SAFETY DATA SHEET

CROWN ALLOYS COMPANY

Section 1 – PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Tin-Zinc-Lead Alloy for Cast Iron

PRODUCT IDENTIFICATION: ROYAL 108

RECOMMENDED USE: TS (Torch Soldering)

SPECIFICATION: N/A

SUPPLIER: Crown Alloys Company
30105 Stephenson Hwy.
Madison Heights, MI. 48071

TELEPHONE NUMBER: (248) 588-3790

EMERGENCY NUMBER: Call CHEMTREC Day or Night 1-800-424-9300 / +1 703-527-3887

WEBSITE: www.crownalloys.com

Section 2 – HAZARDS IDENTIFICATION

2.1 Classification of the mixture

This product is placed on the market in solid form

2.1.1 Classification in accordance with GHS-US

Acute Tox. 4 (Oral) H302 Carc. 1B H350
Skin Sens. 1 H317 Carc. 2 H351
Resp. Sens. 1B H334 Repr. Tox. 2 H361
Muta. 1 H340 STOT RE 2 H373
Muta. 2 H341 Aquatic Chronic 4 H413

2.2 Label elements

GHS-US labelling

Hazard Pictograms (GHS-US):

GHS07  GHS08  GHS09

Signal word (GHS-US): Danger

Hazard-determining components of labeling: LEAD (Pb)

Hazard statements (GHS-US):

H302 – Harmful if swallowed
H317 – May cause an allergic skin reaction
H334 – May cause allergy or asthma symptoms or breathing difficulties if inhaled
H340 – May cause genetic defects
H341 – Suspected of causing genetic defects

Precautionary statements (GHS-US):

P202 – Do not handle until all safety precautions have been read and understood
P260 – Do not breathe dust/fume/gas/mist/vapors/spray
P263 – Avoid contact during pregnancy/while nursing
P264 – Wash thoroughly after handling
P270 – Do not eat, drink or smoke when using this product
P271 – Use only outdoors or in a well-ventilated area
P272 – Contaminated work clothing should not be allowed out of the workplace
P273 – Avoid release to the environment
P280 – Wear protective gloves/protective clothing/eye protection/face protection

P302+P352 – IF ON SKIN: Wash thoroughly with soap and water to remove any Residue. If a rash develops, call a physician.
P304+P340 – IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call physician: advise of chemical composition (section 3)
P305+P351+P338 – IF IN EYES: Flush with water for at least 15 minutes to remove irritant. Remove contact lenses, if present and easy to do. Continue rinsing. Consult a physician.
P312 – Call a POISON CENTER or physician if you feel unwell
P314 – Get medical advice and attention if you feel unwell
P391 – Collect spillage
P403+P233 – Store in a well-ventilated place. Keep container tightly closed
P501- Dispose of contents/container in accordance with local / regional / national / international regulations
P405 – Store locked up

2.3 Other hazards

No additional information available
2.4 Unknown acute toxicity (GHS-US)
No data available

Other hazards which do not result in GHS classification:

Heat rays (infrared radiation) from flame or hot metal can injure eyes.
Overexposure to brazing fumes and gases can be hazardous.
Read and understand the manufacturer’s instructions, Safety Data Sheets and the precautionary labels before using these alloys. Refer to Section 8.

Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances
Not applicable

Full text of H-phrases: See section 16

3.2 Mixture

Reportable Hazardous Ingredients

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>CAS-No.</th>
<th>Weight Percent (%)</th>
<th>GHS-US Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead (Pb)*</td>
<td>7439-92-1</td>
<td>40.0 – 60.0</td>
<td>Acute Tox. 4; Carc. 2; Repr. 2; STOT RE 2; Aquatic Acute 1; Aquatic Chronic 1; H302, H351, H361, H373, H410</td>
</tr>
<tr>
<td>Tin (Sn)</td>
<td>7440-31-5</td>
<td>20.0 – 40.0</td>
<td>Not classified</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>7440-66-6</td>
<td>10.0 – 30.0</td>
<td>Not classified</td>
</tr>
</tbody>
</table>

*The OSHA standard limit for occupational exposure to lead as referenced in CFR Title 29, Part 1910.1025 is 50.0 µg/m³ (micrograms/cubic meter) based on an eight hour time-weighted average. This standard states that, when the air of work-rooms contains regularly not more than 50.0 µg (micrograms) of inorganic lead and its inorganic compounds per cubic meter of air, as measured by prescribed methods, cases of lead intoxication will not occur.

No other hazardous material is present in concentrations greater than 1% (0.1% for carcinogens)

CAUTION!! ROYAL 108 contains lead and is by law prohibited for usage on private or public water systems.

Composition Comments: The term “Hazardous Ingredients” should be interpreted as a term defined in Hazard Communication standards and does not necessarily imply the existence of a welding hazard. These alloys may contain additional non-hazardous ingredients or may form additional compounds under the condition of use. Refer to Sections 2 & 8 for more information.

Section 4 – FIRST AID MEASURES

4.1 Description of first aid measures

Ingestion: Unlikely due to the form of the product. Avoid hand, clothing, food, and drink contact with metal fume or powder which can cause ingestion of particulate during hand to mouth activities such as drinking, eating, smoking, etc. If ingested, do not induce vomiting. Contact a poison control center. Unless the poison control center advises otherwise, wash out mouth thoroughly with water. If symptoms develop, seek medical attention at once. Advise of chemical composition (Section 3).

Inhalation: Move to fresh air if breathing is difficult. If not breathing, perform artificial respiration. Seek medical assistance immediately. Advise of chemical composition (Section 3).

Skin Contact: Flush with soap and water for at least 15 minutes. For reddened or blistered skin, or thermal burns, obtain medical assistance.

Eye Contact: Flush with clean, tepid water for at least 15 minutes to remove irritant. Remove contact lenses, if present and easy to do. Continue rinsing. Consult a physician.

4.2 Most important symptoms/effects, acute and delayed

Special brazing hazards: Brazing/soldering hazards are complex and may include physical and health hazards such as but not limited to infrared radiation from flame or hot metal, physical strains, thermal burns due to hot metal or spatter and potential health effects of overexposure to brazing fume or dust. Refer to Section 11 for more information.

Symptoms/injuries after inhalation: Short-term (acute) overexposure to the gases, fumes, and dusts may include irritation of the eyes, lungs, nose, and throat. Some toxic gases associated with welding (usually not brazing/soldering) may cause pulmonary edema, asphyxiation, and death.

Acute overexposure may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, difficulty in breathing, frequent coughing, or chest pain.

Symptoms/injuries after skin contact: Dusts may cause irritation.

Symptoms/injuries after eye contact: Causes eye irritation.

Symptoms/injuries after ingestion: Not an anticipated route of exposure during normal product handling. May be harmful if ingested.

4.3 Indication of immediate medical attention and special treatment needed

No additional information available
Section 5 – FIRE-FIGHTING MEASURES

General Fire Hazards: As shipped, this product is nonflammable. However, infrared radiation from flame or hot metal can ignite combustibles and flammable products. Read and understand American National Standard Z49.1, “Safety In Welding, Cutting and Allied Processes” and National Fire Protection Association NFPA 51B, “Standard for Fire Prevention During Welding, Cutting and Other Hot Work” before using this product.

5.1 Extinguishing media

Suitable extinguishing media: CO2 or dry chemical extinguisher.

Unsuitable extinguishing media: Do NOT use water on molten metal: Large fires may be flooded with water from a distance.

5.2 Special hazards arising from the substance

Fire/explosion hazard:

- Lead and its decomposition products are hazardous to health. Fire-fighters should not enter an area in which a fire involves these products without wearing specialized protective equipment suitable for potential Lead exposure. Normal fire-fighter bunker gear is not adequate to protect against exposure to Lead and its decomposition products. A full-body, encapsulating chemical resistant suit with positive-pressure Self-Contained Breathing Apparatus may be necessary. If possible, prevent run-off water from entering storm drains, bodies of water or other environmentally sensitive areas.
- NOTE: When overheated, lead fumes are toxic. Never exceed 500ºC.
- Never drop water or liquids onto molten solder.
- Do not plunge damp or wet solder bars/pieces into molten solder.
- Flame will trace fine zinc dust. Product of combustion is ZnO.
- Finely divided dust may form explosive mixture with air.

5.3 Special protective equipment and precautions for firefighters

Special firefighting procedures: Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in a fire.

Special protective equipment for firefighters: Firefighters should wear full protective gear.

Section 6 – ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8.

6.2 Environmental precautions

Avoid release to the environment

6.3 Methods and material for containment and cleaning up

Clean up spills immediately, observing precautions in the personal protective equipment in Section 8. Avoid generating dust. Vacuuming is recommended for accumulated metal dust from saw/grind operations. Prevent product from entering any drains, sewers or water sources. Refer to Section 13 for proper disposal. Solder is solid/recyclable. Attempt to reclaim the product if possible.

Section 7 – HANDLING AND STORAGE

7.1 Precautions for safe handling


Do not eat, drink or smoke when using the product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Cosmetics should not be applied in areas where exposures exist! Routinely wash work clothing and protective equipment to remove contaminants.

Wet or moist solder bar(s) will present an explosion hazard when submerged in molten solder. Always preheat bar/ingot before charging into furnace.

7.2 Conditions for safe storage, including any incompatibilities

Store in closed original container in a dry place at ambient temperature. Store away from incompatible materials. Store in accordance with local/regional/national regulations.

7.3 Specific end use(s)

For welding/brazing/soldering consumables and related products
8.1 Control parameters

<table>
<thead>
<tr>
<th>Chemical Identity (CAS-No.)</th>
<th>ACGIH TLV (TWA)</th>
<th>OSHA PEL (TWA)</th>
<th>NIOSH REL</th>
<th>NIOSH STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead (7439-92-1)</td>
<td>0.05 mg/m³</td>
<td>50 µg/m³</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Tin (7440-31-5)</td>
<td>2.0 mg/m³</td>
<td>2.0 mg/m³</td>
<td>2.0 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td>Zinc (7440-66-6)</td>
<td>2.0 mg/m³ (respirable oxide dust)</td>
<td>5.0 mg/m³ (oxide fume)</td>
<td>N/A</td>
<td>10.0 mg/m³</td>
</tr>
</tbody>
</table>

8.2 Exposure controls:

Appropriate Engineering Controls:

Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases from the welder's breathing zone & the general area. Maintain exposures below acceptable exposure levels (see Section 8.1). Use industrial hygiene air monitoring to ensure that your use of these products does not create exposures that exceed the recommended exposure limits. Always use exhaust ventilation in user operations such as high temperature cutting, grinding, welding and brazing. Train the welder to keep his head out of the fume plume. Confined spaces require adequate ventilation and/or air supplied respirators. Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1, Safety in Welding, Cutting, and Allied Processes, published by the American Welding Society, 8669 Doral Blvd. Suite 130, Doral, FL 33166 and OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, D.C. 20402 for more details on many of the following.

General information: Exposure Guidelines: Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) are values published by the American Conference of Government Industrial Hygienists (ACGIH). ACGIH Statement of Positions Regarding the TLVs® and BEIs® states that the TLV-TWA should be used as a guide in the control of health hazards and should not be used to indicate a fine line between safe and dangerous exposures. See Section 10 for information on potential fume constituents of health interest. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists.

Eye/face protection: Wear helmet or use face shield with filter lens of appropriate shade number. Shield others by providing screens and flash goggles.

Skin/Hand Protection: Wear protective gloves. Suitable gloves can be recommended by the glove supplier.

Protective Clothing: Wear head, head, and body protection which help to prevent injury from radiation, sparks, flame and electrical shock. See Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Wear dry gloves free of holes or split seams. Train the welder not to permit electrically live parts or electrodes to contact skin . . . or clothing or gloves if they are wet. Insulate yourself from the work piece and ground using dry plywood, rubber mats or other dry insulation.

Respiratory Protection: Keep your head out of fumes. Use enough ventilation and local exhaust to keep fumes and gases from your breathing zone and the general area. An approved respirator should be used unless exposure assessments are below applicable exposure limits. Use respirable fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLV's (see Section 8.1). Use only NIOSH approved respirators in accordance with 29 CFR 1910.134 – Respiratory Protection. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

Hygiene measures: Do not eat, drink or smoke when using the product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Cosmetics should not be applied in areas where exposures exist! Routinely wash work clothing and protective equipment to remove contaminants. Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder's helmet if worn or in the worker's breathing zone. Improve ventilation if exposures are not below limits. See ANSI/AWS F1.1, F1.2, F1.3 and F1.5, available from the American Welding Society, www.aws.org.

Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Appearance:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
</tr>
<tr>
<td>Form</td>
<td>Rods of various shapes and sizes</td>
</tr>
<tr>
<td>Color</td>
<td>Silver-gray metallic</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Density</td>
<td>.3353 lb/cu in. or 9.281 g/ml</td>
</tr>
<tr>
<td>Melting point</td>
<td>350-550°F (177-288°C)</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No data available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not determined</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Boiling point</td>
<td>No data available</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor pressure (mm Hg)</td>
<td>LEAD ONLY: Health effects ONLY &gt;500°C</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>None (solid)</td>
</tr>
<tr>
<td>Solubility (other)</td>
<td>No data available</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>No data available</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
</tbody>
</table>
Section 10 – STABILITY AND REACTIVITY

10.1 Reactivity
This product is non-reactive under normal conditions of use, storage and transport.

10.2 Chemical stability
This product is stable under normal conditions.

10.3 Possibility of hazardous reactions
Will not occur under normal conditions of use, storage, and transportation as shipped.

10.4 Conditions to avoid
Uncontrolled exposure to extreme temperatures and moisture.

10.5 Incompatible materials
Strong acids and strong alkalis.

10.6 Hazardous decomposition products
Welding/brazing fumes and gases can’t be classified simply. The composition and quantity of both are dependent upon the metal being welded/brazed and the rods used. Coatings on the metal being welded/brazed (such as paint, plating, or galvanizing), the number of welders, the volume of the work area, the quality and the amount of ventilation, the position of the welder’s head with respect to the gas plume, the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities), the process and procedures, as well as the welding/brazing consumables.

When this soldering alloy is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 3, plus those from the base metal, coatings, etc. as noted above. Gaseous reaction products may include carbon monoxide and carbon dioxide. Reasonably expected fume constituents of this soldering alloy would include: Complex oxides of lead, tin, carbon dioxide, carbon monoxide, oxygen and nitrogen oxides. The fume limit for lead, tin and/or zinc may be reached before the general welding fume limit of 5 mg/m³ is reached. One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder’s helmet if worn or in the worker’s breathing zone. See ANSI/AWS F1.1 “Method for Sampling Airborne Particles Generated by Welding and Allied Processes” and “Characterization of Arc Welding Fume” available from the American Welding Society, 8669 Doral Blvd. Suite 130, Doral, FL 33166.

Section 11 – TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Ingestion: Health injuries from ingestion are not known or expected under normal use. However, if particulates or fumes, generated during brazing/soldering operations, are ingested (i.e., through poor hygiene practices), nausea, vomiting, diarrhea, stomach ache, degeneration of blood and liver cells, gastrointestinal bleeding, decreased urine output, listlessness, rapid heartbeat, convulsions, and coma may occur. Ingestion of this product can also result in lead poisoning. Severe ingestion overexposure may be fatal.

Inhalation: Potential chronic health hazards related to the use of welding/brazing consumables are most applicable to the inhalation route of exposure. Refer to Inhalation statements in this section.

Skin Contact: Dusts or fumes of these products may be irritating to contaminated skin.

Eye contact: Dusts or fumes of these products may be irritating to contaminated eye.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation: Short-term (acute) overexposure to welding/brazing fumes may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g. asthma, emphysema). Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure): Harmful if swallowed

Specified substance: LEAD
Cyto genetic Analysis-Human-Unreported 50 µg/m³
TCLo (Inhalation-Human) = 10 µg/m³
Gastrointestinal tract effects: LIV
TDL0 (Oral-Woman) = 450 mg/kg/6years
Peripheral nervous system effects: Central nervous system effects

Specified substance: TIN
LD50 (oral, rat) = 700 mg/kg

Specified substance: ZINC
Skin Irritancy (human) = 300µg/3days intermittent; mild
TCL0 (inhalation, human) = 124mg/m³ 50 minutes; pulmonary system, skin effects

Repeated dose toxicity (product): Not classified

Skin corrosion/irritation (product): Not classified

Serious eye damage/irritation (product): Not classified

Respiratory or skin sensitization (product): May cause an allergic skin reaction
Symptoms related to the physical, chemical and toxicological characteristics under the condition of use:

- **Symptoms of high levels of airborne or ingested lead** may result in lead poisoning. Symptoms of poisoning include headache, fatigue, nausea, metallic taste in the mouth, vomiting, constipation, dizziness, weakness, and shortness of breath. The syndrome usually runs its course in 24-48 hours.

- **Resolution of symptoms typically occurs quickly, usually not lasting longer than 48 hours.**

Reproductive toxicity (product):

- **Reproductive toxicity (lead):** Not classified

Specific target organ toxicity - single exposure (product): May cause drowsiness or dizziness. May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (product): Causes damage to organs through prolonged or repeated exposure

Aspiration hazard (product): Not classified

Other Effects:

Organic polymers may be used in the manufacture of various welding/brazing consumables. Overexposure to their decomposition byproducts may result in a condition known as polymer fume fever. Polymer fume fever usually occurs within 4 to 8 hours of exposure with the presentation of flu-like symptoms, including mild pulmonary irritation with or without an increase in body temperature. Signs of exposure can include an increase in white blood cell count. Resolution of symptoms typically occurs quickly, usually not lasting longer than 48 hours.

Symptoms related to the physical, chemical and toxicological characteristics under the condition of use:

**Specified substance: ZINC**

- Inhalation of dusts and fumes of zinc can cause metal fume fever. Excessive inhalation of zinc oxide fumes may produce symptoms known as "zinc shakes" which are flu-like and usually cease when the individual is removed from the source. Typically metal fume fever begins four to twelve hours after sufficient exposure to freshly formed fumes. Symptoms can include a metallic or sweet taste in the mouth, sweating, shivering, headache, throat irritation, fever, chills, thirstiness, muscle aches, constipation, dizziness, nausea, vomiting, weakness, and shortness of breath. The syndrome usually runs its course in 24-48 hours.

**Specified substance: LEAD**

- **Acute exposure** to high levels of airborne or ingested lead may result in lead poisoning. Symptoms of poisoning include headache, fatigue, nausea, metallic taste in the mouth, vomiting, constipation, bloody diarrhea, and harmful effects on the central nervous system.

- **LONG TERM (CHRONIC):** Long-term, low-level lead exposure has resulted in harm to the central nervous system and brain function. Symptoms of chronic, low to moderate levels include forgetfulness, irritability, tiredness, headache, fatigue, impotence, decreased libido, dizziness, altered mood states and depression. Symptoms of chronic exposure to moderate to high lead levels include disturbances in hand to eye coordination, reaction times, visual motor performance, mental performance, gradual decrease in visual acuity with slow recovery or possible blindness, changes in hearing ability, and in worse cases, encephalopathy (a progressive degeneration of the brain and its functions). Early symptoms of encephalopathy include dizziness, irritability, poor attention span, muscular tremor, headache, and loss of memory and hallucinations. Severe, chronic exposure to lead at high concentrations can result in symptoms of the central nervous system, including delirium, lack of coordination, convulsions, paralysis, coma and death. Exposure to lead can also result in significant adverse effects on the peripheral nervous system, including harm to nerves in hands, legs, and feet. These effects can be reversible if exposure is short term (5 months or less) and treatment is received; if not, these effects can become permanent. A syndrome known as "Lead Palsy" can occur, with symptoms such as weakness of legs or arms, weakness and paralysis of the wrist, fingers and ankles. At lower exposure levels decreased hand dexterity has been reported. At higher exposure levels an inability to hold the foot or hand in extended position can occur. Exposure to lead can also cause adverse effects on the gastrointestinal system, including loss of appetite, inflammation of the stomach walls (gastritis), colic, severe abdominal pain, cramps, nausea, vomiting, constipation, anorexia, weight loss and decreased urination. In severe cases of lead poisoning, a deposit of lead occurs in the gums near the base of the teeth, resulting in a visible blue-gray line. Reversible kidney injury has been observed in some cases of workers exposed to lead at chronic, low to moderate levels. Death due to kidney failure has occurred to workers chronically exposed to lead at moderate levels. Exposure to lead can cause harmful effects to certain types of blood cells, including reduced hemoglobin production and reduced life-span and function of red blood cells. This harm can cause anemia in workers exposed to moderate levels. Low, moderate and high level exposure to lead may increase blood pressure, especially in men. Some studies have indicated that moderate exposure to lead can result in electrocardiographic abnormalities. There is some evidence that low-level exposure to lead can cause harmful effects on the thyroid and immune systems, including possible susceptibility to colds and flu infections. Exposure to lead, especially at high levels, has resulted in significant adverse effects in the reproductive systems of both men and women.
Additional toxicological information under the conditions of use:

**Acute toxicity**

<table>
<thead>
<tr>
<th>Specified substance: CARBON DIOXIDE</th>
<th>Specified substance: CARBON MONOXIDE</th>
<th>Specified substance: NITROGEN DIOXIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCLo (inhalation, human) = 90000 ppm/5 min.</td>
<td>LC50 (inhalation, rat) = 1300 mg/l/4h</td>
<td>LC50 (inhalation, human) = 88 ppm/4h</td>
</tr>
<tr>
<td>Specified substance: CARBON MONOXIDE</td>
<td></td>
<td>LC50 (inhalation, human) = 50 ppm/30 min.</td>
</tr>
<tr>
<td>LC50 (inhalation, rat) = 1300 mg/l/4h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Section 12 – ECOLOGICAL INFORMATION**

**Ecotoxicity**

Acute hazards to the aquatic environment:

- **Fish**
  - Specified substance: ZINC and/or zinc alloys (as Zn)
    - LC50 (Pimephales promelas) [flow-through], 96 h): 2.16 – 3.05 mg/l
    - LC50 (Pimephales promelas) [semi-static], 96 h): 0.211 – 0.269 mg/l
  - Specified substance: LEAD
    - LC50 (Cyprinus carpio) [semi-static], 96 h): 0.44 mg/l
    - LC50 (Oncorhynchus mykiss) [flow-through], 96 h): 1.17 mg/l
    - Mortality LOEC (Oncorhynchus mykiss (rainbow trout), 96 h): 1.19 mg/l
    - LC50 (Micropterus dolomieui), 96 h): 2.2 mg/l
    - Mortality NOEC (Salvelinus fontinalis), 10 d): 1.7 mg/l

- **Aquatic Invertebrates**
  - Specified substance: ZINC and/or zinc alloys (as Zn)
    - EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.11 – 0.271 mg/l
    - EC50 (Pseudokirchneriella subcapitata) [static], 72 h): 0.09 – 0.125 mg/l
    - EC50 (Daphnia Magna) [Static], 48 h): 0.139 – 0.908 mg/l
  - Specified substance: LEAD
    - EC50 (Water flea (Daphnia magna), 48 h): 600 µg/l
    - Mortality LOEC (Water flea (Daphnia magna), 24 h): 0.17 mg/l
    - Mortality NOEC (Water flea (Daphnia magna), 24 h): 0.099 mg/l

Chronic hazards to the aquatic environment:

- Fish (product): Not classified
- Aquatic Invertebrates (product): Not classified

**Toxicity to Aquatic Plants**

- Specified substance: LEAD
  - Mortality EC50 (Skeletonema costatum), 10 d): 7.94 mg/l

**Persistence and Degradability**

- Biodegradation (product): No data available
- Bioaccumulative Potential
  - Bioconcentration Factor (BCF) (product): No data available
  - Bioaccumulation:
    - Specified substance: LEAD
      - (Oncorhynchus kisutch) – 2 Weeks – 150 µg/l, Bioconcentration Factor (BCF): 12.0

**Mobility in Soil:** No data available

**Section 13 – DISPOSAL CONSIDERATIONS**

Waste disposal recommendations: Prevent waste from contaminating surrounding environment. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with international/federal/state/local regulations. However, alloy wastes are normally collected to recover metal values.

**Section 14 – TRANSPORT INFORMATION**

In accordance with DOT / ADR / RID / ADNR / IMDG / ICAO / IATA

14.1 **UN number**

Not a dangerous good in sense of transport regulations

14.2 **UN proper shipping name**

Not applicable

14.3 **Additional information**

Other information: No supplementary information available

**Overland transport:**

No additional information available

**Transport by sea:**

No additional information available

**Air transport:**

No additional information available
Section 15 – REGULATORY INFORMATION

15.1 US Federal regulations

Lead (7439-92-1) Zinc (7440-66-6)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Listed on SARA Section 313 (Specific toxic chemical listings)
SARA Section 313 – Emission Reporting: 0.1%
SARA Section 313 – Emission Reporting: 1.0% (dust or fume only)

Tin (7440-31-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2 US State regulations

U.S. - California - Proposition 65 - Carcinogens List YES
U.S. - California - Proposition 65 - Developmental Toxicity YES
U.S. - California - Proposition 65 - Reproductive Toxicity – Female YES
U.S. - California - Proposition 65 - Reproductive Toxicity – Male YES

U.S. - Massachusetts - Right To Know List
U.S. - Minnesota - Hazardous Substance List
U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know) List

Section 16 – OTHER INFORMATION

SUPERSEDES LAST REVISION: 12/16/2015 (SDS)

<table>
<thead>
<tr>
<th>HMIS RATING (Hazardous Materials Information System)</th>
<th>Health (blue)</th>
<th>Flammability (red)</th>
<th>Reactivity (yellow)</th>
<th>Protective Equipment - X</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 (slight acute or chronic exposure hazard)</td>
<td>0 (minimal hazard)</td>
<td>0 (normally stable)</td>
<td></td>
</tr>
</tbody>
</table>

NATIONAL FIRE PROTECTION ASSOCIATION:

Health Hazard: 0 (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); 1 (materials that on exposure under fire conditions could cause irritation or minor residual injury); 2 (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); 3 (materials that can on short exposure cause serious temporary or residual injury); 4 (materials that under very short exposure causes death or major residual injury).

Flammability Hazard: Refer to definitions for "HMIS RATING"
Reactivity Hazard: Refer to definitions for "HMIS RATING"

DEFINITIONS OF TERMS

ACGIH - American Conference of Governmental Industrial Hygienists
CAS No. - Chemical Abstracts Service Number
EPA - Environmental Protection Agency
GHS - Globally Harmonized System
IARC - International Agency for Research on Cancer
LC50 - Lethal Concentration (50 percent kill)
LCLo - Lowest published lethal concentration
LD50 - Lethal dose (50 percent kill)
LDLo - Lowest published lethal dose
NIOSH - National Institute of Occupational Safety and Health
PEL - Permissible Exposure Limit
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average

Full text of H-phrases (from Section 2)

- Acute Tox. 4 (Oral) Acute toxicity (oral), Category 4
- Skin Sens. 1 Sensitisation — Skin, category 1
- Resp. Sens. 1B Respiratory Sensitiser, Sub-Category 1B
- Muta. 1 Germ cell mutagenicity, Category 1
- Muta. 2 Germ cell mutagenicity, Category 2
- Carc. 1B Carcinogenicity, Category 1B
- Carc. 2 Carcinogenicity, Category 2
- Repr. Tox. 2 Reproductive toxicity, Category 2
- STOT RE 2 Specific target organ toxicity — Repeated exposure, Category 2
- Aquatic Chronic 1 Hazardous to the aquatic environment — Chronic Hazard, Category 1
- Aquatic Chronic 4 Hazardous to the aquatic environment — Chronic Hazard, Category 4
- H302 Harmful if swallowed
- H317 May cause an allergic skin reaction
- H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H340 May cause genetic defects
- H341 Suspected of causing genetic defects
- H350 May cause cancer
- H351 Suspected of causing cancer
- H352 May cause damage to organs through prolonged or repeated exposure
- H401 Very toxic to aquatic life with long lasting effects
- H413 May cause long lasting harmful effects to aquatic life

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