

GALVA•GUARD® MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Galva•Guard®

NOTE: In the form in which it is sold this product is not regulated. This Material Safety Data Sheet is provided for information purposes only.

Manufacturer:

Teck Metals Ltd.
Product Technology Centre
2380 Speakman Dr.
Sheridan Science & Technology Park
Mississauga, Ontario
L5K 1B4
Emergency Telephone: 905-822-2022

Supplier:

Teck Metals Ltd.
Product Technology Centre
2380 Speakman Dr.
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L5K 1B4

MSDS Preparer:

Teck Metals Ltd.
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Vancouver, British Columbia
V6C 0B3

Date of Last Review/Edit: September 9, 2009.

Product Use: Zinc-tin solder.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)	LD ₅₀ / LC ₅₀ Species and Route
Zinc	35-65%	7440-66-6	OSHA PEL None established ACGIH TLV None established NIOSH REL None established	No Data
Tin	35-65%	7440-31-5	OSHA PEL 2 mg/m ³ ACGIH TLV 2 mg/m ³ NIOSH REL 2 mg/m ³	No Data
Copper	0.1-5%	7440-50-8	OSHA PEL 0.1 mg/m ³ fume 1.0 mg/m ³ dusts/mists ACGIH TLV 0.2 mg/m ³ fume 1.0 mg/m ³ dusts/mists NIOSH REL 0.1 mg/m ³ fume (respirable) 1.0 mg/m ³ dusts/mists (total)	No Data

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit, PEL – Permissible Exposure Limit, TLV – Threshold Limit Value, REL – Recommended Exposure Limit.

While there is no established OEL for zinc as such, there is an OEL for zinc oxide which may be formed during burning, welding or other fuming processes. The OSHA PEL final rule limits for zinc oxide dust are 10 mg/m³ (total) and 5 mg/m³ (respirable); the OSHA PEL final rule limit for zinc oxide fume is 5 mg/m³. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. They are 15 mg/m³ (total) and 5 mg/m³ (respirable) while the transitional PEL for zinc oxide fume is 5 mg/m³. The ACGIH TLV for zinc oxide is 2 mg/m³ (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m³ respirable fraction. The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m³ 10 hr TWA with a 15 mg/m³ ceiling limit (15 minute sample) for zinc oxide dust and a 10 mg/m³ STEL for zinc oxide fume (15 minute sample).

The OSHA PEL final rule limits for tin, inorganic compounds (except oxides) (as Sn) is 2 mg/m³. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. The transitional PEL is also 2 mg/m³ for tin, inorganic compounds. The ACGIH TLV for tin as tin metal, oxide and inorganic compounds except tin hydrides (as Sn) is 2 mg/m³ and the NIOSH REL for tin and inorganic tin compounds (except tin oxide) is 2 mg/m³.

Trade Names and Synonyms: Galvanizing Solder Repair Stick, Zn-Sn Solder, Repair Solder.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A silver metal that does not burn in bulk but may form explosive mixtures if dispersed in air as a fine powder. Contact with acids or alkalis may generate flammable hydrogen gas that can accumulate in poorly-ventilated areas. Do not use water or foam on molten metals in fire fighting. This product is relatively non-toxic and does not pose an immediate hazard to the health of emergency response personnel or to the environment in an emergency situation.

Potential Health Effects: Pure zinc, tin and copper are relatively non-toxic to humans. This product may cause mild local irritation to eyes, nose, throat and upper airways, particularly if the product is heated to the point of fuming. Acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting. Zinc, tin and copper are not listed as carcinogens by OSHA, NTP, IARC, ACGIH or the EU. (see Toxicological Information, Section 11)

Potential Environmental Effects: This product does not pose significant ecological risks in the form in which it is sold. However, spillage of the product onto soil and into water courses should be prevented. (See Ecological Information, Section 12)

EU Risk Phrase(s): Not applicable - zinc, tin and copper are not dangerous substances.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Dust:* No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice. *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: If symptoms are experienced remove source of contamination or move victim to fresh air. Obtain medical advice. NOTE: Metal fume fever may develop 3-10 hours after exposure. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if irritation or discomfort occurs, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not considered a fire or explosion hazard. However, finely-divided metallic dust or powder may form explosive dust clouds when dispersed in air at high concentrations and exposed to a source of ignition such as heat, flame or static electric discharge. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive.

Extinguishing Media: Do NOT use water or foam on molten metals. Apply dry chemical, dry sand, or special powder extinguishing media. Water may be ineffective for extinguishing a fire but should be used to keep fire-exposed containers cool.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Apply dry chemical, sand, or special powder extinguishing media. Do not use direct water streams on fires where molten metal is present. Zinc and tin oxide fumes may evolve in fires. Fire fighters should 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.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Lower Flammable Limit (Zinc Dust): 500 g/m³; Upper Flammable Limit: Not Applicable.

Autoignition Temperature: Approximately 630 - 650°C (dust cloud in air).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Solid metal is recyclable. Powder or dust should be cleaned up using methods that will minimize dust generation (e.g., vacuum solids or dampen material and wet sweep/shovel, etc.). Molten metal should be allowed to solidify prior to clean-up. Return uncontaminated spilled material to process if possible. Place contaminated and non-recyclable material in suitable labelled containers for later disposal. Treat or dispose of waste material in accordance with all local, regional and national requirements, as applicable.

Personal Precautions: Standard protective equipment used in soldering operations: heat-resistant gloves, approved respirator where fume/dust are present, safety glasses/welding goggles, protection from hot-metal splash, safety-type boots.

Environmental Precautions: Zinc, tin and copper in the metallic forms present in this product have limited bioavailability and pose no immediate ecological risk. However, good management practices should be applied in the storage and use of the product.

SECTION 7. HANDLING AND STORAGE

Store Galva•Guard[®] in a DRY covered area, separate from incompatible materials. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas. No special packaging materials are required.

EU Safety Phrase(s): Not applicable - zinc, tin and copper are not dangerous substances.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls, shop coat or other work clothing with long sleeves are recommended to prevent prolonged or repeated direct skin contact when Galva•Guard[®] is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where oxide fume is generated. Where hot or molten metal is handled, heat-resistant gloves, goggles or face-shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Ventilation: Use adequate local or general ventilation to maintain the concentration of zinc and tin oxide 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.

Respirators: Where zinc or tin oxide 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-95 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Silver metal	Odour: None	Physical State: Solid	pH: Not Applicable
Vapour Pressure: Negligible at 20°C	Vapour Density: Not Applicable	Boiling Point/Range: 904°C	Melting Point/Range: 190°C-360°C
Specific Gravity: 7.26 g/cc	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Odour Threshold: None
Solubility: Insoluble in water			

SECTION 10. STABILITY AND REACTIVITY

Stability and Reactivity: This material is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur. Fine, condensed zinc or tin dust or powder can ignite spontaneously in the presence of air when damp. Zinc metal will react with acids and strong alkalis to generate hydrogen gas. A violent, explosive reaction may occur when powdered zinc or tin is heated with sulphur or halogenated hydrocarbons. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

Incompatibilities: Always keep product dry. Avoid contact with strong acids or alkalis or elemental sulphur dust. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chlorate or fused ammonium nitrate. Acidic arsenic or antimony solutions in contact with Galva•Guard[®] metal or dust may generate highly toxic arsine or stibine gas.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate metal oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the metallic form in which it is sold this product is relatively non-toxic. The major route of exposure would be through the generation and inhalation of metal oxide fume, particularly zinc oxide.

Acute:

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

Inhalation: If excessive quantities of Galva•Guard® fume are inhaled, it can result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest, and coughing which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after effects, or chronic effects that result from this condition.

Ingestion: When ingested in excessive quantities, zinc and tin can irritate the stomach resulting in possible nausea and vomiting.

Chronic: There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Some workers may develop a short-term immunity (resistance) so that repeated exposure to zinc oxide fumes does not cause metal fume fever. This immunity (resistance) however is quickly lost after short absences from work (weekends or vacations). Workers exposed to finely-divided metallic zinc for up to 35 years revealed no acute or chronic illnesses attributable to zinc. Chronic exposure to tin dust or fumes is known to cause a benign pneumoconiosis (Stannosis) characterized by progressive X-ray changes of the lung while exposure continues, but without any distinctive fibrosis or scarring of the lungs and without any evidence of disability. Zinc, tin and copper are not listed as human carcinogens by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH) or the European Union (EU).

SECTION 12. ECOLOGICAL INFORMATION

Two of the constituent metals in this product, zinc and copper, in their metallic forms, have low bioavailability, and are therefore unlikely to pose any immediate ecological risk. However, when the product is processed, or resides in the environment for an extended period, zinc and copper compounds may form which are potentially toxic to aquatic and terrestrial organisms. In aquatic systems, for example, zinc and copper are potentially toxic in certain forms at elevated concentrations, and can bioaccumulate in both plants and animals; pH, hardness and dissolved organic carbon are regulating factors. Zinc and copper can also bioaccumulate in terrestrial plants, soil invertebrates and mammals, depending on chemical species and ambient soil properties. Tin, in its metallic form, is also known to have low bioavailability, is only moderately toxic in the environment, and is therefore unlikely to pose any immediate ecological risk.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

Proper Shipping Name Transport Canada and U.S. DOT Not a regulated product
Hazard Classification Transport Canada and U.S. DOT Not applicable
Product Identification Number Transport Canada and U.S. DOT Not applicable
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 (Copper)

CERCLA Section 103 Hazardous Substances ZincRQ: 1,000lbs. (454 kg.)

CopperRQ: 5,000lbs. (2270 kg.)

* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

EPCRA Section 302 Extremely Hazardous Substance: No Ingredients Qualify

EPCRA Section 311/312 Hazard Categories: No Hazard Categories Apply

EPCRA Section 313 Toxic Release Inventory Zinc (Fume or Dust)
CAS No. 7440-66-6
Percent by Weight 35-65%
Copper
CAS No. 7440-50-8
Percent by Weight..... 0.1-5%

CANADIAN:

Ingredients Listed On Domestic Substances List: Yes
WHMIS Classification: Not a Controlled Product under the Controlled Product Regulations (CPR).

EUROPEAN UNION:

Ingredients Listed On the European Inventory Of Existing
Commercial Chemical Substances (EINECS): Yes
EU Classification: Not applicable. Zinc, tin and copper are not dangerous substances.

SECTION 16. OTHER INFORMATION

The information in this Material 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, 7th Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2009 Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, 2009, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P.G. Urban, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, Ontario, CHEMINFO Record No. 239 – Zinc (Rev. 2006-01)
CHEMINFO Record No. 3462 – Tin (Rev. 2006-05)
CHEMINFO Record No. 2073 – Copper (Rev. 2005-03)
- European Economic Community, Commission Directives 91/155/EEC, 93/21/EEC, and 67/548/EEC.
- Industry Canada, Controlled Products Regulations SOR/88-66, as amended.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – 2009, (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 (HSDB) on-line version.
- Patty's Toxicology, 5th Edition, (E Bingham, B Cohrssen & C H Powell, Ed.) 2001.
- Sax, N. Irving, 1989, Dangerous Properties of Industrial Materials, Seventh Edition.
- U.S. Department 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. Department of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS), CCOHS on-line version.
- U.S. Department of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 11th Report on Carcinogens, January 2005.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR)
Toxicological Profile for, Zinc - August 2005.
Toxicological Profile for Tin – September 2003.
Toxicological Profile for Copper – September 2004.
- 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 Metals Ltd. extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material 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.