ZINC Metal HG & SHG

Safety Data Sheet (SDS)

Section 1 – Identification

1(a) Product Identifier Used on Label: Zinc Metal - HG & SHG
1(b) Other Means of Identification: High Grade (HG) and Special High Grade (SHG) Zinc
1(c) Recommended Use of the Chemical and Restrictions on Use: None
1(d) Name, Address, and Telephone Number:
   WIRE-BOND
   400 Rountree Road
   Charlotte, NC 28217
   Phone number : 800-849-6722
1(e) Emergency Phone Number: Chemtrec 1-800-424-9300 (Within Continental U.S.); Chemtrec 703-527-3887 (Outside U.S.).

Section 2 – Hazard(s) Identification

2(b) Signal Word, Hazard Statement(s), Symbols and Precautionary Statement(s): Not Applicable
2(c) Hazards not Otherwise Classified: None Known
2(d) Unknown Acute Toxicity Statement (Mixture): None Known

Section 3 – Composition/Information on Ingredients

3(a-c) Chemical Name, Common Name (Synonyms), CAS Number and Other Identifiers, and Concentration:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>EC Number</th>
<th>% weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc</td>
<td>7440-66-6</td>
<td>231-175-3</td>
<td>99.95% (HG) - 99.99% (SHG) min.</td>
</tr>
</tbody>
</table>

EC: European Community
CAS: Chemical Abstract Service
Note: High Grade (.03% max lead), Special High Grade (.003% max lead)

Section 4 – First-aid Measures

4(a) Description of Necessary Measures:
   Inhalation: If inhaled: Remove person to fresh air and keep comfortable for breathing.
   Eye Contact: If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
   Skin Contact: If on skin: Rinse skin with water/shower.
   Ingestion: If swallowed: Rinse mouth. Do NOT induce vomiting.
4(b) Most Important Symptoms/Effects, Acute and Delayed (Chronic):
   Acute effects:
   Inhalation: Excessive exposure to high concentrations of dust may cause irritation to the eyes, skin and mucous membranes of the upper respiratory tract.
   Eye: Excessive exposure to high concentrations of dust may cause irritation to the eyes.
   Skin: Skin contact with dusts may cause irritation or sensitization, possibly leading to dermatitis. Skin contact with metallic dusts may cause physical abrasion.
   Ingestion: Ingestion of dust may cause nausea and/or vomiting.
   Chronic Effects:
   Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any airborne particulate matter exposure. Persons with pre-existing skin disorders may be more susceptible to dermatitis.
4(c) Immediate Medical Attention and Special Treatment: Treat symptomatically.

Section 5 – Fire-fighting Measures

5(a) Suitable (and Unsuitable) Extinguishing Media: Smother and cool with a suitable dry extinguishing agent (class D fires) such as dry powder (Ansul Met-L-X), zinc oxide or dry sand. Do not use water if possible. Use water only when necessary, such as to cool containers exposed to fire. Extreme caution should be taken to prevent contact with molten zinc or burning zinc products.
Section 5 – Fire-fighting Measures (continued)

5(b) Specific Hazards Arising from the Chemical: The pressure in sealed containers can increase under the influence of heat.

5(c) Special Protective Equipment and Precautions for Fire-fighters: Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause emission of acrid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used.

Section 6 - Accidental Release Measures

6(a) Personal Precautions, Protective Equipment and Emergency Procedures: For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. If material is in a dry state, avoid inhalation of dust. Personnel should be protected against contact with eyes and skin. Fine, dry material should be removed by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid using compressed air. Do not release into sewers or waterways.

6(b) Methods and Materials for Containment and Clean Up: Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Section 7 - Handling and Storage

7(a) Precautions for Safe Handling: Use personal protective equipment as required. Avoid and control operations which create high dust concentrations.

7(b) Conditions for Safe Storage, Including any Incompatibilities: Store in a cool, well-ventilated area. Keep away from heat. Inspect periodically for damage or leaks. Store away from incompatible materials.

Section 8 - Exposure Controls / Personal Protection

8(a) Occupational Exposure Limits (OELs): The following exposure limits are offered as reference, for an experienced industrial hygienist to review.

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>OSHA PEL 1</th>
<th>ACGIH TLV 2</th>
<th>NIOSH REL 3</th>
<th>IDLH 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Compounds</td>
<td>5.0 mg/m³ (as zinc oxide fume)</td>
<td>2.0 mg/m³ (as zinc oxide)</td>
<td>10 mg/m³ (as total dust)</td>
<td>NE</td>
</tr>
<tr>
<td></td>
<td>15 mg/m³ (as total dust)</td>
<td></td>
<td>5.0 mg/m³ (as respirable fraction)</td>
<td></td>
</tr>
</tbody>
</table>

NE - None Established

ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes. A Short Term Exposure Limit (STEL) is defined as the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures.


4. The *immediately dangerous to life or health air concentration values (IDLHs)* are used by NIOSH as part of the respirator selection criteria and were first developed in the mid-1970s by NIOSH. The Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) is a compilation of the rationale and sources of information used by NIOSH during the original determination of IDLHs and their subsequent review and revision in 1994.

8(b) Appropriate Engineering Controls: Local exhaust ventilation should be used to control the emission of air contaminants. General dilution ventilation may assist with the reduction of air contaminant concentrations. Emergency eye wash stations and deluge safety showers should be available in the work area.

8(c) Individual Protection Measures:

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use only a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Half-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 10 times the exposure limit. Full-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 50 times the exposure limit. Protection by air-purifying negative-pressure and powered air respirators is limited. Use a positive-pressure-demand, full-face, supplied air respirator or self contained breathing apparatus (SCBA) for concentrations above 50 times the exposure limit. If exposure is above the IDLH (immediately dangerous to life or health) for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.

Warning! Air-purifying respirators both negative-pressure, and powered-air do not protect workers in oxygen-deficient atmospheres.
Section 8 - Exposure Controls / Personal Protection (continued)

8(c) Individual Protection Measures (continued):

Eyes: Wear eye protection/face protection. A face shield should be used when appropriate to prevent contact with splashed materials. Chemical goggles, face shields or glasses should be worn to prevent eye contact. Contact lenses should not be worn where industrial exposure to this material is likely.

Skin: Persons handling this product should wear appropriate clothing.

Other protective equipment: An eyewash fountain and deluge shower should be readily available in the work area.

Section 9 - Physical and Chemical Properties

9(a) Appearance (physical state, color, etc.): Silver gray, metallic solid.
9(b) Odor: Odorless
9(c) Odor Threshold: NA
9(d) pH: NA
9(e) Melting Point/Freezing Point: 420°C
9(f) Initial Boiling Point and Boiling Range: 907°C
9(g) Flash Point: NA
9(h) Evaporation Rate: NA
9(i) Flammability (solid, gas): NA - Not Applicable
9(j) Upper/Lower Flammability or Explosive Limits: NA
9(k) Vapor Pressure: NA
9(l) Vapor Density (Air = 1): NA
9(m) Relative Density: 7.14 SG
9(n) Solubility(ies): slightly soluble (<2 mg/L)
9(o) Partition Coefficient Octanol/Water: NA
9(p) Auto-ignition Temperature: ND
9(q) Decomposition Temperature: ND
9(r) Viscosity: ND

Section 10 - Stability and Reactivity

10(a) Reactivity: Not Determined (ND)
10(b) Chemical Stability: Zinc Metal is stable under normal storage and handling conditions.
10(c) Possibility of Hazardous Reaction: None Known
10(d) Conditions to Avoid: Direct sources of heat.
10(e) Incompatible Materials: Acids; Alkalis; Halogenated compounds; Oxidizing agents; Nitrogen compounds.
10(f) Hazardous Decomposition Products: Oxides of carbon, metal oxides and toxic vapors may be releases at elevated temperatures.

Section 11 - Toxicological Information

11 Information on Toxicological Effects: The following toxicity data has been determined for Zinc Metal by using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL:

NR Not Rated - Available data does not meet criteria for classification.

The Toxicological data listed below are presented regardless to classification criteria. Individual hazard classification categories where the toxicological information has met or exceeded a classification criteria threshold are listed above.

a. No LC50 or LD50 has been established for Zinc Metal.
b. No Skin (Dermal) Irritation data available for Zinc Metal.
c. No Eye Irritation data available for Zinc Metal.
d. No Skin (Dermal)/Respiratory Sensitization data available for Zinc Metal.
e. No Aspiration Hazard data available for Zinc Metal.
f. No Germ Cell Mutagenicity data available for Zinc Metal.
g. Carcinogenicity: IARC, NTP, and OSHA do not list Zinc Metal as a carcinogen.
h. No Toxic Reproduction data available for Zinc Metal.
i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for Zinc Metal.
j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for Zinc Metal.

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources include: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) with Other Worldwide Occupational Exposure Values 2009, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCLID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCEOL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS), European Union Classification, Labeling and Packaging (EU CPL), Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), International Uniform Chemical Information Database (IUCLID), TOXicology Data NETwork (TOXNET), European Risk Assessment Reports (EU RAR).
Section 11 - Toxicological Information (continued)

The following health hazard information is provided regardless to classification criteria and is based on the individual component(s):

Acute Effects by Component:
ZINC: Not Reported/ Not Classified

Delayed (chronic) Effects by Component:
ZINC: Zinc Residue CGLs are a low health risk by inhalation and should be treated as a nuisance dust. Inhalation of zinc oxide fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): Not Applicable (NA) as shipped or sold. Zinc metal is not an environmental hazard, however processing may lead to the release of zinc compounds in bioavailable forms generated from downstream processing activities.

12(b) Persistence & Degradability: Not Applicable (NA) as shipped or sold

12(c) Bioaccumulative Potential: Not Applicable (NA) as shipped or sold

12(d) Mobility (in soil): Not Applicable (NA) as shipped or sold

Section 13 - Disposal Considerations

Disposal: Dispose of in accordance with Local, State, Federal and International regulations. Observe safe handling precautions.

Container Cleaning and Disposal: Follow Local, State, Federal and international regulations. Observe safe handling precautions.

Please note this information is for Zinc Metal in its original form. Any alterations can void this information.

Section 14 - Transport Information

14 (a-g) Transportation Information:
US Department of Transportation (DOT) under 49 CFR 172.101 does not regulate Zinc Metal as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

Shipping Name: NOT DOT Regulated
Shipping Symbols: NA
Hazard Class: NA
UN No.: NA
Packaging Group NA
DOT/IMO Label: NA
Special Provisions (172.102): NA

Packaging Authorizations
a) Exceptions: NA
b) Non-bulk: NA
c) Bulk: NA

Quantity Limitations
a) Passenger Aircraft or Rail: NA
b) Cargo Aircraft Only: NA

Vessel Stowage Location: NA
DOT reportable quantities: NA

International Maritime Dangerous Goods (IMDG) and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR) does not regulate Zinc Metal as a hazardous material.

Shipping Name: NOT DOT Regulated
Classification Code: NA
UN No.: NA
Packaging Group: NA
ADR Label: NA
Special Provisions: NA
Limited Quantities: NA

Packaging
a) Packing Instructions: NA
b) Special Packing Provisions: NA
c) Mixed Packing Provisions: NA

Portable Tanks & Bulk Containers
a) Instructions: NA
b) Special Provisions: NA

International Air Transport Association (IATA) does not regulate Zinc Metal as a hazardous material.

Shipping Name: NOT DOT Regulated
Class/Division: NA
Hazard Label (s): NA
UN No.: NA
Packaging Group: NA
Excepted Quantities (EQ): NA

Passenger & Cargo Aircraft
Limited Quantity (EQ)
Pkg Inst: NA
Max Net Qty/Pkg: NA

Cargo Aircraft Only
Pkg Inst: NA
Max Net Qty/Pkg: NA

Special Provisions
ERG Code: NA

Pkg Inst – Packing Instructions
Max Net Qty/Pkg – Maximum Net Quantity per Package
ERG – Emergency Response Drill Code
Section 14 - Transport Information (continued)

Zinc Metal does not have a Transport Dangerous Goods (TDG) classification.

Section 15 - Regulatory Information

Regulatory Information: The following listing of regulations relating to a Horsehead product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

This product and/or its constituents are subject to the following regulations:

OSHA Regulations: Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-2, Z-3): The product, Zinc Metal as a whole is listed. Refer to Section 8, Exposure Controls and Personal Protection

EPA Regulations: The product, Zinc Metal is not listed as a whole in the following regulatory listings. However, individual components of the product are listed:

<table>
<thead>
<tr>
<th>Components</th>
<th>Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc (Zn Compounds)</td>
<td>CWA, SARA 313</td>
</tr>
</tbody>
</table>

SARA Potential Hazard Categories: Immediate Acute Health Hazard, Delayed Chronic Health Hazard.

Regulations Key:

- CAA Clean Air Act (42 USC Sec. 7412; 40 CFR Part 61 [As of: 8/18/06])
- CERCLA Comprehensive Environmental Response, Compensation and Liability Act (42 USC Secs. 9601(14), 9603(a); 40 CFR Sec. 302.4, Table 302.4, Table 302.4 and App. A)
- CWA Clean Water Act (33 USC Secs. 1311; 1314(b), (c), (e), (g); 136(b), (c); 137(b), (c) [as of 8/2/06])
- RCRA Resource Conservation Recovery Act (42 USC Sec. 6921; 40 CFR Part 261 App VIII)
- SARA Superfund Amendments and Reauthorization Act of 1986 Title III Section 302 Extremely Hazardous Substances (42 USC Secs. 11023, 13106; 40 CFR sec. 372.65) and Section 313 Toxic Chemicals (42 USC Secs. 11023, 13106; 40 CFR Sec. 372.65 [as of 6/30/05])
- TSCA Toxic Substance Control Act (15 U.S.C. s/s 2601 et seq. [1976])
- SDWA Safe Drinking Water Act (42 U.S.C. s/s 300f et seq. [1974])

Section 313 Supplier Notification: The product, Zinc Metal contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372:

<table>
<thead>
<tr>
<th>CAS #</th>
<th>Chemical Name</th>
<th>Percent by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>7440-66-6</td>
<td>Zinc</td>
<td>100</td>
</tr>
</tbody>
</table>

State Regulations: The product, Zinc Metal as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations:

- Pennsylvania Right to Know (RTK): Contains regulated material in the following categories:
  - Hazardous Substances: Zinc
  - Environmental Hazards: Zinc
- California Prop. 65: Does not contains elements known to the State of California to cause cancer or reproductive toxicity.
- New Jersey: Contains regulated material in the following categories:
  - Hazardous Substance: Zinc
  - Environmental Hazards: Zinc
- Minnesota: Zinc
- Massachusetts: Zinc

Other Regulations:

WHMIS Classification (Canadian): The product, Zinc Metal is not listed

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

Section 16 - Other Information

Prepared By: Horsehead Corporation
Revision History:
05/19/2015 - Original

Additional Information:

Hazardous Material Identification System (HMIS) Classification

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Health</th>
<th>Fire</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

HEALTH = 1, * Denotes possible chronic hazard if airborne dusts or fumes are generated irritation or minor reversible injury possible.

FIRE = 0, Materials that will not burn.

PHYSICAL HAZARDS = 0, Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

National Fire Protection Association (NFPA)

HEALTH = 1, Exposure could cause irritation but only minor residual injury even if no treatment is given.

FIRE = 0, Materials that will not burn.

INSTABILITY = 0, Normally stable, even under fire exposure conditions, and are not reactive with water.
### ABBREVIATIONS/ACRONYMS:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienists</td>
</tr>
<tr>
<td>BEIs</td>
<td>Biological Exposure Indices</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>CLP</td>
<td>Classification, Labelling and Packaging</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CNS</td>
<td>Central Nervous System</td>
</tr>
<tr>
<td>GI, GIT</td>
<td>Gastro-Intestinal, Gastro-Intestinal Tract</td>
</tr>
<tr>
<td>HMIS</td>
<td>Hazardous Materials Identification System</td>
</tr>
<tr>
<td>IARC</td>
<td>International Agency for Research on Cancer</td>
</tr>
<tr>
<td>LC50</td>
<td>Median Lethal Concentration</td>
</tr>
<tr>
<td>LD50</td>
<td>Median Lethal Dose</td>
</tr>
<tr>
<td>LD Lo</td>
<td>Lowest Dose to have killed animals or humans</td>
</tr>
<tr>
<td>LEL</td>
<td>Lower Explosive Limit</td>
</tr>
<tr>
<td>LOEL</td>
<td>Lowest Observed Effect Level</td>
</tr>
<tr>
<td>LOAEC</td>
<td>Lowest Observable Adverse Effect Concentration</td>
</tr>
<tr>
<td>µg/m3</td>
<td>microgram per cubic meter of air</td>
</tr>
<tr>
<td>mg/m3</td>
<td>milligram per cubic meter of air</td>
</tr>
<tr>
<td>mppcf</td>
<td>million particles per cubic foot</td>
</tr>
<tr>
<td>MSHA</td>
<td>Mine Safety and Health Administration</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Association</td>
</tr>
<tr>
<td>NIF</td>
<td>No Information Found</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety and Health</td>
</tr>
<tr>
<td>NTP</td>
<td>National Toxicology Program</td>
</tr>
<tr>
<td>ORE</td>
<td>Organization Resources Counselors</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
</tr>
<tr>
<td>PNOR</td>
<td>Particulate Not Otherwise Regulated</td>
</tr>
<tr>
<td>PNC</td>
<td>Particulate Not Otherwise Classified</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
</tr>
<tr>
<td>REACH</td>
<td>Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals</td>
</tr>
<tr>
<td>RTECS</td>
<td>Registry of Toxic Effects of Chemical Substances</td>
</tr>
<tr>
<td>SARAC</td>
<td>Superfund Amendment and Reauthorization Act</td>
</tr>
<tr>
<td>SCBA</td>
<td>Self-contained Breathing Apparatus</td>
</tr>
<tr>
<td>SDS</td>
<td>Safety Data Sheet</td>
</tr>
<tr>
<td>STEL</td>
<td>Short-term Exposure Limit</td>
</tr>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>TWA</td>
<td>Time-weighted Average</td>
</tr>
<tr>
<td>UEL</td>
<td>Upper Explosive Limit</td>
</tr>
</tbody>
</table>

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