



ZINC METAL MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Zinc Metal

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

Supplier:

Teck Cominco Metals Ltd.
1500-120 Adelaide Street, W.
Toronto, Ontario
M5H 1T1

MSDS Preparer:

Teck Cominco Metals Ltd.
600 - 200 Burrard Street
Vancouver, British Columbia
V6C 3L9

Date of Last Revision/Edit: December 15, 2003.

Product Use: Zinc metal is used to coat steel for corrosion protection (galvanizing, electroplating, electrogalvanizing), as an alloying element in bronze, brass, aluminum and other metal alloys, for zinc die casting alloys, for zinc dry cell batteries, for the production of zinc sheet for architectural and coinage applications, as a reducing agent in organic chemistry and for other chemical applications.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Approximate Percent by Weight	C.A.S. Number	Occupational Exposure Limits (OELs)	LD ₅₀ / LC ₅₀ Species and Route	
Zinc	99+	7440-66-6	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	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.

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: High Grade Zinc; Special High Grade Zinc; TADANAC® Zinc; C-CAST® Zinc; Zn

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A lustrous bluish-silver metal that does not burn 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. Zinc is relatively non-toxic and poses little immediate health hazard to personnel or the environment in an emergency situation.

Potential Health Effects: Pure zinc dust is relatively non-toxic to humans by inhalation. However, acute over-exposure to zinc oxide fume may cause metal fume fever, characterized by flu-like symptoms such as chills, fever, nausea, and vomiting. Ingestion of soluble salts may cause abdominal irritation resulting in nausea and vomiting. Prolonged or repeated skin contact with zinc dust

may cause a mild dermatitis in some individuals. Zinc is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. (see Toxicological Information, Section 11)

Potential Environmental Effects: In the form in which the product is sold, it does not represent a significant threat to the environment. However, extended exposure in the aquatic or terrestrial environments may lead to the release of zinc in a bioavailable form. (see Ecological Information, Section 12)

EU Risk Phrase(s): Not applicable - zinc is not listed as a dangerous substance.

SECTION 4. FIRST AID MEASURES

Eye Contact: Flush with warm running water, including under the eyelids, for at least 15 minutes. If irritation persists, seek medical attention.

Skin Contact: *Dust:* Remove contaminated clothing and wash affected area with soap and warm water. Seek medical attention if irritation develops or persists. *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 victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Keep affected person warm and at rest. Medical oxygen may be administered, if available, where breathing is difficult. Seek medical attention immediately.

Ingestion: If victim is conscious, dilute stomach contents with 2-4 cupfuls of water or milk. Do not induce vomiting. Seek medical attention immediately and bring a copy of this MSDS. Never give anything by mouth to an unconscious person.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable; however, finely-divided metallic dust or powder may form flammable or explosive dust clouds when mixed with air. Bulk metallic 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 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 or foam on molten metals.

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

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Solid metal is recyclable. Vacuuming recommended for accumulated metal dust. Molten metal should be allowed to solidify prior to clean-up. Return uncontaminated spilled material to the process if possible. Place contaminated and non-recyclable material in suitable labeled containers for later disposal. Treat or dispose of waste material in accordance with all local, regional and national requirements, as applicable.

Personal Precautions: Protective clothing, gloves, and respirator equipment are recommended for persons exposed to potentially hazardous levels of zinc dust or fume. Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with zinc dust or fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash.

Environmental Precautions: Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, contamination of water and soil should be prevented.

SECTION 7. HANDLING AND STORAGE

Store zinc in a DRY covered area, separate from incompatible materials. Zinc ingots suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Ingots may contain cavities that collect moisture. Entrained moisture will expand explosively when immersed in a molten 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): Not applicable - zinc in ingot form is not listed as a dangerous substance.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact when zinc is processed. Eye protection should be worn where fume or dust is generated. Respiratory protection may be required where zinc 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 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 dust particles of zinc metal 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.

Respirators: Where zinc oxide dust or fumes are generated and cannot be controlled to within acceptable levels, 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:
Bluish-silver lustrous metal

Odour:
None

Physical State:
Solid

pH:
Not Applicable

Vapour Pressure:
1 mm at 487°C
Negligible at 20°C

Vapour Density:
Not Applicable

Boiling Point/Range:
908° C

Freezing/Melting Point/Range:
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. It slowly becomes covered with a white coating of a hydrated basic zinc carbonate on exposure to moist air. Damp zinc dust or powder may heat spontaneously and ignite on exposure to air and moisture. 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 in the presence of fluorine, chlorine or bromine. Powdered zinc can also react explosively with halogenated hydrocarbons if heated. Mixtures with potassium chlorate or ammonium nitrate may explode on impact.

Incompatibilities: Contact with acids and alkalis will generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic ARSINE or STIBINE gas. Zinc is incompatible with oxidizing agents, acids, alkalis, and halogenated hydrocarbons, as well as ammonium nitrate, barium peroxide, barium nitrate, chlorates, chlorine, chlorine trifluoride, chromium trioxide, ethyl acetoacetate + tribromoneopentyl alcohol, fluorine, hydrazine mononitrate, hydroxylamine, lead nitrate, manganese + barium nitrate + barium peroxide, manganese chloride, nitric acid, performic acid, potassium chlorate, potassium nitrate, potassium peroxide, selenium, sodium chlorate, sodium peroxide, sulphur, telluride, water, ammonium sulphide, arsenic trioxide, carbon disulphide, calcium chloride, sodium hydroxide, chlorinated rubber, catalytic metals, halocarbons, o-nitroanisol, nitrobenzene, oxidants, paint primer base, pentacarbonyliron, transition metal halides, and seleninyl bromide.

Hazardous Decomposition Products: Thermal oxidation of zinc metal powder or dust will generate zinc oxide fume which, on inhalation in sufficient quantity, can produce metal fume fever, a transient, influenza-like illness.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Zinc, especially in the metal form, is relatively non-toxic. However, it can react with other materials, such as oxygen or acids, to form compounds that can be potentially toxic. The primary route of exposure would be through inhalation of zinc oxide fume from welding or burning or overheated melting pots.

Acute:

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

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.

Ingestion: When ingested in excessive quantities, zinc can irritate the stomach resulting in 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. Prolonged or repeated skin contact with zinc dust or powder may cause dryness, irritation and cracking (dermatitis) since zinc is astringent and may tend to draw moisture from the skin. Zinc dust 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).

SECTION 12. ECOLOGICAL INFORMATION

Zinc in the metallic form has limited bioavailability and poses no immediate ecological risk. However, processes in the environment may alter its bioavailability. In aquatic systems, zinc bioaccumulates in both plants and animals. In terrestrial systems, the mobility of zinc in soil is dependent on soil conditions, such as cation exchange capacity, pH, redox potential, and chemical species present in the soil. Zinc also bioaccumulates in terrestrial plants, vertebrates, and mammals, with plant uptake from soil dependent on the plant species, soil pH, and soil composition.

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 applicable -- not regulated.
U.S. DOT AND TRANSPORT CANADA HAZARD CLASSIFICATION Not applicable
U.S. DOT AND TRANSPORT CANADA PID Not applicable
MARINE POLLUTANT No
IMO CLASSIFICATION Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENT LISTED ON TSCA INVENTORY Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES Zinc Yes RQ: 1,000 lb. (454 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

EPCRA SECTION 311/312 HAZARD CATEGORIES..... No Hazard Categories Apply

EPCRA SECTION 313 Toxic Release Inventory: This product does not contain any toxic chemicals subject to the Toxic Release reporting requirements. However, potential by-products from working with this product - "Zinc (Fume or Dust)" CAS 7440-66-6 are reportable.

CANADIAN:

INGREDIENTS LISTED ON DOMESTIC SUBSTANCES LIST Yes

WHMIS CLASSIFICATION: Not applicable. Zinc is not a Controlled Product under CPR.

EUROPEAN UNION:

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

EU CLASSIFICATION: Not applicable. Zinc in ingot form is not listed as a dangerous substance.

SECTION 16. OTHER INFORMATION

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

- American Conference of Governmental Industrial Hygienists, 1991, Documentation of the Threshold Limit Values and Biological Exposure Indices, Sixth Edition, plus updates.
- American Conference of Governmental Industrial Hygienists, 2003, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2002, Guide to Occupational Exposure Values.
- Canadian Centre for Occupational Health and Safety (CCOHS) Hamilton, Ontario, CHEMINFO Record No. 548 – Zinc (Last Revision 2003-03-02).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, 2003, Hazardous Substance Data Bank.
- Patty's Toxicology, Fifth Edition, 2001 E. Bingham, B. Cohnsen & CH Powell (Eds.)
- 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 DHHS(NIOSH) Publication No. 2001-145, Aug 2001.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, May 1994, Toxicological Profile for Zinc.
- Urben, P.G., 1995, Bretherick's Handbook of Reactive Chemical Hazards, Fifth Edition.