

SAFETY DATA SHEET

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

1.1. Product identifier

Trade name

Lead metal

Product no.

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REACH registration number

01-2119513221-59-XXXX

Other means of identification

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses of the substance or mixture

Uses considered in Exposure Scenarios:

- 1 Primary Lead Production
- 2 Secondary Lead Production
- 3 Lead Battery Production
- 4 Lead Sheet Production
- 5 Use of Lead in production of Hot-Dip Galvanised Steel
- 6 Use of Lead Metal in production of a range of lead articles (e.g. cast, rolled and extruded production, ammunition and lead shot)
- 7 Use of lead in the production of leaded steels
- 8 Lead powder production
- 9 Use of lead metal in lead oxide production
- 10 Use of molten lead as heat transfer fluid in closed process Use of lead metal in lead oxide production
- 11 Professional use of lead solder

Uses advised against

The placing on the market for supply to the general public is prohibited for 'Lead metal massives (general and high purity grades)' on its own and in mixtures at 0.3% or more Pb by weight. As such, the consumer use of lead solder is a use advised against.

In accordance with the CSR, the use of lead shot over wetlands is a use advised against.

1.3. Details of the supplier of the safety data sheet

Company and address

Boliden Commercial
Box 750
SE-101 35 Stockholm
Sweden

Tel +46 8 610 15 00

Fax +46 8 31 55 45

Contact person

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E-mail

info.market@boliden.com

SDS date

13-02-2018

SDS Version

2.0

According to EC-Regulation 1907/2006 (REACH)

1.4. Emergency telephone number

999 (or 111 for non-emergency medical advice). Emergency Action: In the event of a medical enquiry involving this product, please contact your doctor or local hospital accident and emergency department or the NHS enquiry service). See section 16.

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Lead metal massives (general and high purity grades); [particle diameter $\geq 1\text{mm}$]
Repr. 1A; H360FD
Lact.; H362
STOT RE1; H372.

2.2. Label elements

Hazard pictogram(s)



Signal word

Danger

Hazard statement(s)

May damage fertility. May damage the unborn child. (H360FD)
May cause harm to breast-fed children. (H362)
Causes damage to central nervous system, blood and kidneys through prolonged or repeated exposure by oral intake or inhalation. (H372)

Safety statement(s)	General	-
	Prevention	Do not breathe dust or fume (P260) Use personal protective equipment as required. (P281) Avoid contact during pregnancy and while nursing (P263)
	Response	IF exposed or concerned: Get medical advice/attention (P308 + P313)
	Storage	-
	Disposal	Dispose of contents/container to an approved waste disposal plant (P501).

Identity of the substances primarily responsible for the major health hazards

Lead.

† A derogation from labelling requirements exists for metals in massive form. Such metals do not require a label according to Annex 1 to Regulation (EC) No 1272/2008 if they do not present a hazard to human health by inhalation, ingestion or contact with skin or to the aquatic environment in the form in which they are placed on the market, although classified as hazardous in accordance with the criteria of that Annex.

2.3. Other hazards

Melting or activities generating lead dust, fume or vapour can result in sufficient lead entering your body to be hazardous to your health. Oxidation products (including lead compounds) may also form on the surface of metallic lead. Lead is heavy and care should be taken when lifting and handling. See section 11 for more information on the health hazards of lead compounds.

Additional labelling

Labelling according to REACH Annex XVII, Entry 30: 'Restricted to professional users'.

Additional warnings

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VOC

-

According to EC-Regulation 1907/2006 (REACH)

SECTION 3: Composition/information on ingredients

3.1. Substances

NAME:	Lead metal massives (general and high purity grades); [particle diameter $\geq 1\text{mm}$]
IDENTIFICATION NOS.:	CAS-no: 7439-92-1 EC-no: 231-100-4 REACH-no: 01-2119513221-59-XXXX
CONTENT:	≥ 99.8 - $\leq 99.999\%$
CLP CLASSIFICATION:	Repr. 1A; H360FD, Lact.; H362, STOT RE1; H372

(*) See full text of H-phrases in section 16. Occupational exposure limits are listed in section 8, if these are available.

3.2. Mixtures

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Other informations

SECTION 4: First aid measures

4.1. Description of first aid measures

The measures below are unlikely to be relevant whilst lead is in its solid metallic state. However, they are relevant in the event of exposure to fumes, vapour or dust or oxidation products that may form on the surface of lead.

General information

In the case of accident: Contact a doctor or casualty department – take the label or this safety data sheet. Contact a doctor, if in doubt about the injured person's condition or if the symptoms continue. Never give an unconscious person water or similar.

Inhalation

Get the person into fresh air and stay with them.

Skin contact

Remove contaminated clothing and shoes at once. Skin that has come in contact with the material must be washed thoroughly with water and soap. Skin cleanser can be used. DO NOT use solvents or thinners.

Eye contact

Remove contact lenses. Flush eyes immediately with plenty of water (20-30°C) and continue until irritation stops. Make sure you flush under the upper and lower eyelids. If irritation continues, contact a doctor.

Ingestion

Rinse out mouth and give plenty of water to drink. Contact a doctor immediately and take this safety data sheet or the label from the material with you. Do not induce vomiting. In the event of spontaneous vomiting, hold head facing down so that no vomit runs back into the mouth and throat.

Burns

Rinse with water until the pain stops and continue for 30 minutes.

4.2. Most important symptoms and effects, both acute and delayed

Typical clinical manifestations of acute lead poisoning include weakness, irritability, asthenia, nausea, abdominal pain with constipation, and anaemia.

4.3. Indication of any immediate medical attention and special treatment needed

Symptoms of poisoning may occur after several hours; seek medical attention.

Information to medics

Bring this safety data sheet.

SECTION 5: Firefighting measures

5.1. Extinguishing media

The product itself does not burn. Use extinguishing measures that are appropriate to local circumstances and the surrounding. Never use water in presence of molten metal. Water expands explosively in contact with molten / liquid metal.

5.2. Special hazards arising from the substance or mixture

In case of fires, hazardous combustion gases are formed: Lead fumes; Lead oxide.

5.3. Advice for firefighters

Wear self-contained breathing apparatus and protective clothing to prevent contact.

According to EC-Regulation 1907/2006 (REACH)

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation. Avoid dust formation. Avoid contact with skin, eyes and clothing.

6.2. Environmental precautions

Do not discharge into the drains/surface waters/groundwater. In case of entry into waterways, soil or drains, inform the responsible authorities.

6.3. Methods and material for containment and cleaning up

Collect mechanically (preferably in dry condition). Send in suitable containers for recovery or disposal.

6.4. Reference to other sections

See section on "Disposal considerations" with regard to the handling of waste. See section on 'Exposure controls/personal protection' for protective measures.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

See section on 'Exposure controls/personal protection' for information on personal protection. The product is not combustible.

7.2. Conditions for safe storage, including any incompatibilities

Do not store together with foodstuffs. Do not store together with animal feedstocks. Do not store with acids or alkalis.

Storage temperature

No data available.

7.3. Specific end use(s)

This product should only be used for applications described in Section 1.2

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

OEL

Lead (EH40/2005)

Long-term exposure limit (8-hour TWA reference period): - ppm | 0.15 mg/m³

Short-term exposure limit (15-minute reference period): - ppm | - mg/m³

DNEL / PNEC

DNEL workers (lead): 40 µg/dL blood (adults) - Duration: Long term – Systemic effects

DNEL workers (lead): 10 µg/dL blood (developmental effect on foetus) - Duration: Long term – Systemic effects

PNEC (lead): 3.1 µg Pb/L (dissolved) - Exposure: Freshwater

PNEC (lead): 3.5 µg Pb/L (dissolved) - Exposure: Marine water

PNEC (lead): 174.0 mg Pb/kg dw - Exposure: Freshwater sediment

PNEC (lead): 41.0 mg Pb/kg dw (bioavailability correction) - Exposure: Freshwater sediment

PNEC (lead): 164.0 mg Pb/kg dw - Exposure: Marine water sediment

PNEC (lead): 212.0 mg Pb/kg dw - Exposure: Soil

PNEC (lead): 0.1 mg Pb/L - Exposure: Sewage Treatment Plant

8.2. Exposure controls

Compliance with the stated exposure limits values should be checked on a regular basis.

Blood lead monitoring: Set in place a certified monitoring regime which covers all site activities; Define a policy for submitting workers to regular blood lead monitoring, including increased frequency for workers undertaking high-risk jobs and workers with elevated blood lead levels; Ensure all workers have a blood test prior to working on site. Set an "action level" that is typically 5 µg/dL below the exposure limit deemed to be safe. If the action level is exceeded, appropriate measures are to be taken, to prevent further increases in blood lead. If the safe threshold is exceeded, continue or begin ban on overtime, ensure strict hygiene procedures are followed, undertake detailed inspections to ensure correct use of personal protective equipment, undertake detailed inspections to ensure recommended workplace procedures are followed, move employee to workplace where exposure is expected to be lower or remove from lead

According to EC-Regulation 1907/2006 (REACH)

environment altogether, further increase blood lead sampling frequency, and continue frequent sampling until results are below the first action level.

General recommendations

Observe general occupational hygiene.

Exposure scenarios

If there is an appendix to this safety data sheet, the indicated exposure scenarios must be complied.

Exposure limits

Trade users are covered by the rules of the working environment legislation on maximum concentrations for exposure. See work hygiene threshold values.

Appropriate technical measures

Airborne gas and dust concentrations must be kept as low as possible and below the current threshold values. Use for example an exhaust system if the normal air flow in the work room is not sufficient. Make sure that eyewash and emergency showers are clearly marked.

Hygiene measures

Personal Hygiene: Ensure workers follow simple hygiene rules (e.g. do not bite nails and keep them cut short, avoid touching or scratching face with dirty hands or gloves); Ensure workers do not wipe away sweat with hands or arms; Ensure workers use disposable tissues rather than a handkerchief; Prohibit drinking, eating and smoking in production areas, or access to eating and non-production areas in working clothes; Ensure workers wash hands, arms, faces and mouths (but preferably shower) and change into clean clothing before entering eating areas; For high exposure workplaces, separate rooms for cleaning hands, removal of clothes, showers and clean clothes may be necessary; Ensure workers handle dirty working clothes with care; Allow no personal belongings to be taken into production areas, or items that have been used in production areas to be taken home. Ensure general shop cleanliness is maintained by frequent washing/vacuuming. Clean every workplace at the end of every shift.

Measures to avoid environmental exposure

One or more of the following measures may if necessary be taken to reduce emissions to water:

- Chemical precipitation: used primarily to remove the metal ions
- Sedimentation
- Filtration: used as final clarification step
- Electrolysis: for low metal concentration
- Reverse osmosis: extensively used for the removal of dissolved metals
- Ion exchange: final cleaning step in the removal of heavy metal from process wastewater

One or more of the following measures may if necessary be taken to reduce emissions to air:

- Electrostatic precipitators using wide electrode spacing: Wet electrostatic precipitators:
- Cyclones, but as primary collector Fabric or bag filters: high efficiency in controlling fine particulate (melting): achieve emission values Membrane filtration techniques can achieve
- Ceramic and metal mesh filters. PM10 particles are removed
- Wet scrubbers

Lead removal from treatment works should be at least the minimum default 84% removal used in the CSR. Solid material collected from on-site treatment must be sent for metal recovery or treated as hazardous waste. Waste water treatment sludge must be recycled, incinerated or landfilled and not used as agricultural fertiliser.

Individual protection measures, such as personal protective equipment



Generally

Only CE-marked personal protection equipment should be used.

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Respiratory Equipment

Suitable respiratory protective device recommended if work activity is likely to result in formation of lead fumes, vapours or dust. In case of brief or low level exposure use dust mask or half mask with particle filter P2. Assess the need to wear respiratory protective equipment in production areas. Consider use effective masks accompanied by a compliance policy (ensure proper shaving; ensure workers do not remove RPE in production areas in order to communicate). Where masks are used, employ formal mask cleaning and filter changing strategies.

Skin protection

Wear protective work clothing. For workers in areas of significant exposure, provide sufficient working clothes to enable daily change into clean clothes. In such cases all work clothing should be cleaned by the employer on a daily basis and is not permitted to leave the work site.

Hand protection

Protective gloves. Material of gloves: Neoprene or Leather.

Eye protection

Safety glasses.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Form	Colour	Odour	pH	Viscosity	Density (g/cm ³)
Solid	Grey-blue	None	Not applicable	Not applicable	11,45

Phase changes

Melting point (°C)	Boiling point (°C)	Vapour pressure (mm Hg)
326	> 600	Not applicable

Data on fire and explosion hazards

Flashpoint (°C)	Ignition (°C)	Self ignition (°C)
Not applicable	Not applicable	Not applicable
Explosion limits (Vol %)	Oxidizing properties	
Not explosive	Not oxidising	

Solubility

Solubility in water	n-octanol/water coefficient
185 mg/L at 20°C	Not applicable

9.2. Other information

Solubility in fat
Not soluble

SECTION 10: Stability and reactivity

10.1. Reactivity

Lead is not a reactive substance and no reactive hazards are expected.

10.2. Chemical stability

Expected to be stable under normal conditions of use.

10.3. Possibility of hazardous reactions

No hazardous reactions expected under normal conditions of use.

10.4. Conditions to avoid

No special

10.5. Incompatible materials

Strong acids and strong oxidizing agents.

10.6. Hazardous decomposition products

The product is not degraded when used as specified in section 1.

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

This product has not been fully tested. Judgements on the expected toxicity of this product have been made based upon consideration of sparingly soluble inorganic lead compounds and the agreed harmonised classification of lead metal.

The following information is relevant if you swallow any lead or breathe in lead dust, fume or vapour. Lead is slowly absorbed by ingestion and inhalation and poorly absorbed through the skin. If absorbed, it will accumulate in the body with low rates of excretion, leading to long-term build up. Part of risk management is to take worker blood samples for analysis to ensure that exposure levels are acceptable.

Acute toxicity

Lead in massive form is not considered to be acutely toxic. It is not easily inhaled or ingested, and if it is accidentally ingested, normally passes through the gastrointestinal system without significant absorption into the body. Lead is not easily absorbed through the skin.

Skin corrosion/irritation

Studies have shown that sparingly soluble inorganic lead compounds are not corrosive or irritating to skin, and this lack of effect is expected also for metallic lead. This conclusion is supported by the lack of reports of irritant effects from occupational settings.

Serious eye damage/irritation

Studies have shown that sparingly soluble inorganic lead compounds are not corrosive or irritating to eyes, and this lack of effect is expected also for metallic lead. This conclusion is supported by the lack of reports of irritant effects from occupational settings.

Respiratory or skin sensitisation

There is no evidence that lead causes respiratory or skin sensitisation.

Germ cell mutagenicity

The evidence for genotoxic effects of highly soluble inorganic lead compounds is contradictory, with numerous studies reporting both positive and negative effects. Responses appear to be induced by indirect mechanisms, mostly at very high concentrations that lack physiological relevance.

Carcinogenicity

There is some evidence that inorganic lead compounds may have a carcinogenic effect, and they have been classified by IARC as probably carcinogenic to humans (Group 2A). However, it is considered that this classification does not apply to lead in massive form, given the very low bioavailability of metallic lead. Carcinogenicity studies of lead metal powder have been negative. Epidemiology studies of workers exposed to inorganic lead compounds have found a limited association with stomach cancer. IARC has concluded that lead metal is possibly carcinogenic to humans (Group 2B).

Reproductive toxicity

Exposure to high levels of inorganic lead compounds may cause adverse effects on male and female fertility, including adverse effects on sperm quality. Prenatal exposure to inorganic lead compounds is also associated with adverse effects on the development of the unborn child.

STOT-single exposure

Inorganic lead compounds have generally been found to be of relatively low acute toxicity by ingestion, in contact with skin, and by inhalation, with no evidence of any local or systemic toxicity from such exposures. The bioavailability of lead metal is low and acute lead exposure is not expected to result in acute toxicity effects.

STOT-repeated exposure

Lead is a cumulative poison and may be absorbed into the body through ingestion or inhalation; its toxicity is generally considered to be mediated through the lead cation. Although inhalation and ingestion of lead in massive form are unlikely, poor hygiene practises may result in hand to mouth transfer which maybe significant over a prolonged period of time. Lead metal may also be used in such a way that inhalable particles may form, resulting in systemic uptake. Inorganic lead compounds have been documented in observational human studies to produce toxicity in multiple organ systems and body function including the haematopoietic (blood) system, kidney function, reproductive function and the central nervous system. Postnatal exposure to lead compounds is associated with impacts on neurobehavioral development in children

Aspiration hazard

Lead metal is a solid and aspiration hazards are not expected to occur.

SECTION 12: Ecological information

12.1. Toxicity

Lead metal in massive form is not classified as hazardous to the aquatic environment, due to its low solubility and rapid removal from the water column. Lead toxicity is expected to be greater in softer waters.

Substance	Species	Test	Test duration	Result
lead	Fish: Pimephales promelas, Oncorhynchus mykiss	LC50	96 h	pH 5.5 – 6.5: 40.8 – 810.0 µg Pb/L
lead	Fish: Pimephales promelas, Oncorhynchus mykiss	LC50	96 h	pH >6.5 – 7.5: 52.0 – 3,598.0 µg Pb/L
lead	Fish: Pimephales promelas, Oncorhynchus mykiss	LC50	96 h	pH > 7.5 – 8.5: 113.8 – 3,249.0 µg Pb/L
lead	Invertebrates: Daphnia magna, Ceriodaphnia dubia	LC50	48 h	pH 5.5 – 6.5: 73.6 – 655.6 µg Pb/L
lead	Invertebrates: Daphnia magna, Ceriodaphnia dubia	LC50	48 h	pH >6.5 – 7.5: 28.8 – 1,179.6 µg Pb/L
lead	Invertebrates: Daphnia magna, Ceriodaphnia dubia	LC50	48 h	pH > 7.5 – 8.5: 26.4 – 3,115.8 µg Pb/L
lead	Algae: Pseudok. subcapitata, Chlorella kesslerii	ErC50	72 h	pH 5.5 – 6.5: 72.0 – 388.0 µg Pb/L
lead	Algae: Pseudok. subcapitata, Chlorella kesslerii	ErC50	72 h	pH >6.5 – 7.5: 26.6 – 79.5 µg Pb/L
lead	Algae: Pseudok. subcapitata, Chlorella kesslerii	ErC50	72 h	pH > 7.5 – 8.5: 20.5 – 49.6 µg Pb/L
lead	Freshwater fish (different species)	EC10		17.8 – 1558.6 µg Pb/L
lead	Freshwater invertebrates (different species)	EC10		1.7 – 963.0 µg Pb/L
lead	Freshwater algae (different species)	EC10		6.1 – 190.0 µg Pb/L
lead	Freshwater higher plants: Lemna minor	EC10		85.0 – 1,025.0 µg Pb/L
lead	Marine fish: Cyprinodon variegatus	EC10		229.6 – 437.0 µg Pb/L
lead	Marine invertebrates (different species)	EC10		9.2 – 1409.6 µg Pb/L
lead	Marine algae (different species)	EC10		52.9 – 1234.0 µg Pb/L
lead	Marine higher plants: Champia parvula	EC10		11.9 µg Pb/L
lead	Freshwater sediment invertebrates (diff. species)	EC10		573.0 – 3,390.0 mg Pb/kg dw
lead	Marine sediment invertebrates (diff. species)	EC10		680.0 – 1,291.0 mg Pb/kg dw
lead	Terrestrial invertebrates (different species)	EC10		34.0 – 2,445.0 mg Pb/kg dw
lead	Terrestrial plants (different species)	EC10		57.0 – 6,774.0 mg Pb/kg dw
lead	Micro-organisms (different species)	EC10		97.0 – 7,880.0 mg Pb/kg dw
lead	Bacterial populations	EC10		Resp. 1.06 - 2.92 mg Pb/L
lead	Bacterial populations	EC10		Ammonia uptake 2.79 - 9.59 mg Pb/L
lead	Protozoan community	EC10		Mortality: 1.0 – 7.0 mg Pb/L

12.2. Persistence and degradability

Lead is naturally occurring and ubiquitous in the environment. Lead is obviously persistent in the sense that they do not degrade to CO₂, water, and other elements of less environmental concern. In the water compartment, lead is rapidly and strongly bound to the suspended solids of the water column. This binding and subsequent settling to the sediment allows for rapid metal removal of lead from the water column. Insignificant remobilization of lead from sediment is expected.

12.3. Bioaccumulative potential

Available BCF/BAF data for the aquatic environment show a distinct inverse relationship with the exposure concentration demonstrating that lead is homeostatically regulated by aquatic organisms. A median BAF within environmentally relevant concentrations of 1,552 L/kg_{ww} is observed in aquatic organisms. In the soil compartment no bioaccumulation is expected. The BAF's are not significantly affected by the Pb concentration in the soil. A median BAF value for soil dwelling organisms is 0.10 kg_{dw}/kg_{ww}. Available information on transfer of Pb through the food chain indicates that lead does not biomagnify in aquatic or terrestrial food chains.

12.4. Mobility in soil

Lead metal (non-classified) is sparingly soluble in water and with its relatively high K_d value, is expected to be absorbed onto soils and sediments. Typical log K_d-values of 5.2, 5.7 and 3.8 have been determined for freshwater sediment, marine sediment and soil, respectively.

12.5. Results of PBT and vPvB assessment

The PBT and vPvB criteria of Annex XIII to the Regulation do not apply to inorganic substances, such as lead monoxide. The criterion for persistence is not applicable for inorganic Pb. Under conditions of a standard EUSES lake, Pb meets the criteria for rapid removal from the water column (> 70% in 28 days).

Bioaccumulation criterion is not applicable to inorganic substances such as Pb. However, Pb is considered to be toxic, since the most sensitive NOECs, HC5-50 and PNEC values are lower than 10 µg Pb/L.

12.6. Other adverse effects

Lead metal (non-classified) is not expected to contribute to ozone depletion, ozone formation, global warming or acidification.

According to EC-Regulation 1907/2006 (REACH)

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Should be recycled or disposed as hazardous waste. Do not allow product to reach sewage system. Different Pb-bearing wastes resulting from the processes described above are generated in the form of dross, flue dust and slag. These waste products are mainly recycled in the production process or landfilled.

Waste

EWC code

17 04 03, 06 04 05*

Specific labelling

-

Contaminated packing

Packaging which contains leftovers from the product must be disposed of in the same way as the product.

SECTION 14: Transport information

Not listed as dangerous goods under ADR and IMDG regulations.

14.1 – 14.4

ADR/RID

14.1. UN number

14.2. UN proper shipping name

14.3. Transport hazard class(es)

14.4. Packing group

Notes

Tunnel restriction code

IMDG

UN-no.

Proper Shipping Name

Class

PG*

EmS

MP**

Hazardous constituent

IATA/ICAO

UN-no.

Proper Shipping Name

Class

PG*

14.5. Environmental hazards

-

14.6. Special precautions for user

-

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

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(*) Packing group

(**) Marine pollutant

According to EC-Regulation 1907/2006 (REACH)

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Restrictions for application

Annex XVII, Entry No. 30 (regarding supply to the general public)
REACH Annex XVII, Entry No. 63

Demands for specific education

-

Additional information

-

Sources

EC regulation 1907/2006 (REACH)
Directive 2000/532/EC
EC Regulation 1272/2008 (CLP)
EH40/2005 Workplace exposure limits

15.2. Chemical safety assessment

A Chemical Safety Assessment has been carried out for this product.

SECTION 16: Other information

Full text of H-phrases as mentioned in section 2 and 3

H360FD: May damage fertility. May damage the unborn child.

H362: May cause harm to breast-fed children.

H372: Causes damage to organs through prolonged or repeated exposure by oral intake or inhalation.

The full text of identified uses as mentioned in section 1

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Other symbols mentioned in section 2

-

Other

It is recommended to hand over this safety data sheet to the actual user of the product. Information in this safety data sheet cannot be used as a product specification.

The information in this safety data sheet applies only to this specific product (mentioned in section 1) and is not necessarily correct for use with other chemicals/products.

A change (in proportion to the last essential change (first cipher in SDS version)) is marked with a blue triangle.

According to EC-Regulation 1907/2006 (REACH)

Emergency numbers

Austria: Poison Control Centre Emergency helpline +43 1 406 43 43, 112
Belgium: 070 - 245 245
Bulgaria: +359 2 9154 409
Czech Republic: Toxikologické informační středisko Telefon: +420 224 919 293, +420 224 915 402
Denmark: Kontakt Giftlinien på tlf.nr.: 82 12 12 12 (åbent 24 timer i døgnet).
Estonia: 112, 16662, ((+372) 626 93 90)
Finland: 09-4711/Myrkytystietokeskus tai suora numero 09-471977 Myrkytystietokeskus/HUS, Tukholmankatu 17, 00029 HUS (Helsinki) 112
France: ORFILA (INRS) : + 33 (0)1 45 42 59 59. 24 heures sur 24 et 7 jours sur 7
Germany: Giftnotruf Berlin, Emergency telephone: +49 30 19240 (Tag und Nacht)
Greece: +30 10 779 3777
Hungary: Telefon: 06-80-20-11-99
Iceland: Neyðarlínan: Sími 112. Eitrunarmiðstöð Landsspítalans. Sími: 543 2222.
Ireland: +353 1 8379964
Italy: Centro antiveleni di Roma - Policlinico Umberto I tel. 06-49978000
Latvia: +371 704 2468
Lithuania: Visuomenės sveikatos centrams +370 5 236 20 52 arba +370 687 53378
Malta: 2425 0000
Netherlands: 30-2748888
Norway: Giftinformasjonssentralen på tlf.nr.: 22 59 13 00, 113
Poland: +48 58301 65 16 / +48 58 349 2831
Portugal: Em caso de intoxicacao, ligue 808 250 143
Romania: +40 21 3183606
Slovakia: +421 2 54 77 4166
Slovenia: + 386 41 650500
Spain: Servicio de Información Toxicológica Teléfono: + 34 91 562 04 20 (solo emergencias toxicológicas) Información en español (24h/365 días)
Sweden: 112, 08-331231 (vardagar kl 9-17)
United Kingdom: 999 (or 111 for non-emergency medical advice). Emergency Action: In the event of a medical enquiry involving this product, please contact your doctor or local hospital accident and emergency department or the NHS enquiry service)

Date of last essential change (First cipher in SDS version)

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Date of last minor change (Last cipher in SDS version)

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Annex: Exposure Scenarios

ES 1 Primary lead production

1. Title	
Identified Use	Use of concentrates and other lead bearing materials in primary lead production
Systemic title based on use descriptor	PC7, ERC1
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 26	Raw material handling: ore/concentrate delivery, loading/unloading, and furnace feed mixing
PROC 22, 8b	Sintering: feeding/unloading, sinter plant operation
PROC 22, 1, 2	Smelting: furnace operation (blast, rotary, and reveratory furnaces)
PROC 23	Refining and casting: decopperisation, softening (As, Sb, Sn removal), silver separation, zinc distillation, casting of lead ingots/slabs or lead alloy ingots
PROC 21	Internal logistics: storage and shipment of finished goods, intra-facility transport
PROC 28	Others: repair, cleaning, and maintenance, quality control, and engineering
2.1 Control of workers exposure	
Product characteristic	Raw material is principally lead concentrates, although some scrap metallic lead, used lead-acid batteries, production residues, ashes, sludge and filter dust may be used. These materials will have varying levels of dustiness. The product is massive lead metal, usually as ingots or bars with low dust.
Amounts used	Not restricted
Frequency and duration of use/exposure	Full shift (8 hours) exposure for all workplaces other than sintering (part shifts, < 8 hours)
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)
Other given operational conditions affecting workers exposure	Outdoor handling of bulk ores and raw materials Indoor handling, room volume >1000 m ³
Technical conditions and measures at process level (source) to prevent release	Full containment of furnace operations, reaction vessels and other handling operations. Manual handling of ores and finished metal.
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, negative draft exhaust systems and/or local exhaust ventilation. Pass waste air through cleaning equipment.
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8).
2.2 Control of environmental exposure	
Amounts used	26,000 tonnes/annum/site
Frequency and duration of use	Continuous use/release, up to 326 days/year
Environment factors not influenced by risk management	Dilution factor (Freshwater): 10 Dilution factor (Marine): 100
Other given operational conditions affecting environmental exposure	Not applicable
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.
	Estimated fraction released to water (g/tonne): 0.26
	Estimated fraction released to air (g/tonne): 25.41
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.

According to EC-Regulation 1907/2006 (REACH)

Conditions and measures related to external treatment of waste for disposal	Different Pb-bearing wastes resulting from the processes described above are generated in the form of dross, flue dust, slag. These waste products are mainly recycled in the production process or landfilled.			
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	32.9 µg/dL	40.0 µg/dL	0.82
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.91 µg/l	3.1 µg/l	0.29
	Marine:	0.051 µg/l	3.5 µg/l	0.015
	Freshwater sediment:	164.15 mg/kg dw	174.0 mg/kg dw	0.94
	Marine water sediment:	60.72 mg/kg dw	164.2 mg/kg dw	0.37
	Terrestrial:	28.52 mg/kg dw	212.0 mg/kg dw	0.13
	Sewage treatment plant:	0.012 mg/l	0.1 mg/l	0.12
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				

ES 2: Secondary lead production

1. Title	
Identified Use	Use of lead-batteries and scrap in secondary lead production
Systemic title based on use descriptor	ERC 1; PC 7
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 8b, 26	Raw material handling: storage, transport and handling of batteries and other lead scrap
PROC 2	Shredding and sorting: for batteries, separation of sulphuric acid, shredding (breaking), grid-separation, elution of PbO-paste, also sorting of other lead scrap
PROC 4	Desulphurisation: sulphur removal from PbO-paste
PROC 22	Melting and smelting: melting of grids, smelting and reduction of paste
PROC23	Refining and casting: refining of lead, casting of ingots
PROC21	Storage, shipment and transport: storage and shipment of finished goods, intra-facility transport
PROC28	Repair, cleaning and maintenance
2.1 Control of workers exposure	
Product characteristic	Raw material is principally lead scrap, used lead batteries, drosses and battery oxides. These materials will have varying levels of dustiness. The product is massive lead metal, usually as ingots.
Amounts used	Not restricted

According to EC-Regulation 1907/2006 (REACH)

Frequency and duration of use/exposure	Full shift exposure (8 hours) for all workplaces (not restricted).			
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)			
Other given operational conditions affecting workers exposure	Indoor handling, room volume >1000 m ³			
Technical conditions and measures at process level (source) to prevent release	Enclosed system for melting of grids, smelting and reduction of paste.			
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, dilution ventilation and/or local exhaust ventilation. Pass waste air through cleaning equipment. Separation of workers via control room for melting of grids, smelting and reduction of paste. Protective gloves to be worn.			
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.			
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8).			
2.2 Control of environmental exposure				
Amounts used	13,000 tonnes/annum/site			
Frequency and duration of use	Continuous use/release, up to 345 days/year			
Environment factors not influenced by risk management	Dilution factor (Freshwater): 10 Dilution factor (Marine): 100			
Other given operational conditions affecting environmental exposure	Not applicable			
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.			
	Estimated fraction released to water (g/tonne):	0.018		
	Estimated fraction released to air (g/tonne):	154.65		
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.			
Conditions and measures related to external treatment of waste for disposal	Pb-bearing wastes resulting from the processes described above are generated in the form of solids (e.g. slags, matte). These should be treated by a licensed waste treatment operator (landfilled or incinerated) according to relevant waste regulation.			
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	38.1 µg/dL	40.0 µg/dL	0.95
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.84 µg/l	3.1 µg/l	0.27
	Marine:	0.051 µg/l	3.5 µg/l	0.015
	Freshwater sediment:	166.07 mg/kg dw	174.0 mg/kg dw	0.95
	Marine water sediment:	60.95 mg/kg dw	164.2 mg/kg dw	0.37
	Terrestrial:	29.30 mg/kg dw	212.0 mg/kg dw	0.14
	Sewage treatment plant:	12 µg/l	100 µg/l	0.12
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:				

According to EC-Regulation 1907/2006 (REACH)

DNEL for male workers:	40 µg/dL
DNEL for female workers of reproductive capacity:	10 µg/dL

ES 3: Lead Battery Production

1. Title	
Identified Use	Use of lead in lead battery production, also incorporating the manufacture and use of lead monoxide, pentalead tetraoxide sulphate and tetralead trioxide sulphate
Systemic title based on use descriptor	SU16, SU17; ERC 5, ERC 6a; AC 1, AC 2, AC 3
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 3, 21, 22, 23	Plate manufacturing: Casting/production of grids, oxide production, mixing, pasting, and curing operations
PROC 4, 21	Plate treatment: Jar/tank formation, plate washing, drying, cutting
PROC 21, 25, 26	Assembly: Stacking, assembly, welding and joining operations
PROC 4, 21	Battery formation: Acid filling, formation (wet batteries), finishing
PROC 21	Internal logistics: Storage of raw materials and finished goods, intra-facility transport, shipment
PROC 28	Cleaning and maintenance
2.1 Control of workers exposure	
Product characteristic	Raw material is principally lead ingots, and sometime lead oxides. Lead sulphates are formed during the paste production process. During the different process steps varying levels of dustiness occur. The article is an assembled and sealed battery.
Amounts used	Not restricted
Frequency and duration of use/exposure	Full shift exposure (8 hours) for all workplaces (not restricted).
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)
Other given operational conditions affecting workers exposure	Indoor handling, room volume >1000 m ³
Technical conditions and measures at process level (source) to prevent release	Closed system required for oxide production and enclosed spaces for curing operations.
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, dilution ventilation and/or local exhaust ventilation. Pass waste air through cleaning equipment. Separation of workers via control room for melting of grids, smelting and reduction of paste.
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8).
2.2 Control of environmental exposure	
Amounts used	10,400 tonnes/annum/site (of lead)
Frequency and duration of use	Continuous use/release, up to 315 days/year
Environment factors not influenced by risk management	Dilution factor (Freshwater): 10 Dilution factor (Marine): 100
Other given operational conditions affecting environmental exposure	Not applicable
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.
	Estimated fraction released to water (g/tonne): 0.18
	Estimated fraction released to air (g/tonne): 344.75
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.

According to EC-Regulation 1907/2006 (REACH)

Conditions and measures related to external treatment of waste for disposal		Different Pb-bearing wastes resulting from the processes described above are generated in the form of waste batteries, dross, scrap, plates, dust, swarf. These waste products are mainly recycled in the production process or incinerated		
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	37.1 µg/dL	40.0 µg/dL	0.93
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.84 µg/l	3.1 µg/l	0.27
	Marine:	0.051 µg/l	3.5 µg/l	0.015
	Freshwater sediment:	167.80 mg/kg dw	174.0 mg/kg dw	0.96
	Marine water sediment:	61.15 mg/kg dw	164.2 mg/kg dw	0.37
	Terrestrial:	29.50 mg/kg dw	212.0 mg/kg dw	0.14
	Sewage treatment plant:	13 µg/l	100 µg/l	0.13
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				

ES 4: Lead sheet production

1. Title	
Identified Use	Use of secondary lead materials in lead sheet production
Systemic title based on use descriptor	SU 14, SU 15, ERC 5 ; PC 7
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 26, 4, 23	Raw material handling: scrap delivery, loading/unloading, and furnace feed mixing
PROC 22, 23	Melting, drossing and refining
PROC 24	Milling operations
PROC 21	Sawing and slitting operations
PROC 21	Internal logistics: storage and shipment of finished goods, intra-facility transport
PROC 28	Others: repair, cleaning, and maintenance, quality control, and engineering
2.1 Control of workers exposure	
Product characteristic	Raw materials are principally metallic scrap. Fine lead particles are generated during the process steps. Finished product is solid, dry (>90% lead purity).
Amounts used	Not restricted.

According to EC-Regulation 1907/2006 (REACH)

Frequency and duration of use/exposure	Full shift (8 hours) exposure for all workplaces other than raw material handling and melting, drossing and refining (3 hours).			
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels).			
Other given operational conditions affecting workers exposure	Indoor handling, room volume >1000 m ³ . Process temperature for raw material handling <500°C. Process temperature for melting, drossing and refining <510°C.			
Technical conditions and measures at process level (source) to prevent release	Enclosed space (furnace) for melting, drossing and refining.			
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction for all processes other than milling operations (17%). Risk Management Measures include enclosure of process equipment, dilution ventilation and/or local exhaust ventilation. Pass waste air through cleaning equipment.			
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.			
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8). Protective gloves are required.			
2.2 Control of environmental exposure				
Amounts used	14,700 tonnes/annum/site			
Frequency and duration of use	Continuous use/release, up to 296 days/year			
Environment factors not influenced by risk management	Dilution factor (Freshwater): 10 Dilution factor (Marine): 100			
Other given operational conditions affecting environmental exposure	Not applicable			
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.			
	Estimated fraction released to water (g/tonne):	0.008		
	Estimated fraction released to air (g/tonne):	43.44		
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.			
Conditions and measures related to external treatment of waste for disposal	Different Pb-bearing wastes resulting from the processes described above are generated in the form of solids (dross, slag). The waste products should be treated by a licensed waste treatment operated according to relevant waste regulation.			
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	28.0 µg/dL	40.0 µg/dL	0.70
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.84 µg/l	3.1 µg/l	0.27
	Marine:	0.051 µg/l	3.5 µg/l	0.015
	Freshwater sediment:	144.1 mg/kg dw	174.0 mg/kg dw	0.83
	Marine water sediment:	61.2 mg/kg dw	164.2 mg/kg dw	0.37
	Terrestrial:	28.51 mg/kg dw	212.0 mg/kg dw	0.13
	Sewage treatment plant:	13 µg/l	100 µg/l	0.13
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:				
DNEL for male workers:	40 µg/dL			

According to EC-Regulation 1907/2006 (REACH)

DNEL for female workers of reproductive capacity:	10 µg/dL
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ES 5: Use of Lead in the Production of Hot-Dip Galvanized Steel (including wire galvanizing)

1. Title		
Identified Use	Use of lead in the production of Hot-Dip Galvanized Steel (including wire galvanizing)	
Systemic title based on use descriptor	SU15; ERC 5, PC 14; AC 7	
2. Operational conditions and risk management measures		
Involved PROCs	Involved Tasks	
PROC 23	Raw material handling	
PROC 23, 13	Hot dip galvanizing: periodic alloying additions of lead to the molten zinc bath (batch galvanizing).	
PROC 23	Wire Galvanizing: lead wire passed through a bath of molten zinc	
PROC 28	Cleaning and maintenance, quality control	
2.1 Control of workers exposure		
Product characteristic	Massive steel coated with a metallic lead layer.	
Amounts used	Not restricted	
Frequency and duration of use/exposure	Full shift exposure (8 hours) for all workplaces.	
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)	
Other given operational conditions affecting workers exposure	Indoor handling, room volume >1000 m ³ . Process temperature 445-460°C for molten zinc bath.	
Technical conditions and measures at process level (source) to prevent release	Enclosed system for Hot dip galvanizing and Wire Galvanizing.	
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, dilution ventilation and/or local exhaust ventilation. Pass waste air through cleaning equipment.	
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.	
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8). Thermal gloves required for Hot Dip Galvanizing and Wire Galvanizing.	
2.2 Control of environmental exposure		
Amounts used	500-1000 tonnes/annum/site	
Frequency and duration of use	Continuous use/release, up to 42 days/year	
Environment factors not influenced by risk management	No emissions to water.	
Other given operational conditions affecting environmental exposure	Not applicable	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.	
	Estimated fraction released to water (g/tonne):	No Emissions
	Estimated fraction released to air (g/tonne):	4,000
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.	
Conditions and measures related to external treatment of waste for disposal	The Pb content of wastes leaving the process is insignificant.	

According to EC-Regulation 1907/2006 (REACH)

3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	<12.0 µg/dL	40.0 µg/dL	<0.3
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	No Emissions	3.1 µg/l	N/A
	Marine:	No Emissions	3.5 µg/l	N/A
	Freshwater sediment:	No Emissions	174.0 mg/kg dw	N/A
	Marine water sediment:	No Emissions	164.2 mg/kg dw	N/A
	Terrestrial:	29.6 mg/kg dw	212.0 mg/kg dw	0.14
	Sewage treatment plant:	No Emissions	0.1 mg/l	N/A
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				

ES 6: Use of Lead metal in production of a range of lead articles (e.g. cast, rolled and extruded production, ammunition and lead shot)

1. Title	
Identified Use	Use of lead metal in the production of cast, rolled and extruded products, e.g. weights, foil, string, rope, bars, shot, sheathing and cables.
Systemic title based on use descriptor	SU 15, SU 17; PC 7, PC 38; AC 7, AC1, AC 2, AC 3; ERC5
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 26	Raw material handling
PROC22, 23	Melting
PROC 23	Refining and Casting
PROC 14	Extrusion
PROC 24	Milling/Rolling
PROC 21	Sawing/Slitting
PROC 25	Soldering/Manufacture of Solder
PROC 21, 22, 23, 24, 25, 4, 5	Production of lead shot
PROC 21	Ammunition Manufacture (i.e. assembly of ammunition)
PROC 23	Addition of coating metal to bath
PROC 23	Hot dip coating
PROC 21	Storage and Shipment
2.1 Control of workers exposure	
Product characteristic	Raw material is lead ingots, bars, or other forms of massive lead (1-99% purity). Raw materials can also include lead powder and paste. Finished lead articles are in solid form.
Amounts used	Not restricted

According to EC-Regulation 1907/2006 (REACH)

Frequency and duration of use/exposure	4 – 8 hour shifts for all workplaces.			
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels).			
Other given operational conditions affecting workers exposure	Indoor handling, room volume >20m ³ for raw material handling, >60m ³ for melting and >1000m ³ for all other workplaces.			
Technical conditions and measures at process level (source) to prevent release	Enclosed systems required for melting, refining and casting and possibly soldering/production of lead shot. Open systems/no direct handling required for remaining workplaces.			
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, dilution ventilation and/or local exhaust ventilation. Pass waste air through cleaning equipment. LEV typically required for all processes other than storage and shipment.			
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.			
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8). Leather or thermal-protective gloves required for all processes other than milling/rolling, sawing/slitting and storage and shipment.			
2.2 Control of environmental exposure				
Amounts used	Not restricted.			
Frequency and duration of use	Continuous use/release, up to 300 days/year.			
Environment factors not influenced by risk management	Flow rate of receiving surface water is 37 m ³ /s.			
Other given operational conditions affecting environmental exposure	Not applicable.			
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.			
	Estimated emissions released to water:	20 kg/annum/site		
	Estimated emissions released to air:	100 kg/annum/site		
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.			
Conditions and measures related to external treatment of waste for disposal	Pb-bearing wastes resulting from the processes described above are generated in the form of solids (e.g. dross, slags). These should be treated by a licensed waste treatment operator (landfilled or incinerated) according to relevant waste regulation.			
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	33.7 µg/dL	40.0 µg/dL	0.84
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.622 µg/l	3.1 µg/l	0.20
	Marine:	0.049 µg/l	3.5 µg/l	0.014
	Freshwater sediment:	103.5 mg/kg dw	174.0 mg/kg dw	0.59
	Marine water sediment:	57.1 mg/kg dw	164.2 mg/kg dw	0.35
	Terrestrial:	28.3 mg/kg dw	212.0 mg/kg dw	0.13
	Sewage treatment plant:	The site is assumed not to be connected with an off-site STP		
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:				
DNEL for male workers:	40 µg/dL			

According to EC-Regulation 1907/2006 (REACH)

DNEL for female workers of reproductive capacity:	10 µg/dL
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ES 7: Use of lead metal in the production of leaded steels – Industrial

1. Title	
Identified Use	Use of lead metal in the production of leaded steels
Systemic title based on use descriptor	SU 14; PC 7; AC 7; ERC 3
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 26	Raw material handling
PROC 22, 23	Secondary Steel making. Carried out using a ladle arc furnace. Lead is added by the addition of lead pellets or adding lead shot by deep injection into the ladle.
PROC 23	Casting via continuous casting route or ingot casting
PROC 21, 24, 25	Rolling / Cutting / Finishing
PROC 21	Internal logistics
PROC 28, 25	Others
2.1 Control of workers exposure	
Product characteristic	Raw material is principally graphitised lead shot. The lead can be added in conjunction with other additives or separately. The lead shot is granular with a diameter of 2mm and below. The product is massive metal, usually as blooms, billets, ingots or bars. The concentration of lead in the finished steel product is typically in the range 0.2-0.35%.
Amounts used	Not restricted
Frequency and duration of use/exposure	Full shift exposure (8 hours) for all workplaces (not restricted).
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)
Other given operational conditions affecting workers exposure	Indoor handling, room volume >1000 m ³ . Outdoor storage of finished products.
Technical conditions and measures at process level (source) to prevent release	All workplaces other than Raw Material Handling require enclosed systems with extraction.
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, dilution ventilation and/or local exhaust ventilation. Pass waste air through cleaning equipment. Leather gloves are required for all processes.
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8).
2.2 Control of environmental exposure	
Amounts used	Approx.430.7 tonnes/annum/site
Frequency and duration of use	Continuous use/release, up to 156 days/year (3 days/week)
Environment factors not influenced by risk management	Flow rate of receiving surface water 13.0 m ³ /s
Other given operational conditions affecting environmental exposure	Not applicable
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.
	Estimated fraction released to water (g/tonne): 255.4
	Estimated fraction released to air (g/tonne): 1,686.8
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.

According to EC-Regulation 1907/2006 (REACH)

Conditions and measures related to external treatment of waste for disposal	Different Pb-bearing wastes resulting from the processes described above are generated in the form of extraction dust, slag. These waste products are mainly recycled in the production process or through off site processes.			
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	25.5 µg/dL	40.0 µg/dL	0.64
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.84µg/l	3.1 µg/l	0.27
	Marine:	No Emissions	3.5 µg/l	N/A
	Freshwater sediment:	166.2 mg/kg dw	174.0 mg/kg dw	0.96
	Marine water sediment:	No Emissions	164.2 mg/kg dw	N/A
	Terrestrial:	28.9 mg/kg dw	212.0 mg/kg dw	0.14
	Sewage treatment plant:	The site is assumed not to be connected with an off-site STP.		
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				

ES 8: Lead Powder Production

1. Title	
Identified Use	Use of lead metal in the production of powders (Solder)
Systemic title based on use descriptor	SU 15, SU 17; PC 0, PC 7; ERC 2
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 26	Raw material handling
PROC 22, 25	Manufacture of Solder (molten lead alloy)
PROC 27a, 27b	Powder Production: Blowing of molten lead alloy with different gases
PROC 27a, 27b, 26	Powder Production: Ultrasonic atomisation (Solder falling onto an ultrasonic horn) and Centrifugal atomisation (Solder falling onto a spinning disc)
PROC 21	Storage and Shipment
2.1 Control of workers exposure	
Product characteristic	Raw material is lead or lead alloy ingots, bars, or other forms of massive lead with a lead content usually in the range 36-99%.
Amounts used	Not restricted

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Frequency and duration of use/exposure	Full shift exposure (8 hours) for all workplaces.			
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)			
Other given operational conditions affecting workers exposure	Indoor handling, room volume >150 m ³ Outdoor handling for raw material processes.			
Technical conditions and measures at process level (source) to prevent release	Enclosed systems are required for all workplaces other than Raw Material Handling and Storage and Shipment.			
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, negative draft exhaust systems and/or local exhaust ventilation. Pass waste air through cleaning equipment.			
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.			
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8). Leather gloves are required for all workplaces other than Raw Handling and Storage and Shipment.			
2.2 Control of environmental exposure				
Amounts used	Not restricted			
Frequency and duration of use	Continuous use/release, up to 300 days/year			
Environment factors not influenced by risk management	No emissions to the environment.			
Other given operational conditions affecting environmental exposure	Not applicable			
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.			
	Estimated fraction released to water (g/tonne):	No emissions		
	Estimated fraction released to air (g/tonne):			
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.			
Conditions and measures related to external treatment of waste for disposal	Pb-bearing wastes resulting from the processes described above are generated in the form of solids (e.g. dross, slags). These should be treated by a licensed waste treatment operator (landfilled or incinerated) according to relevant waste regulation.			
3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	16.0 µg/dL	40.0 µg/dL	0.4
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	No Emissions	3.1 µg/l	N/A
	Marine:	No Emissions	3.5 µg/l	N/A
	Freshwater sediment:	No Emissions	174.0 mg/kg dw	N/A
	Marine water sediment:	No Emissions	164.2 mg/kg dw	N/A
	Terrestrial:	28.3 mg/kg dw	212.0 mg/kg dw	0.13
	Sewage treatment plant:	No Emissions	100 µg/l	N/A
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:				

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DNEL for male workers:	40 µg/dL
DNEL for female workers of reproductive capacity:	10 µg/dL

ES 9: Use of lead metal in lead oxide production

1. Title	
Identified Use	Use of lead metal in lead oxide production
Systemic title based on use descriptor	SU 8; ERC 6a; PC 19
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 21, 22, 24, 26	Lead oxide production: production of crude oxide, further oxidation/calcination, grinding/milling, packaging
PROC 21	Internal logistics: storage (raw materials, finished goods) and shipment of finished goods
PROC 28	Repair, cleaning, and maintenance, quality control, engineering
2.1 Control of workers exposure	
Product characteristic	Ingots of highly refined metallic lead (99.9 %) are used as raw material. The oxidation products are powders. Varying levels of dustiness will occur during the process steps.
Amounts used	Not restricted
Frequency and duration of use/exposure	Full shift (8 hours) exposure for all workplaces (not restricted).
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)
Other given operational conditions affecting workers exposure	Indoor handling, room volume >1000 m ³ . Process temperature <620°C during production of crude oxide.
Technical conditions and measures at process level (source) to prevent release	Full containment for the Lead oxide production workplace.
Technical conditions and measures to control dispersion from source towards the worker	Controls give 78% minimum worker exposure reduction. Risk Management Measures include enclosure of process equipment, negative draft exhaust systems and/or local exhaust ventilation. Pass waste air through cleaning equipment.
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.
Conditions and measures related to personal protection, hygiene and health evaluation	Minimum Respiratory Protective Equipment (RPE) is FFP 2 mask, except in cases where adequate ventilation/emission control in place (see also section 8).
2.2 Control of environmental exposure	
Amounts used	14,000 tonnes/annum/site
Frequency and duration of use	Continuous use/release, up to 365 days/year
Environment factors not influenced by risk management	Dilution factor (Freshwater): 10 Dilution factor (Marine): 100
Other given operational conditions affecting environmental exposure	Not applicable
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	See Section 8 of the SDS, above.
	Estimated fraction released to water (g/tonne): 0.015
	Estimated fraction released to air (g/tonne): 6.45
Organisational measures to prevent/limit release from site	See Section 8 of the SDS, above.
Conditions and measures related to external treatment of waste for disposal	Pb-bearing wastes resulting from the processes described above are generated in the form of oxides. These waste products are recycled in the production process

According to EC-Regulation 1907/2006 (REACH)

3 Exposure estimation				
Health Exposure Estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	39.0 µg/dL	40.0 µg/dL	0.98
Environmental Exposure Estimations (based on measures outlined in section 2.2)		Predicted Exposure Concentrations (Maximum)	Predicted No Effect Concentrations	
	Freshwater:	0.88 µg/l	3.1 µg/l	0.28
	Marine:	0.052 µg/l	3.5 µg/l	0.015
	Freshwater sediment:	160.92 mg/kg dw	174.0 mg/kg dw	0.92
	Marine water sediment:	62.31 mg/kg dw	164.2 mg/kg dw	0.38
	Terrestrial:	28.33 mg/kg dw	212.0 mg/kg dw	0.13
	Sewage treatment plant:	14 µg/l	100 µg/l	0.14
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				

ES 10: Use of molten lead as heat transfer fluid in closed process

1. Title	
Identified Use	Professional Use of Lead Solder
Systemic title based on use descriptor	SU 14, SU15 ; ERC 7 ; PC 16
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 2	Lead is used in liquid/molten form in an enclosure (main crucible belt) 24 hours per day, 365 days per year. The molten lead bath is covered by a thick layer of mineral granulates (vermiculite), so its contact between ambient air and molten lead is avoided
PROC 8b, PROC 23, PROC 24, PROC 26	Removal of the vermiculite insulation and the lead oxide solid layer. Drainage of the liquid/molten lead in open air and transfer to ancillary containers. Skimming of the ancillary crucible (lead after remelting). Filling of the crucible belt with liquid/molten lead in open air
2.1 Control of workers exposure	
Product characteristic	Molten lead is used as a heat transfer fluid in closed process.
Amounts used	Amount in tank: approx. 45 tonnes
Frequency and duration of use/exposure	8 hour shift 350 days a year. Maintenance: maximum once a year
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)
Other given operational conditions affecting workers exposure	No limitations assessed
Technical conditions and measures at process level (source) to prevent release	None needed.
Technical conditions and measures to control dispersion from source towards the worker	Ensure good ventilation where possible.

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Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.			
Conditions and measures related to personal protection, hygiene and health evaluation	For operations covered by this scenario, gloves should ideally be worn.			
2.2 Control of environmental exposure				
Overview	No environmental emissions.			
Conditions and measures related to recovery of articles at the end of service life	Not applicable			
3 Exposure estimation				
Health Exposure estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	4.3 µg/dL	40µg/dL	<0.15
Environmental Exposure estimations (based on measures outlined in section 2.2)	Not applicable			
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				

ES 11: Professional Use of Lead Solder

1. Title	
Identified Use	Professional Use of Lead Solder
Systemic title based on use descriptor	PC 7, PC 38; SU 15, SU 16, SU 17, SU 19, SU 0; AC 3, AC 7; ERC 0, ERC 8c.
2. Operational conditions and risk management measures	
Involved PROCs	Involved Tasks
PROC 0, PROC 4, PROC 5, PROC 15, PROC 25	Use of low temperature melting solders for electrical appliance assemblage or repair and pipe joining or assembly of stained glass articles.
2.1 Control of workers exposure	
Product characteristic	Ingots, wire or powder of metallic alloy containing lead (typically range of 37-75%).
Amounts used	Based on maximum professional use of 20 kg per shift.
Frequency and duration of use/exposure	Use of lead solders is assumed to occur 0.5 - 3 hours per day, five days per week
Human factors not influenced by risk management	See Section 8 of the SDS, above (hygiene measures affecting lead blood levels)
Other given operational conditions affecting workers exposure	No limitations assessed
Technical conditions and measures at process level (source) to prevent release	None needed.
Technical conditions and measures to control	Ensure good ventilation where possible.

According to EC-Regulation 1907/2006 (REACH)

dispersion from source towards the worker				
Organisational measures to prevent /limit releases, dispersion and exposure	See Section 8 of the core SDS, above.			
Conditions and measures related to personal protection, hygiene and health evaluation	For operations covered by this scenario, gloves should ideally be worn.			
2.2 Control of environmental exposure				
Overview	No environmental emissions during professional use.			
Conditions and measures related to recovery of articles at the end of service life	Soldered articles are expected to be recovered and recycled (by a licensed recovery operator in accordance with relevant legislation), owing to the intrinsic values of the substrates and the solders.			
3 Exposure estimation				
Health Exposure estimations (based on measures outlined in section 2.1)		Predicted Blood Lead Levels (Maximum)	Derived No Effect Level	Risk Characterisation Ratio
	Solder, electrical, stained glass, plumbing	1.55 µg/dL	40 µg/dL	0.04
	Solder, industrial (bars)	5.2 µg/dL	40 µg/dL	0.13
Environmental Exposure estimations (based on measures outlined in section 2.2)	Not applicable			
4 Guidance to DU to evaluate whether they work inside the boundaries set by the ES				
<p>The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his implemented risk management measures are adequate. Detailed guidance for evaluation of ES can be acquired via your supplier or from the ECHA website (guidance R14, R16). For environmental exposure, a DU-Scaling tool (free download: http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool) is available. For human health, exposure (as measured blood lead levels) must be below the DNEL:</p> <p>DNEL for male workers: 40 µg/dL DNEL for female workers of reproductive capacity: 10 µg/dL</p>				