

ZINC WITH CONTROLLED LEAD MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Zinc with Controlled Lead

Manufacturer:

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

Supplier:

Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

MSDS Preparer:

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

Date of Last MSDS Revision/Edit: August 18, 2010.

Product Use: Hot-dip galvanizing, steel mill, wire galvanizing, fence galvanizing.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)	LD ₅₀ / LC ₅₀ Species and Route
Zinc	98.5 to 99.5%	7440-66-6	OSHA PEL None established ACGIH TLV None established NIOSH REL None established	LD ₅₀ , mouse, oral >5,000 mg/kg
Lead	0.5 to 1.5%	7439-92-1	OSHA PEL 0.05 mg/m ³ ACGIH TLV 0.05 mg/m ³ NIOSH REL 0.05 mg/m ³	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 are OELs for the zinc oxide which is 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).

Trade Names and Synonyms: Prime Western Zinc

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A lustrous bluish-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 generates flammable hydrogen gas which can accumulate in poorly-ventilated areas. DO NOT use water or foam in fire fighting. Apply dry chemical, sand or special powder extinguishing media. This product contains 0.5 – 1.5% lead but would not be considered to pose an immediate or acute hazard of lead intoxication for emergency response personnel. The zinc and lead in this product have no direct bioavailability and pose no immediate ecological risk.

Potential Health Effects: Metallic zinc is relatively non-toxic to humans. This product may cause mild local irritation to eyes, nose, throat and upper airways if 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. Repeated overexposure to dust or fume may cause lead absorption and consequential health effects. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. 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 compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while

lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently 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. (See Toxicological Information, Section 11).

Potential Environmental Effects: The metals in this alloy product, zinc and lead, have little direct bioavailability and therefore, pose negligible ecological risks. However, lead and zinc compounds have the potential to be toxic, particularly in the aquatic environment. Lead compounds can be hazardous at relatively low concentrations. Zinc and lead are known to bioaccumulate in plants and animals in aquatic and terrestrial environments. (See Ecological Information, Section 12.)

EU Risk Phrase(s): R61 - May cause harm to unborn child; R20/22 - Harmful by inhalation and if swallowed; R33 - Danger of cumulative effects (due to lead content).

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, 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: Remove source of contamination or move victim from exposure area to fresh air immediately. NOTE: Metal fume fever may develop 3 – 10 hours after exposure to zinc oxide fumes. If symptoms of metal fume fever (flu-like symptoms) develop, obtain medical attention.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 2 – 8 oz. (60 – 240 ml) of water. If vomiting occurs naturally, have victim rinse mouth with water again. Obtain medical advice and bring a copy of this MSDS.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not considered a fire or explosion hazard. However, finely-divided metallic dust may form flammable or explosive dust clouds when dispersed in the air at high concentrations and exposed to heat, flame or other ignition sources. Bulk dust in a damp state may heat spontaneously and ignite on exposure to air. Contact with acids and alkali hydroxides results in evolution of hydrogen gas which is potentially explosive. Mixtures with potassium chlorate or fused ammonium nitrate may explode on impact.

Extinguishing Media: 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. Do NOT use water, carbon dioxide or foam on molten metal.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Apply dry chemical, sand, or special powder extinguishing media. Zinc oxide fumes and highly toxic lead oxide fumes may evolve in fires. 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.

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 680°C (dust cloud in air); 460°C (dust layer).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do so safely. Clean up spilled material immediately observing precautions in Section 8, Personal Protection. Molten metal should be allowed to cool and harden 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 or dampen material and wet sweep/shovel, etc.). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (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 hot metal splash.

Environmental Precautions: The zinc and lead in this product have no direct bioavailability and pose no immediate ecological risk but their compounds, particularly those of lead, can pose a threat to aquatic and terrestrial environments. Contamination of water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store metal in a DRY, covered area, away from incompatible materials. 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. 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): S53 - Avoid exposure - obtain special instructions before use; S45 – In case of accident, or if you feel unwell, seek medical advice immediately (show label where possible).

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 this product is processed. Eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat-resistant gloves, 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 lead 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. Where metallic particles of zinc and lead are being collected and transported by a ventilation system, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Locate dust collectors and fans outdoors if possible and provide dust collectors with explosion vents or blow out panels. Refer to appropriate NFPA Standards 484, 654, and/or 68 for specific guidance.

Respirators: Where zinc / lead 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-100 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Bluish-silver lustrous metal	Odour: None	Physical State: Solid	pH: Not Applicable
Vapour Pressure: 1mm at 487°C (negligible @ 20°C)	Vapour Density: Not Applicable	Boiling Point/Range: 907°C	Melting Point/Range: 417° to 420°C
Specific Gravity: 7.1	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Odour Threshold: None
Solubility: Insoluble in water			

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable under normal temperatures and pressures. However, fine, condensed zinc dust or powder can heat spontaneously and ignite on exposure to 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 is heated with sulphur. Powdered zinc will become incandescent or ignite when heated with halogen gases. Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or fused ammonium nitrate may explode on impact.

Incompatibilities: Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic or antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Incompatible with strong oxidizing agents such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chlorate, chromium trioxide and fused

ammonium nitrate. Also incompatible with elemental sulphur dust, halogenated hydrocarbons or chlorinated solvents, chlorinated rubber and solutions of sodium azide.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient influenza-like illness. Thermal oxidation products will also include small amounts of lead oxide fumes which are highly toxic.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the metallic form in which this product is sold it is relatively non-toxic. The lead component of this alloy and its various compound forms are health hazards. The primary route of exposure would be through the generation and inhalation of metal oxide fumes, principally composed of zinc oxide with some lead oxide as well.

Acute:

Skin/Eye: In most cases, dermal exposure to zinc or zinc compounds does not result in any noticeable toxic effects. This metal alloy is not chemically irritating to the eyes.

Inhalation: If excessive quantities of zinc oxide 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. An acute, short-term exposure to high lead levels could cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. However, a short-term lead exposure of this magnitude is unlikely with this product.

Ingestion: When ingested in excessive quantities, zinc can irritate the stomach resulting in nausea and vomiting. Kidney damage, as well as anemia, can occur from acute lead exposure but ingestion of sufficient lead from this product would be all but impossible.

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. Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Once lead enters the body, it can affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal system. The primary routes of exposure to lead are ingestion or inhalation of dust and fumes. Zinc is not listed as a human carcinogen 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). 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 compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently 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.

SECTION 12. ECOLOGICAL INFORMATION

While this product is relatively insoluble, when it is processed or is in the environment for an extended period, it may release zinc and lead compounds in more bioavailable forms. Certain compounds formed with both of these metals have the potential to be toxic to aquatic organisms, especially fish; lead can be toxic at relatively low concentrations. Water hardness, pH and dissolved organic carbon content are factors which can regulate the degree of toxicity of both metals. Lead compounds are not particularly mobile in surface water or groundwater; however, zinc compounds are mobile in both media.

In the soil compartment, lead tends to become highly sorbed onto soil particles, in accordance with physicochemical properties; however, zinc is more mobile and therefore, more bioavailable, especially in acidic soils. Both lead and zinc are known to bioaccumulate in plants and animals in both aquatic and terrestrial environments.

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 Not a regulated product

U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION Not applicable
 U.S. DOT AND TRANSPORT CANADA PIN 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

CERCLA SECTION 103 HAZARDOUS SUBSTANCES Zinc Yes RQ: 1,000lbs. (454 kg.)*
 Lead Yes RQ: 10 lbs. (4.54 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 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:0.5% to 1.5%

Zinc (Fume or Dust)
 CAS No 7440-66-6
 Percent by Weight:98.5% to 99.5%

CANADIAN:

INGREDIENTS LISTED ON DSL: Yes

WHMIS CLASSIFICATION: Controlled Product, Classification D2A - Materials
 Causing Other Toxic Effects – Very Toxic (due to lead content)

EUROPEAN UNION:

INGREDIENTS LISTED ON THE EUROPEAN INVENTORY
 OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES (EINECS).... Yes

EU CLASSIFICATION: Reproductive Category 1 Toxic, and Harmful (due to lead content).

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, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices – 2009.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (PG Urben, Ed), 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, ON, CHEMINFO Record No. 239 – Zinc Metal.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, ON, CHEMINFO Record No. 608 – Lead.
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, 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.
- Patty's Toxicology, Fifth Edition, 2001. E. Bingham, B. Cohrssen & CH Powell (Eds.).
- 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, 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, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Lead (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Zinc (August 2005).
- 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.