SAFETY DATA SHEET

Lead metal (sheet)

Safety Data Sheet according to REACH Regulation (EC 1907/2006), and CLP Regulation (EC1272/2008).

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

1.1 Product identifier

Name of Substance: Lead metal (sheet)

EC number:	**231-100-4**
EC name:	**Lead**
CAS number (EC inventory):	**7439-92-1**
Registration number	**N/A**

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

Uses considered in Exposure Scenarios in an Annex to section 16.

1 Lead sheet production
2 Professional use of lead sheet

No specific uses advised against have been identified, other than legal restrictions on the use of lead.

1.3 Details of the supplier of the safety data sheet

BLM – British Lead
Peartree Lane
Welwyn Garden City
Hertfordshire
AL7 3UB
Tel: 01707324595
Fax. **01707 328941**
E mail: dward@britishlead.co.uk

1.4 Emergency telephone number

In case of emergency Tel. 01707 324595 (Mon – Fri 0800hrs – 1700hrs)

SECTION 2: Hazards Identification

2.1 Classification

Dangerous Substances Directive 67/548/EEC - Not classified as hazardous.

Classification Labelling and Packaging Regulation EC 1272/2008 - Not classified as hazardous.

2.2 Labelling

Classification Labelling and Packaging Regulation EC 1272/2008 - None required.

2.3 Other hazards

Lead is a toxic metal and may present a hazard via Lead fumes when melted and/or from Lead dust

SECTION 3: Composition

3.1 Substances

Not appicable

3.2 Mixtures

Lead Sheet:

Substance	EC Number	REACH registration number (if applicable)	Concentration (% w/w)	Hazard Classification
Lead	231-100-4		>99	None
Copper	231-159-6		0.03-0.06	None
Non-hazardous impurities	n/a	n/a	remainder	None

SECTION 4: First Aid Measures

4.1 Description of first aid measures

EYE CONTACT: Separate eyelids, wash the eyes thoroughly with water (15 min).
INHALATION: Fresh air. Get medical attention if pain still persists.
SKIN CONTACT: Wash off immediately with soap and water.
INGESTION: Rinse out mouth and give plenty of water to drink. Seek medical attention.

4.2 Most important symptoms and effects, both acute and delayed
Clinical manifestations of lead poisoning include weakness, irritability, asthenia, nausea, abdominal pain with constipation, and anaemia.

4.3 Indication of any immediate medical attention and special treatments needed
Symptoms of poisoning may occur after several hours; seek medical attention.

SECTION 5: Firefighting Measures

5.1 Extinguishing media
Water spray jet; Dry sand. Extinguishing media that must not be used for safety reasons: Full water jet; Foam.

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 fire fighters
Appropriate breathing apparatus may be required. Wear protective clothing.

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. See section 8 for further details.

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 materials for containment and clearing up
Collect mechanically (preferably in dry condition). Send in suitable containers for recovery or disposal. When picked up, treat material as prescribed under heading "Disposal considerations".

6.4 References to other sections
See sections 8 and 13 for further advice.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling
Provide good ventilation of working area (local exhaust ventilation, if necessary). The product is not combustible.

7.2 Conditions for safe storage, including any incompatibilities
No special measures required. Do not store together with foodstuffs. Do not store together with animal feedstocks. Do not store with acids or alkalies. Do not store with combustible materials.

7.3 Specific end uses(s)
Specific Exposure Scenarios are included in an Annex to Section 16.

SECTION 8. Exposure Controls/Personal Protection

8.1 Control parameters

8.1.1 Human Toxicity values

OELs - Lead and inorganic compounds (as Pb):

	Limit values – 8 hours mg/m³	**Limit values – short term mg/m³**
Austria	0.1 inhalable aerosol	0.4 inhalable aerosol
Belgium	0.15	
Denmark	0.05 inhalable aerosol	0.10 inhalable aerosol
European Union	0.15 inhalable aerosol	
France	0.1 inhalable aerosol	
Germany (AGS)	0.1 inhalable aerosol	
Hungary	0.15 inhalable aerosol 0.05 respirable aerosol	0.60 inhalable aerosol 0.2 respirable aerosol
Italy	0.15 inhalable aerosol	
Poland	0.05	
Spain	0.15 inhalable aerosol	
Sweden	0.1 inhalable aerosol 0.15 respirable aerosol	
Switzerland	0.1 inhalable aerosol	0.8 inhalable aerosol
United Kingdom	0.15	

Biological action levels, inorganic lead

EU	70 µg/dL
Germany	40 µg/dL 30 µg/dL (for woman, age below 45 year`s)
UK	60 µg/dL 30 µg/dL (for woman of reproductive capacity)

France	40 µg/dL 30 µg/dL (for woman of reproductive capacity)

DN(M)ELs for workers:

Exposure pattern	Route	Descriptors	DNEL/DMEL (appropriate unit)	Most sensitive endpoint
Acute - systemic effects	Dermal (mg/kg bw /day)	NA	NA	NA
	Inhalation (mg/m^3)	NA	NA	NA
Acute - local effects	Dermal (mg/cm^2)	NA	NA	NA
	Inhalation (mg/m^3)	NA	NA	NA
Long-term - systemic effects	Systemic (µg lead /dL blood)	NOAEL = 40 µg/dL NOAEL = 10 µg/dL	40 µg/dL 10 µg/dL	Adult neurological function Developmental effect on foetus of pregnant women
Long-term – local effects	Dermal (mg/cm^2)	NA	NA	NA
	Inhalation (mg/m^3)	NA	NA	NA

8.1.2 Ecological toxicity values

Reliable acute aquatic toxicity test results (tests conducted with soluble lead salts)

Test organism	Species	Endpoint	Value
Algae	*Pseudokirchneriella subcapitata*	72h EC50 (pH>6.5-7.5) 72h EC50 (pH<7.5-8.5)	52.0 µg Pb/L 233.1 µg Pb/L
Invertebrates	*Daphnia magna* *Ceriodaphnia dubia*	48h EC50 (pH>7.5-8.5) 48h EC50 (pH>5.5-8.5)	107.5 µg Pb/L 73.6 µg Pb/L
Fish	*Oncorhynchus mykiss* *Pimephales promelas*	96h LC50 (pH>6.5-8.5) 96h LC50 (pH>5.5-8.5)	107.0 µg Pb/L 194.2 µg Pb/L

Listed values are for tests performed at most sensitive pH. Other organisms have also been evaluated in the chemical safety report. References are listed in section 16.

Reliable chronic toxicity test results (tests conducted with soluble lead salts)

Compartment	Species	Value (EC_{10}, NOEC)
Freshwater	*Hyalella azteca* (42d, mortality)	8.2 µg Pb/L (dissolved lead)
Marine water	*Mytilus trossolus* (48h, developmental abnormalities)	9.2 µg Pb/L (dissolved lead)
Freshwater sediment	*Tubifex tubifex* (28d, reproduction)	573 mg Pb/kg dw
Marine sediment	*Neanthes arenaneodentata (28d, growth)*	680 mg Pb/kg dw
Terrestrial (plants)	*Hordeum vulgare* (yield based on root)	57 mg Pb/kg dw
STP Micro-organisms (Protozoa)	Protozoan community (24h-LC10)	1.0 mg Pb/L

Listed reports are for most sensitive organisms. References are listed in section 16.

The following Predicted No Effect Concentrations have been derived for the above environmental compartments:

Compartment	PNEC Value
Freshwater	6.5 µg Pb/L (dissolved lead)
Marine water	3.4 µg Pb/L (dissolved lead)
Freshwater sediment (with/without bioavailability correction)	41.0/174.0 mg Pb/kg dw
Marine water sediment	164.2 mg Pb/kg dw
Terrestrial	147.0 mg Pb/kg dw
STP Micro-organisms	0.1 mg Pb/L

8.2 Exposure controls

8.2.1 Organisational 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.

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

8.2.2 Personal Protection Equipment

Respiratory protection: Suitable respiratory protective device recommended. In case of brief exposure or low pollution 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.

Hand Protection: Protective gloves. Material of gloves: Neoprene or Leather.

Eye protection: Safety glasses.

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.

8.2.3 Environmental Protection

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.

SECTION 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance:	Grey-blue solid
Odour:	None
Odour threshold:	Not applicable
pH:	Not applicable
Melting point:	326°C
Boiling point:	>600°C
Flashpoint:	Not applicable
Evaporation rate:	Not applicable
Flammability:	Not flammable
Upper/lower flammability limits:	Not applicable
Vapour pressure:	Not applicable
Vapour density	Not applicable
Relative density	11.45
Solubility in water:	185 mg/L at 20°C
Solubility in other solvents:	Not applicable
Partition coefficient (log Kow)	Not applicable
Autoignition temperature	Not applicable
Decomposition temperature	Not applicable
Viscosity	Not applicable
Explosive properties	Not explosive
Oxidising properties	Not oxidising

9.2 Other information

None.

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
Not applicable.

10.5 Incompatible materials
Strong oxidizing agents.

10.6 Hazardous decomposition products
No decomposition if used as directed.

SECTION 11: Toxicological Information

11.1 Information on toxicological effects

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

Toxicokinetic assessment	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.
(a) acute toxicity	Lead massive metal 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.
(b) 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.
(c) 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.
(d) respiratory/skin sensitisation	There is no evidence that lead causes respiratory or skin sensitisation.
(e) 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.
(f) 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 articles, 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 aB).
(g) 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 neurobehavioural development in children.
(h) 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.
(i) STOT-repeated exposure	Lead is a cumulative poison and may be absorbed into the body through ingestion or inhalation. 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. Inorganic lead compounds have been documented in observational human studies to produce toxicity in multiple organ systems and body function including the haemotopoetic (blood) system, kidney function, reproductive function and the central nervous system.
(j) aspiration hazard	Lead metal is a solid and aspiration hazards are not expected to occur.

SECTION 12: Ecological Information

The environmental effects have been assessed using read-across from studies with similar inorganic lead compounds.

12.1 Toxicity
Lead massive metal is not classified as hazardous to the aquatic environment, due to its low solubility and rapid removal from the water column. Inorganic lead compounds are considered to be acutely toxic in the environment and also to present a long term

hazard to aquatic organisms. Toxicity will depend on the level of free lead ion in solution, which in turn is affected by pH, water hardness, salinity, etc. Lead toxicity is expected to be greater in softer waters.

12.2 Persistence and degradability
Lead is rapidly removed from the water column and binds to suspended solid and sediment. Lead is an inorganic substance and does not degrade. It is persistent in the environment. Biodegradation is not relevant for inorganic substances.

12.3 Bioaccumulative potential
Inorganic lead is considered to be bioaccumulating in the environment, and may accumulate in aquatic and terrestrial plants and animals.

12.4 Mobility in soil
Lead metal has very low solubility and is expected to be adsorbed onto soils and sediments. Mobility is expected to be low.

12.5 Results of PBT and vPvB assessment
The PBT and vPvB criteria in Annex XIII of the REACH Regulation do not apply to inorganic substances.

12.6 Other adverse effects
No information available.

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.
European waste catalogue:
06 03 13* solid salts and solutions containing heavy metals or
06 04 05* wastes containing other heavy metals

SECTION 14: Transport Information

Not classified as dangerous for transport.

14.1	UN Number	Not applicable
14.2	UN Proper shipping name	Not applicable
14.3	Transport hazard class(es)	Not applicable
14.4	Packing group	Not applicable
14.5	Environmental hazards	Not applicable
14.6	Special precautions for user	None
14.7	Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not transported in bulk

SECTION 15: Regulatory Information

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

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

SECTION 16: Other Information

R Phrases and H Statements used in Section 3
None

Revision information:
This is the first SDS to the format required by Commission Regulation (EU) No 453/2010

Legal Statement:
The information contained within this Safety Data Sheet is the property of the members of the Lead REACH Consortium. Only legal entities with legitimate access may use this data.

List of Abbreviations
Acute Tox.: Acute Toxicity
CAS No: CAS Registry Numbers
Carc.: Carcinogenic
CLP: Classification, Labeling and Packaging of chemicals
DN(M)EL: Derived No-Effect Level or Derived Minimal Effect Level
DW: Dry weight
EC No: European Commission number
EC Name: European Commission Name
EHS: Environmentally hazardous substance
IARC: International Agency for Research on Cancer
IBC: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
LC_{50}: Lethal Dose, 50%
LD_{50}: Lethal Dose, 50%
MARPOL 73/78: International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978
NOAEL: No observed adverse effect level.
NOEC: No Observed Effect Concentration
OELs: Occupational Exposure Limits
P Statement: Precautionary statement

PNEC: Predicted No-Effect Level
PBT: Persistent, bio-accumulative, toxic
REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals
Repr.: Reprotoxic
STOT: Single Target Organ Toxicity
SDS: Safety Data Sheet
vPvB: Very Toxic Very Bio-accumulative
WW: Wet weight

References from Section 8.1.2

Acute Toxicity data:

Diamond JM, Koplish DE, McMahon III J and Rost R. (1997). Evaluation of the water-effect ratio procedure for metals in a riverine system. Environmental Toxicology and Chemistry, Vol 16, No 3, pp. 509-520, 1997.

Grosell M, Gerdes R, Brix KV (2006). Influence of Ca, humic acid and pH on lead accumulation and toxicity in the fathead minnow during prolonged water-borne lead exposure. Comparative Biochemistry and Physiology, Part C 143 (2006) 473-483.

Grosell M (2010b). The effects of pH on waterborne lead toxicity in the fathead minnow, Pimephales promelas - 24 February 2010. Testing laboratory: University of Miami, USA.

Davies PH, JP Goettl, JR Sinley and NF Smith (1976). Acute and chronic toxicity of lead to rainbow trout Salmo Gairdneri, in hard and soft water. Water Research, Vol 10, pp 199-206.

Roger JT, Richards JG, Wood CM (2003). Ionoregulatory disruption as the acute toxic mechanism for lead in the rainbow trout (Oncorhynchus mykiss). Aquatic Toxicology 64 (2003) 215-234.

Schubauer-Berigan MK et al. (1993b). pH-dependent toxicity of Cd, Cu, Ni, Pb and Zn to Ceriodaphnia dubia, Pimephales promelas, Hyalella azteca and Lumbriculus variegatus. Environmental Toxicology and Chemistry, Vol 12, pp. 1261-1266, 1993.

Spehar RL, Fiandt JT. (1986). Acute and chronic effects of water quality criteria-based metal mixtures on three aquatic species. Environ Toxicol Chem 5:917-931.

Chronic Toxicity Data:

Aery N C and Jagetiya B L (1997). Relative toxicity of Cadmium, Lead and Zinc on Barley. Commun. Soil Sci. Plant Anal., 28(11&12), 949-960. Testing laboratory: Dept. of Botany, University College of Science, M. L. Sukhaida University, Udaipur, India.

Bengtsson G., Gunnarsson T. and Rundgren S. (1986). Effects of metal pollution on the earthworm Dendrobaena Rubida (Sav.) in Acified soils. Water, Air and Soil Pollution 28 (1986) 361-383. Testing laboratory: University of Lund. Ecology Building, Helgonavagen, Sweden.

Besser JM, Brumbaugh WG, Brunson EL and Ingersoll CG (2005). Acute and chronic toxicity of lead in water and diet to the amphipod Hyalella azteca. Environmental Toxicology and Chemistry, Vol. 24, No. 7, pp. 1807-1815, 2005.

Chang F-H and Broadbent F E (1981). Influence of trace metals on carbon dioxide evolution from a yolo soil. Soil Science, vol 132 No 6, december 1981.

Farrar JD, Bridges TS. (2003). Effects of lead on Leptocheirus plumulosus, Neanthes arenaceodentata, Chironomus tentans and Hyalella azteca following long-term sediment exposures. Report for the International Lead Zinc Research Organization. US Army Engineer Research and Development Center, Vicksburg, Mississippi.

Madoni P, Davoli D, Gorbi G, Vescovi L (1996). Toxic effect of heavy metals on the activated sludge protozoan community. Water Research, 30 (1), 135-141. Testing laboratory: Istituto di Ecologica, Universita di Parma, Italy.

Madoni P, Davoli D, Guglielmi L (1999). Response to SOUR and AUR to heavy metal contamination in activated sludge. Water Research, 33 (10), 2459-2464. Testing laboratory: Dipartimento di Scienze Ambientali, Universita di Parma, Italy.

Nguyen LTH, Roman Y, Zoetardt H, Janssen CR. (2003). Ecotoxicity of lead to the tubificid oligochaete Tubifex tubifex tested in natural freshwater sediments. Draft final report to the International Lead Zinc Research Organization. Laboratory of Environmental Toxicology and Aquatic Ecology, Ghent University, Belgium.

Wood C. M. & Nadella S. (2010). Effects of salinity and DOC on Pb Toxicity to Marine Organisms. Testing laboratory: Dept. of Biology, McMaster University, Hamilton, Canada L8S 4K1. Report date: 2010-01-01.

Annex: Exposure Scenarios

ES 1 Lead sheet production – Industrial

1. Title
Use of secondary lead materials in lead sheet production

2. Operational conditions and risk management measures		
Descriptors	Involved PROCs	Summary of tasks
SU10, SU14, SU15, SU19; ERC1, ERC10a; PC7, PC0	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 0	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 solid, dry (>90% lead purity).
Amounts used	Not restricted
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).
Other operational conditions affecting workers exposure	Indoor handling, room volume >1000 m^3
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. 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 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	Amount used (tonnes/annum):	14,700
	Assumed timeframe (days):	296
Environment factors not influenced by risk management	Dilution rate (Freshwater): 10 Dilution rate (Marine): 100	
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 relevent waste regulation.	

3 Exposure estimation				
Health Exposure Estimations		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
	Blood lead concentrations for male workers (maximum):	34µg/dL	40µg/dL	0.85
Environmental Exposure Estimations		Predicted Exposure	Predicted No Effect Concentrations	

		(Maximum)		
	Freshwater:	0.84µg/l	6.5µg/l	0.13
	Marine:	0.051µg/l	3.4µg/l	0.015
	Freshwater sediment:	144.1mg/kg dw	174mg/kg dw	0.97
	Marine water sediment:	61.2 mg/kg dw	164.2mg/kg dw	0.37
	Terrestrial:	28.51mg/kg dw	147mg/kg dw	0.19
	Sewerage treatment plant:	0.013 mg/l	0.1mg/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. For female workers these DNEL are 30µg/dL or 10µg/dL (for female workers of reproductive capacity).

ES 2 Professional Use of Lead Sheet

Title

Installation and maintenance of Lead sheet by professional users.

2 Operational conditions and risk management measures

Descriptors	Involved PROCs	Summary of tasks
SU 15, 17, 19; AC7; ERC 10a, 11a; PC7	PROC 21	Installation and maintenance of lead sheet
	PROC 24	Welding of lead sheets

2.1 Control of workers Exposure

Product characteristic	Lead sheets (typically >99% purity).
Amounts used	Weight of articles used varies from 1kg to several kg.
Frequency and duration of us/exposure	Full shift (8 hours) exposure apart from welding (1 hour non-continuous/day) five days a week.
Operational conditions affecting workers exposure	No limitations assessed.
Technical conditions and measures at process level (source) to prevent release	Surface varnish to reduce exposure. Specialty welding equipment to reduce inhalation exposure.
Technical conditions and measures to control dispersion from source towards the worker	Ensure good ventilation where possible. For indoor use fume extraction where possible.
Organisational measures to present /limit releases, dispersion and exposure	General precautions for handling lead products outlined in section 8 of the SDS above may not apply to professional users. Specialised training for lead sheet handling is appropriate as well as blood lead monitoring programs.
Conditions and measures related to personal protection, hygiene and health evaluation	For operations covered by this scenario, gloves should be worn thereby effectively eliminating the dermal lead exposure. Respiratory protection (local exhaust and/or full face respiration) are required during indoor welding activity and may be worn during outdoor activity as a function of local wind conditions and the duration of welding activity.

2.2 Control of environmental exposure

Overview	No risk management measures related to the environment are taken, as this ES does not include intended release to the environment.
Conditions and measures related to recovery of articles at the end of service life	Lead sheet articles are expected to be recovered and recycled at the end of building life service by those with expertise in building demolition.

3 Exposure estimation

		Predicted Blood Lead Levels (Maximum)	Derived No-Effect Level	Risk Characterisation Ratio
Health Exposure estimations	Blood lead concentrations for male professionals:	28 µg/dL	40µg/dL	0.7

Environmental Exposure estimations	Not applicable.

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. For female workers these DNEL are 30µg/dL or 10µg/dL (for female workers of reproductive capacity).