

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026**

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

1.1 Product identifier:**Trade name:** refined lead with increased content of bismuth**Synonyms:** bismuth lead; lead bismuth alloy**IUPAC name:** bismuth; lead**REACH registration No. (lead):** 01-2119513221-59-0006**REACH registration No. (bismuth):** 01-2119560575-33-0011**UN-No.:** -**CAS No.:** -**WE No.:** -**Index No.:** -**1.2 Relevant identified uses of the substance or mixture and uses advised against**Identified uses:

- Primary lead production (IU1)
- Secondary lead production (IU2)
- Lead-acid battery production (IU3)
- Lead sheet production (IU4)
- Use of lead in the production of hot-dip galvanized steel (IU5)
- Use of metallic lead in the production of a range of lead products (e.g., cast, rolled, and extruded products, ammunition, lead shot) (IU6)
- Use of metallic lead in the production of lead steel (IU7)
- Production of lead powder (IU8)
- Use of metallic lead in the production of lead oxide and stabilizers (IU9)
- Use of molten lead as a heat transfer medium in a closed-loop process (IU10)
- Professional use of lead solder (IU11)
- Professional use of lead ammunition (IU12)
- Professional use of products intended to come into contact with the skin (IU13)
- Installation and maintenance of lead sheet by professional users (IU14)
- Professional installation of lead-acid batteries (IU15)
- Professional use of lead steels (IU16)
- Professional use of inert anodes (IU17)
- Consumer use of products with expected dermal exposure (IU18)
- Consumer use of external lead sheet (IU19)
- Consumer use of internal lead sheet by consumers (IU20)
- Consumer use of products without expected exposure (IU21)
- Consumer use of sealed batteries (IU22)
- Consumer use of solder (IU23)
- Consumer use of lead ammunition (IU24)

1.3 Details of the supplier of the material safety data sheet:

KGHM Polska Miedź S.A.
Oddział Huta Miedzi „Legnica”
ul. Żłotoryjska 194

Refined lead with increased content of bismuth

Date of issue: 20.11.2008

Revision No. / Revision date: 11 / 25.08.2026

59-220 Legnica

Person responsible for preparing the MSDS: phone No.: (+48 76) 747 82 21, e-mail: karty.charakterystyki@kghm.com

1.4. Emergency telephone number:

Manufacturer (Poland): (+48 76) 747 50 02 – available 24/7

Fire Department (Poland): (+48) 998 – available 24/7

General European Emergency Number: 112 – available 24/7

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture:

Repr. 1a; H360FD – May damage fertility. May damage the unborn child

Lact.; H362 – May cause harm to breast-fed children.

Aquatic Chronic 1; H410 – Very toxic to aquatic life with long lasting effects.

2.2. Label elements:

In accordance with point 1.3.4. Annex I to Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and amending Regulation (EC) No 1907/2006 (CLP) solid metals do not require labeling if they do not pose a risk to human health by inhalation, ingestion or dermal contact or the aquatic environment in the form in which they are placed on the market although they are classified as hazardous.

2.3 Other hazards:

Lead in the form of blocks, if not exposed to high temperature or chemical agents, does not pose a chemical risk to human health.

The substance does **not** meet classification criteria for PBT and vPvB.

The substance is **not** a substance identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

SECTION 3. Composition/information on ingredients

3.1. Substances

N.	Name	CAS No.	WE No.	Index No.	Content [mass fraction in %]	Hazard Class and Category Code(s)	H State-ments	Specific Conc. Limit, M-factor, ATE
1.	Lead in massive form (particles ≥ 1 mm)	7439-92-1	231-100-4	082-014-00-7	> 99,97	Repr. 1A Lact. Aq. Chronic 1	H360FD H362 H410	M = 10
2.	Bismuth	7440-69-9	231-177-4	-	up to 15	-	-	-

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026****3.2. Mixtures**

n/a

SECTION 4. First Aid measures

4.1 Description of first aid measures:

Not applicable. Lead in the form of blocks, if not exposed to high temperature or chemical agents, does not pose a chemical risk to human health. However, during the production and processing of lead, hazards may occur due to the presence of respirable particles containing lead. This section considers the potential hazards of lead-containing materials related to the production and processing of lead.

By inhalation: In case of exposure to fumes and dusts: take the victim to fresh air, place in the supine position. Contact a doctor.

Skin contact: After contact with the material, use general hygiene measures: wash the skin with warm water and soap. In case of contact with the liquid product, immediately cool the skin with water and contact a doctor. Do not remove the molten material from the skin, as this will damage the skin. Cuts or abrasions should be thoroughly decontaminated immediately.

Contact with eyes: If eye irritation occurs, do not rub them, remove contact lenses. Rinse immediately with plenty of cool running water with the eyelid held wide open. Avoid a strong stream of water due to the risk of mechanical damage to the cornea. Contact your doctor. After swallowing: If swallowed, rinse mouth with water and give 200-300 ml of water to drink. Induce vomiting if the victim does not have gastric ulcer. Contact a doctor.

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

Not applicable. Lead in the form of blocks, if not exposed to high temperature or chemical agents, does not pose a chemical risk to human health. However, during the production and processing of lead, hazards may occur due to the presence of respirable particles containing lead. This section considers the potential hazards of lead-containing materials related to the production and processing of lead. Symptoms of acute lead poisoning: Acute symptoms of poisoning may occur after several days of exposure to high concentrations of dust or fumes, or in the course of chronic exposure to lead in concentrations exceeding acceptable hygienic standards. There are violent pains in the entire abdomen (abdominal colic), usually preceded by a few days of constipation; an increase in blood pressure may occur. Ingestion (accidental or intentional poisoning) crushed (powdered) lead causes similar symptoms and sometimes yellowing of the sclera of the eyes and liver damage. In the course of poisoning, kidney damage may occur (usually transient). The consequence of poisoning is hypochromic anemia (decrease in hemoglobin content and increase in the number of reticulocytes in the blood). Symptoms of chronic lead poisoning: hypochromic anemia, changes in peripheral nerves, mainly in the limbs. In severe, chronic poisonings, paresis of the limbs, especially hands, and symptoms of damage to the central nervous system (lead encephalopathy) occurred.

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

If the victim is unconscious, make sure that the respiratory tract is not obstructed and place the victim in a recovery position. **Provide immediate medical assistance.**

SECTION 5. Firefighting measures

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026****5.1 Extinguishing media:**

Suitable extinguishing media: Non-flammable substance. Apply extinguishing media proper for the surrounding materials. Prevent lead from melting by cooling it with a suitable extinguishing agent.

Unsuitable extinguishing media: Do not use water on molten metal.

5.2 Special hazards arising from the substance or mixture:

Lead melts at about 327 °C. Despite the high boiling point of approx. 1750 °C, lead evaporation is already observed at approx. 600 °C. Toxic fumes may be emitted if lead is directly exposed to fire.

5.3 Advice for fire-fighters:

Depending on the burning materials and the temperature to which the lead will be heated, if heated to a temperature higher than the melting point, use gas-tight protective clothing with a breathing apparatus isolating the respiratory tract from the environment.

Additional information: In the event of a fire, notify the fire department and inform the surrounding area about the fire.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

6.1.1 For non-emergency personnel: Do not inhale dusts. Avoid direct contact. In case of choosing evacuation route consider the direction of the dust/ movement.

6.1.2 For emergency responders: Avoid dust generation, do not inhale dusts. Avoid direct contact. Apply clothing protecting against chemicals as well as eye protection. In case of dust formation, wear dust mask.

6.2 Environmental precautions:

Avoid releasing the product into the environment. If the product enters surface waters or soil, it must be removed immediately.

6.3 Methods and material for containment and cleaning up:

n/a

6.4 Reference to other sections:

Disposal considerations are described in section 13.

SECTION 7. Handling and storage

7.1 Precautions for safe handling:

When handling the substance wear protective clothing and gloves, do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities:

Internal transport using a forklift or overhead crane. Do not exceed the permissible unit load of the storage area. Keep away from acids, bases and incompatible materials.

7.3 Specific end use(s):

Identified uses are listed in section 1.2.

SECTION 8. Exposure control/personal protection

8.1 Control parameters:

The following current national occupational exposure limit values apply (Poland):

No.	Substance name	TLV-TWA [mg/m ³]	TLV-STEL [mg/m ³]
1.	Lead and its compounds - calculated to Pb	0.03	-

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026**Legal basis:

Decree of the Minister of Family, Labour and Social Policy of March 26th, 2026 on the highest allowable concentrations and intensities of agents harmful for health at the workplace (Official Journal of 2026 item 447);

The derived no-effect levels (DNELs):

- DNEL (long-term exposure) - 40 µg Pb/dL blood (employees - men);
- DNEL (long-term exposure) - 30 µg Pb/dL of blood (employees - women);
- DNEL (long-term exposure) - 10 µg Pb/dL of blood (employees - pregnant women);
- DNEL (long-term exposure) - 20 µg Pb/dL of blood (general population);
- DNEL (long-term exposure) - 10 µg Pb/dL of blood (general population - pregnant women);

8.2 Exposure controls:8.2.1 Appropriate engineering controls at industrial settings

In the case of exposure to lead and its compounds at the workplace, first of all, technical and organizational measures should be taken to reduce its level. When processing lead, ensure appropriate local exhaust ventilation with the casing of the area of emission to the air environment and general ventilation of the room. Unavoidable dust should be systematically removed using suitable industrial vacuum cleaners or central extraction systems. Air can only be released into the atmosphere after passing through appropriate dust separators. Waste water generated during the production process and as a result of cleaning operations should be treated in an on-site wastewater treatment plant that will ensure sufficient removal of lead from it.

8.2.2 Individual protection measures, such as personal protective equipment

Eye/face protection: Not required. If there is a possibility of exposure to dust, wear goggles against fine dust. Do not wear contact lenses.

Hands protection: Leather or neoprene protective gloves.

Skin protection: Protective clothing.

Respiratory protection: Necessary when vapours/dusts are formed - anti-dust half mask of class P-3.

Thermal hazards: Not applicable.

Hygiene means: Immediately change contaminated clothing. Decontaminate clothing in water before reuse. Wash your hands and face after working with the substance. Do not eat and drink during substance handling.

8.2.3. Environmental exposure controls:

Avoid releasing the product into the environment. Environmental exposure should be controlled in accordance with applicable national environmental legislation.

SECTION 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties:

- Physical state:* solid;
- Colour:* grey;
- Odour:* odourless;
- Melting point/freezing point:* approx. 327 °C;
- Boiling point or initial boiling point and boiling range:* at 1013 hPa approx. 1750 °C;
- Flammability:* n.a. inflammable;

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026**

- g) *Lower and upper explosion limit:* n.a.;
- h) *Flash point:* n.a.;
- i) *Auto-ignition temperature:* n.a.;
- j) *Decomposition temperature:* n.a.;
- k) *pH:* n.a.;
- l) *Kinematic viscosity:* n.a.;
- m) *Solubility:* in water: insoluble;
- n) *Partition coefficient n-octanol/water (log value):* n.a.;
- o) *Vapour pressure:* n.a.;
- p) *Density and/or relative density:* n.a.;
- q) *Relative vapour density:* n.a.;
- r) *Particle characteristics:* n.a.; Lead in the form of blocks.

9.2 Other information:

None

SECTION 10. Stability and reactivity

10.1. Reactivity: none**10.2. Chemical stability:** The substance is stable under normal conditions.**10.3 Possibility of hazardous reactions:** none**10.4 Conditions to avoid:** High temperature, accidental incompatible materials contact.**10.5 Incompatible materials:** fluorine, nitric acid, azides, picrates, ammonium nitrate above 200 °C, concentrated H₂O₂ solutions, sodium acetylide.**10.6 Hazardous decomposition products:** none

SECTION 11. Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008:**a) Acute toxicity:**Acute toxicity (oral):*on the basis of available data the classification criteria are not met.*Acute toxicity (inhalation):*on the basis of available data the classification criteria are not met.*Acute toxicity (skin contact):*on the basis of available data the classification criteria are not met.***b) Skin corrosion/irritation:***on the basis of available data the classification criteria are not met.***c) Serious eye damage/ eye irritating:***on the basis of available data the classification criteria are not met.***d) Respiratory tract or skin sensitization:***on the basis of available data the classification criteria are not met.***e) Germ cell mutagenicity:***on the basis of available data the classification criteria are not met.***f) Carcinogenicity:***on the basis of available data the classification criteria are not met.*

Refined lead with increased content of bismuth

Date of issue: 20.11.2008

Revision No. / Revision date: 11 / 25.08.2026

g) Reproductive toxicity:

due to lead content above concentration limit the product is classified as:

Repr. 1B; H360FD – May damage fertility. May damage the unborn child

Lact.; H362 – May cause harm to breast-fed children

h) Specific target organ toxicity — Single exposure:

on the basis of available data the classification criteria are not met

i) Specific target organ toxicity — Repeated exposure:

on the basis of available data the classification criteria are not met

j) Aspiration hazard

on the basis of available data the classification criteria are not met.

11.2 Information on other hazards:

None

SECTION 12. Ecological information

12.1. Toxicity:

The substance meet the classification criteria as: Aquatic Chronic 1; H410 - Very toxic to aquatic life with long lasting effects.

Predicted no-effect concentrations of lead in the environment:

PNEC (surface waters) - 6.5 µg/l

PNEC (marine waters) - 3.4 µg/l

PNEC (surface water sediments) - 174 mg/kg dry weight

PNEC (marine water sediment) - 164.2 mg/kg dry weight

PNEC (soil) - 147 mg/kg dry weight

PNEC (municipal wastewater treatment plant) - 0.1 mg/l

PNEC for birds, after ingestion - 16.9 mg/kg of food

PNEC for mammals after ingestion - 10.9 mg/kg food.

Concentrations toxic to aquatic animal and plant organisms:

Lead:

LC₅₀/96 h for fish (*Pimephales promelas*) - 40.79 µg Pb/l.

LC₅₀/96 h for fish (*Salmo gairderi*) - 107 µg Pb/l.

LC₅₀/48 h for crustaceans (*Ceriodaphnia dubia*) - 26.4 µg Pb/l

LC₅₀/48 h for crustaceans (*Daphnia magna*) - 107.03 µg Pb/l

LC₅₀/24H for algae, growth inhibition (*Pseudokirchneriella subcapitata*) - 21.7 µg Pb/l.

12.2. Persistence and degradability:

In the aquatic environment lead ions form with sulfide, phosphate and carbonate ions present in the water, hardly soluble salts that sink to the bottom sediments.

12.3. Bioaccumulative potential:

Absorbed into the body, lead penetrates into the bloodstream, where most of it is incorporated into red blood corpuscles. 25-40% of it penetrates into the soft tissues, about 15% into the bones, and the remaining amount is excreted. The residence time in soft tissues is about 30 days, and in bones 40-90 years in an adult. Lead is strongly bound to high molecular number compounds, such as amino acids, hemoglobin, enzymes, RNA, DNA; thus, many metabolic pathways are disrupted.

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026**

The consequences of toxicity are impaired blood formation, hypertension, neuropathy, and brain damage.

Plants take up lead both from the soil and from atmospheric dust. While lead taken up from the soil largely accumulates in the roots, lead taken up by leaves accumulates in their tissues, although a significant amount is bound in the cuticle. Most ($93 \div 96\%$) of the metal taken up by the roots remains in this organ. On its surface, lead forms crystalline deposits (of ortho- and dipyrophosphates). The element enters the leaves through the stomata or after previous damage to the cuticle. Lead uptake and activity are antagonistically affected by Ca, S, P, causing it to precipitate in poorly soluble forms both in the root environment and in plant tissues.

Marine fauna, shellfish, clams, fish and also higher plants easily accumulate lead and are good indicators of pollution. The average lead content in fish of unpolluted water bodies of the United States is $0.3 \div 3$ ppm, in fish of the Baltic Sea $0.02 \div 1.3$ ppm, and in fish of Polish rivers $0.02 \div 2.6$ ppm. There is a greater accumulation of lead in marine organisms than in terrestrial mammals, in which it is mainly concentrated in bones.

12.4. Mobility in soil:

Lead is an element with higher concentrations in soil than in crop biomass, showing elevated levels in the near-surface layer of soils, indicating its sorption in the humus level. The uptake of lead compounds by green plants depends on the degree of solubility of these substances in the soil, as well as on the pH value. Lead cations are absorbed by the roots and then transported further into the stem, sometimes the leaves.

12.5. Results of PBT and vPvB assessment:

Product is not classified as PBT and vPvB.

12.6. Endocrine disrupting properties:

Not applicable. The substance is **not** a substance identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

12.7. Other adverse effects:

Lead retards root growth and causes a marked reduction in respiration. The harmful effects depend on the plant species, soil properties and the form of the lead compound. Greater damage presumably occurs in acidic soils, less in neutral or alkaline soils.

Microorganisms involved in the aerobic decomposition of organic matter show signs of poisoning if the concentration of lead is at or above 0.1 mg/dm^3 . Toxic effects on *Flagellata* and *Infusoria* begin at 0.5 to 1.0 mg/dm^3 , while on other bacteria at 1.0 mg/dm^3 .

SECTION 13: Disposal considerations

13.1. Waste treatment methods:

Do not dispose of to sewage system. Do not dispose of together with municipal waste. Consider the opportunity to reuse. Waste dispose of in a hazardous waste landfills.

Waste management according to the Directive of the European Parliament and Council 2008/98/EC of November 19th, 2008 on waste (Official Journal EC L 312 of 22.11.2008, with subsequent amendments).

SECTION 14: Transport information

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026****14.1. UN number or ID number:** n/a**14.2. UN proper shipping name:** n/a**14.3. Transport hazard class(es):** n/a**14.4. Packing group:** n/a**14.5. Environmental hazards:** n/a**14.6. Special precautions for user:** n/a**14.7. Maritime transport in bulk according to IMO instruments:** n/a

SECTION 15: Regulatory information

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

The substance has been placed on the candidate list in accordance with the REACH Regulation as a substance of very high concern (SVHC) due to reproductive toxicity cat 1A.

The substance is subject to restrictions according to Annex XVII of the REACH Regulation (entry no. 63)

Provisions of law:

Commission Regulation (EU) 2020/878 of 18 June 2020 amending Annex II to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) (as amended). Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures (CLP) (as amended, including Commission Delegated Regulation (EU) 2024/197). Act of 25 February 2011 on Chemical Substances and Their Mixtures (consolidated text: Journal of Laws 2022, item 1816, as amended). Regulation of the Minister of Health of 26 July 2024 on chemical substances, their mixtures, agents or technological processes with carcinogenic, mutagenic or reprotoxic effects in the working environment (Journal of Laws 2024, item 1126). Regulation of the Minister of Family, Labour and Social Policy of 12 June 2018 on the maximum admissible concentrations and intensities of agents harmful to health in the working environment (Journal of Laws 2018, item 1286, as amended, including Journal of Laws 2026, item 447). Act of 14 December 2012 on Waste (consolidated text: Journal of Laws 2023, item 1587, as amended). Act of 13 June 2013 on Packaging and Packaging Waste Management (consolidated text as amended, including Journal of Laws 2026, item 174).

15.2. Chemical safety assessment

Chemical safety assessment of the lead has been carried out.

SECTION 16: Other information

Changes made: TLV-TWA updated in Section 8, and the list of legal acts updated in Section 15.

Explanations of abbreviations and acronyms used in the MSDS:

CAS number – means numerical identification assigned to chemical substance by the American organization named Chemical Abstract Service (CAS), enabling substance identification.

Index number – it is an identification code given in part 3 of the annex VI to the Regulation of the European Parliament and Council (EC) No. 1272/2008 dated December 16th, 2008, on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006;

WE number – the number assigned to chemical substance in EINECS - European Inventory of Existing Chemical Substances, or the number assigned to chemical substance in ELINCS – European

Refined lead with increased content of bismuth**Date of issue: 20.11.2008****Revision No. / Revision date: 11 / 25.08.2026**

List of Notified Chemical Substances or the number in chemical substances inventory included in "No-longer polymers" document.

Registration number – number given by ECHA after substance/intermediate registration by the manufacturer/importer according to REACH Regulation.

UN number – unequivocal marking of hazardous substances and goods assigned by United Nations Central Committee to provide international recognition and use.

IUPAC name – name of a substance given by IUPAC - International Union of Pure and Applied Chemistry Committee

TLV-TWA – the highest admissible concentration/threshold limit value – weighted average value – concentration of toxic chemical whose impact on a worker during 8-hour daily shift and average weekly time of work provided in the Labor Code during the period of his occupational activity should not cause negative changes of his health condition and of health condition of his next generations.

TLV-STEL – the highest admissible short term concentration/short term exposure limit – weighted average of concentration of the specified, toxic chemical compound which should not cause negative changes of a worker's health if present in the work environment for not longer than 15 minutes and not more often than twice per shift with occurrences separated by more than 1 hour. and not more often than twice per shift with occurrences separated by more than 1 hour.

LD₅₀ – lethal dose - dose of toxic substance expressed in milligrams per kilogram of body mass necessary to kill 50% of the examined population within specified time.

LC₅₀ – lethal concentration - concentration of a substance in the inhaled air, expressed in milligrams per litre, which causes death of 50% of the examined population after specified period of exposure.

Sources of information used during preparation of the MSDS:

- Own results of qualitative and quantitative analyses of bismuth lead;
- Chemical Safety Report for lead;

Necessary training: Post-related training within the scope of safe use of a substance considering its hazardous properties for human and the environment.

Information contained in the material safety data sheet is to describe the product within the scope of safety requirements. User is responsible for taking any steps in order to meet the provisions of the national law and to create safe conditions for use of the product. User is held responsible for effects resulting from improper application of this product.

Further information can be obtained under the telephone numbers given in section 1.