DRAFT Proposal – Inclusion of electrolytic iron (billets / flakes) into the Lead Registrant REACH registration dossier of iron

Note:

Electrolytic iron considered as a new type of iron:



Composition of the substance

**Name: Electrolytic iron**

Description: Electrolytic iron refers to iron flakes / billets produced by electrolytic refining technologies. It does not include electrolytic iron powders, which are covered by 'Iron Powders' composition.

Degree of purity: >= 80.0 — <= 100.0 % (w/w)

**Table 14. Constituents**

| **Constituent** | **Typical concentration** | **Concentration range** | **Remarks** |
| --- | --- | --- | --- |
| iron  EC no.: 231-096-4 | >= 90.0 % (w/w) | >= 80.0 — <= 100.0 % (w/w) |  |

**Table 15. Impurities**

| **Impurity** | **Typical concentration** | **Concentration range** | **Remarks** |
| --- | --- | --- | --- |
| carbon  EC no.: 231-153-3 | ca. 0.3 % (w/w) | >= 0.0 — 1.0 % (w/w) |  |
| sulfur  EC no.: 231-722-6 | ca. 0.4 % (w/w) | >= 0.0 — <= 1.5 % (w/w) |  |
| manganese  EC no.: 231-105-1 | ca. 5.0 % (w/w) | >= 0.0 — <= 20.0 % (w/w) |  |
| silicon  EC no.: 231-130-8 | ca. 0.5 % (w/w) | >= 0.0 — <= 2.0 % (w/w) |  |
| phosphorus  EC no.: 231-768-7 | ca. 0.4 % (w/w) | >= 0.0 — <= 1.5 % (w/w) |  |
| nitrogen  EC no.: 231-783-9 | ca. 0.05 % (w/w) | >= 0.0 — <= 0.8 % (w/w) |  |

MANUFACTURE AND USES

Manufacture

**Table 3. Manufacture**

| **Identifiers** | **Use descriptors** | **Other information** |
| --- | --- | --- |
| M-10: Electrolytic iron production | **Environmental release category (ERC):**  ERC 1: Manufacture of substances  **Process category (PROC):**  PROC 1: Use in closed process, no likelihood of exposure  PROC 2: Use in closed, continuous process with occasional controlled exposure  PROC 3: Use in closed batch process (synthesis or formulation)  PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises  PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)  PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  PROC 21: Low energy manipulation of substances bound in materials and/or articles  PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting  PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature  PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles  PROC 25: Other hot work operations with metals |  |

**Table 4. Manufacturing process related to the specified manufacture(s)**

| **Related manufacture(s)** | **Description of manufacturing process** |
| --- | --- |
| M-10 - Electrolytic iron production | Electrolytic iron (billets / flakes) - Electrolytic iron is produced by electrolytic refining technologies. The cell contains an electrolyte bath of iron solution. Pure iron is deposited as a brittle lightly adhering sheet on the cathode. The deposited iron is then crushed and ground according to specific size requirements (flakes). Electrolytic iron can also be casted into billets after smelting operations. |

Identified uses

**Table 5. Formulation**

| **Identifiers** | **Use descriptors** | **Other information** |
| --- | --- | --- |
| F-10: Electrolytic iron - Formulation | **Environmental release category (ERC):**  ERC 2: Formulation of preparations  ERC 3: Formulation in materials  **Process category (PROC):**  PROC 1: Use in closed process, no likelihood of exposure  PROC 2: Use in closed, continuous process with occasional controlled exposure  PROC 3: Use in closed batch process (synthesis or formulation)  PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises  PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)  PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  PROC 21: Low energy manipulation of substances bound in materials and/or articles  PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting  PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature  PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles  **Product Category formulated:**  PC 7: Base metals and alloys  PC 21: Laboratory chemicals  PC 33: Semiconductors  PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products  **Technical function of the substance during formulation:**  Food/feedstuff additives  Intermediates  Laboratory chemicals  alloying element  Conductive agents | Substance supplied to that use:  As such |

**Table 6. Uses at industrial sites**

| **Identifiers** | **Use descriptors** | **Other information** |
| --- | --- | --- |
| IW-10: Electrolytic iron - industrial uses | **Environmental release category (ERC):**  ERC 5: Industrial use resulting in inclusion into or onto a matrix  **Process category (PROC):**  PROC 1: Use in closed process, no likelihood of exposure  PROC 2: Use in closed, continuous process with occasional controlled exposure  PROC 3: Use in closed batch process (synthesis or formulation)  PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)  PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities  PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  PROC 15: Use as laboratory reagent  PROC 21: Low energy manipulation of substances bound in materials and/or articles  PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting  PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature  PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles  PROC 25: Other hot work operations with metals  PROC 26: Handling of solid inorganic substances at ambient temperature  PROC 27a: Production of metal powders (hot processes)  PROC 27b: Production of metal powders (wet processes)  **Product Category used:**  PC 7: Base metals and alloys  PC 21: Laboratory chemicals  PC 33: Semiconductors  PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products  **Sector of end use:**  SU 4: Manufacture of food products  SU 9: Manufacture of fine chemicals  SU 14: Manufacture of basic metals, including alloys  SU 15: Manufacture of fabricated metal products, except machinery and equipment  SU 16: Manufacture of computer, electronic and optical products, electrical equipment  SU 24: Scientific research and development  **Technical function of the substance during formulation:**  Food/feedstuff additives  Intermediates  Laboratory chemicals  Alloying element  Conductive agents | Substance supplied to that use:  As such  Subsequent service life relevant for that use: yes  Link to the subsequent service life:  A-9: Electrolytic iron - Article service life |

**Table 7. Article service life**

| **Identifiers** | **Use descriptors** | **Other information** |
| --- | --- | --- |
| SL-9: Electrolytic iron - Article service life | **Article category related to subsequent service life (AC):**  AC 1: Vehicles  AC 2: Machinery, mechanical appliances, electrical/electronic articles  AC 7: Metal articles  **Environmental release category (ERC):**  ERC 12a: Industrial processing of articles with abrasive techniques (low release)  ERC 12b: Industrial processing of articles with abrasive techniques (high release)  **Process category (PROC):**  PROC 21: Low energy manipulation of substances bound in materials and/or articles  PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting  PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature  PROC 24: High (mechanical) energy work-up of substances bound in materials and/or articles  PROC 25: Other hot work operations with metals  **Technical function of the substance during formulation:**  Alloying element  Conductive agents | Article used by:  workers |

CLASSIFICATION AND LABELLING

Classification and labelling according to CLP / GHS

**Name: Electrolytic iron**

Implementation: EU

State/form of the substance: solid

Related composition: Electrolytic iron

Remarks: Electrolytic iron refers to iron flakes / billets produced by electrolytic refining technologies. It does not include electrolytic iron powders, which are covered by 'Iron Powders' composition.

**Classification**

The substance is not classified.

**Table 44. Classification and labelling according to CLP / GHS for physicochemical properties**

|  |  |
| --- | --- |
| **Endpoint** | **Reason for no classification** |
| Explosives: | conclusive but not sufficient for classification |
| Flammable gases: | conclusive but not sufficient for classification |
| Flammable aerosols: | conclusive but not sufficient for classification |
| Oxidising gases: | conclusive but not sufficient for classification |
| Gases under pressure: | conclusive but not sufficient for classification |
| Flammable liquids: | conclusive but not sufficient for classification |
| Flammable solids: | conclusive but not sufficient for classification |
| Self-reactive substances and mixtures: | conclusive but not sufficient for classification |
| Pyrophoric liquids: | conclusive but not sufficient for classification |
| Pyrophoric solids: | conclusive but not sufficient for classification |
| Self-heating substances and mixtures: | conclusive but not sufficient for classification |
| Substances and mixtures which in contact with water emit flammable gases: | conclusive but not sufficient for classification |
| Oxidising liquids: | conclusive but not sufficient for classification |
| Oxidising solids: | conclusive but not sufficient for classification |
| Organic peroxides: | conclusive but not sufficient for classification |
| Corrosive to metals: | conclusive but not sufficient for classification |

**Table 45. Classification and labelling according to CLP / GHS for health hazards**

|  |  |
| --- | --- |
| **Endpoint** | **Reason for no classification** |
| Acute toxicity - oral: | conclusive but not sufficient for classification |
| Acute toxicity - dermal: | conclusive but not sufficient for classification |
| Acute toxicity - inhalation: | conclusive but not sufficient for classification |
| Skin corrosion / irritation: | conclusive but not sufficient for classification |
| Serious damage / eye irritation: | conclusive but not sufficient for classification |
| Respiration sensitization: | conclusive but not sufficient for classification |
| Skin sensitation: | conclusive but not sufficient for classification |
| Aspiration hazard: | conclusive but not sufficient for classification |
| Reproductive Toxicity: | conclusive but not sufficient for classification |
| Reproductive Toxicity: Effects on or via lactation: | conclusive but not sufficient for classification |
| Germ cell mutagenicity: | conclusive but not sufficient for classification |
| Carcinogenicity: | conclusive but not sufficient for classification |
| Specific target organ toxicity - single: | conclusive but not sufficient for classification |
| Specific target organ toxicity - repeated: | conclusive but not sufficient for classification |

**Table 46. Classification and labelling according to CLP / GHS for environmental hazards**

|  |  |
| --- | --- |
| **Endpoint** | **Reason for no classification** |
| Hazards to the aquatic environment (acute/short-term): | conclusive but not sufficient for classification |
| Hazards to the aquatic environment (long-term): | conclusive but not sufficient for classification |
| Hazardous to the ozone layer: | conclusive but not sufficient for classification |

**Labelling**

Signal word: No signal word

Classification and labelling according to DSD / DPD

Self classification(s)

**Chemical name: Electrolytic iron**

Related composition: Electrolytic iron

Remarks: Electrolytic iron refers to iron flakes / billets produced by electrolytic refining technologies. It does not include electrolytic iron powders, which are covered by 'Iron Powders' composition.

**Table 11. Self classification according to Directive 67/548/EEC criteria**

| **Endpoints** | **Reason for no classification** |
| --- | --- |
| Explosiveness | conclusive but not sufficient for classification |
| Oxidising properties | conclusive but not sufficient for classification |
| Flammability | conclusive but not sufficient for classification |
| Thermal stability | conclusive but not sufficient for classification |
| Acute toxicity | conclusive but not sufficient for classification |
| Acute toxicity- irreversible damage after single exposure | conclusive but not sufficient for classification |
| Repeated dose toxicity | conclusive but not sufficient for classification |
| Irritation / Corrosion | conclusive but not sufficient for classification |
| Sensitisation | conclusive but not sufficient for classification |
| Carcinogenicity | conclusive but not sufficient for classification |
| Mutagenicity - Genetic Toxicity | conclusive but not sufficient for classification |
| Toxicity to reproduction- fertility | conclusive but not sufficient for classification |
| Toxicity to reproduction- development | conclusive but not sufficient for classification |
| Toxicity to reproduction - breastfed babies | conclusive but not sufficient for classification |
| Environment | conclusive but not sufficient for classification |

Physicochemical properties – addition to existing information

**Physical state**

| **Form of Iron** | **Form** | **Colour** |
| --- | --- | --- |
| Electrolytic iron | Flakes: Average size: 3-7mm thick, 3-15mm width x length Billets: Average size: up to 155mm x 155mm | Grey |

**Granulometry**

| **Form of Iron** | **Form** |
| --- | --- |
| Electrolytic iron | Flakes: ~ 3-7mm thick, ~3-15mm width x length  Billets: ~ < 155mm x 155mm |

**Autoflammability / self-ignition temperature / Flammability**

| **Phys-chem endpoint** | **Carbonyl iron powder** | **Iron powder** | **Pig iron** | **DRI** | **HBI** | **Elemental iron** | **Reduced Iron Catalyst** | **Electrolytic iron** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Self-heating** | Category 1 Self-heating | NC | NC | NC | NC | NC | Category 1 self-heating | NC |
| **Pyrophoric solid** | NC | NC | NC | NC | NC | NC | NC | NC |
| **Solid flammability** | Category 1 Flammability | NC | NC | NC | NC | NC | NC | NC |
| **Emission of gas in contact with water** | NC | NC | NC | NC | NC | NC | NC | NC |

NC: not classified

Electrolytic iron\_Guidance on safe use

**First-aid measures**

Eye contact: Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 20 minutes. Get medical attention if irritation occurs.

Skin contact: Wash with soap and water. Get medical attention if irritation occurs.

Inhalation: Move person to fresh air. Get medical attention if breathing difficulty persists.

Ingestion: Do not induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.

**Fire-fighting measures**

Flammability of the product: Non-flammable.

Products of combustion: Decomposition products may include metal oxide/oxides.

Suitable extinguishing process: Use extinguishers appropriate for surrounding materials. Use an appropriate metal-fire-extinguishing dry powder.

Unsuitable extinguishing media for safety reasons: DO NOT USE water.

Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment.

**Accidental release measures**

Spill/Leak Procedures: Not applicable to iron in solid state.

For spills involving molten iron, personnel should be protected against contact with eyes and skin and avoid inhalation of dust/fume.

Fine, dry material should be removed by vacuuming or wet sweeping methods to prevent spreading of dust. Do not release into sewers or waterways. Collect material in appropriate, labelled containers for recovery or disposal in accordance with local regulations.

Disposal: Any excess product can be recycled for further use, disposed in an appropriately permitted waste landfill, or disposed by other methods, which are in accordance with local regulations.

**Handling and storage**

**Handling**

Avoid breathing dusts. Avoid prolonged contact with eyes, skin and clothing. Wash thoroughly after handling.

The movement of molten iron should be carried out using suitable and approved refractory lined containers. Some products may be secured by straps or bands. These should not be used for lifting as they could cause eye or other injury when tension is released. Certain products, may as a result of processing, be brittle or have residual stress, which might cause fracture or significant movement. All products are likely to have sharp edges, which could cause lacerations, and flying particles may be produced when shearing.

**Storage**

Suitable storage areas should be clearly marked and containers should be sufficient to hold the product.

Store in cool, dry, well-ventilated area removed from incompatible materials (see stability and reactivity), sources of heat (e.g. steam lines), and ignition sources.

Keep container closed.

**Exposure controls / personal protection**

**1. Technical protection measures**

Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fumes or mist, use ventilation to keep exposure to airborne contaminants below Occupational Exposure Limits.

**2. Organisational protection measures**

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Keep working clothes separately.

**3. Hand protection**

The use of canvas gloves is advisable.

**4. Feet protection**

The use of safety shoes is advisable.

**5. Body protection**

Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

For molten metal or the generation of airborne particulates: the use of protective clothing (flame retardant–molten), gloves (aluminized-molten) and safety glasses to prevent skin.

Head Protection: During handling, material can spill and the use of helmet is advisable.

**6. Eye protection**

In case of generation of airborne particulates, e.g. loading, unloading, cutting or sanding, the use of safety goggles is advisable. Contact lenses should not be worn where industrial exposures to this material are likely.

**7. Respiratory protection**

During handling dust may be generated.

When fume or dust is generated, provide adequate ventilation to ensure that the Occupational Exposure Limits are not exceeded. If necessary provide local fume extraction, with the correct capture hood and capture velocity to match the conditions. Alternatively, where necessary, suitable respiratory protective equipment ( FFP2 (EN 149:2001) should be provided for use by those at risk from inhalation of fumes.

**Stability and reactivity**

Electrolytic iron is normally stable.

Incompatibility with various materials:

Reactive with oxidizing agents, acids.

Flammable materials (e.g. coke, wood).

Readily dissolved by diluted mineral acids and attacked or dissolved by organic acids; not appreciably attacked by cold concentrated. H2SO4 or HNO3, but is attacked by the hot acids.

Chlorine Trifluoride reacts with iron with incandescence.

Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization: Under normal conditions of storage and use, hazardous polymerization will not occur.

**Disposal considerations**

Electrolytic iron can be recycled to avoid landfill.