ Good housekeeping practices must be maintained.
- ▶ Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.
- ▶ Do not use compressed air to remove settled materials from floors, beams or equipment
- ▶ Vacuum cleaners, of flame-proof design, should be used to minimise dust accumulation.
- ▶ Use non-sparking handling equipment, tools and natural bristle brushes. Cover and reseal partially empty containers. Provide grounding and bonding where necessary to prevent accumulation of static charges during metal dust handling and transfer operations.
- ▶ Do not allow chips, fines or dusts to contact water, particularly in enclosed areas.
- ▶ Metal spraying and blasting should, where possible, be conducted in separate rooms. This minimises the risk of supplying oxygen, in the form of metal oxides, to potentially reactive finely divided metals such as aluminium, zinc, magnesium or titanium.
- ▶ Work-shops designed for metal spraying should possess smooth walls and a minimum of obstructions, such as ledges, on which dust accumulation is possible.
- ▶ Wet scrubbers are preferable to dry dust collectors.
- ▶ Bag or filter-type collectors should be sited outside the workrooms and be fitted with explosion relief doors.
- ▶ Cyclones should be protected against entry of moisture as reactive metal dusts are capable of spontaneous combustion in humid or partially wetted states.
- ▶ Local exhaust systems must be designed to provide a minimum capture velocity at the fume source, away from the worker, of 0.5 metre/sec.
- ▶ Local ventilation and vacuum systems must be designed to handle explosive dusts. Dry vacuum and electrostatic precipitators must not be used, unless specifically approved for use with flammable/ explosive dusts.

Air contaminants generated in the workplace possess varying 'escape' velocities which, in turn, determine the 'capture velocities' of fresh circulating air required to effectively remove the contaminant.


Type of Contaminant:	Air Speed:
welding, brazing fumes (released at relatively low velocity into moderately still air)	0.5-1.0 m/s (100-200 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2.5 m/s (200-500 f/min.) for extraction of gases discharged 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the

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	extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.
8.2.2. Personal protection	
Eye and face protection	<ul style="list-style-type: none"> ▶ Safety glasses with side shields. ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]
Skin protection	See Hand protection below
Hands/feet protection	<p>The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.</p> <p>The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.</p> <p>Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.</p> <p>Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:</p> <ul style="list-style-type: none"> - frequency and duration of contact, - chemical resistance of glove material, - glove thickness and - dexterity <p>Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).</p> <ul style="list-style-type: none"> - When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. - When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended. - Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use. - Contaminated gloves should be replaced. <p>As defined in ASTM F-739-96 in any application, gloves are rated as:</p> <ul style="list-style-type: none"> - Excellent when breakthrough time > 480 min - Good when breakthrough time > 20 min - Fair when breakthrough time < 20 min - Poor when glove material degrades <p>For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.</p> <p>It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.</p> <p>Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task.</p> <p>Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:</p> <ul style="list-style-type: none"> - Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. - Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential <p>Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.</p> <ul style="list-style-type: none"> ▶ Protective gloves eg. Leather gloves or gloves with Leather facing <p>Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.</p> <ul style="list-style-type: none"> ▶ polychloroprene. ▶ nitrile rubber. ▶ butyl rubber. ▶ fluorocautchouc. ▶ polyvinyl chloride. <p>Gloves should be examined for wear and/ or degradation constantly.</p>
Body protection	See Other protection below
Other protection	<ul style="list-style-type: none"> ▶ Overalls. ▶ P.V.C. apron. ▶ Barrier cream. ▶ Skin cleansing cream. ▶ Eye wash unit.

Respiratory protection

Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:001, ANSI Z88 or national equivalent)

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	P1 Air-line*	-	PAPR-P1
up to 50 x ES	Air-line**	P2	PAPR-P2
up to 100 x ES	-	P3	-
100+ x ES	-	Air-line* Air-line**	- PAPR-P3

* - Negative pressure demand ** - Continuous flow

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A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- ▶ Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- ▶ The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- ▶ Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory protection. These may be government mandated or vendor recommended.
- ▶ Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- ▶ Use approved positive flow mask if significant quantities of dust becomes airborne.
- ▶ Try to avoid creating dust conditions.

8.2.3. Environmental exposure controls

See section 12

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance	Silver Grey		
Physical state	Solid	Relative density (Water = 1)	7.4
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Available	Decomposition temperature	Not Available
Melting point / freezing point (°C)	228	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Immiscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

9.2. Other information

Not Available

SECTION 10 STABILITY AND REACTIVITY

10.1.Reactivity	See section 7.2
10.2. Chemical stability	<ul style="list-style-type: none"> ▶ Unstable in the presence of incompatible materials. ▶ Product is considered stable. ▶ Hazardous polymerisation will not occur.
10.3. Possibility of hazardous reactions	See section 7.2
10.4. Conditions to avoid	See section 7.2
10.5. Incompatible materials	See section 7.2
10.6. Hazardous decomposition products	See section 5.3

SECTION 11 TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Inhaled	<p>The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified by EC Directives using animal models). Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.</p> <p>Metals which form part of massive metals and their alloys, are 'locked' into a metal lattice; as a result they are not readily bioavailable following inhalation. Mechanical processing of massive metals (e.g. cutting, grinding) may cause irritation of the upper respiratory tract. Additional health effects from elevated temperature processing (e.g., welding) can cause metal fume fever (nausea, fever, chills, shortness of breath and malaise), reduced ability of the blood to</p>
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4942-4944 Sn100e RA Solder Wire

	<p>carry oxygen (methaemoglobin) and the accumulation of fluid in the lungs (pulmonary oedema).</p> <p>Inhalation of freshly formed metal oxide particles sized below 1.5 microns and generally between 0.02 to 0.05 microns may result in 'metal fume fever'. Symptoms may be delayed for up to 12 hours and begin with the sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalised feeling of malaise. Mild to severe headache, nausea, occasional vomiting, fever or chills, exaggerated mental activity, profuse sweating, diarrhoea, excessive urination and prostration may also occur. Tolerance to the fumes develops rapidly, but is quickly lost. All symptoms usually subside within 24-36 hours following removal from exposure.</p>						
Ingestion	<p>Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.</p> <p>Metals which form part of massive metals and their alloys, are 'locked' into a metal lattice; as a result they are not readily bioavailable following ingestion. Secondary processes (e.g. change in pH or intervention by gastrointestinal microorganisms) may allow certain substances to be released in low concentrations.</p> <p>As tin salts (stannous and stannic) are generally poorly absorbed from the gastrointestinal tract. Ingestion of food contaminated with tin may cause transient gastrointestinal disturbances such as nausea, vomiting, diarrhoea, fever and headache.</p> <p>Parenteral administration provides a substantial description of tin toxicology. Systemic tin is highly toxic producing diarrhoea, muscle paralysis, twitching and neurological damage.</p> <p>By mouth most tin salts are relatively non-toxic. A number of tin 'food' poisonings, producing vomiting, nausea and diarrhoea, have occurred after ingestion of fruit juices etc. with tin levels above 1400 ppm. This appears to be due to gastric irritation resulting from the activity and astringency of tin compounds, rather than systemic toxicity. Severe growth retardation occurs in rats with dietary stannous salts at levels exceeding 0.3%.</p>						
Skin Contact	<p>Skin contact is not thought to produce harmful health effects (as classified under EC Directives using animal models). Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.</p> <p>Particles and foreign bodies produced by high speed processes may penetrate the skin. Even after the wound heals persons with retained foreign bodies may experience sharp pain with movement or pressure over the site. Discolouration or a visible mass under the epidermis may be obvious.</p> <p>Numbness or tingling ('pins and needles'), with decreased sensation, may be the result of a foreign body pressing against nerves.</p> <p>Persons with diabetes or a history of vascular problems have a higher potential for acquiring an infection</p> <p>Open cuts, abraded or irritated skin should not be exposed to this material</p>						
Eye	<p>Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals and/or may produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals.</p> <p>Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.</p> <p>Contact with the eye, by metal dusts, may produce mechanical abrasion or scratches on the cornea - these injuries usually are minor. However foreign body penetration of the eyeball may produce infection or result in permanent visual damage.</p> <p>High-speed machines (such as drills and saws) can produce white-hot particles of metal that resemble sparks. Any of these white-hot particles can enter the unprotected eye and become embedded deep within it. Foreign bodies that penetrate the inside of the eye can cause infection (endophthalmitis).</p> <p>During the first hours after injury, symptoms of intraocular foreign bodies may be similar to those of corneal abrasions and foreign bodies. However, people with intraocular foreign bodies may also have a noticeable loss of vision. Fluid may leak from the eye, but if the foreign body is small, the leak may be so small that the person is not aware of it. Also, pain may increase after the first several hours</p> <p>Corneal abrasions caused by particles and foreign bodies usually cause pain, tearing, and a feeling that there is something in the eye. They may also cause redness (due to inflamed blood vessels on the surface of the eye) or, occasionally, swelling of the eye and eyelid. Vision may become blurred. Light may be a source of irritation or may cause the muscle that constricts the pupil to undergo a painful spasm.</p> <p>Injuries that penetrate the eye may cause similar symptoms. If a foreign object penetrates the inside of the eye, fluid may leak out.</p>						
Chronic	<p>Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.</p> <p>Metallic dusts generated by the industrial process give rise to a number of potential health problems. The larger particles, above 5 micron, are nose and throat irritants. Smaller particles however, may cause lung deterioration. Particles of less than 1.5 micron can be trapped in the lungs and, dependent on the nature of the particle, may give rise to further serious health consequences.</p> <p>Metals are widely distributed in the environment and are not biodegradable. Biologically, many metals are essential to living systems and are involved in a variety of cellular, physiological, and structural functions. They often are cofactors of enzymes, and play a role in transcriptional control, muscle contraction, nerve transmission, blood clotting, and oxygen transport and delivery. Although all metals are potentially toxic at some level, some are highly toxic at relatively low levels. Moreover, in some cases the same metal can be essential at low levels and toxic at higher levels, or it may be toxic via one route of entry but not another. Toxic effects of some metals are associated with disruption of functions of essential metals. Metals may have a range of effects, including cancer, neurotoxicity, immunotoxicity, cardiotoxicity, reproductive toxicity, teratogenicity, and genotoxicity. Biological half lives of metals vary greatly, from hours to years. Furthermore, the half life of a given metal varies in different tissues. Lead has a half life of 14 days in soft tissues and 20 years in bone. In considering how to evaluate the toxicity of metals of potential concern, a number of aspects of metal toxicity should be kept in mind:</p> <p>Different species vary in their responses to different metals; in some cases, humans are more sensitive than rodents. Thus, there is a need for broad-based testing of metals;</p> <ul style="list-style-type: none"> ▶ The route of exposure may affect the dose and site where the metal concentrates, and thus the observed toxic effects; ▶ Metal-metal interactions can reduce or enhance toxicity; biotransformation can reduce or enhance toxicity; ▶ It is difficult to predict the toxicity of one metal based on the adverse effects of another; in trying to evaluate the toxicity of one particular metal compound, predictions based on similar compounds of the same metal may be valid. 						
4942-4944 Sn100e RA Solder Wire	<table border="1"> <thead> <tr> <th>TOXICITY</th> <th>IRRITATION</th> </tr> </thead> <tbody> <tr> <td>Not Available</td> <td>Not Available</td> </tr> </tbody> </table>	TOXICITY	IRRITATION	Not Available	Not Available		
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4942-4944 Sn100e RA Solder Wire

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

COPPER

for copper and its compounds (typically copper chloride):

Acute toxicity: There are no reliable acute oral toxicity results available. In an acute dermal toxicity study (OECD TG 402), one group of 5 male rats and 5 groups of 5 female rats received doses of 1000, 1500 and 2000 mg/kg bw via dermal application for 24 hours. The LD50 values of copper monochloride were 2,000 mg/kg bw or greater for male (no deaths observed) and 1,224 mg/kg bw for female. Four females died at both 1500 and 2000 mg/kg bw, and one at 1,000 mg/kg bw. Symptom of the hardness of skin, an exudation of hardness site, the formation of scar and reddish changes were observed on application sites in all treated animals. Skin inflammation and injury were also noted. In addition, a reddish or black urine was observed in females at 2,000, 1,500 and 1,000 mg/kg bw. Female rats appeared to be more sensitive than male based on mortality and clinical signs.

No reliable skin/eye irritation studies were available. The acute dermal study with copper monochloride suggests that it has a potential to cause skin irritation.

Repeat dose toxicity: In repeated dose toxicity study performed according to OECD TG 422, copper monochloride was given orally (gavage) to Sprague-Dawley rats for 30 days to males and for 39 - 51 days to females at concentrations of 0, 1.3, 5.0, 20, and 80 mg/kg bw/day. The NOAEL value was 5 and 1.3 mg/kg bw/day for male and female rats, respectively. No deaths were observed in male rats. One treatment-related death was observed in female rats in the high dose group. Erythropoietic toxicity (anaemia) was seen in both sexes at the 80 mg/kg bw/day. The frequency of squamous cell hyperplasia of the forestomach was increased in a dose-dependent manner in male and female rats at all treatment groups, and was statistically significant in males at doses of =20 mg/kg bw/day and in females at doses of =5 mg/kg bw/day doses. The observed effects are considered to be local, non-systemic effect on the forestomach which result from oral (gavage) administration of copper monochloride.

Genotoxicity: An in vitro genotoxicity study with copper monochloride showed negative results in a bacterial reverse mutation test with Salmonella typhimurium strains (TA 98, TA 100, TA 1535, and TA 1537) with and without S9 mix at concentrations of up to 1,000 ug/plate. An in vitro test for chromosome aberration in Chinese hamster lung (CHL) cells showed that copper monochloride induced structural and numerical aberrations at the concentration of 50, 70 and 100 ug/mL without S9 mix. In the presence of the metabolic activation system, significant increases of structural aberrations were observed at 50 and 70 ug/mL and significant increases of numerical aberrations were observed at 70 ug/mL. In an in vivo mammalian erythrocyte micronucleus assay, all animals dosed (15 - 60 mg/kg bw) with copper monochloride exhibited similar PCE/(PCE+NCE) ratios and MNPCE frequencies compared to those of the negative control animals. Therefore copper monochloride is not an in vivo mutagen.

Carcinogenicity: there was insufficient information to evaluate the carcinogenic activity of copper monochloride.

Reproductive and developmental toxicity: In the combined repeated dose toxicity study with the reproduction/developmental toxicity screening test (OECD TG 422), copper monochloride was given orally (gavage) to Sprague-Dawley rats for 30 days to males and for 39-51 days to females at concentrations of 0, 1.3, 5.0, 20, and 80 mg/kg bw/day. The NOAEL of copper monochloride for fertility toxicity was 80 mg/kg bw/day for the parental animals. No treatment-related effects were observed on the reproductive organs and the fertility parameters assessed. For developmental toxicity the NOAEL was 20 mg/kg bw/day. Three of 120 pups appeared to have icterus at birth; 4 of 120 pups appeared runted at the highest dose tested (80 mg/kg bw/day).

WARNING: Inhalation of high concentrations of copper fume may cause 'metal fume fever', an acute industrial disease of short duration. Symptoms are tiredness, influenza like respiratory tract irritation with fever.

TIN & ROSIN, POLYMERISED

No significant acute toxicological data identified in literature search.

Acute Toxicity	✗	Carcinogenicity	✗
Skin Irritation/Corrosion	✗	Reproductivity	✗
Serious Eye Damage/Irritation	✗	STOT - Single Exposure	✗
Respiratory or Skin sensitisation	✗	STOT - Repeated Exposure	✗
Mutagenicity	✗	Aspiration Hazard	✗

Legend: ✗ - Data either not available or does not fill the criteria for classification
✓ - Data available to make classification

SECTION 12 ECOLOGICAL INFORMATION

12.1. Toxicity

4942-4944 Sn100e RA Solder Wire	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available

tin	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	>0.0124mg/L	2
	EC50	48	Crustacea	0.00018mg/L	5
	EC50	72	Algae or other aquatic plants	0.009-0.846mg/L	2
	NOEC	72	Algae or other aquatic plants	0.001-mg/L	2

rosin, polymerised	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	>1-mg/L	2
	EC50	48	Crustacea	>2-mg/L	2
	EC50	96	Algae or other aquatic plants	0.031mg/L	2
	NOEC	96	Algae or other aquatic plants	0.013mg/L	2

copper	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	0.001-0.09mg/L	2
	EC50	48	Crustacea	0.001mg/L	2
	EC50	72	Algae or other aquatic plants	0.013335mg/L	4
	BCF	960	Fish	200mg/L	4
EC25	6	Algae or other aquatic plants	0.00150495mg/L	4	

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4942-4944 Sn100e RA Solder Wire

	NOEC	96	Crustacea	0.0008mg/L	4
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Legend: *Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*

Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air. Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved/ sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms. When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities.

Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects.

A metal ion is considered infinitely persistent because it cannot degrade further.

The current state of science does not allow for an unambiguous interpretation of various measures of bioaccumulation.

The counter-ion may also create health and environmental concerns once isolated from the metal. Under normal physiological conditions the counter-ion may be essentially insoluble and may not be bioavailable.

Environmental processes may enhance bioavailability.

Tin may exist in either divalent (Sn²⁺) or tetravalent (Sn⁴⁺) cationic (positively charged) ions under environmental conditions. Tin(II) dominates in reduced (oxygen-poor) water, and will readily precipitate as a sulfide (SnS) or as a hydroxide (Sn(OH)₂) in alkaline water. Tin(IV) readily hydrolyses, and can precipitate as a hydroxide. The solubility product of Sn(OH)₄ has been measured at approximately 10 exp(-56) g/L at 25 °C. In general, tin(IV) would be expected to be the only stable ionic species in the weathering cycle.

Tin in water may partition to soils and sediments. Cations such as Sn²⁺ and Sn⁴⁺ will generally be adsorbed by soils to some extent, which reduces their mobility. Tin is generally regarded as being relatively immobile in the environment. However, tin may be transported in water if it partitions to suspended sediments, but the significance of this mechanism has not been studied in detail. Transfer coefficients for tin in a soil-plant system were reported to be 0.01-0.1.

A bioconcentration factor (BCF) relates the concentration of a chemical in plants and animals to the concentration of the chemical in the medium in which they live. It was estimated that the BCFs of inorganic tin were 100, 1,000, and 3,000 for marine and freshwater plants, invertebrates, and fish, respectively. Marine algae can bioconcentrate tin(IV) ion by a factor of 1,900.

Inorganic tin cannot be degraded in the environment, but may undergo oxidation-reduction, ligand exchange, and precipitation reactions. It has been established that inorganic tin can be transformed into organometallic forms by microbial methylation. Inorganic tin may also be converted to stannane (H₄Sn) in extremely anaerobic (oxygen-poor) conditions by macroalgae.

DO NOT discharge into sewer or waterways.

12.2. Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

12.3. Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

12.4. Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

12.5. Results of PBT and vPvB assessment

	P	B	T
Relevant available data	Not Applicable	Not Applicable	Not Applicable
PBT Criteria fulfilled?	Not Applicable	Not Applicable	Not Applicable

12.6. Other adverse effects

No data available

SECTION 13 DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Product / Packaging disposal	
	<ul style="list-style-type: none"> Recycle wherever possible or consult manufacturer for recycling options. Consult State Land Waste Management Authority for disposal. <p>Metal scrap recycling operations present a wide variety of hazards, including health hazards associated with chemical exposures and safety hazards associated with material processing operations and the equipment used in these tasks. Many of these metals do not pose any hazard to people who handle objects containing the metal in everyday use. In cases where employees could be exposed to multiple hazardous metals or other hazardous substances at the same time or during the same workday, employers must consider the combined effects of the exposure in determining safe exposure levels. The recycling of scrap metals is associated with illness and injury. The most common causes of illness were poisoning (e.g., lead or cadmium poisoning), disorders associated with repeated trauma, skin diseases or disorders, and respiratory conditions due to inhalation of, or other contact with, toxic agents. The most common events or exposures leading to these cases were contact with an object or piece of equipment; overextension; and exposure to a harmful substance. The most common types of these injuries were sprains and strains; heat burns; and cuts, lacerations, and punctures. Any combustible material can burn rapidly when in a finely divided form. If such a dust is suspended in air in the right concentration, under certain conditions, it can become explosible. Even materials that do not burn in larger pieces (such as aluminum or iron), given the proper conditions, can be explosible in dust form. The force from such an explosion can cause employee deaths, injuries, and destruction of entire buildings. Breaking apart large metal pieces may involve the use of gas cutting torch. Classic cutting torches use gas, while other torches use plasma or powder, or even water. Thermal (gas) torches expose employees to sprays of sparks and metal dust particles, to high temperatures, to bright light that could damage eyes (light both inside and outside of the visible spectrum), and to various gases. Materials that require higher temperatures to cut, such as pig iron and heat-resistant alloyed scrap, or materials that conduct heat too well to be cut with thermal torches, such as copper and bronze, may be cut with non-thermal methods such as plasma torches or powder cutting torches. Plasma torches are often used for superconductors of heat or heat-resistant metals, such as alloy steels containing nickel and/or chromium. Plasma torches generate a large amount of smoke and noise, as well as ultraviolet (UV) and infrared (IR) light. Depending on the metal, this smoke could contain toxic fumes or dusts.</p>

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	<p>Other hazards common to cutting operations (as well as to welding and brazing) include burns, fires, explosions, electric shock, and heat stress. Even chemicals that are generally not flammable may burn readily when vapourised.</p> <p>Larger scrap metal objects are often broken apart using stationary shears, such as alligator shears used to cut apart short steel for foundries or to cut nonferrous metals. These machines can send small pieces of metal flying.</p> <p>Many scrap metal recycling operations heat scrap pieces to high temperatures to separate different metal components, increase the purity of scrap, bake out non-metal substances, burn off contaminants, remove insulation from wire, or otherwise process the metal scrap. This may be done using furnaces or ovens that use fuel or electrical heating sources. Furnaces generate smoke, dust, and metal fumes, depending on temperature and content. Combustion by-products may include sulfur and nitrogen oxides, and carbon monoxide and carbon dioxide. Organic compounds may be emitted as heating vapourises oil and grease on scraps. In addition, heating or burning of certain plastics (such as plastic-coated wiring) may release phosgene or other hazardous substances. Emissions from fluxing typically include chlorides and fluorides. The highest concentrations of 'fugitive' emissions (i.e., gases and vapours that escape from equipment) occur when the lids and doors of a furnace are opened during charging, alloying, and other operations.</p> <p>Chemical processes are also used in a wide range of metal scrap recycling industries as a means to separate scrap into its component metals, to clean scrap metal prior to using physical processes, to remove contaminants (such as paint) from scrap material, or to extract selected metals from a batch of scrap containing many metal types. Chemical processes may include high-temperature chlorination, electrorefining, plating, leaching, chemical separation, dissolution, reduction, or galvanizing. The most probable emissions from these processes include metal fumes and vapours, organic vapours, and acid gases. Other potential hazards may include high amounts of heat, splashing of caustic or other-wise hazardous chemicals, or combustion hazards.</p> <p>The recycling of scrap metals or metals found in e-waste (such as printed circuit boards) may present a significant environmental and human health risk. These may contain heavy metals such as cadmium, cobalt, chrome, copper, nickel, lead and zinc. Roads and premises of nearby public facilities such as a school-yard and outdoor food market have been shown to be adversely impacted by the uncontrolled recycling activity. Heavy metal concentrations, especially lead and copper, in workshop and road dusts were found to be severely enriched, posing potential health risks, especially to children.</p> <ul style="list-style-type: none"> ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ It may be necessary to collect all wash water for treatment before disposal. ▶ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▶ Where in doubt contact the responsible authority.
Waste treatment options	Not Available
Sewage disposal options	Not Available

SECTION 14 TRANSPORT INFORMATION

Land transport (ADR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number	Not Applicable												
14.2. UN proper shipping name	Not Applicable												
14.3. Transport hazard class(es)	<table border="0"> <tr> <td>Class</td> <td>Not Applicable</td> </tr> <tr> <td>Subrisk</td> <td>Not Applicable</td> </tr> </table>	Class	Not Applicable	Subrisk	Not Applicable								
Class	Not Applicable												
Subrisk	Not Applicable												
14.4. Packing group	Not Applicable												
14.5. Environmental hazard	Not Applicable												
14.6. Special precautions for user	<table border="0"> <tr> <td>Hazard identification (Kemler)</td> <td>Not Applicable</td> </tr> <tr> <td>Classification code</td> <td>Not Applicable</td> </tr> <tr> <td>Hazard Label</td> <td>Not Applicable</td> </tr> <tr> <td>Special provisions</td> <td>Not Applicable</td> </tr> <tr> <td>Limited quantity</td> <td>Not Applicable</td> </tr> <tr> <td>Tunnel Restriction Code</td> <td>Not Applicable</td> </tr> </table>	Hazard identification (Kemler)	Not Applicable	Classification code	Not Applicable	Hazard Label	Not Applicable	Special provisions	Not Applicable	Limited quantity	Not Applicable	Tunnel Restriction Code	Not Applicable
Hazard identification (Kemler)	Not Applicable												
Classification code	Not Applicable												
Hazard Label	Not Applicable												
Special provisions	Not Applicable												
Limited quantity	Not Applicable												
Tunnel Restriction Code	Not Applicable												

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number	Not Applicable														
14.2. UN proper shipping name	Not Applicable														
14.3. Transport hazard class(es)	<table border="0"> <tr> <td>ICAO/IATA Class</td> <td>Not Applicable</td> </tr> <tr> <td>ICAO / IATA Subrisk</td> <td>Not Applicable</td> </tr> <tr> <td>ERG Code</td> <td>Not Applicable</td> </tr> </table>	ICAO/IATA Class	Not Applicable	ICAO / IATA Subrisk	Not Applicable	ERG Code	Not Applicable								
ICAO/IATA Class	Not Applicable														
ICAO / IATA Subrisk	Not Applicable														
ERG Code	Not Applicable														
14.4. Packing group	Not Applicable														
14.5. Environmental hazard	Not Applicable														
14.6. Special precautions for user	<table border="0"> <tr> <td>Special provisions</td> <td>Not Applicable</td> </tr> <tr> <td>Cargo Only Packing Instructions</td> <td>Not Applicable</td> </tr> <tr> <td>Cargo Only Maximum Qty / Pack</td> <td>Not Applicable</td> </tr> <tr> <td>Passenger and Cargo Packing Instructions</td> <td>Not Applicable</td> </tr> <tr> <td>Passenger and Cargo Maximum Qty / Pack</td> <td>Not Applicable</td> </tr> <tr> <td>Passenger and Cargo Limited Quantity Packing Instructions</td> <td>Not Applicable</td> </tr> <tr> <td>Passenger and Cargo Limited Maximum Qty / Pack</td> <td>Not Applicable</td> </tr> </table>	Special provisions	Not Applicable	Cargo Only Packing Instructions	Not Applicable	Cargo Only Maximum Qty / Pack	Not Applicable	Passenger and Cargo Packing Instructions	Not Applicable	Passenger and Cargo Maximum Qty / Pack	Not Applicable	Passenger and Cargo Limited Quantity Packing Instructions	Not Applicable	Passenger and Cargo Limited Maximum Qty / Pack	Not Applicable
Special provisions	Not Applicable														
Cargo Only Packing Instructions	Not Applicable														
Cargo Only Maximum Qty / Pack	Not Applicable														
Passenger and Cargo Packing Instructions	Not Applicable														
Passenger and Cargo Maximum Qty / Pack	Not Applicable														
Passenger and Cargo Limited Quantity Packing Instructions	Not Applicable														
Passenger and Cargo Limited Maximum Qty / Pack	Not Applicable														

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number	Not Applicable
14.2. UN proper shipping name	Not Applicable

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14.3. Transport hazard class(es)	IMDG Class	Not Applicable
	IMDG Subrisk	Not Applicable
14.4. Packing group	Not Applicable	
14.5. Environmental hazard	Not Applicable	
14.6. Special precautions for user	EMS Number	Not Applicable
	Special provisions	Not Applicable
	Limited Quantities	Not Applicable

Inland waterways transport (ADN): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number	Not Applicable	
14.2. UN proper shipping name	Not Applicable	
14.3. Transport hazard class(es)	Not Applicable	Not Applicable
14.4. Packing group	Not Applicable	
14.5. Environmental hazard	Not Applicable	
14.6. Special precautions for user	Classification code	Not Applicable
	Special provisions	Not Applicable
	Limited quantity	Not Applicable
	Equipment required	Not Applicable
	Fire cones number	Not Applicable

14.7. Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

15.1. Safety, health and environmental regulations / legislation specific for the substance or mixture

TIN(7440-31-5) IS FOUND ON THE FOLLOWING REGULATORY LISTS

EU Consolidated List of Indicative Occupational Exposure Limit Values (IOELV/s) Europe EC Inventory	European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch Harmonised classification
Europe ECHA Registered Substances - Classification and Labelling - DSD-DPD	European Trade Union Confederation (ETUC) Priority List for REACH Authorisation
Europe European Customs Inventory of Chemical Substances	European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

ROSIN, POLYMERISED(65997-05-9) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Europe EC Inventory	European Union (EU) No-Longer Polymers List (NLP) (67/548/EEC)
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European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch
Harmonised classification

COPPER(7440-50-8) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Europe EC Inventory	European Chemical Agency (ECHA) Classification & Labelling Inventory - Chemwatch Harmonised classification
Europe ECHA Registered Substances - Classification and Labelling - DSD-DPD	European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)
Europe European Customs Inventory of Chemical Substances	UK Workplace Exposure Limits (WELs)

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : Directives 98/24/EC, - 92/85/EEC, - 94/33/EC, - 2008/98/EC, - 2010/75/EU; Commission Regulation (EU) 2015/830; Regulation (EC) No 1272/2008 as updated through ATPs.

15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

National Inventory Status

National Inventory	Status
Australia - AICS	Yes
Canada - DSL	Yes
Canada - NDSL	No (rosin, polymerised; copper; tin)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	No (copper; tin)
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes

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Mexico - INSQ	No (rosin, polymerised)
Vietnam - NCI	Yes
Russia - ARIPS	No (rosin, polymerised)
Thailand - TECI	No (rosin, polymerised; copper)
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Revision Date	17/03/2020
Initial Date	14/06/2018

Full text Risk and Hazard codes**SDS Version Summary**

Version	Issue Date	Sections Updated
2.3.1.1.1	23/07/2019	Fire Fighter (fire/explosion hazard), Storage (storage incompatibility), Name

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

Definitions and abbreviations

PC – TWA: Permissible Concentration-Time Weighted Average

PC – STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

Reason For Change

A-1.01 - Update to the emergency phone number information.