

## SAFETY DATA SHEET



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

#### 1.1 Product identifier

**Product name** : *Polybor*<sup>®</sup> DF  
**Product type** : Solid.

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

**Material uses** : Refer to Annex - Exposure Scenarios

Identified uses	
Binding agent Chemical production Complexing agent Corrosion inhibitors and anti-scaling agents Fertilisers Flame retardants Flux agents for casting Intermediate Laboratory chemicals Lubricants and lubricant additives Oxidising agents Photosensitive agents and other photo-chemicals pH-regulating agents Plating agents and metal surface treating agents Process regulator (other than polymerisation or vulcanization processes) Process regulator (used in polymerisation or vulcanization processes) Processing aid not otherwise listed Stabilisers Surface active agents Viscosity modifiers <i>A complete list of uses is provided in the introduction to Annex - Exposure Scenarios</i>	
Uses advised against	Reason
Consumer uses above the specific concentration limit.	Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

#### 1.3 Details of the supplier of the safety data sheet

**Borax Europe Limited**  
6 St. James's Square  
London, SW1Y 4AD  
United Kingdom

+44 (0)20 7781 2000

**e-mail address of person responsible for this SDS** : [rtb.sds@riotinto.com](mailto:rtb.sds@riotinto.com)

#### 1.4 Emergency telephone number

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

### National advisory body/Poison Centre

- Telephone number** : EU States Emergency Helpdesks: [http://echa.europa.eu/help/nationalhelp\\_contact\\_en.asp](http://echa.europa.eu/help/nationalhelp_contact_en.asp)
- Telephone number** : +44 (0) 1235 239 670 (Rio Tinto Borates)  
For advice on chemical emergencies, spillages, fires or First Aid.

## SECTION 2: Hazards identification

### 2.1 Classification of the substance or mixture

**Product definition** : Mixture

### Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Eye Irrit. 2, H319

Repr. 1B, H360FD (Fertility and Unborn child)

Boric acid has a specific concentration limit of  $\geq 5.5\%$  for toxic to reproduction classification. Sodium tetraborate pentahydrate has a specific concentration limit of  $\geq 6.5\%$  for toxic for reproduction classification and  $\geq 10\%$  for eye irritant classification. Pentaboron sodium octaoxide pentahydrate has a specific concentration limit of  $\geq 5.2\%$  for toxic to reproduction classification.

The product is classified as hazardous according to Regulation (EC) 1272/2008 as amended.

See Section 16 for the full text of the H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

### 2.2 Label elements

#### **Hazard pictograms**



**Signal word** : Danger

**Hazard statements** : Causes serious eye irritation.  
May damage fertility. May damage the unborn child.

#### Precautionary statements

**General** : Do not handle until all safety precautions have been read and understood.

**Prevention** : Use personal protective equipment as required.

**Response** : IF exposed or concerned: Get medical attention.  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**Storage** : Not applicable.

**Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Hazardous ingredients** : boric acid  
disodium tetraborate pentahydrate

**Supplemental label elements** : Not applicable.

**Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles** : Restricted to professional users. The product is permitted for use in consumer products where it is below the specific concentration limit.

#### Special packaging requirements

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## SECTION 2: Hazards identification

**Containers to be fitted with child-resistant fastenings** : Not applicable.

**Tactile warning of danger** : Not applicable.

### 2.3 Other hazards

**Other hazards which do not result in classification** : May be harmful if swallowed.

## SECTION 3: Composition/information on ingredients

**3.2 Mixtures** : Mixture

Product/ingredient name	Identifiers	%	Regulation (EC) No. 1272/2008 [CLP]	Type
boric acid	REACH #: 01-2119486683-25 EC: 233-139-2 CAS: 10043-35-3 Index: 005-007-00-2	45	Repr. 1B, H360FD (Fertility and Unborn child)	[1] [2]
disodium tetraborate pentahydrate	REACH #: 01-2119490790-32 EC: 215-540-4 CAS: 12179-04-3 Index: 005-011-02-9	35	Eye Irrit. 2, H319 Repr. 1B, H360FD (Fertility and Unborn child)	[1] [2]
Pentaboron sodium octaoxide pentahydrate	REACH #: 01-2119970731-35 EC: 234-522-7 CAS: 12631-71-9	20	Repr. 2, H361d (Unborn child)	[1]
<b>See Section 16 for the full text of the H statements declared above.</b>				

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment, are PBTs, vPvBs or Substances of equivalent concern, or have been assigned a workplace exposure limit and hence require reporting in this section.

### Type

[1] Substance classified with a health or environmental hazard

[2] Substance with a workplace exposure limit

[3] Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII

[4] Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII

[5] Substance of equivalent concern

[6] Additional disclosure due to company policy

Occupational exposure limits, if available, are listed in Section 8.

## SECTION 4: First aid measures

### 4.1 Description of first aid measures

**Eye contact** : Use eye wash fountain or fresh water to cleanse the eye. If irritation persists for more than 30 minutes, seek medical attention.

**Inhalation** : If symptoms such as nose or throat irritation are observed, remove to fresh air.

**Skin contact** : No treatment necessary.

**Ingestion** : Swallowing small quantities (one teaspoon) will cause no harm to healthy adults. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

**Protection of first-aiders** : No special protective clothing is required

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## SECTION 4: First aid measures

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

#### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
respiratory tract irritation  
coughing
- Skin contact** : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.
- Ingestion** : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

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

- Notes to physician** : Supportive care only is required for adult ingestion of less than a few grams of the product. For ingestion of larger amounts, maintain fluid and electrolyte balance and maintain adequate kidney function. Gastric lavage is only recommended for heavily exposed, symptomatic patients in whom emesis has not emptied the stomach. Hemodialysis should be reserved for patients with massive acute absorption, especially for patients with compromised renal function. Boron analyses of urine or blood are only useful for verifying exposure and are not useful for evaluating severity of poisoning or as a guide in treatment.
- Specific treatments** : No specific treatment.

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

### 5.2 Special hazards arising from the substance or mixture

- Hazards from the substance or mixture** : None. The product is not flammable, combustible or explosive.
- Hazardous combustion products** : None.

### 5.3 Advice for firefighters

- Special protective actions for fire-fighters** : None.
- Special protective equipment for fire-fighters** : Not applicable.
- Additional information** : Not explosive.

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## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : Eye protection according to CEN 166:2001; respirators according to CEN149:2001 should be considered if environment is excessively dusty.
- For emergency responders** : Eye protection according to CEN 166:2001; respirators according to CEN149:2001 should be considered if environment is excessively dusty.

### 6.2 Environmental precautions

- : The product is a water-soluble white powder that may cause damage to trees or vegetation by root absorption. Avoid contamination of water bodies during clean up and disposal. Advise local water authority that none of the affected water should be used for irrigation or for the abstraction of potable water until natural dilution returns the boron value to its normal environmental background level or meets local water quality standards.

### 6.3 Methods and material for containment and cleaning up

- Small spill** : Move containers from spill area. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labelled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

### 6.4 Reference to other sections

- : See Section 1 for emergency contact information.  
See Section 8 for information on appropriate personal protective equipment.  
See Section 13 for additional waste treatment information.

## SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

### 7.1 Precautions for safe handling

- Protective measures** : Good housekeeping procedures should be followed to minimise dust generation and accumulation. Avoid spills.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

### 7.2 Conditions for safe storage, including any incompatibilities

No special handling precautions are required, but dry, indoor storage is recommended. To maintain package integrity and to minimise caking of the product, bags should be handled on a first-in first-out basis.

Storage temperature: Ambient temperature  
Storage pressure: Ambient pressure  
Special sensitivity: Moisture (Caking)

### 7.3 Specific end use(s)

- Recommendations** : Refer to Annex - Exposure Scenarios
- Industrial sector specific solutions** : Not available.

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## SECTION 7: Handling and storage

## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

#### Occupational exposure limits

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

Product/ingredient name	Exposure limit values
boric acid	<b>ACGIH TLV (United States, 3/2017).</b> TWA: 2 mg/m <sup>3</sup> 8 hours. Form: Inhalable fraction STEL: 6 mg/m <sup>3</sup> 15 minutes. Form: Inhalable fraction
disodium tetraborate pentahydrate	<b>ACGIH TLV (United States, 3/2017).</b> TWA: 2 mg/m <sup>3</sup> 8 hours. Form: Inhalable fraction STEL: 6 mg/m <sup>3</sup> 15 minutes. Form: Inhalable fraction

**Recommended monitoring procedures** : In the absence of a national OEL, Rio Tinto Borates recommends and applies internally an Occupational Exposure Limit (OEL) of 1 mg B/m<sup>3</sup>. To convert product into equivalent boron (B) content, multiply by 0.167.

#### DNELs/DMELs

Product/ingredient name	Type	Exposure	Value	Population	Effects
Polybor® DF	DNEL	Long term Oral	1.02 mg/kg bw/day	Consumers	Systemic
	DNEL	Short term Oral	1.02 mg/kg bw/day	Consumers	Systemic
	DNEL	Short term Inhalation	15.09 mg/m <sup>3</sup>	Consumers	Local
	DNEL	Long term Inhalation	15.09 mg/m <sup>3</sup>	Consumers	Local
	DNEL	Long term Inhalation	15.09 mg/m <sup>3</sup>	Workers	Local
	DNEL	Short term Inhalation	15.09 mg/m <sup>3</sup>	Workers	Local
	DNEL	Long term Inhalation	8.68 mg/m <sup>3</sup>	Workers	Systemic
	DNEL	Long term Inhalation	4.37 mg/m <sup>3</sup>	Consumers	Systemic
	DNEL	Long term Dermal	205.4 mg/kg bw/day	Consumers	Systemic
	DNEL	Long term Dermal	407.2 mg/kg bw/day	Workers	Systemic

#### PNECs

Product/ingredient name	Compartment Detail	Value	Method Detail
Polybor® DF	Fresh water	2.02 mg B/L	-
	Marine water	2.02 mg B/L	-
	Water - intermittent	13.7 mg B/L	-
	Air	No exposure expected	-
	Soil	5.4 mg B/kg dry soil	-
	Sediment	Waived due to lack of partitioning to sediment	-
	Sewage Treatment Plant	10 mg B/L	-

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## SECTION 8: Exposure controls/personal protection

### 8.2 Exposure controls

**Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

#### Individual protection measures

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles. Recommended: Eye protection according to CEN 166:2001 is required.

#### Skin protection

**Hand protection** : Standard work gloves (cotton, canvas or leather) may be warranted if environment is excessively dusty

**Body protection** : No special protective clothing is required.

**Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection** : Where airborne concentrations are expected to exceed exposure limits, respirators should be used. (CEN 149:2001).

**Environmental exposure controls** : Limiting releases from site: Where appropriate, material should be recovered and recycled through the process. Spillages of powder or granulated borates should be swept or vacuumed up immediately and placed in containers for disposal in order to prevent unintentional release to the environment. Waste containing borates should be handled as a hazardous waste and removed by licensed operator to an offsite location where it can be incinerated or disposed to a hazardous landfill.

Water Emissions: Storage should be sheltered from precipitation. Avoid spillage into water and cover drains. Removal from water can only be accomplished by very specific treatment technologies including ion exchange resins, reverse osmosis etc. Removal efficiency is dependent upon a number of factors and will vary from 40 to 90%. Much of the technology is currently not appropriate to high volume or mixed waste streams. Boron is not removed in considerable amounts in conventional STP. If sites discharge to a municipal STP the concentration of boron should not exceed the PNEC in the municipal STP

Air Emissions: Emissions to air can be removed by one or more of the following dust-control measures: electrostatic precipitators, cyclones, fabric or bag filters, membrane filters, ceramic and metal mesh filters, and wet scrubbers

## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

#### Appearance

**Physical state** : Solid. [Crystalline solid.]

**Colour** : White.

**Odour** : Odourless.

**Odour threshold** : Not available.

**pH** : 7.4 [Conc. (% w/w): 10%]

**Melting point/freezing point** : >500°C



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## SECTION 9: Physical and chemical properties

<b>Initial boiling point and boiling range</b>	: Not applicable.
<b>Flash point</b>	: Not applicable.
<b>Evaporation rate</b>	: Not applicable.
<b>Flammability (solid, gas)</b>	: The product is not flammable, combustible or explosive.
<b>Upper/lower flammability or explosive limits</b>	: Not available.
<b>Vapour pressure</b>	: Not applicable.
<b>Vapour density</b>	: Not available.
<b>Bulk density</b>	: Not available.
<b>Granulometry</b>	: Not available.
<b>Relative density</b>	: 1.49 @ 23°C ( Boric acid); 2.35 @ 26°C (Disodium tetraborate anhydrous); 1.72 @ 23°C ( disodium tetraborate decahydrate); 1.691 @ 20°C ( Pentaboron sodium octaoxide pentahydrate)
<b>Solubility(ies)</b>	: 9.5% at 20 °C
<b>Partition coefficient: n-octanol/ water</b>	: Not applicable.
<b>Auto-ignition temperature</b>	: Not applicable.
<b>Decomposition temperature</b>	: Not applicable.
<b>Viscosity</b>	: Dynamic (room temperature): Not applicable. Kinematic (room temperature): Not applicable.
<b>Explosive properties</b>	: Not explosive.
<b>Oxidising properties</b>	: Not oxidising.

### 9.2 Other information

**Solubility in water** : Not available.

## SECTION 10: Stability and reactivity

<b>10.1 Reactivity</b>	: No specific test data related to reactivity available for this product or its ingredients.
<b>10.2 Chemical stability</b>	: Under normal ambient temperatures (-40°C to +40°C), the product is stable. When heated it loses water, eventually forming anhydrous borates.
<b>10.3 Possibility of hazardous reactions</b>	: Reaction with strong reducing agents such as metal hydrides or alkali metals will generate hydrogen gas which could create an explosive hazard.
<b>10.4 Conditions to avoid</b>	: Avoid contact with strong reducing agents by storing according to good industrial practice
<b>10.5 Incompatible materials</b>	: Strong reducing agents
<b>10.6 Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.



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## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

#### Acute toxicity

Product/ingredient name	Result type	Species	Dose	Exposure
boric acid	LC50 Inhalation Dusts and mists LD50 Dermal	Rat Rabbit	>2 mg/l 2000 mg/kg body weight	4 hours -
	LD50 Oral	Rat	2000 to 5000 mg/kg body weight	-

**Conclusion/Summary** : Based on the available data, the classification criteria are not met.

#### Acute toxicity estimates

Not available.

#### Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
disodium tetraborate pentahydrate	Skin - No irritation.	New Zealand White Rabbit	-	0.5 g moistened with saline	-
	Eyes - Irritant	New Zealand White Rabbit	-	0.08 ml equivalent	-

#### Conclusion/Summary

**Skin** : Non-irritant to skin.

**Eyes** : Irritating, fully reversible in 14 days. Classification: Eye irritation Category 2 (Hazard statements: H319 Causes serious eye irritation.)  
Many years of occupational exposure indicate no adverse effects on human eye.

#### Sensitisation

Product/ingredient name	Route of exposure	Species	Result
disodium tetraborate pentahydrate	skin	Guinea pig	Not sensitizing

#### Conclusion/Summary

**Skin** : Non-sensitiser to skin. Based on the available data, the classification criteria are not met.

**Respiratory** : No respiratory sensitisation studies have been conducted. There are no data to suggest that boric acid is a respiratory sensitiser. Based on the available data, the classification criteria are not met.

#### Mutagenicity

Product/ingredient name	Test	Experiment	Result
boric acid	(based on boric acid)	Experiment: In vitro Subject: Mammalian-Animal Cell: Germ	Negative

**Conclusion/Summary** : Not mutagenic (based on boric acid). Based on the available data, the classification criteria are not met.

#### Carcinogenicity

Product/ingredient name	Result	Species	Dose	Exposure
boric acid	Negative - Oral - TC	Mouse	446 to 1150 mg/kg Boric acid / body weight	-

**Conclusion/Summary** : No evidence of carcinogenicity in mice. Based on the available data, the classification criteria are not met.

#### Reproductive toxicity

Polybor® DF

## SECTION 11: Toxicological information

Product/ingredient name	Maternal toxicity	Fertility effects	Developmental effects	Species	Effects	Exposure
boric acid	-	Positive	-	Rat	NOAEL in rats for effects on fertility in males is 17.5 mg B/kg body weight. No adverse fertility effects in male workers. Epidemiological studies of human developmental effects have shown an absence of effects in exposed borate workers and populations living in areas with high environmental levels of boron. Epidemiological studies of human developmental effects have shown an absence of effects in exposed borate workers and populations living in areas with high environmental levels of boron. NOAEL in rats for developmental effects on the foetus including foetal weight loss and minor skeletal variations is 9.6 mg B/kg body weight; NOAEL in rats for maternal toxicity is 13.3 mg B/kg body weight	Oral feeding study
	Negative	Negative	Negative	Human		Combined oral ingestion and inhalation.
	Positive	-	Positive	Rat		Oral feeding study

**Conclusion/Summary** : Reprotoxicity studies have been conducted with boric acid and disodium tetraborate. A multigeneration study in the rat gave a NOAEL for fertility in males of 17.5 mg B/kg/day. Developmental effects have been observed in laboratory animals, the most sensitive species being the rat with a NOAEL of 9.6 mg B/kg bw/day. Boric acid and Disodium tetraborate are classified under the 1st ATP to CLP as Repr. 1B; H360FD. While boron has been shown to adversely affect male reproduction in laboratory animals, there was no clear evidence of male reproductive effects attributable to boron in studies of highly exposed workers.

### Teratogenicity

**Conclusion/Summary** : See Reproductive toxicity.

### Specific target organ toxicity (single exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Based on the available data, the classification criteria are not met.			

### Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Route of exposure	Target organs
Based on the available data, the classification criteria are not met.			

### Aspiration hazard

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## SECTION 11: Toxicological information

Product/ingredient name	Result
Polybor® DF	Physical form of solid powder indicates no aspiration hazard potential.

**Information on likely routes of exposure** : Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because product is poorly absorbed through intact skin. **Product is not intended for ingestion.**

### Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.
- Ingestion** : This product is not intended for ingestion. Small amounts (e.g., a teaspoon) swallowed accidentally are not likely to cause effects; swallowing amounts larger than that may cause gastrointestinal symptoms. Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

### Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:  
pain or irritation  
watering  
redness
- Inhalation** : Adverse symptoms may include the following:  
respiratory tract irritation  
coughing
- Skin contact** : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.
- Ingestion** : Symptoms of accidental over-exposure to high doses of inorganic borate salts have been associated with ingestion or absorption through large areas of severely damaged skin. These may include nausea, vomiting, and diarrhoea, with delayed effects of skin redness and peeling.

### Delayed and immediate effects as well as chronic effects from short and long-term exposure

#### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

#### Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid and sodium borate dust. Human epidemiological studies indicate no effect on fertility in occupational populations with chronic exposures to borate dust and indicate no effect to a general population with high exposures to borates in the environment.

### Potential chronic health effects

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## SECTION 11: Toxicological information

Product/ingredient name	Result	Species	Dose	Exposure
boric acid	Chronic NOAEL Oral	Rat	17.5 mg/kg 0; 33 (5.9); 100 (17.5); 334 (58.5) mg boric acid (B)/kg bw per day (nominal in diet); and 0; 52 (5.9); 155 (17.5); 516 (58.5) mg borax (B)/kg/day (nominal in diet)	Oral feeding study

**Conclusion/Summary** : A NOAEL of 17.5 mg B/kg body weight/day equivalent to 100 mg boric acid/kg body weight/day was determined in a chronic feeding study (2 years) in rats and is based on testes effects.

Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to boric acid and sodium borate dust. Human epidemiological studies indicate no effect on fertility in occupational populations with chronic exposures to borate dust and indicate no effect to a general population with high exposures to borates in the environment.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : May damage the unborn child.

**Developmental effects** : May damage the unborn child.

**Fertility effects** : May damage fertility.

### Toxicokinetics

**Absorption** : Absorption of borates via the oral route is nearly 100 %. For the inhalation route also 100 % absorption is assumed as worst case scenario. Dermal absorption through intact skin is very low with a percent dose absorbed of < 0.5 %.

**Distribution** : Boric acid is distributed rapidly and evenly through the body, with concentrations in bone 2 - 3 higher than in other tissues.

**Metabolism** : In the blood boric acid is the main species present and is not further metabolised

**Elimination** : Boric acid is excreted rapidly, with elimination half-lives of 1 h in the mouse, 3 h in the rat and < 27.8 h in humans, and has low potential for accumulation. Boric acid is mainly excreted in the urine.

**Other information** : Not available.

## SECTION 12: Ecological information

### 12.1 Toxicity

Product/ingredient name	Test	Result	Species	Exposure
boric acid	Algae	EC50 52.4 mg/l (as Boron)	<i>Pseudokirchneriella subcapitata</i>	Fresh water - Acute
	Invertebrate	LC50 91 mg/l (as Boron)	<i>Ceriodaphnia dubia</i>	Fresh water - Acute
	Fish.	LC50 79.7 mg/l (as Boron)	<i>Pimephales promelas</i>	Fresh water - Acute
	Fish.	NOEC 6.4 mg/l (as Boron)	<i>Brachydanio rerio</i>	Fresh water - Chronic
	Invertebrate	NOEC 14.2 mg/l (as Boron)	<i>Daphnia magna</i>	Fresh water - Chronic
Algae	NOEC 17.5 mg/l (as Boron)	<i>Pseudokirchneriella subcapitata</i>	Fresh water - Chronic	

**Conclusion/Summary** : Note that the data values are expressed as boron equivalents. To convert product into equivalent boron (B) content, multiply by 0.167. Studies judged to be unreliable or with insufficient information to evaluate are not included.

Boron is an essential micronutrient for healthy growth of plants; however, it can be harmful to boron sensitive plants in high quantities. Care should be taken to minimize the amount of this product released to the environment.

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## SECTION 12: Ecological information

### 12.2 Persistence and degradability

**Conclusion/Summary** : Not applicable. Inorganic substance

### 12.3 Bioaccumulative potential

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
boric acid	-0.757	-	low

### 12.4 Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Mobility** : The product is soluble in water and is leachable through normal soil. Adsorption to soils or sediments is insignificant.

### 12.5 Results of PBT and vPvB assessment

**PBT** : Not applicable.  
P: Not available. B: Not available. T: Not available.

**vPvB** : Not applicable.  
vP: Not available. vB: Not available.

**12.6 Other adverse effects** : No known significant effects or critical hazards.

## SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

### 13.1 Waste treatment methods

#### Product

**Methods of disposal** : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

**Hazardous waste** : Yes. This product is classified as toxic to reproduction (Repr. 1B) and falls within scope of Directive 2008/98/EC as hazardous waste (H10).

#### Packaging

**Methods of disposal** : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

**Special precautions** : Care should be taken when handling emptied containers that have not been cleaned or rinsed out.

Polybor® DF

## SECTION 14: Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	Not regulated.	Not regulated.	Not regulated.	Not regulated.
14.2 UN proper shipping name	-	-	-	-
14.3 Transport hazard class(es)	-	-	-	-
14.4 Packing group	-	-	-	-
14.5 Environmental hazards	No.	No.	No.	No.

14.6 Special precautions for user : Not applicable.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code : Not available.

## SECTION 15: Regulatory information

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

[EU Regulation \(EC\) No. 1907/2006 \(REACH\)](#)

[Annex XIV - List of substances subject to authorisation](#)

[Annex XIV](#)

None of the components are listed.

[Substances of very high concern](#)

Ingredient name	Intrinsic property	Status	Reference number	Date of revision
Boric acid	Toxic to reproduction	Candidate	ED/30/2010	7/1/2015
Disodium tetraborate anhydrous	Toxic to reproduction	Candidate	ED/30/2010	7/1/2015

**Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles** : Restricted to professional users. The product is permitted for use in consumer products where it is below the specific concentration limit.

[Other EU regulations](#)

**Industrial emissions (integrated pollution prevention and control) - Air** : Not listed

**Industrial emissions (integrated pollution prevention and control) - Water** : Not listed

[Ozone depleting substances \(1005/2009/EU\)](#)

Polybor® DF

## SECTION 15: Regulatory information

Not listed.

### Prior Informed Consent (PIC) (649/2012/EU)

Not listed.

### Seveso Directive

This product is not controlled under the Seveso Directive.

### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A, B, C, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

### Inventory list

<b>Australia</b>	: All components are listed or exempted.
<b>Canada</b>	: All components are listed or exempted.
<b>China</b>	: All components are listed or exempted.
<b>Europe</b>	: All components are listed or exempted.
<b>Japan</b>	: <b>Japan inventory (ENCS)</b> : Not determined. <b>Japan inventory (ISHL)</b> : All components are listed or exempted.
<b>Malaysia</b>	: Not determined.
<b>New Zealand</b>	: All components are listed or exempted.
<b>Philippines</b>	: All components are listed or exempted.
<b>Republic of Korea</b>	: All components are listed or exempted.
<b>Taiwan</b>	: All components are listed or exempted.
<b>Thailand</b>	: Not determined.
<b>Turkey</b>	: Not determined.
<b>United States</b>	: All components are listed or exempted.
<b>Viet Nam</b>	: Not determined.

**15.2 Chemical safety assessment** : Complete.

## SECTION 16: Other information

🔍 Indicates information that has changed from previously issued version.

**Abbreviations and acronyms** : ATE = Acute Toxicity Estimate  
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]  
DMEL = Derived Minimal Effect Level  
DNEL = Derived No Effect Level  
EUH statement = CLP-specific Hazard statement  
IMSBC = International Maritime Solid Bulk Cargoes Code  
PBT = Persistent, Bioaccumulative and Toxic  
PNEC = Predicted No Effect Concentration



Polybor® DF

## SECTION 16: Other information

RRN = REACH Registration Number  
vPvB = Very Persistent and Very Bioaccumulative

**Key literature references and sources for data** : For general information on the toxicology of borates see Patty's Toxicology, 6th Edition Vol. I, (2012) Chap. 23, 'Boron'.

### Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Eye Irrit. 2, H319 Repr. 1B, H360FD (Fertility and Unborn child)	Expert judgment Regulatory data

### Full text of abbreviated H statements

H319 H360FD H361d	Causes serious eye irritation. May damage fertility. May damage the unborn child. Suspected of damaging the unborn child.
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### Full text of classifications [CLP/GHS]

Eye Irrit. 2, H319 Repr. 1B, H360FD  Repr. 2, H361d	SERIOUS EYE DAMAGE/EYE IRRITATION - Category 2 REPRODUCTIVE TOXICITY (Fertility and Unborn child) - Category 1B REPRODUCTIVE TOXICITY (Unborn child) - Category 2
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**Additional information** : Restricted to professional users.  
Do not ingest.  
Keep out of reach of children.  
Refer to safety data sheet.  
Not for use in food, drugs or biocides

**Date of issue/ Date of revision** : 21/09/2018

**Date of previous issue** : 12/07/2018

**Version** : 1.01

Europe / 4.9 / EN-GB

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

## Annex: Exposure Scenarios

The following table lists the uses identified and registered for this substance. Each use has a number of applicable human health, environmental and consumer exposure scenarios. These can be found at [www.borax.com/EU-REACH/exposure-scenarios](http://www.borax.com/EU-REACH/exposure-scenarios)

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
1	Production and Import	Production and Import	X					3,8,9	1,7,8,9a,9b,12,14,15,17,18,19,20,21,23,24,25,26,29,30,32,37,38,39	1, 2, 3, 4, 8a, 8b, 9, 14, 15	-	1, 6a	E1 - Importing, manufacture, refining and packaging of borates	ES3 - Refining and processing of borates ES14 - Loading of road tankers ES15 - Off-loading borates from ships ES19 - Packaging into bags (25-50kg) ES20 - Packaging into big bags (750-1500kg) ES21 - General maintenance activities ES32 - Working in a laboratory ES41 - Working in a warehouse
2	Abrasives	Formulation of borates in abrasives		X				3	UCN S351000	3, 4, 5, 8b, 9	4	3	E8 - Generic formulation of borates into materials	ES2 - Closed or largely closed production at high temperatures ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750-1500kg) into mixing vessels ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES31 - Compaction and tableting of borate-containing powders ES32 - Working in a laboratory
3	Abrasives	Industrial use of abrasives			X			3, 15, 17	UCN S351000	24	4	4	E9 - Generic industrial use of borates as processing aids in processes and products	ES39 - Industrial and professional use of abrasives
4	Abrasives	Professional use of abrasives			X		X	22	UCN S351000	24	4	10b, 11b	E28 - Generic wide dispersive use of articles containing borates with high release	ES39 - Industrial and professional use of abrasives
5	Abrasives	Consumer use of abrasives				X	X	21	UCN S351000	-	4	10b, 11b	E28 - Generic wide dispersive use of articles containing borates with high release	ESC5 - Consumer exposure for the use of cutting wheels

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
6	Adhesives	Formulation of borates in adhesives		X				6a, 6b, 9, 11	1	3, 4, 5, 8a, 8b, 9, 14	-	2	E7 - Formulation into of borates into adhesives	<p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES18 - Transfer of substance or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES31 - Compaction and tableting of borate-containing powders</p> <p>ES32 - Working in a laboratory</p>
7	Adhesives	Industrial use of adhesives			X		X	3, 6a, 6b, 16, 17, 18, 19	1	2, 4, 5, 7, 8b, 9, 10, 13, 14	-	5	E12 - Industrial use of adhesives containing borate compounds	<p>ES6 - Industrial application of adhesive</p> <p>ES18 - Transfer of substance or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES26 - Professional application of adhesives</p>
8	Adhesives	Consumer use of articles containing adhesives				X	X	21	-	-	8	10a, 11a	E27 - Generic wide dispersive use of articles containing borates with low release	ESC2 - Consumer mouthing of cardboard and oral contact with boron-containing adhesives

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
9	Agriculture	Formulation of borates in fertilizers		X				1, 3	12	2, 3, 4, 5, 8b, 9, 14	-	2	E4 - Generic formulation of borates into mixtures	<p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES31 - Compaction and tableting of borate-containing powders</p> <p>ES32 - Working in a laboratory</p>
10	Agriculture	Professional use of fertilizers			X			1, 22	12	2, 3, 4, 5, 8a, 8b, 9, 11, 13	-	8a, 8c, 8d, 8f	E24 - Wide dispersive use of fertilizers containing borates	<p>ES5 - Fertigation using boron-containing liquid fertiliser</p> <p>ES10 - Transfer of boron-containing granular fertiliser</p> <p>ES23 - Transfer of boron-containing liquid foliar fertiliser</p> <p>ES27 - Spreading of boron-containing granular fertiliser</p> <p>ES28 - Application of boron-containing liquid foliar fertiliser</p>
11	Agriculture	Consumer use of fertilizers				X		21	19	-	-	8a, 8c, 8d, 8f	E24 - Wide dispersive use of fertilizers containing borates	<p>ESC3 - Consumer use of boron-containing fertiliser</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
12	Analytical reagent	Formulation into analytical reagents		X				3	21	2, 3, 4, 5, 8b, 9, 15, 19	-	2	E4 - Generic formulation of borates into mixtures	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES32 - Working in a laboratory
13	Analytical reagent	Laboratory use of analytical reagent			X			3,22	21	15	-	8a, b, d, e	E22 - Generic environmental exposure scenario for use of borates in laboratories as analytical reagent	ES32 - Working in a laboratory
14	Autocausticizing	Processing aid						3, 6b	20	8b, 9	-	4	E10 - Industrial use of borates for autocausticizing	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
15	Catalysts	Manufacture of catalysts	X	X				3, 8, 9	UCN P15500	3, 4, 5, 8b	-	1, 3, 6a, 6b	E3 - Industrial use of borates in the production of diboron trioxide-containing catalysts	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES31 - Compaction and tableting of borate-containing powders ES32 - Working in a laboratory
16	Catalysts	Polymer production		X				3, 8	32	2	-	1, 6a, 6b	E2 - Generic industrial use of borates resulting in the manufacture of another substance	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities
17	Cellulose insulation	Formulation of cellulose insulation		X				5, 6a, 6b, 19	UCN I15600	1, 2, 3, 4, 8b	4	3	E8 - Generic formulation of borates into materials	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
18	Cellulose insulation	Professional use of cellulose insulation			X			19,22	I15600	21	4	8c, 8f	E26 - Wide dispersive use of cellulose insulation	ES36 - Professional installation of cellulose insulation

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
19	Cellulose insulation	Service life of cellulose insulation					X	-	-		4	10a, 11a	E27 - Generic wide dispersive use of articles containing borates with low release	-
20	Ceramics	Production of frits	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	E17 - Industrial use of borates during the manufacture of frits	ES2 - Closed or largely closed production at high temperatures ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
21	Chemical synthesis	Manufacture of new chemicals using borates	X					3, 8, 9	19	2, 3, 4, 5, 8b, 9, 13, 15, 19, 21	-	1, 6a	E2 - Generic industrial use of borates resulting in the manufacture of another substance	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES31 - Compaction and tableting of borate-containing powders ES32 - Working in a laboratory



IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
22	Coatings	Formulation of paints and coatings		X				3, 7, 8, 10	9a, 18	1,2, 3, 4, 8a, 8b, 9, 15	--	2	E6 - Formulation of borates into paints and coatings	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES31 - Compaction and tableting of borate-containing powders ES32 - Working in a laboratory
23	Coatings	Industrial use of paints and coatings			X			3, 7	9a, 18	7, 8b, 9, 10, 13	-	5	E13 - Industrial use of paints and coatings containing borate compounds	ES11 - Industrial use of paints and coatings.
24	Coatings	Professional use of paints and coatings			X			22	9a, 18	5, 8a, 8b, 9, 10, 11, 13, 19		8c, 8f	E25 - Wide dispersive use of paints and coatings containing borates	ES25 - Professional use of paints and coatings

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
26	Construction materials	Formulation/use of borates in construction materials (plaster board, wood)		X				3, 13	K35000, 8	4, 5, 8b, 14, 24, 26	4, 11	2, 3, 5	<p>E4 - Generic formulation of borates into mixtures</p> <p>E8 - Generic formulation of borates into materials</p> <p>E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix</p>	<p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES31 - Compaction and tableting of borate-containing powders</p> <p>ES32 - Working in a laboratory</p>
27	Construction materials	Professional use of construction materials			X		X	22, 19	K35000, 8	21	4	10a, 11a, 12a	<p>E21 – Generic industrial processing of articles with low abrasive techniques</p> <p>E27 - Generic wide dispersive use of articles containing borates with low release</p>	<p>ES37 - Professional installation of plasterboard, board and other products</p>
28	Construction materials	Consumer use of construction materials				X	X	21	0	-	4	10a, 11a	<p>E27 - Generic wide dispersive use of articles containing borates with low release</p>	<p>ESC4 - Consumer use of boron-containing construction materials (other than insulation)</p>
29	Construction materials	Service life of construction materials					X		-	-	4	10a, 11a	<p>E27 - Generic wide dispersive use of articles containing borates with low release</p>	-

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
30	Detergents	Formulation into detergents		X				3, 10	35	2, 3, 4, 5, 8b, 9, 15	-	2	E5 - Formulation of borates into detergents	<p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production activities at ambient temperatures</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES31 - Compaction and tableting of borate-containing powders</p> <p>ES32 - Working in a laboratory</p>
31	Detergents	Professional use of detergents			X			22	35	1, 2, 3, 11, 10, 13, 19	-	8a, 8c, 8d, 8f	E23 - Generic wide dispersive use of borates with 100% release to water	ES4 - Use of fabric detergents in industrial or professional settings
32	Detergents	Consumer use of detergents				X		21	35	-	-	8a, 8c, 8d, 8f	E23 - Generic wide dispersive use of borates with 100% release to water	ESC1 - Consumer use of boron-containing detergents
33	Glass	Production of glass wool	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	E14 - Industrial use of borates during the manufacture of glass wool	<p>ES2 - Closed or largely closed production at high temperatures</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES32 - Working in a laboratory</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
34	Glass	Production of high alkali glass	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	E15 - Industrial use of borates during the manufacture of high alkali glass	ES2 - Closed or largely closed production at high temperatures ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
35	Glass	Production of low alkali glass	X	X				3, 13, NACE 23.1	19	1, 2, 3, 8b, 22	4	2, 5, 6a	E16 - Industrial use of borates during the manufacture of low alkali glass	ES2 - Closed or largely closed production at high temperatures ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
36	Industrial fluids	Formulation of borates into industrial fluids		X				3, 8, 9, 10,15	20, 24, 25	3, 4, 5, 8b, 9		2	E4 - Generic formulation of borates into mixtures	ES2 - Closed or largely closed production at high temperatures ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES32 - Working in a laboratory

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
37	Industrial fluids	Industrial use of industrial fluids		X	X			3, 15, 17	19, 20, 24, 25	1, 2, 6, 8a, 8b, 9, 10, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, 26	-	2, 4, 5, 7	<p>E4 - Generic formulation of borates into mixtures</p> <p>E9 - Generic industrial use of borates as processing aids in processes and products</p> <p>E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix</p> <p>E18 - Generic industrial use of borates in closed systems</p>	<p>ES2 - Closed or largely closed production at high temperatures</p> <p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES9 - Diluting metal working fluid concentrate with water</p> <p>ES12 - Use of cleaners in industrial or professional settings</p> <p>ES16 - Closed production at ambient temperatures</p> <p>ES17 - Make up of treatment baths for galvanising, plating and other surface treatments</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES29 - Galvanising, plating and other surface treatments of metal articles</p> <p>ES32 - Working in a laboratory</p> <p>ES33 - Use of metal working fluids in machining</p> <p>ES34 - Greasing at high energy conditions</p>
38	Industrial fluids	Consumer use of automotive fluids				x		21	4, 16, 24	-	-	9a, 9b	<p>E27 - Generic wide dispersive use of articles containing borates with low release</p>	<p>ESC8 - Consumer exposure for the use of automotive fluids</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
39	Metallurgy	Formulation into alloys	X	X				3, 14	7, 19	8b,22,23,24	7	1, 2	E2 - Generic industrial use of borates resulting in the manufacture of another substance	<p>ES2 - Closed or largely closed production at high temperatures</p> <p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES32 - Working in a laboratory</p>
40	Metallurgy	Manufacture of flux mixtures and pastes	X	X				3, 10, 13	38	3, 4, 5, 8b, 9, 14	-	2	E4 - Generic formulation of borates into mixtures	<p>ES2 - Closed or largely closed production at high temperatures</p> <p>ES7 - Discharging bags (25 -50 kg) into mixing vessels</p> <p>ES8 - Discharging big bags (750 – 1500kg) into mixing vessels</p> <p>ES16 - Closed production activities at ambient temperatures</p> <p>ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities</p> <p>ES21 - General maintenance activities</p> <p>ES22 - Transfer of substances into small containers</p> <p>ES32 - Working in a laboratory</p>

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
41	Metallurgy	Industrial use of fluxes for (Precious) Metal smelting			X			3, 14	7, 19	22	7	6b	E2 - Generic industrial use of borates resulting in the manufacture of another substance	ES2 - Closed or largely closed production at high temperatures ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
42	Metallurgy	Industrial use of flux pastes for coating brazing and welding rods			X			3,10	38	14	7	5	E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	ES24 - Industrial use of flux pastes to coat welding/brazing rods
43	Metallurgy	Industrial/Professional Use of welding, brazing or soldering rods			X			3, 14, 15, 17, 19	38	13, 25, 26	-	4	E9 - Generic industrial use of borates as processing aids in processes and products	ES40 - Industrial and professional use of fluxes in welding/brazing
44	Metallurgy	Use of borates in metal treatment (plating, passivation, galvanising etc)			X			3, 15, 17	14	3,4,5, 8a, 8b	-	4	E9 - Generic industrial use of borates as processing aids in processes and products	ES17 - Make up of treatment baths for galvanising, plating and other surface treatments ES29 - Galvanising, plating and other surface treatments of metal articles
45	Non Oxide Ceramics	Intermediate use in the production of non oxide ceramic powders		X				8,9,13	19	3,4 8b 22,23,24	4	1, 2, 5, 6a, 6b	E2 - Generic industrial use of borates resulting in the manufacture of another substance E4 - Generic formulation of borates into mixtures E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	ES2 - Closed or largely closed production at high temperatures ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES38 - Crushing grinding borate-containing powders



IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
46	Nuclear applications	Industrial use of borates in closed nuclear system			X			23	37	1, 2, 8b	-	7	E19 - Industrial use of borates in nuclear power plants with release to water E20 - Industrial use of borates in nuclear power plants without release to water	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES32 - Working in a laboratory
47	Oil industry	Formulation into cement		X				2b	K35100	2, 3, 8b	-	2	E4 - Generic formulation of borates into mixtures	ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES32 - Working in a laboratory
48	Oil industry	Industrial use of cement			X			2b	K35100	8b, 4	-	5	E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES32 - Working in a laboratory
49	Photography	Formulation into photographic solutions		X				3, 10	20 30	4, 5, 8b, 9	-	2	E4 - Generic formulation of borates into mixtures	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES22 - Transfer of substances into small containers
50	Photography	Industrial use of photographic solutions			X			3	30	19	-	4	E9 - Generic industrial use of borates as processing aids in processes and products	ES35 - Make up of stock solution for photographic applications

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			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
51	Photography	Professional use of photographic solutions			X			22	30	13, 19	-	8a	E23 - Generic wide dispersive use of borates with 100% release to water	ES30 - Use of developer and fixer solutions ES35 - Make up of stock solution for photographic applications
53	Printing paper	Formulation of borate PVA solutions		X				3, 10	20	4, 5, 8b	-	1, 6a, 6b	E2 - Generic industrial use of borates resulting in the manufacture of another substance	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels
54	Refractories	Formulation in refractory mixtures		X				3, 15, 10	0	1, 2, 3,4, 5, 8a, 9, 21, 22, 23, 24,	4	2,3	E4 - Generic formulation of borates into mixtures E8 - Generic formulation of borates into materials	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES13 - Preparing and applying refractory mixes ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES31 - Compaction and tableting of borate-containing powders ES22 - Transfer of substances into small containers ES32 - Working in a laboratory
55	Refractories	Industrial use of refractories mixtures			X		X	3, 14	15	7,14,19		5	E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	ES13 - Preparing and applying refractory mixes

IU number	Sector	Identified Use	Life cycle stage					Sector of use category (SU)	Chemical Product Category (PC)	Process category (PROC)	Article category (AC)	Environmental release category (ERC)	Exposure Scenario	
			Manufacture	Formulation	End use	Consumer use	Service life (for articles)						Environment	Human Health
56	Tablet Production and Use	Swimming pool tablets production		X				3	37	2, 3, 4, 5, 8b, 9, 15, 19	-	5	E11 - Generic industrial use of borates resulting in inclusion into or onto a matrix	ES7 - Discharging bags (25 -50 kg) into mixing vessels ES8 - Discharging big bags (750 – 1500kg) into mixing vessels ES16 - Closed production at ambient temperatures ES18 - Transfer of substances or preparations from/to large vessels/containers at dedicated facilities ES21 - General maintenance activities ES22 - Transfer of substances into small containers ES31 - Compaction and tableting of borate-containing powders ES32 - Working in a laboratory
57	Tablet Production and Use	Swimming pool tablet use			X			22	-	0	-	8a, 8d	E23 - Generic wide dispersive use of borates with 100% release to water	ES1 - Professional use of swimming pool tablets.
58	Toys	Consumer use of modelling clays				x		21	9b	-	-	11a	E27- Generic wide dispersive use of articles containing borates with low release	ESC7 - Consumer use of modelling clays

**Note:** The IU number as well as the Exposure Scenarios numbering is correct. Even if the numbering might be inconsistent in some cases, this is not a mistake. There are no documents missing.