

**TIN-LEAD EUTECTIC ALLOY
SAFETY DATA SHEET**

SECTION 1. IDENTIFICATION

Product Identity: This SDS applies to the following grades of Tin-Lead Eutectic Alloy

- Standard Tin-Lead Alloy
- Low Alpha Tin-Lead Alloy
- Ultra Low Alpha Tin-Lead Alloy

Trade Names and Synonyms: LC628, 63/37 Sn/Pb.

Manufacturer:

Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:

Teck Advanced Materials Inc.
13670 Danielson Street
Suite H & I
Poway, CA 92064

SDS Preparer:

Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

Date of Last Review: June 4, 2018.

Date of Last Edit: June 4, 2018.


Product Use: Production of tin-lead solder, manufacture of electronic devices.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health	Physical	Environmental
Acute Toxicity (Oral, Inhalation) – Does not meet criteria Skin Corrosion/Irritation – Does not meet criteria Eye Damage/Eye Irritation – Does not meet criteria Respiratory or Skin Sensitization – Does not meet criteria Mutagenicity – Does not meet criteria Carcinogenicity – Category 2 Reproductive Toxicity – Category 1A Specific Target Organ Toxicity Acute Exposure – Does not meet criteria Chronic Exposure – Category 1	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – Short Term (Acute) - Category 3

LABEL:

Symbols:		Signal Word: DANGER
<u>Hazard Statements</u>		<u>Precautionary Statements:</u>
<p>DANGER! Causes damage to kidneys, blood-forming systems, central nervous system and digestive tract through prolonged or repeated exposure. May damage the unborn child. May cause harm to breast-fed children. Suspected of damaging fertility. Suspected of causing cancer. Harmful to aquatic life.</p>		<p>Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust. Wear protective gloves, protective clothing, and eye protection. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. If exposed or concerned or you feel unwell: Get medical advice/attention.</p>

Emergency Overview: A silvery-grey, heavy, soft metal that does not burn in bulk but will melt readily at temperatures above 245°C to form a molten metal pool. Finely-divided dust clouds are a moderate explosion hazard, however. This alloy contains

37% lead and fumes generated in a fire situation present the risk of lead inhalation and absorption. SCBA and full protective clothing required for fire emergency response personnel.

Potential Health Effects: While this product is not considered hazardous in the form in which it is sold, this Safety Data Sheet contains valuable information critical to the safe handling and proper use of the product. Inhalation or ingestion of lead-containing dust or fumes from this product may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage, gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure to dust in order to prevent lead crossing the placental barrier and causing infant neurological disorders. Airborne lead dust or fume is considered a potential human carcinogen by IARC, ACGIH and NTP (see Toxicological Information, Section 11).

Potential Environmental Effects: The product, a tin-lead alloy, is unlikely to yield direct ecological effects, as the constituent metals (i.e., tin and lead), are generally not readily bioavailable. However, processing of the product or extended exposure in both aquatic and terrestrial environments may lead to the release of tin and lead compounds in more bioavailable, and therefore, potentially toxic, forms (see Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	CAS Registry No.	CONCENTRATION (% wt/wt)
Tin	7440-31-5	63%
Lead	7439-92-1	37%

Note: see Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Eye irritation, redness. Gently brush product off face if necessary. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not dislodge, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Symptoms:* Skin soiling, mild irritation. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes, or until product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: *Symptoms:* Respiratory irritation. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

Ingestion: *Symptoms:* Stomach upset. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible but will melt readily at temperatures above 245°C to form a molten metal pool. Finely-divided dust or powder that may be generated during processing is a moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Explosions may also occur under certain circumstances upon contact with some incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam. Do not use direct water streams on fires where molten metal is present.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Apply water, carbon dioxide, foam or dry chemical. Lead and tin oxide fumes may evolve in a fire. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face piece mask. Do not use direct water streams on fires where molten metal is present, due to the risk of a steam explosion that could potentially eject molten metal uncontrollably. Use a fine water mist on the front-running edge of the spill and on the top of the molten metal to cool and solidify it.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Material is recyclable. Control source of spillage if possible to do so safely. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to solidify before cleanup. Once solidified, wear gloves, pick up and return to process. Powder or dust should be cleaned up using methods that will minimize dust generation (e.g., vacuum solids.). Return uncontaminated spilled material to the process if possible. Place

contaminated material in suitable labelled containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust and fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from radiant heat and hot-metal splash as well as a respirator to protect against inhalation of fumes. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination with lead dust.

Environmental Precautions: The constituent metals in this product (an alloy) have relatively low bioavailability; however, compounds of the constituent metals (in particular, lead), under certain chemical conditions, can yield toxic effects to aquatic and terrestrial plants and animals. Releases of the product to water and soil should, therefore, be prevented.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling: Ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. Use with adequate ventilation.

Conditions for Safe Storage: Store in a dry, covered area away from incompatible materials and food or feedstuffs.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines:

<u>Component</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>NIOSH REL</u>
Tin	2.0 mg/m ³	2.0 mg/m ³	2.0 mg/m ³
Lead	0.05 mg/m ³	0.05 mg/m ³	0.05 mg/m ³

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead and tin fumes in the working environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, welding, grinding and flame cutting or burning.

Protective Clothing: Gloves and shop coat or other work clothing with long sleeves are recommended to prevent prolonged or repeated direct skin contact when this product is processed. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from hot metal splash and radiant heat should be worn. Appropriate eye protection should be worn where fume or dust is generated. Safety type boots are recommended.

Respirators: Where alloy dust or fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge).

General Hygiene Considerations: Avoid breathing dust or fumes. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands after handling and before eating, drinking, or smoking in appropriate designated areas only.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:
Silver-grey metal

Odour:
None

Odour Threshold:
Not applicable

pH:
Not applicable

Vapour Pressure:
(negligible @ 20°C)

Vapour Density:
Not applicable

Melting Point/Range:
245-255°C

Boiling Point/Range:
1740°C (Lead) / 2270°C (Tin)

Relative Density (Water = 1):
8.52

Evaporation Rate:
Not applicable

Coefficient of Water/Oil Distribution: Not applicable

Solubility:
Insoluble in water

Flash Point:
None

Flammable Limits (LEL/UEL):
Not flammable

Auto-ignition Temperature:
None

Decomposition Temperature:
None

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: This material may react vigorously with strong acids, strong oxidizers such as hydrogen peroxide, chlorine, chlorine trifluoride, and active metals such as sodium and potassium. Powdered lead fused with ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead-containing materials can form lead azide, which is a detonating compound.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating of a molten bath will generate toxic metal oxide fumes. The fumes will contain oxides of lead and tin. The particle size of metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

SECTION 11. TOXICOLOGICAL INFORMATION

General: It should be noted that simple handling and non-thermal processing of this alloy does not present any significant health hazard to workers. The major route of exposure would be through inhalation of lead fumes generated from high temperature processing. Dust generated by handling and processing also creates some inhalation and/or ingestion risk. Tin is much less toxic than lead and the health effects are therefore due principally to the lead content.

Acute:

Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to fumes of this alloy may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term fume exposure could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today. Kidney damage, as well as anemia, can occur from acute exposure.

Ingestion: May cause headache, nausea, vomiting, dizziness and/or gastrointestinal irritation. Kidney damage, as well as anemia can occur from acute lead exposure. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

Chronic: Lead can be harmful when ingested or inhaled. Overexposure to lead can cause lead poisoning, which is characterized by decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains, and decreased appetite. These symptoms are reversible and complete recovery is possible. However, continued over-exposure to lead can lead to increased symptoms and chronic systemic disorders. The kidneys, blood, gastrointestinal tract, nervous system, male and female reproductive system can all be adversely affected by concentrations of lead in the body. Pregnant women should be protected from excessive exposure in order to prevent lead crossing the placental barrier and causing infant neurological disorders. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead as a *Group 2B Carcinogen (Possibly Carcinogenic to Humans)*. The NTP has also listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. This carcinogenic risk is only associated with inhalation of lead fumes or fine airborne lead dust. Chronic overexposure to tin can result in a benign pneumoconiosis called stanosis. This form of pneumoconiosis produces progressive x-ray changes of the lungs as long as exposure exists, but there is no evidence of disability and no special complicating factors. Tin is not considered a human carcinogen by the ACGIH, IARC, NTP, OSHA or the EU.

Animal Toxicity:

<u>Hazardous Ingredient:</u>	<u>Acute Oral Toxicity:</u>	<u>Acute Dermal Toxicity:</u>	<u>Acute Inhalation Toxicity:</u>
Tin	No data	No data	No data
Lead	No data	No data	No data

SECTION 12. ECOLOGICAL INFORMATION

This product, a metal alloy, is relatively insoluble (and therefore not readily bioavailable); however, processing of the product or extended exposure in aquatic and terrestrial environments may lead to the release of tin and lead compounds in more bioavailable forms. Compounds of lead have been shown to yield toxic effects in aquatic organisms, especially fish, at relatively low concentrations. Water hardness, pH and dissolved organic carbon content are physico-chemical characteristics which regulate the degree of toxicity by lead in solution. Lead compounds, however, are not particularly mobile in surface water or groundwater. In soil, lead has a tendency to become highly sorbed onto soil particles in accordance with certain soil properties. Lead also has the tendency to bioaccumulate in plants and animals in both aquatic and terrestrial environments.

Tin compounds have similar geochemical and ecological properties to those of lead but are considerably less toxic to aquatic and terrestrial organisms.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of only in accordance with applicable local, state/provincial and federal regulations. Waste material meets the requirements of a hazardous waste in most jurisdictions. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated in order to determine the proper waste classification and disposal methods.

SECTION 14. TRANSPORT INFORMATION

TRANSPORT CANADA CLASSIFICATION..... Not a regulated product in ingot form.
U.S. DOT CLASSIFICATION Not a regulated product in ingot form.
MARINE POLLUTANT..... No.
IMO CLASSIFICATION Not regulated.

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENTS LISTED ON TSCA INVENTORY..... Yes
HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD Yes
CERCLA SECTION 103 HAZARDOUS SUBSTANCES..... Lead RQ: 10lb. (4.54 kg.)*
* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers.
EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE..... No Ingredients Qualify
EPCRA SECTION 311/312 HAZARD CATEGORIES..... Delayed (chronic) health hazard – Carcinogen
Delayed (chronic) health hazard – Reproductive Toxin
EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... Lead CAS No. 7439-92-1
Percent by Weight: 37%

SECTION 16. OTHER INFORMATION

Date of Original Issue: January 9, 2002 **Version:** 01 (*First edition*)

Date of Latest Revision: June 4, 2018 **Version:** 11

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2018, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2018, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition (P. G. Urban, Ed.), 1995.
- Commission de la santé et la sécurité du travail, Service du répertoire toxicologique, Étain, 2000-01 et Plomb 2007-04.
- European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.
- Handbook on the Toxicology of Metals, 3rd ed., Gunnar F. Nordberg, Bruce A. Fowler, Monica Nordberg and Lars Friberg, Editors, Academic Press, New York, NY (2007) Tin – Chapter 42.
- Industry Canada, SOR/2015-17, 30 January 2015 - Hazardous Products Regulations.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (on-line version).

- Patty's Toxicology, Fifth Edition, 2001: E Bingham, B Cahrssen & C H Powell, Ed.
- Sax, N. Irving & Lewis, Richard J., Sr., 1987, Hawley's Condensed Chemical Dictionary, Eleventh Edition.
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 13th Report on Carcinogens, October 2014.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition September 2005.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS) (CCOHS web version, last accessed 8 May 2018).
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Advanced Materials Inc. extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.