

Extended SAFETY DATA SHEET
prepared in accordance with Regulation (EC) No. 1907/2006

SDS ID: BTI02440_EU

SECTION 1 - IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1 Product Identifier

Substance name: Barium nitrate
Synonyms: Barium dinitrate; Nitric acid, barium salt; Nitrobarite; Nitrate of barium; Barium(II) nitrate; Barium nitrate (Ba(NO₃)₂); Nitric acid barium salt (2:1); UN 1446; B-53; BAN2O6; RTECS: CQ9625000
EC No.: 233-020-5
CAS No.: 10022-31-8
REACH Registration No.: 01-2119986880-22-0000
Chemical Family: inorganic, salt

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Identified Uses: Industrial
Formulation
Used by workers in industrial settings

- Raw material transport
- Raw material dosing, weighing, mixing and transport to furnace or filling to tank
- Furnace

Uses Advised Against: none

See Annex to this SDS for a complete list of uses for which Exposure Scenarios are provided.

1.3 Details of the supplier of the safety data sheet

BASSTECH EUROPE BVBA Phone: +32 14 38 91 92
Turnhoutsebaan 171 bus 120 Fax: +1 (201) 569-7511
2480 Dessel, Belgium Email: info@basstechintl.com

1.4 Emergency Telephone Number

CHEMTREC: 1-800-424-9300 (U.S.); +1-703-527-3387 (International: Call Collect)

SECTION 2 - HAZARDS IDENTIFICATION

2.1 Classification of the Substance or Mixture

Classification according to Regulation (EC) No 1272/2008

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Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

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Oxidizing solid, Category 2, H272
Acute Toxicity (Oral), Category 3, H301
Acute Toxicity (Inhalation), Category 4, H332
Eye Irritation, Category 2, H319

Classification according to Directives 67/548/EEC and/or 1999/45/EC

O; R8 Contact with combustible material may cause fire.
R20 Harmful by inhalation
R36 Irritating to eyes
T;R25 Toxic if swallowed
S45 in case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)

For full text of R-phrases and H-statements: see Section 16

2.2 Label Elements

2.2.1 Labeling according to Regulation (EC) 1272/2008/EC

Hazard pictograms:



GHS03



GHS06

Signal Word

DANGER

Hazard Statement(s)

H272 May intensify fire, oxidiser
H301 Toxic if swallowed
H319 Causes serious eye irritation
H332 Harmful if inhaled

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P220 Keep/Store away from clothing/combustible materials.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

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P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3 Other Hazards

The substance is inorganic. Therefore, the criteria for PBT or vPvB identification as laid out in Annex XIII of the REACH regulation do not apply to inorganic substances.

No other hazards known.

SECTION 3 - COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances

CAS No	EC No	REACH registration No.	% (w/w)	Name
10022-31-8	233-020-5	01-2119986880-22-0000	100%	Barium nitrate

SECTION 4 - FIRST AID MEASURES

4.1 Description of First Aid Measures

- General advice:** First aider: pay attention to self-protection! Wear at least gloves. Move victim to fresh air and remove contaminated clothing. In case of unconsciousness place victim stably in side position for transportation. Seek medical advice immediately.
- Inhalation:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.
- Skin:** Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.
- Eyes:** Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.
- Ingestion:** If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention. Induce vomiting only at the instructions of a physician. Do not give anything by mouth to unconscious or convulsive person.

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4.2 Most Important Symptoms and Effects, both Acute and Delayed

The most important known symptoms are described in section 2 and/or in section 11. Further important symptoms and effects are so far not known.

4.3 Indication of any Immediate Medical Attention and Special Treatment Needed

Note to Physicians

For ingestion, consider gastric lavage.

SECTION 5 - FIRE FIGHTING MEASURES

5.1 Extinguishing Media

Suitable extinguishing Media

Water.

Large fires: Flood with water. Apply water from a protected location or from a safe distance.

Unsuitable extinguishing Media

Non known.

5.2 Special Hazards Arising from the Substance or Mixture

Negligible fire hazard. Oxidizer. May ignite or explode on contact with combustible materials.

5.3 Advice for Firefighters

Fire Fighting Measures

Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. Flood with water. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Evacuate if fire gets out of control or containers are directly exposed to fire. Evacuation radius: 800 meters (1/2 mile).

Protective Equipment and Precautions for Firefighters

Wear full protective firefighting gear including self-contained breathing apparatus (SCBA) for protection against possible exposure.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

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Legal Address:
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2480 Dessel, Belgium

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6.1 Personal Precautions, Protective Equipment and Emergency Procedures

Wear personal protective clothing and equipment.

6.2 Environmental Precautions

Avoid release to the environment.

6.3 Methods and Material for Containment and Cleaning up

Avoid contact with combustible materials. Do not touch spilled material.

Small spills: Collect spilled material in appropriate container for disposal. Move containers away from spill to a safe area.

Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry.

6.4 Reference to Other Sections

See Section 7 for Handling Procedures. See Section 8 for Personal Protective Equipment recommendations. See Section 13 for Disposal Considerations.

SECTION 7 - HANDLING AND STORAGE

7.1 Precautions for Safe Handling

Use methods to minimize dust.

7.2 Conditions for Safe Storage, Including any Incompatibilities

Store and handle in accordance with all current regulations and standards. Keep away from heat and ignition sources. Protect from physical damage. Avoid storage on wooden floors. Keep separated from incompatible substances.

7.3 Specific End Use(s)

For industrial use only.

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SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control Parameters

Component Exposure Limits

BARIUM NITRATE (10022-31-8)

Finland: 0.5 mg/m³ TWA (as Ba)

Germany (TRGS): Group 2

Germany (DFG): 0.5 mg/m³ MAK (inhalable fraction, as Ba, related to Barium compounds, n.o.s.)
4 mg/m³ Peak (as Ba, inhalable fraction, related to Barium compounds, n.o.s.)

Biological Limit Values: Biological Limit Values have not developed for any of component(s) of this material.

Derived No Effect Levels (DNELs):

Summary table of calculated DNELs (values from CSR):

Industrial worker	
	Chronic, systemic effects
Human dermal	DNEL = 12.22 mg/kg bw/day
Human inhalation	DNEL = 1.34 mg/m ³

Predicted No Effect Concentrations (PNECs):

Summary table of calculated PNECs (predicted no effect concentration) (values from CSR):

Compartment		PNEC
Aquatic	Freshwater	227.8 µg Ba/L (based on data from FOREGS database)
	Sediment	792.7 mg Ba/kg dry weight
Marine	Marine water	Not calculated
	Sediment	Not calculated
Terrestrial	Soil	207.7 mg Ba/kg dry weight (based on data from FOREGS database)
Atmospheric		No hazard assessment nor risk characterization of effects of barium in the air compartment for ecotoxicity endpoints has been conducted. This is consistent with Section 10.7.1 of the REACH Guidance (ECHA 2008a)
Sewage Treatment Plant		50.1 mg Ba/L
Oral - birds		Not calculated

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Oral - mammals		Not calculated
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Ventilation: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

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8.2 Exposure Controls

8.2.1 Appropriate engineering controls

Keep away from heat, sparks, open flame, and hot surfaces - No smoking. Keep away from incompatible materials. Take any precaution to avoid mixing with combustibles. Do not breathe dust. Do not eat, drink, or smoke when using this product. Wash thoroughly after handling. Wear protective gloves/clothing and eye/face protection. Use only outdoors or in a well-ventilated area.

8.2.2 Individual protection measures, such as personal protective equipment

8.2.2.1 Eye / Face Protection

Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

8.2.2.2 Skin Protection

Wear appropriate chemical resistant clothing. Wear appropriate chemical resistant gloves.

8.2.2.3 Respiratory Protection

If engineering controls do not maintain airborne concentrations to a negligible level, an approved respirator must be worn.

8.2.3 Environmental Exposure Controls

No special instructions.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

Appearance:	White solid
Odour:	Odourless
Odour threshold:	No data available
pH:	5.0-8.0
Melting point / freezing point:	590 °C
Initial boiling point and boiling range:	No data on decomposition available
Flash point:	Not applicable
Evaporation rate:	No data available
Flammability (solid, gas):	Non flammable

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Explosive limits:	Non explosive
Vapour pressure:	Not applicable
Vapour density (air=1):	Not applicable
Relative density:	3.24 @ 20°C
Solubility in water:	94000 mg/L @ 20°C
Partition coefficient:	Not applicable
Auto ignition temperature:	No data available
Decomposition temperature:	No data available
Viscosity:	Not applicable
Explosive properties:	No data available
Oxidising properties:	No data available

SECTION 10 - STABILITY AND REACTIVITY

10.1 Reactivity

No reactivity hazard is expected.

10.2 Chemical Stability

Stable at normal temperatures and pressure.

10.3 Possibility of Hazardous Reactions

Will not polymerize.

10.4 Conditions to Avoid

Avoid contact with combustible materials. Minimize contact with material.

10.5 Incompatible Materials

metals, combustible materials, reducing agents, acids, metal salts

10.6 Hazardous Decomposition Products

oxides of nitrogen, oxides of barium

SECTION 11 - TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Effects

Acute oral toxicity: Adverse effect observed (LD50: 300 mg/kg bw)

Acute dermal toxicity: No study available

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Acute inhalation toxicity:	Adverse effect observed (LC50: 1100 mg/m ³)
Skin corrosion/irritation :	Not irritating
Serious eye damage/irritation:	eye irritation
Respiratory or Skin Sensitization:	No data available on respiratory sensitization, not sensitizing to skin
Germ Cell Mutagenicity:	Non mutagenic
Carcinogenicity:	None of this product's components are listed by IARC or DFG.
Reproductive Toxicity:	Not toxic to reproduction
Specific Target Organ Toxicity – Single Exposure:	Not classified as STOT SE
Specific Target Organ Toxicity – Repeated Exposure:	Not classified as STOT RE
Aspiration Hazard:	No data available.

SECTION 12 - ECOLOGICAL INFORMATION

12.1 Toxicity

Freshwater fish (*Danio rerio*): 96h-LC50 > 3.5 mg Ba/L

Freshwater invertebrate (*Daphnia magna*): 48h-LC50: 14.5 mg Ba/L; 21-d NOEC: 2.9 mg Ba/L

Freshwater algae (*Pseudokirchneriella subcapitata*): 72h-EC50: > 1.92 mg/L (dissolved Ba); NOEC >= 1.92 mg/L (dissolved Ba)

12.2 Persistence and Degradability

Does not apply to inorganic substances, such as barium metal.

12.3 Bioaccumulative Potential

The substance is inorganic. Therefore, the criteria for PBT or vPvB identification as laid out in Annex XIII of the REACH regulation do not apply to inorganic substances.

12.4 Mobility in Soil

Adsorption to soil appears to be mild.

12.5 Results of PBT and vPvB Assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

12.6 Other Adverse Effects

No information available.

SECTION 13 - DISPOSAL CONSIDERATIONS

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2480 Dessel, Belgium

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13.1 Waste Treatment Methods

Dispose in accordance with all applicable regulations.

SECTION 14 - TRANSPORT INFORMATION

14.1 UN Number

ADR, IMDG, IATA: 1446

14.2 UN proper shipping name

ADR: UN 1446, Barium nitrate

IMDG, IATA: Barium nitrate

14.3 Transport hazard class(es)

ADR, IMDG, IATA: 5.1

14.4 Packing group

ADR, IMDG, IATA: II

Environmental hazards

Marine pollutant: no

14.5 Environmental hazards

ADR, IMDG, IATA: no

Marine pollutant: no

14.6 Special precautions for user

Land transport (ADR/RID):



Warning board: ADR/RID: Kemler number 56, UN number 1446

Hazard label: 5.1, 6.1

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

This material does not contain any chemicals required by the IBC Code to be identified as dangerous chemicals in bulk.

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SECTION 15 - REGULATORY INFORMATION

15.1 Safety, Health and Environmental Regulations / Legislation Specific for the Substance or Mixture

EU - REACH (1907/2006) - Annex XIV List of Substances Subject to Authorisation

No component(s) of this material are listed.

EU - REACH (1907/2006) - Article 59(1) Candidate List of Substances Subject to Authorisation

No component(s) of this material are listed.

EU - REACH (1907/2006) - Annex XVII Restrictions of Certain Dangerous Substances, Mixtures and Articles

No component(s) of this material are listed.

EU - REACH (1907/2006) - Potential Substances of Very High Concern

No component(s) of this material are listed.

UK Regulations

No component(s) of this material are listed on the List of Chemicals of Concern or the Dangerous Substances in Water (Red List). **Germany Regulations**

Germany Water Classification

BARIUM NITRATE (10022-31-8)

ID Number 304, hazard class 1 - low hazard to waters

Reference: Umwelt Bundes Amt (UBA)

Denmark Regulations

Environmental Protection Agency List of Undesirable Substances

No components of this material are listed.

15.2 Chemical Safety Assessment

A chemical safety assessment has been carried out for the substance.

SECTION 16 - OTHER INFORMATION

16.1 Indication of changes

Revision 1.1, 25 April 2014

16.2 Key / Legend

ACGIH - American Conference of Governmental Industrial Hygienists;

ADR - European Road Transport;

AU - Australia;

BOD - Biochemical Oxygen Demand;

C - Celsius;

CAS - Chemical Abstracts Service;

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2480 Dessel, Belgium

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CLP - Classification, Labelling and Packaging;
DFG Deutsche Forschungsgemeinschaft;
EEC - European Economic Community;
EINECS - European Inventory of Existing Commercial Chemical Substances;
EPA - Environmental Protection Agency;
EU - European Union;
IARC - International Agency for Research on Cancer;
IATA - International Air Transport Association;
ICAO - International Civil Aviation Organization;
IDLH - Immediately Dangerous to Life and Health;
IMDG - International Maritime Dangerous Goods;
Kow - Octanol/water partition coefficient;
LEL - Lower Explosive Limit;
LOLI - List Of Lists™ - ChemADVISOR's Regulatory Database;
MAK - Maximum Concentration Value in the Workplace;
MEL - Maximum Exposure Limits;
NTP - National Toxicology Program;
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals;
RID - European Rail Transport;
RTECS - Registry of Toxic Effects of Chemical Substances®;
STEL - Short-term Exposure Limit;
TSCA - Toxic Substances Control Act;
TWA - Time Weighted Average;
UEL - Upper Explosive Limit

16.3 Key literature references and sources for data

Available upon request

16.4 Methods used for classification of mixture according to Regulation (EC) No 1272/2008

Available upon request

16.5 Full text of R phrases and H-statements in Section 2

H272 May intensify fire; oxidizer
H301 Toxic if swallowed
H319 Causes serious eye irritation
H332 Harmful if inhaled
R8 Contact with combustible material may cause fire
R22 Harmful if swallowed

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16.6 Training Advice

Make sure that employees are aware of the risks of this product.

16.7 Other Information

Disclaimer: Supplier gives no warranty of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser will make his own tests to determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental and/or consequential property damage arising out of the use of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. Read the Safety Data Sheet before handling product.

End of Sheet BTI02440_EU

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2480 Dessel, Belgium

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ANNEX: Generic uses and exposure scenarios

ES number	Short description of exposure scenario	Resulting life cycle stage					Process Category (PROC)	Environmental Release Category (ERC)	
		Manufacture	Formulation	End Use					Service life (for articles)
				Industrial	Professiona	Consumer			
1	Formulation		x	x			2, 3	2	
2	Industrial use - Raw material transport			x			2, 3, 8a, 8b, 9, 15, 26	6A	
3	Industrial use - Raw material dosing, weighing, mixing and transport to furnace or filling to tank			x			2, 3, 4, 5, 8a, 8b	6A	
4	Industrial use - Furnace			X			22	6A	

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Exposure scenario 1 – Exposure resulting from Formulation

Title	Formulation
Process category	PROC2 - Use in closed, continuous process with occasional exposure PROC3 - Use in closed batch process (synthesis or formulation)
Environmental release category	SpERC Eurometaux 2.2c.v2.1 – Formulation of metal compounds in other than plastics and paint sectors. Mixing and blending of metal compounds into preparations. All processes are integrated in the release fractions from raw materials handling to cleaning and maintenance (related default use descriptor ERC2).
Processes, tasks, activities covered	The formulation scenario includes feeding of the raw material with screw feeders, pneumatic or vibratory feeders to scale hoppers and weighing. After weighing it is discharged on the conveyor belt with other components and transported to the mixer. It is a closed batch process.
1. Operational conditions and risk management measures	
1.1. Control of worker exposure: PROC 2, 3	
Frequency and duration of use	
Covers daily exposures up to 8 hours (unless stated differently)	
Product characteristics	
Physical state	Solid
Vapour pressure	Not determined but expected to be low
Fugacity / Dustiness	High dustiness
Concentration of the substance in mixture/article	Covers percentage substance in the product up to 100 % (unless stated differently)
Human factors not influenced by risk management	

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Not applicable	
Other given operational conditions affecting workers exposure	
Use	Assumes industrial, indoor use Assumes a good basic standard of occupational hygiene is implemented
Technical conditions and measures to prevent release	
None	
Technical conditions and measures to control dispersion and exposure	
Provide a good standard of general ventilation. No local exhaust ventilation required.	
Organisational measures to prevent/ limit releases, dispersion and exposure	
Non-dispersive use, non-direct handling, incidental contact level	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to type EN374) in combination with 'basic' employee training. No respiratory protection required.	
1.2. Control of environmental exposure: ERC 2	
Operational conditions	
Amount used	
Regional use tonnage (tonnes/year)	987
Fraction of regional tonnage used locally	100%
Maximum daily site tonnage (kg/day)	14731, 34
Frequency and duration of use	
Emission days (days/year)	67 (default value from Eurometaux spERC 2.2.c.v2.1)
Environmental factors not influenced by risk management	
Local fresh water dilution factor	1.5xE6 m ³ /d (dilution: 779)
Local marine water dilution factor	For estuarine and marine discharges a default dilution factor of 100 was used.
Other given operational conditions affecting environmental exposure	Eurometaux spERC background document 2.2c.v2.1

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Release fraction to air from process	0.01 % (after on-site RMM)
Release fraction to wastewater from process	2 % (before on-site STP)
Release fraction to soil from process	0 % (not applicable to local scale)
Risk management measures	
Technical conditions and measures at process level (source) to prevent release	Direct emissions should be reduced by implementing one or more of the RMMs reported in the Eurometaux spERC background document 2.2c.v2.1
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	Eurometaux spERC background document 2.2c.v2.1
Waste water:	Eurometaux spERC background document 2.2c.v2.1
Soil:	Eurometaux spERC background document 2.2c.v2.1
Organizational measures to prevent/limit release from site	
None	
Conditions and measures related to municipal waste water treatment plant	
Municipal sewage treatment plant	No
Discharge rate of the municipal STP	Not relevant
Incineration of the sludge of the Municipal STP	Not relevant
Conditions and measures related to external treatment of waste for disposal	Barium bearing waste shall be recovered or recycled if possible. Releases to the floor, water and soil are to be prevented.
Conditions and measures related to external recovery of waste	Not applicable
2. Exposure estimation and reference to its source	
2.1. Health	

 Office Address:
 Turnhoutsebaan 171 bus 120
 2480 Dessel, Belgium

 Legal Address:
 Gemeentedijk 20
 2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Exposure scenarios have been calculated using MEASE1.02.01, an exposure assessment tool for metals and inorganic substances (http://www.ebrc.de/industrial_chemicalsreach/projects_and_references/mease.php). This tool is developed by EBRC and commissioned by Eurometaux.				
2.2. Environment				
Predicted (modelled) local and regional (measured) concentrations of barium are used for calculation of the PEC – Tools available: EUSES 2.1.2 / Suitable scaling tools The Specific Environmental Release Factors (SPERCS) for metals and metal compounds can be found here: http://www.reach-metals.eu/index.php?option=com_content&task=view&id=124&Itemid=203				
3. Exposure and risk estimation				
Workers				
PROC 2 Use in closed, continuous process with occasional exposure				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.024	0.000028
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 3 Use in closed batch process (synthesis or formulation)				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.012	0.000014
Inhalation				

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Long-term systemic	mg/m ³	1.34	1	0.75		
Environment						
spERC 2.2.c.v2.1						
Formulation of metal compounds in other than plastics and paint sectors						
Compartment	Unit	PNEC	PECregional	Clocal	PEC	RCR
Freshwater	µg Ba/L	227.8	1.0E-03	0.175	0.176	0.775
Freshwater sediment	mg Ba/kg dw	792.7	10.2	Not calculated	921	0.581
Marine		Not calculated				Not calculated
Marine sediment		Not calculated				Not calculated
Terrestrial	mg Ba/kg dw	207.7	0.204	1.5E-03	0.0854	4.11E-04
STP	mg Ba/L	50.1	-	-	-	Wastewater is not connected to an STP
4. Guidance to check compliance with the Exposure Scenario						
4.1. Health						
Scaling not applicable						

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 Turnhoutsebaan 171 bus 120
 2480 Dessel, Belgium

 Legal Address:
 Gemeentedijk 20
 2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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4.2. Environment

Scaling tool: Metal EUSES IT tool (free download: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>).

Scaling of the release to air and water environment includes: refining of the release factor to air and wastewater and/or the efficiency of the air filter and wastewater treatment facility.

It should be noted that the emissions to wastewater presented in this document have been modelled on the basis of dilution/flow rate of receiving waters. These assumptions may not accurately reflect the conditions that prevail at a particular site. As such, the information presented in this document should be regarded as a guidance tool only. It remains the responsibility of the user to ensure that a compound is used safely within the context of their site and in full consultation with the relevant local authorities.

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Exposure scenario 2 – Exposure resulting from Industrial use: raw material transport

Title	Industrial Use – Raw material transport
Sector of use	SU 3: industrial
Process category	<p>PROC2 - Use in closed, continuous process with occasional exposure</p> <p>PROC3 - Use in closed batch process (synthesis or formulation)</p> <p>PROC8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities</p> <p>PROC8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities</p> <p>PROC9 - Transfer of chemicals into small containers (dedicated filling line)</p> <p>PROC15 - Use of laboratory reagents in small scale laboratories</p> <p>PROC26 - Handling of solid inorganic substances at ambient temperature</p>
Environmental release category	SpERC Eurometaux 2.5-6c.v2.1 – Industrial use of metal compounds in glass, ceramics and crystal industry sector. All processes are integrated in the release fractions from raw materials handling to cleaning and maintenance (related default use descriptor ERC6A).
Processes, tasks, activities covered	<p>Raw material (closed big bags and sacks) is stored in closed storage areas under consideration of regulations for hazardous materials. A sample of the raw material is removed for analysis. The de-dusting system on top of the silo is in use (if necessary during the whole handling process). The extracted dust is collected and reused again.</p> <p>Raw material, delivered by silo trucks (closed system), is transferred by pneumatic conveying system to main storage silos. The de-dusting system on top of the silos is in use. The extracted dust is directed towards inside silos.</p>
1. Operational conditions and risk	
1.1. Control of worker exposure: PROC 2, 3, 8a, 8b, 9, 15, 26	

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Frequency and duration of use	
Covers daily exposures up to 8 hours (unless stated differently). For transfer activities (covered by PROC 8a, 8b or 9), exposure duration should be limited to 1 hour per day. For handling the substance at ambient temperature (covered by PROC 26), the duration should be limited to 4 hours per day.	
Product characteristics	
Physical state	Solid
Vapour pressure	Not determined but expected to be low
Fugacity / Dustiness	High dustiness
Concentration of the substance in mixture/article	Covers percentage substance in the product up to 100 % (unless stated differently)
Human factors not influenced by risk management	
Not applicable	
Other given operational conditions affecting workers exposure	
Assumes industrial, indoor use Assumes a good basic standard of occupational hygiene is implemented	
Technical conditions and measures to prevent release	
None	
Technical conditions and measures to control dispersion and exposure	
Provide a good standard of general ventilation. Provide extract ventilation to points where emissions occur. Ensure material transfers are under containment or extract ventilation (PROC 8a, 8b, 9). Provide extract ventilation to material transfer points and other openings (PROC 15, 26).	
Organisational measures to prevent/ limit releases, dispersion and exposure	
Non dispersive use, non-direct handling (except for transfer activities: direct handling), incidental contact level	
Conditions and measures related to personal protection, hygiene and health evaluation	

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Wear chemically resistant gloves (tested to type EN374) in combination with 'basic' employee training. No respiratory protection required, except when handling the substance at ambient air (PROC 26): wear a respirator conforming to EN140 with Type A filter or better.	
1.2. Control of environmental exposure: 6A	
Operational conditions	
Amount used	
Regional use tonnage (tonnes/year)	987
Fraction of regional tonnage used locally	100%
Maximum daily site tonnage (kg/day)	14731, 34
Frequency and duration of use	
Emission days (days/year)	180 (default value from Eurometaux spERC 2.5-6c.v2.1)
Environmental factors not influenced by risk management	
Local fresh water dilution factor	1.5xE6 m3/d (dilution: 779)
Local marine water dilution factor	For estuarine and marine discharges a default dilution factor of 100 was used.
Other given operational conditions affecting environmental exposure	Eurometaux spERC background document 2.5-6c.v2.1
Release fraction to air from process	2% (after on-site RMM)
Release fraction to wastewater from process	0.5 % (after on-site STP) Here a conservative value of 2% was assumed
Release fraction to soil from process	0 % (not applicable to local scale)
Risk management measures	
Technical conditions and measures at process level (source) to prevent release	Direct emissions should be reduced by implementing one or more of the RMMs reported in the Eurometaux spERC background document 2.5-6c.v2.1
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	Eurometaux spERC background document 2.5-6c.v2.1

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Wastewater:	Eurometaux spERC background document 2.5-6c.v2.1
Soil:	Eurometaux spERC background document 2.5-6c.v2.1
Organizational measures to prevent/limit release from site	Eurometaux spERC background document 2.5c-6c.v2.1
Organizational measures to prevent/limit release from site	
None	
Conditions and measures related to municipal waste water treatment plant	
Municipal sewage treatment plant	No
Discharge rate of the municipal STP	Not relevant
Incineration of the sludge of the Municipal STP	Not relevant
Conditions and measures related to external treatment of waste for disposal	Barium bearing waste shall be recovered or recycled if possible. Releases to the floor, water and soil are to be prevented.
Conditions and measures related to external recovery of waste	Not applicable

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Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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2. Exposure estimation and reference to its source				
2.1. Health				
Exposure scenarios have been calculated using MEASE1.02.01, an exposure assessment tool for metals and inorganic substances (http://www.ebrc.de/industrial_chemicalsreach/projects_and_references/mease.php). This tool is developed by EBRC and commissioned by Eurometaux.				
2.2. Environment				
Predicted (modelled) local and regional (measured) concentrations of barium are used for calculation of the PEC – Tools available: EUSES 2.1.2 / Suitable scaling tools The Specific Environmental Release Factors (SPERCS) for metals and metal compounds can be found here: http://www.reach-metals.eu/index.php?option=com_content&task=view&id=124&Itemid=203				
3. Exposure and risk estimation				
Workers				
PROC 2				
Use in closed, continuous process with occasional exposure				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.024	0.000028
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 3				
Use in closed batch process (synthesis or formulation)				
	Unit	DNEL	Exposure concentration	RCR
Dermal				

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Long-term systemic	mg/kg bw/day	12.22	0.012	0.000014
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 8a Transfer of chemicals from/to vessels/ large containers at non dedicated facilities				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.096	0.00011
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 8b Transfer of chemicals from/to vessels/ large containers at dedicated facilities				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.048	0.00006
Inhalation				
Long-term systemic	mg/m ³	1.34	0.25	0.19
PROC 9 Transfer of chemicals into small containers (dedicated filling line)				

 Office Address:
 Turnhoutsebaan 171 bus 120
 2480 Dessel, Belgium

 Legal Address:
 Gemeentedijk 20
 2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Dermal	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.048	0.00006
Inhalation				
Long-term systemic	mg/m3	1.34	0.4	0.30
PROC 15				
Use of laboratory reagents in small scale laboratories				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.012	0.000014
Inhalation				
Long-term systemic	mg/m3	1.34	0.5	0.37
PROC 26				
Handling of solid inorganic substances at ambient temperature				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.059	0.000069
Inhalation				
Long-term systemic	mg/m3	1.34	1.2	0.90

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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Environment						
SpERC Eurometaux 2.5-6c.v2.1						
Industrial use of metal compounds in glass, ceramics and crystal industry sector.						
Compartment	Unit	PNEC	PECregional	Clocal	PEC	RCR
Freshwater	µg Ba/L	227.8	1.0E-03	0.065	0.0663	0.291
Freshwater sediment	mg Ba/kg dw	792.7	10.2	Not calculated	346	0.218
Marine		Not calculated				Not calculated
Marine sediment		Not calculated				Not calculated
Terrestrial	mg Ba/kg dw	207.7	0.204	0.316	0.4	1.93E-03
STP	mg Ba/L	50.1	-			Wastewater is not connected to an STP

Office Address:
 Turnhoutsebaan 171 bus 120
 2480 Dessel, Belgium

Legal Address:
 Gemeentedijk 20
 2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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4. Guidance to check compliance with the Exposure Scenario

4.1. Health

Workers – Scaling tool: MEASE – Occupational Exposure Assessment tool for REACH (free download: <http://www.ebrc.de/industrial-chemicals-reach/projects-and-references/mease.php>)

Scaling considering duration and frequency of use. Collect process occupational exposure monitoring data. It should be noted that the evaluation of worker safety presented in this document is based on standardised (default) assumptions on levels of exposure associated with generic processes, the behaviour of a compound in a particular working environment and the presumed efficiency of Risk Management Measures (e.g. local exhaust ventilation or respiratory protection). These standardised assumptions may not accurately reflect the conditions that prevail at a particular site. As such, the information presented in this document should be regarded as a guidance tool only. It remains the responsibility of the user to ensure that a compound is used safely within the context of their site and in full consultation with the relevant local authorities.

4.2. Environment

Scaling tool: Metal EUSES IT tool (free download: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>).

Scaling of the release to air and water environment includes: refining of the release factor to air and wastewater and/or the efficiency of the air filter and wastewater treatment facility. It should be noted that the emissions to wastewater presented in this document have been modelled on the basis of dilution/flow rate of receiving waters. These assumptions may not accurately reflect the conditions that prevail at a particular site. As such, the information presented in this document should be regarded as a guidance tool only. It remains the responsibility of the user to ensure that a compound is used safely within the context of their site and in full consultation with the relevant local authorities.

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Exposure scenario 3 – Exposure resulting from Industrial Use: raw material dosing, weighing, mixing and transport to furnace or filling to tank

Title	Industrial Use - Raw material dosing, weighing, mixing and transport to furnace or filling to tank
Sector of use	SU 3: industrial
Process category	<p>PROC2 - Use in closed, continuous process with occasional exposure</p> <p>PROC3 - Use in closed batch process (synthesis or formulation)</p> <p>PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC8a - Transfer of chemicals from/to vessels/ large containers at non dedicated facilities</p> <p>PROC8b - Transfer of chemicals from/to vessels/ large containers at dedicated facilities</p>
Environmental release category	SpERC Eurometaux 2.5-6c.v2.1 – Industrial use of metal compounds in glass, ceramics and crystal industry sector. All processes are integrated in the release fractions from raw materials handling to cleaning and maintenance.

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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<p>Processes, tasks, activities covered</p>	<p>In the batch house (inside building) raw material is conveyed from storage silos to day bins or directly from silo to weighing system (closed system). All day bins have their own de-dusting system, dust is rejected into the silo. Dust in this building is cleaned on a regularly basis with vacuum cleaners or brushes. There is a low risk of air emissions during raw material dosing and weighing. All transfer items in the conveying system are de-dusted separately, dust is rejected to the system and reused as raw material or disposed of. Waste from weighing failures is stored in bins or big bags. Raw material dosing and weighing is followed by mixing. Each mixer has its own de-dusting system or coupled in a central de-dusting system. Mixers are discharged on a covered belt system or into a pneumatic transportation system or in closed hoppers.</p> <p>The mixed batch is then transported in closed bins or by conveyed belt conveyors or pneumatic conveying system. A de-dusting system is available on the prefurnace silo. The dust is reused as raw material.</p>
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Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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1. Operational conditions and risk	
1.1. Control of worker exposure: PROC 2, 3, 4, 5, 8a, 8b	
Frequency and duration of use	
Covers daily exposures up to 8 hours (unless stated differently). For transfer activities (covered by PROC 8a, 8b or 9) and mixing/blending activities (covered by PROC 5), exposure duration should be limited to 1 hour per day.	
Product characteristics	
Physical state	Solid
Vapour pressure	Not determined but expected to be low
Fugacity / Dustiness	High dustiness
Concentration of the substance in mixture/article	Covers percentage substance in the product up to 100 % (unless stated differently)
Human factors not influenced by risk management	
Not applicable	
Other given operational conditions affecting workers exposure	
Assumes industrial, indoor use Assumes a good basic standard of occupational hygiene is implemented	
Technical conditions and measures to prevent release	
None	
Technical conditions and measures to control dispersion and exposure	
Provide a good standard of general ventilation. Provide extract ventilation to points where emissions occur (PROC 4, 5). Ensure material transfers are under containment or extract ventilation (PROC 8a, 8b).	
Organisational measures to prevent/ limit releases, dispersion and exposure	
Non dispersive use, non-direct handling (except for transfer activities: direct handling), incidental contact level	
Conditions and measures related to personal protection, hygiene and health evaluation	

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Wear chemically resistant gloves (tested to type EN374) in combination with 'basic' employee training.

No respiratory protection required, except where opportunity for exposure arises (PROC 4): wear a respirator conforming to EN140 with Type A filter or better.

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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1.2. Control of environmental exposure: 6A	
Operational conditions	
Amount used	
Regional use tonnage (tonnes/year)	987
Fraction of regional tonnage used locally	100%
Maximum daily site tonnage (kg/day)	14731, 34
Frequency and duration of use	
Emission days (days/year)	180 (default value from Eurometaux spERC 2.5-6c.v2.1)
Environmental factors not influenced by risk management	
Local fresh water dilution factor	1.5xE6 m3/d (dilution: 779)
Local marine water dilution factor	For estuarine and marine discharges a default dilution factor of 100 was used.
Other given operational conditions affecting environmental exposure	Eurometaux spERC background document 2.5-6c.v2.1
Release fraction to air from process	2% (after on-site RMM)
Release fraction to wastewater from process	0.5 % (after on-site STP) Here a conservative value of 2% was assumed
Release fraction to soil from process	0 % (not applicable to local scale)
Risk management measures	
Technical conditions and measures at process level (source) to prevent release	Direct emissions should be reduced by implementing one or more of the RMMs reported in the Eurometaux spERC background document 2.5-6c.v2.1
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	Eurometaux spERC background document 2.5-6c.v2.1
Wastewater:	Eurometaux spERC background document 2.5-6c.v2.1
Soil:	Eurometaux spERC background document 2.5-6c.v2.1

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

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Organizational measures to prevent/limit release from site	Eurometaux spERC background document 2.5c-6c.v2.1
Organizational measures to prevent/limit release from site	
None	
Conditions and measures related to municipal waste water treatment plant	
Municipal sewage treatment plant	No
Discharge rate of the municipal STP	Not relevant
Incineration of the sludge of the Municipal STP	Not relevant
Conditions and measures related to external treatment of waste for disposal	Ba bearing waste shall be recovered or recycled if possible. Releases to the floor, water and soil are to be prevented.
Conditions and measures related to external recovery of waste	Not applicable
2. Exposure estimation and reference to its source	
2.1. Health	
Exposure scenarios have been calculated using MEASE1.02.01, an exposure assessment tool for metals and inorganic substances (http://www.ebrc.de/industrial_chemicalsreach/projects_and_references/mease.php). This tool is developed by EBRC and commissioned by Eurometaux.	
2.2. Environment	
Predicted (modelled) local and regional (measured) concentrations of barium are used for calculation of the PEC – Tools available: EUSES 2.1.2 / Suitable scaling tools The Specific Environmental Release Factors (SPERCS) for metals and metal compounds can be found here: http://www.reach-metals.eu/index.php?option=com_content&task=view&id=124&Itemid=203	
3. Exposure and risk estimation	
Workers	
PROC 2 Use in closed, continuous process with occasional exposure	

Office Address:
Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

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	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.024	0.000028
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 3 Use in closed batch process (synthesis or formulation)				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.012	0.000014
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 4 Use in batch and other process (synthesis) where opportunity for exposure arises				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.0144	0.000017
Inhalation				
Long-term systemic	mg/m ³	1.34	0.375	0.28

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Turnhoutsebaan 171 bus 120
2480 Dessel, Belgium

Legal Address:
Gemeentedijk 20
2480 Dessel, Belgium

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PROC 5				
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.0048	0.000006
Inhalation				
Long-term systemic	mg/m ³	1.34	0.5	0.37
PROC 8a				
Transfer of chemicals from/to vessels/ large containers at non dedicated facilities				
	Unit	DNEL	Exposure concentration	RCR
Dermal				
Long-term systemic	mg/kg bw/day	12.22	0.096	0.00011
Inhalation				
Long-term systemic	mg/m ³	1.34	1	0.75
PROC 8b				
Transfer of chemicals from/to vessels/ large containers at dedicated facilities				
	Unit	DNEL	Exposure concentration	RCR
Dermal				

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 2480 Dessel, Belgium

Legal Address:
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Long-term systemic	mg/kg bw/day	12.22	0.048	0.00006		
Inhalation						
Long-term systemic	mg/m ³	1.34	0.25	0.19		
Environment						
SpERC Eurometaux 2.5-6c.v2.1						
Industrial use of metal compounds in glass, ceramics and crystal industry sector.						
Compartment	Unit	PNEC	PECregional	Clocal	PEC	RCR
Freshwater	µg Ba/L	227.8	1.0E-03	0.065	0.0663	0.291
Freshwater sediment	mg Ba/kg dw	792.7	10.2	Not calculated	346	0.218
Marine		Not calculated				Not calculated
Marine sediment		Not calculated				Not calculated
Terrestrial	mg Ba/kg dw	207.7	0.204	0.316	0.4	1.93E-03
STP	mg Ba/L	50.1	-			Wastewater is not connected to an STP
4. Guidance to check compliance with the Exposure Scenario						
4.1. Health						

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 2480 Dessel, Belgium

 Legal Address:
 Gemeentedijk 20
 2480 Dessel, Belgium

Phone: +32 (0) 14 38 91 92

Fax: +32 (0) 14 38 91 99

www.basstechintl.com

Workers: Scaling tool: MEASE – Occupational Exposure Assessment tool for REACH (free download: <http://www.ebrc.de/industrial-chemicals-reach/projects-and-references/mease.php>)

Scaling considering duration and frequency of use. Collect process occupational exposure monitoring data. It should be noted that the evaluation of worker safety presented in this document is based on standardised (default) assumptions on levels of exposure associated with generic processes, the behaviour of a compound in a particular working environment and the presumed efficiency of Risk Management Measures (e.g. LEV, RPE). These standardised assumptions may not accurately reflect the conditions that prevail at a particular site. As such, the information presented in this document should be regarded as a guidance tool only. It remains the responsibility of the user to ensure that a compound is used safely within the context of their site and in full consultation with the relevant local authorities.

4.2. Environment

Scaling tool: Metal EUSES IT tool (free download: <http://www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool>).

Scaling of the release to air and water environment includes: refining of the release factor to air and wastewater and/or the efficiency of the air filter and wastewater treatment facility.

It should be noted that the emissions to wastewater presented in this document have been modelled on the basis of dilution/flow rate of receiving waters. These assumptions may not accurately reflect the conditions that prevail at a particular site. As such, the information presented in this document should be regarded as a guidance tool only. It remains the responsibility of the user to ensure that a compound is used safely within the context of their site and in full consultation with the relevant local authorities.

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SDS ID: BTI02440_EU

Exposure scenario 4 – Exposure resulting from Industrial Use: Furnace

Title	Industrial Use - Furnace
Sector of use	SU 3: industrial
Process category	PROC22 – Potentially closed processing operations with minerals/metals at elevated temperature – Industrial setting
Environmental release category	SpERC Eurometaux 2.2c.v2.1 – Formulation of metal compounds in other than plastics and paint sectors. Mixing and blending of metal compounds into preparations. All processes are integrated in the release fractions from raw materials handling to cleaning and maintenance.
Processes, tasks, activities covered	The formulation scenario includes feeding of the raw material with screw feeders, pneumatic or vibratory feeders to scale hoppers and weighing. After weighing it is discharged on the conveyor belt with other components and transported to the mixer. It is a closed batch process.
1. Operational conditions and risk	
1.1. Control of worker exposure: PROC 22	
Frequency and duration of use	
Covers daily exposures up to 8 hours (unless stated differently)	
Product characteristics	
Physical state	Solid
Vapour pressure	Not determined but expected to be low
Fugacity / Dustiness	High dustiness
Concentration of the substance in mixture/article	Covers percentage substance in the product up to 100 % (unless stated differently)
Human factors not influenced by risk management	
Not applicable	
Other given operational conditions affecting workers exposure	

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Assumes industrial, indoor use Assumes a good basic standard of occupational hygiene is implemented	
Technical conditions and measures to prevent release	
None	
Technical conditions and measures to control dispersion and exposure	
Provide a good standard of general ventilation. Provide extract ventilation to points where emissions occur at material transfer points and other openings (PROC 22).	
Organisational measures to prevent/ limit releases, dispersion and exposure	
Non dispersive use, non-direct handling (except for transfer activities: direct handling), incidental contact level	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to type EN374) in combination with 'basic' employee training. No respiratory protection required.	
1.2. Control of environmental exposure: 6A	
Operational conditions	
Amount used	
Regional use tonnage (tonnes/year)	987
Fraction of regional tonnage used locally	100%
Maximum daily site tonnage (kg/day)	14731, 34
Frequency and duration of use	
Emission days (days/year)	180 (default value from Eurometaux spERC 2.5-6c.v2.1)
Environmental factors not influenced by risk management	
Local fresh water dilution factor	1.5xE6 m3/d (dilution: 779)
Local marine water dilution factor	For estuarine and marine discharges a default dilution factor of 100 was used.
Other given operational conditions affecting environmental exposure	Eurometaux spERC background document 2.5-6c.v2.1

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Release fraction to air from process	2% (after on-site RMM)
Release fraction to wastewater from process	0.5 % (after on-site STP) Here a conservative value of 2% was assumed
Release fraction to soil from process	0 % (not applicable to local scale)
Risk management measures	
Technical conditions and measures at process level (source) to prevent release	Direct emissions should be reduced by implementing one or more of the RMMs reported in the Eurometaux spERC background document 2.5-6c.v2.1
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air:	Eurometaux spERC background document 2.5-6c.v2.1
Wastewater:	Eurometaux spERC background document 2.5-6c.v2.1
Soil:	Eurometaux spERC background document 2.5-6c.v2.1
Organizational measures to prevent/limit release from site	Eurometaux spERC background document 2.5c-6c.v2.1
Organizational measures to prevent/limit release from site	
None	
Conditions and measures related to municipal waste water treatment plant	
Municipal sewage treatment plant	No
Discharge rate of the municipal STP	Not relevant
Incineration of the sludge of the Municipal STP	Not relevant
Conditions and measures related to external treatment of waste for disposal	Barium bearing waste shall be recovered or recycled if possible. Releases to the floor, water and soil are to be prevented.
Conditions and measures related to external recovery of waste	Not applicable
2. Exposure estimation and reference to its source	

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2.1. Health						
Exposure scenarios have been calculated using MEASE1.02.01, an exposure assessment tool for metals and inorganic substances (http://www.ebrc.de/industrial_chemicalsreach/projects_and_references/mease.php). This tool is developed by EBRC and commissioned by Eurometaux.						
2.2. Environment						
Predicted (modelled) local and regional (measured) concentrations of barium are used for calculation of the PEC – Tools available: EUSES 2.1.2 / Suitable scaling tools The Specific Environmental Release Factors (SPERCS) for metals and metal compounds can be found here: http://www.reach-metals.eu/index.php?option=com_content&task=view&id=124&Itemid=203						
3. Exposure and risk estimation						
Workers						
PROC 22 Potentially closed processing operations with minerals/metals at elevated temperature – Industrial setting						
	Unit	DNEL	Exposure concentration	RCR		
Dermal						
Long-term systemic	mg/kg bw/day	12.22	0.099	0.00012		
Inhalation						
Long-term systemic	mg/m ³	1.34	0.7	0.52		
Environment						
SpERC Eurometaux 2.5-6c.v2.1 Industrial use of metal compounds in glass, ceramics and crystal industry sector.						
Compartment	Unit	PNEC	PECregional	Clocal	PEC	RCR

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