SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Product name: Die casting zinc alloys
Description: Die casting zinc alloys, ingot form
Synonyms: ZL2, ZL3, ZL5, ZL8, Kayem 1, Cram 22
Index- No: not listed

REACH Registration- No: Under REACH Regulation, an alloy is a mixture or preparation. Therefore an alloy is not subject to registration but its components have to be registered. The registration numbers of said components are:

<table>
<thead>
<tr>
<th>Substance</th>
<th>REACH Registration Number</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc</td>
<td>01-2119467174-37-0020</td>
<td>Registered by Asturiana de Zinc, S.A.</td>
</tr>
<tr>
<td>Aluminium</td>
<td>01-2119529243-45-0162</td>
<td>Registered by Asturiana de Zinc, S.A.</td>
</tr>
<tr>
<td></td>
<td>01-2119529243-45-0141</td>
<td>Registered by the supplier</td>
</tr>
<tr>
<td></td>
<td>01-2119529243-45-XXXX</td>
<td>Registered by the supplier</td>
</tr>
<tr>
<td>Copper</td>
<td>01-2119480154-42-0030</td>
<td>Registered by the supplier</td>
</tr>
<tr>
<td></td>
<td>01-2119480154-42-XXXX</td>
<td>Registered by the supplier</td>
</tr>
<tr>
<td>Magnesium</td>
<td>01-2119537203-49-0024</td>
<td>Registered by the supplier</td>
</tr>
</tbody>
</table>

1.2. Relevant identified uses of the substance or mixture and uses advised against
1.2.1. Relevant identified uses
Pressure die casting, gravity casting, sand casting.

1.2.2. Uses advised against
No uses advised against have been identified

1.3. Details of the supplier of the safety data sheet
Asturiana de Zinc, S.A.U.
33417-San Juan de Nieva, Castrillón
ASTURIAS-ESPAÑA
+34 985 128 100
fichas.seguridad@glencore.es

1.4. Emergency telephone number
Phone (24h): +34 985 128 100
Single emergency telephone number inside the EU: 112

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Zinc alloys in massive form are not classified as dangerous mixtures according to the criteria of Regulation (EC) No 1272/2008 [CLP/GHS]

2.2. Label elements
No label required

2.3. Other hazards
On the basis of the morphology of the product no hazardous properties are expected when it is handled and use with appropriate care. Conditions and work practices which generate dust or fumes should be avoided or controlled.

On dry metal should be added to a molten bath. Exposure to excessive moisture may result in water infiltration into metal cavities. When added to a molten bath, this could lead to bubbling and possibility of explosion if the water is trapped within the internal cavities.
Never spray water on burning metal because of the risk of explosion which would splatter flaming particles of metal to great distances.

SECTION 3: Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>Formula</th>
<th>Content % w/w</th>
<th>EINECS No.</th>
<th>CAS No.</th>
<th>Index No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc</td>
<td>Zn</td>
<td>≥ 89 % - 96 %</td>
<td>231-175-3</td>
<td>7440-66-6</td>
<td>Not listed</td>
</tr>
<tr>
<td>Aluminium</td>
<td>Al</td>
<td>3.8 % - 8.8 %</td>
<td>231-072-3</td>
<td>7429-90-5</td>
<td>Not listed</td>
</tr>
<tr>
<td>Copper</td>
<td>Cu</td>
<td>0.003 % - 3.3 %</td>
<td>231-159-6</td>
<td>7440-50-8</td>
<td>Not listed</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Mg</td>
<td>0.02 % - 0.15 %</td>
<td>231-104-6</td>
<td>7439-95-4</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

Contains no other components or impurities which will influence the classification of the mixture.
SECTION 4: First aid measures

4.1. Description of first aid measures

4.1.1. Following inhalation
Not applicable to metallic zinc alloys in massive form.
In case of generation of fumes or vapours, metal fume fever may develop 3-10 hours after exposure to zinc oxide fumes. If symptoms develop (flu-like symptoms) obtain medical attention.

4.1.2. Following skin contact
Not applicable to metallic zinc alloys in massive form. No health effects expected.
In case of contact with 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.

4.1.3. Following eye contact
Not applicable to metallic zinc alloys in massive form
In case of presence of particles or dust: Do not rub eyes. Do not attempt to manually remove anything stuck to the eye. Immediately flush eyes with plenty of water for at least 15 minutes while holding the eyelids open. Obtain medical attention.

4.1.4. Following ingestion
Not applicable to metallic zinc alloys in massive form.
Large doses of soluble salts may cause irritation of the gastrointestinal tract.

4.2. Most important symptoms and effects, both acute and delayed
Symptoms of metal fume fever (in case of generation of fumes and inhalation of excessive quantities of zinc oxide): immediate dryness and irritation of the throat, tightness of the chest and coughing, followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. There are no recognized complications, after affects, or chronic affects that result from this condition. In rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia.

4.3. Indication of any immediate medical attention and special treatment needed
No data available

SECTION 5: Fire-fighting measures

5.1. Extinguishing media

5.1.1. Suitable extinguishing media
Apply dry chemical, dry sand or special powder extinguishing media. Use extinguishing media adapted to the immediate environment.

5.1.2. Unsuitable extinguishing media
Never use water, carbon dioxide or foam on molten metal because of the risk of explosion, which would splatter flaming particles of metal to great distances.

5.2. Special hazards arising from the substance or mixture
Zinc alloys in massive form are 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. Zinc oxide may evolve in fires.

5.3. Advice for fire-fighters
Fire-fighters must use special fire-fighting protective equipment. The public must be kept at a distance.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Use safety glasses, work gloves and boots. When molten metal is involved wear heat-resistant gloves and suitable clothing for protection from hot-metal splash. When dust or fumes are involved wear an approved self-contained breathing apparatus.

6.2. Environmental precautions
Place material in suitable labelled containers for later recovery or disposal. Solid metal is recyclable.

6.3. Methods and material for containment and cleaning up
Suitable methods for cleaning-up: Use appropriate tools to pile up ingots in a secure way. Use appropriate tools to put the spilled shot in a convenient recycling container. Solid metal is recyclable. Molten metal should be allowed to cool and harden before clean up.
Powder should be cleaned up using methods that will minimize dust generation.

6.4. Reference to other sections
Please refer to section 8 and 13 for more information.

SECTION 7: Handling and storage
7.1. Precautions for safe handling
Only dry metal should be added to a molten bath. Zinc alloys ingots suspected of containing moisture should be thoroughly dried before being added to a molten bath.

Safe procedure to follow when melting ingots of 1 ton or higher: add very slowly the first third part of the ingot in the melting bath. Follow carefully and watch for the presence of bubbling, sign of wetness. At 5 minute time intervals, repeat the same procedure for each of the last two third remaining ingot. Wear the appropriate safety equipment and stand behind a protective device.

7.2. Conditions for safe storage, including any incompatibilities
Store in a dry covered place, separate from incompatible substances.

7.3. Specific end use(s)
No data available

SECTION 8: Exposure controls/personal protection
8.1. Control parameters
Occupational exposure limits:
In case of fume generation:
- Zinc oxide [1314-13-2]:
  - VLA-ED\textsuperscript{0} mg/m\textsuperscript{3} (INSHT): 2 resp. fracc.
  - VLA-EC\textsuperscript{0} mg/m\textsuperscript{3} (INSHT): 10 resp. fracc
- Aluminium [7429-90-5]:
  - VLA-ED\textsuperscript{0} mg/m\textsuperscript{3} (INSHT): 10 metal dust
  - VLA-ED\textsuperscript{0} mg/m\textsuperscript{3} (INSHT): 5 welding fume, as aluminium
- Copper [7440-50-8]:
  - VLA-ED\textsuperscript{0} mg/m\textsuperscript{3} (INSHT, 2011): 0.2 fumes
  - VLA-ED\textsuperscript{0} mg/m\textsuperscript{3} (INSHT, 2011): 1 mist and dust
- Magnesium oxide [1309-48-4]:
  - VLA-ED\textsuperscript{0} mg/m\textsuperscript{3} (INSHT, 2011): 10 fume and dust

OELs for individual jurisdictions may differ. Check with local authorities for the applicable OELs in your jurisdiction.

8.2. Exposure controls
Occupational exposure controls
a. Respiratory protection
Not necessary for zinc alloys in massive form.
In case of fume or dust generation respiratory protection needed: recommended filter type P3

b. Hand protection
When hot or molten metal is handled use heat resistant gloves.

c. Eye protection
Safety glasses. When hot or molten metal is handled use face shield.

d. Skin protection
Wear suitable protective clothing including safety type boots. When hot or molten metal is handled use heat resistant clothing to protect from hot metal splash.

e. Hygiene measures
Do not eat, drink or smoke in work areas. Wash hands before eating, drinking or smoking in appropriate designated areas.

Environmental exposure controls
In case of fume or dust generation use adequate local or general ventilation to maintain the concentration of dust or
SAFETY DATA SHEET
According Regulation (EC) 1907/2006

ZINC ALLOYS FOR CASTING

Code: FDS-04
Page 4 / 6
Revision Nº: 6
Date: 17-05-2016
Supersedes Rev. Nº: 5

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F: PG-001-13

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 aluminium 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.

SECTION 9: Physical and chemical properties
9.1. Information on basic physical and chemical properties
9.1.1. Appearance
Physical state: solid
Appearance: bluish-silver lustrous metal
State: solid
Odor: odourless

9.1.2. Safety relevant basic data
pH: not applicable
Vapour pressure: negligible at 20 ºC
Melting/freezing point: depending on composition, 420 ºC for zinc 99.995 %
Boiling point: depending on composition, 908 ºC for zinc 99.995 %
Specific gravity: depending on composition, 7.1 for zinc 99.995 %
Water solubility: insoluble in water.
Partition coefficient: not applicable
Auto-flammability: not auto-flammable

9.2. Other information
No data available

SECTION 10: Stability and reactivity
10.1. Reactivity
Zinc metal reacts with acid and strong alkalis to generate hydrogen gas. See 10.5 incompatible materials.

10.2. Chemical stability
Massive zinc alloy 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.

10.3. Possibility of hazardous reactions
Contact with acids and alkalis generate highly flammable hydrogen gas. Contact with acidic solutions of arsenic and antimony compounds may evolve highly toxic arsine or stibine gas.

10.4. Conditions to avoid
Avoid overheating of molten bath. Avoid contact with incompatible substances

10.5. Incompatible materials
Acids, strong alkalis, strong oxidizers such as chlorine, fluorine, bromine, sodium potassium or barium peroxide, sodium or potassium chloride, chromium trioxide and fused ammonium nitrate.

Note: this list is not exhaustive, please verify technical documents to determine any incompatibilities with your process.

10.6. Hazardous decomposition products
The material could decompose at high temperatures generating fumes. Reaction with acids and alkalis will generate hydrogen gas. Contact with acidic arsenic or antimony may evolve highly toxic arsine or stibine gas.

SECTION 11: Toxicological information
11.1. Information on toxicological effects
Zinc alloy in massive form is not a toxic substance. No indication of carcinogenic or mutagenic activities, teratogenic properties or impairment of reproductive performance suspected.

SECTION 12: Ecological information
12.1. Toxicity
In the form in which this product is sold, it has low bioavailability and does not pose any significant environmental risks. However, extended exposure in aquatic or terrestrial environments may lead to the release of compounds in more bioavailable forms.
12.2. Persistence and degradability
No data available

12.3. Bioaccumulative potential
Zinc bioaccumulates in both plants and animals in aquatic systems. Aluminium solubility and bioavailability increases with decreasing pH in the aquatic environment. Bioconcentration of aluminium in fish is a function of water quality characteristics such as pH and total organic carbon content.

12.4. Mobility in soil
The mobility of zinc in soil depends on soil characteristics, 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.

12.5. Results of PBT and vPvB assessment
Zinc alloys in massive form are neither a PBT nor a vPvB substance.

12.6. Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

13.1.1. Product/packaging disposal
The material can be completely recovered and recycled.
In case of disposal act according to Local and National regulations. In the European Union, there are no homogeneous standards established for elimination of chemical waste, which is waste of a special nature, and treatment and elimination of same is subject to the domestic legislation in each country. In view of this, if material cannot be returned to process, you should contact the competent authority or those companies legally authorized for elimination of waste.


13.1.2. Waste treatment options
On-site waste water treatment techniques can be applied to prevent releases to water e.g.: chemical precipitation, sedimentation and filtration

13.2. Packaging
Contaminated containers and packaging of dangerous substances or preparations must be treated in the same manner as the actual products contained in them.


SECTION 14: Transport information

14.1. UN number: Not applicable-not regulated
14.2. UN proper shipping name: Not applicable-not regulated
14.3. Transport hazard class(es): Not applicable-not regulated
14.4. Packing group: Not applicable-not regulated
14.5. Environmental hazards: Not applicable-not regulated
14.6. Special precautions for user: Not applicable
14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable-not regulated

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
This substance is not listed in the Annex I of Regulation (EC) No 689/2008.

15.2. Chemical safety assessment
Not required
SECTION 16: Other information

16.1 Indication of changes
Format upgrade

16.2 Key literature references and sources for data
- CHEMICAL SAFETY REPORT, zinc metal
- Limites De Exposición Profesional Para Agentes Químicos En España, 2013. (INSHT).
- Zinc Safety Data Sheet. It can be supplied to the customer on his demand.

16.3 Training advice
Train personnel in the safe use of chemical substances

End of safety data sheet