

The following Safety Data Sheet has been created according to the Regulation (EC) No 1272/2008 [CLP/GHS], the Regulation (EU) No 453/2010 and the Commission Regulation (EU) 2015/830 (28th of May 2015) on compilation of e-SDS.

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

1.1. Product identifier

CALDE® PATCH PB 82 U

1.1.1. Dates and Modifier of the Safety Data Sheet

Creation Date 09/06/2016 (DD/MM/YY)
Modification Date: 09/06/2016
Modifier JP Targe

1.1.2. SDS (Safety Data Sheet) status:

New

1.2. Relevant identifier uses of the substances or mixture and uses advised against:

1.2.1. Relevant identified uses:

Usages of the product according to the ECHA (European Chemical Agency) - Guidance R.12 Use descriptor system - draft version 2.0
SU10; 13+NACE C23.2+PC 10+PROC 1; 2; 3; 4; 5; 8a; 9; 13; 14; 19; 21; 22; 23; 24; 26+ERC 2; 3; 5+AC 12-1; 12-2
Unshaped refractory material
Restricted to industrial or professional users for application as safety or wear linings and maintenance of both in all industrial devices at temperatures > 1000°C.

1.2.2. Uses advised against:

Non relevant.

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

1.3.1. Supplier:

CALDERYS REACH Service

1.3.2. Street address:

4, allée de Lausanne – Bât. F

1.3.3. Country ID/Post code/Place:

F-38070 Saint Quentin Fallavier - France

1.3.4. Telephone number (and telefax):

Phone: +33 (0)4 74 99 99 40 - Fax: +33 (0)4 74 99 99 66

1.3.5. E-mail:

If another updated SDS is needed, please contact your local CALDERYS commercial desk.
For any precision about the content of this MSDS, please refer to the point 1.3.6.

1.3.6. National contact's name:

See local contact for your country at §16 - Point 16.9.
www.calderys.com

1.4. Emergency telephone number:

UK: The UK National Poisons Emergency number is 0870 600 6266 - (Outside the UK: +44 870 600 6266)

1.5. Opening hours:

Non relevant.

SECTION 2: Hazards identification

2.1 Classification of the substance or the mixture:

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

Eye Dam.1; H318 - Skin Irrit.2; H315 - Met.Corr.1; H290

2.1.2. Classification according to Directive 1999/45/EC [DPD]

This regulation should not be used anymore.

2.1.3. Additional information:

For full text of H, EUH-phrases: see section 16.

2.2. Label elements:

2.2.1. Labelling according to directive 1999 45 EC [DPD]:

This regulation should not be used anymore.

2.2.1.1. Classification according to the GHS/CLP regulation:

Mixture corrosive to metals, hazard category 1

Skin irritation, hazard category 2

Serious eye damage, hazard category 1

2.2.1.2. Signal word:

Danger

2.2.2. Symbol(s) in black/white or colour according to directive 1999/45/CE [DPD]:

This regulation should not be used anymore.

2.2.2.1. Symbol(s) in black/white or colour according to the Regulation (EC) No 1272/2008 [CLP/GHS]:



2.2.3. Indication(s) of danger (1999/45/CE):

This regulation should not be used anymore.

2.2.4. Risk phrase(s) R (For full text of R phrases: see section 16)

This regulation should not be used anymore.

2.2.5. Safety phrase(s) S ; (For full text of S phrases: see section 16)

This regulation should not be used anymore.

2.2.6. Applicable label elements in accordance with sections A and B of annex V to the DPD (special provisions for certain mixtures):

Non relevant.

2.2.7. Authorization number(s) from ECHA:

Non relevant.

2.2.8. Labelling according to the Regulation (EC) No 1272/2008 [CLP/GHS]:

Eye Dam.1; H318 - Skin Irrit.2; H315 - Met.Corr.1; H290 - P280 - P302+P352 - P333+P313 - P305+P351+P338 - P337+P313 - P501

2.2.9. GHS/CLP Precautionary statement phrases (P)

P280 - P302+P352 - P333+P313 - P305+P351+P338 - P337+P313 - P501

2.3. Other hazards:

Presence of a substance classified as CMR but below the European specific limits, see the SECTION 16.

2.3.1. SVHC (Substance of Very High Concern):

Contains a substance placed in the ECHA candidate list (Annex XIV) : Boric acid (CAS: 10043-35-33)

2.3.2. CMR : Carcinogenic, Mutagenic or Toxic for Reproduction

No.

2.3.3. PBT : Persistent, Bioaccumulative and Toxic

No.

2.3.4. vPvB: very Persistent very Bioaccumulative

No.

2.3.5. POP: Persistent Organic Pollutant

No.

2.3.6. Formation of air contaminants during hardening or processing:

No.

2.3.7. Dust explosion hazard (VDI 2263):

No.

SECTION 3: Composition / Information on ingredients

3.2. Mixture:

3.2.1. Non hazardous components

Component	CAS N° / EC N°	Weight %
Bauxite calcined - REACH: Substance exempted in accordance with Annex V.7	CAS : 92797-42-7 Einecs : 296-578-9	>=50 <100

3.2.2. Hazardous components

Component	CAS N° / EC N°	Weight %
Orthophosphoric acid - Nr. REACH. 01-2119485924-24	CAS : 7664-38-2 Einecs : 231-633-2	>=2.5 <10
Skin Corr.1B; H314 - Eye Dam.1; H318 - Met.Corr.1; H290		
Boric acid - REACH: 01-2119486683-25	CAS : 10043-35-3 Einecs : 233-139-2	>=0.5 <1
Repr.1B; H360FD		

SECTION 4: First aid measures

4.0. General Information:

Liquid products with chemical bonding: Segregation may occur, after some weeks of storage, between the mineral charge and its liquid binder.
Even if that product is not classified and labelled as complete, that liquid binder, back to its original form, may be irritating or corrosive.

4.1. Description of first aid measures

4.1.1. Eyes:

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

4.1.2. Skin:

Wash with soap and water, if irritation persists seek medical advice.
If skin irritation or rash occurs: Get medical advice/attention.
After contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of water.

4.1.3. Ingestion:

If swallowed, rinse mouth with water (only if the person is conscious).
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

4.1.4. Inhalation:

Non relevant.

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

Redness, tearing.
Stinging to skin
Symptoms: Pain, redness and blurred vision.
Severe causticity with the possibility of severe ocular lesions

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

Information for doctor/physician: If swallowed, gastric irrigation.

SECTION 5: Fire-fighting measures

5.1. Extinguishing media

5.1.1. Suitable fire-fighting methods :

In case of fire use water based extinguishers or hosepipe.
In the event of larger fires, use carbon dioxide foam type fire extinguishers.

5.1.2. Unsuitable extinguishing media:

Non relevant.

5.2. Special hazards arising from the substance or mixture

In standard storage conditions, non-combustible, non-explosive and non-flammable.
May be corrosive to metals.
Causes skin irritation.
Causes serious eye damage.

5.2.1. Hazardous decomposition products

P205

Thermal decomposition may produce toxic fumes of phosphorus oxides and/or phosphine.

5.3. Advice for firefighters

5.3.1. Personal precautions:

Personal precautions : see Section 8.

Personal precautions : wear acid resistant clothing and gloves.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

6.1.1.1. Protective equipment:

Personal precautions : see Section 8.

Personal precautions : wear acid resistant clothing.

6.1.1.2. Emergency procedures

Avoid breathing vapour and contact with skin and eyes. Wear recommended personal protective equipment.

6.1.2. For emergency responders

Personal precautions : wear acid resistant clothing and gloves.

Avoid breathing vapour and contact with skin and eyes. Wear recommended personal protective equipment.

6.2. Environmental precautions

Prevent access to water table, running or stagnant water, or drains.

6.3. Methods and material for containment and cleaning up

6.3.1. Appropriate containment techniques may include any of the following:

6.3.1. - (a) bunding, covering of drains;

Non relevant.

6.3.1. - (b) capping procedures.

Non relevant.

6.3.2. Appropriate advices on how to clean-up a spill. Appropriate clean-up procedures may include any of the following:

6.3.2. - (a) neutralisation techniques;

Neutralize spills with absorbent materials.

6.3.2. - (b) decontamination techniques;

Non relevant.

6.3.2. - (c) adsorbent materials;

Sand, diatomite earth, saw dust, vermiculite.

6.3.2. - (d) cleaning techniques;

To clean the floor and all objects contaminated by this material, wash immediately with plenty of warm water.

Sweep spilled substance; eliminate waste water in accordance with regulation

6.3.2. - (e) vacuuming techniques;

Non relevant.

6.3.2. - (f) equipment required for containment/clean-up (include the use of non-sparking tools and equipment where applicable).

Put in drums after neutralisation.

Collect the spillage in closable, corrosion resistant, suitable disposal containers.

6.3.3. Other information relating to spills and releases:

6.3.3.1. Non allowed techniques:

Non relevant.

6.4. Reference to other sections

6.4.1. References:

Personal precautions : see Section 8.

Dump according to the definition in section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling:

7.1.1. Protective measures:

7.1.1.1.- (a) Measures to prevent fire:

Non relevant.

7.1.1.1.- (b) Measures to prevent aerosol and dust generation:

Non relevant.

Avoid breathing vapour and contact with skin and eyes. Wear recommended personal protective equipment.

7.1.1.1.- (c) Measures to protect environment:

Prevent access to water table, running or stagnant water, or drains.

7.1.2. Advice on general occupational hygiene:

When using do not eat, drink or smoke.

7.2. Conditions for safe storage, including any incompatibilities:

7.2.1. Technical measures and storage conditions:

Keep only in the original container at a temperature not exceeding 40°C.

Avoid breathing vapour and contact with skin and eyes. Wear recommended personal protective equipment.

Stacking height: up to 2 pallets maximum.

7.2.2. Recommended packing:

Metal or plastic drums.

Cartons or drums with plastic liner.

Plastic shrink or cling film.

Wooden pallet with shrink film.

Always keep the main pallet label

7.2.3. Requirements for storage rooms and vessels:

Store away from direct source of heat to avoid product damage.

Avoid freezing conditions.

Do not store outside.

Store away from alkalis.

Store on acid resistant floor.

Avoid contact with incompatibles mentioned under item 10

7.2.4. Storage class (national):

Unknown at that date.

7.2.5. Further information on storage conditions:

Do not store in packaging other than that of origin.

Do not transfer to light alloy metal, aluminium, zinc or tin coated steel.

Keep only in the original container at a temperature not exceeding 40°C.

Always keep in the original packaging.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Substance	CAS N° / EC N°	L.T.E - 8 hr TWA mg/m3
Bauxite calcined - REACH: Substance exempted in accordance with Annex V.7	CAS : 92797-42-7 Eines : 296-578-9	No data
Orthophosphoric acid - Nr. REACH. 01-2119485924-24	CAS : 7664-38-2 Eines : 231-633-2	1
Skin Corr.1B; H314 - Eye Dam.1; H318 - Met.Corr.1; H290	CAS : 10043-35-3 Eines : 233-139-2	0,5
Boric acid - REACH: 01-2119486683-25 Repr.1B; H360FD		

8.2. Exposure Controls:

The chart above mentionnes the lowest exposure limit values known in the EU for each substance.

All the values indicated in the chart above are available in the GESTIS database:
http://limitvalue.ifa.dguv.de/Webform_gw.aspx

http://www.dguv.de/medien/ifa/en/gestis/limit_values/pdf/scoel.pdf

The product is delivered as wet, so is not relevant to respirable dust.

Contains some substances without any approved Occupational Exposure values

8.2.0. DNEL (Derived no effect level)

Workers

Acronyms used in the following sentences.

BBB = DNEL Long Term exposure - Acute effect - Local

ROEX = Route of Exposure

INH = Inhalation dose in mg/m³

8.2.0.1. Substance:

Orthophosphoric acid - CAS Nr.7664-38-2 - Einesc Nr.231-633-2 - BBB; ROEX; INH = 2,92 -

8.2.1. Appropriate engineering controls

Non relevant.

8.2.2. Individual protection measures, such as personal protective equipment**8.2.2.1. Good occupational hygiene practices**

Emergency eye wash fountains should be available in the immediate vicinity of any potential exposure.

For details about the following HS personal devices, please see the annex dedicated to.

(Section .17)

8.2.2.2. Personal protective equipment according to the 89/686/EEC**8.2.2.2. (a) Eye/face protection**

Wear a face shield

Wear safety glasses with lateral protection (166 rev. S4KN2)

**8.2.2.2. (b) Skin protection**

Wear acid resistant clothing.

**8.2.2.2. (c) Hands:**

Suitable material for gloves: Nitrile rubber (NBR) - Natural rubber (NR) - Neoprene

Layer thickness of gloves at least: 0.4 mm

In case of prolonged and intensive contact protection index 6 recommended, according to more than 480 min. penetration time (EN 374).

Layer thickness of gloves at least: 0.7 mm.

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

Not suitable are gloves made of the following materials: Leather gloves

**8.2.2.2. (d) Respiratory protection**

The product is delivered as wet, so is not relevant to respirable dust.

Consult the local reglementation.

**8.2.3. Environmental exposure controls**

Prevent access to water table, running or stagnant water, or drains during installation or during

washing the tools used for installation.

8.2.4. Exposure scenario:

Read carefully the relevant Exposure Scenario for borates placed as annex of the §17

Read carefully the relevant Exposure Scenario for Phosphoric acid placed as annex of the §17

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties**

Appearance:	Wet mixture of aggregates and fine powders
Color:	Grey
Odour:	No particular odour
Melting point	> 1600 °C
Packing Density (g/cm³) :	1.91
Vapour density:	Non relevant.
pH:	5 < pH < 7
Segregation:	BEWARE: Segregation may occur, after some weeks of storage, between the mineral charge and its liquid binder.
Boiling point:	Non relevant.
Flash point:	Non relevant.
Inflammability:	No.
Explosive properties:	No.
Combustive properties:	No.
Solubility solvent:	Unknown at that date.
Partition coefficient n-octanol/water:	Non relevant.
Viscosity:	120 < mPa.s < 200
Hydrosolubility:	Lower than 5%

SECTION 10: Stability and reactivity**10.1. Reactivity**

May react in contact with alkalis.

10.2. Chemical stability

Chemically stable refractory product

10.3. Possibility of hazardous reactions

Strong exothermic reaction with alkaline

10.4. Conditions to avoid

Danger : Hazardous reaction in contact with alkaline.

Avoid incompatible materials mentioned in section 10.5.

10.5. Incompatible materials

Avoid ordinary steels, bases, nitrates, chlorates, calcium carbide, cyanid, sulphurs and sulphites.

Avoid contact with light alloy metal, aluminium, zinc or tin coated steel.

10.6. Hazardous decomposition products

P205

Thermal decomposition may produce toxic fumes of phosphorus oxides and/or phosphine.

SECTION 11: Toxicological information

Substance	CAS N° / EC N°
Orthophosphoric acid - Nr. REACH. 01-2119485924-24	CAS : 7664-38-2
Skin Corr.1B; H314 - Eye Dam.1; H318 - Met.Corr.1;	

H290

Einecs : 231-633-2

Boric acid - REACH: 01-2119486683-25

CAS : 10043-35-3

Repr.1B; H360FD

Einecs : 233-139-2

11.1. Information on toxicological effects.**11.1.1. Substances.**

Non relevant.

11.1.2. Mixtures.

Non relevant.

11.1.2.1. The relevant effects classes for which information shall be provided, are:**11.1.2.1. - (a) acute toxicity:**

Non relevant.

11.1.2.1. - (b) skin corrosion/irritation:

Skin irritation, hazard category 2

11.1.2.1. - (c) serious eye damage/irritation:

Serious eye damage, hazard category 1

11.1.2.1. - (d) respiratory or skin sensitisation:

Non relevant.

11.1.2.1. - (e) germ cell mutagenicity:

Non relevant.

11.1.2.1. - (f) carcinogenicity:

Non relevant.

11.1.2.1. - (g) reproductive toxicity:

Non relevant.

11.1.2.1. - (h) STOT-single exposure:

Non relevant.

11.1.2.1. - (i) STOT - repeated exposure:

Non relevant.

11.1.2.1. - (j) aspiration hazard:

Non relevant.

11.1.2.2.1. C.M.R. - Classification of the mixture for the following health effects according to the Directive 1272/2008 [CLP/GHS]:

Non relevant.

11.1.2.3. Other health effects of the mixture.

The mixture wasn't tested as whole, read the information given for the substances used.

SECTION 12: Ecological information**12.1. Toxicity**

The following points are theoretical conclusions:

Spillage may be dangerous if it comes in contact with incompatible materials see section 10.

12.1.1. Air:

Unknown at that date.

12.1.2. Water:

Unknown at that date.

Prevent access to water table, running or stagnant water, or drains.

Inorganic salts are basically not biodegradable.

Product causes strong drop of pH-value of water

Phosphates are plant nutrient and as such may contribute to the growth of phytoplankton in water.

12.1.2.0 Toxicity linked to fishes, Daphnia, Other aquatic invertebrates, Bacteria, Algae:

Acronyms used in the following sentences.

TOF LC50 = Toxicity on fish LC50

TOF NOEC = Toxicity on fish NOEC

TDOAI EC50 = Toxicity to daphnia and other aquatic invertebrates (EC50)

12.1.2.1 Substance:Orthophosphoric acid - CAS Nr.7664-38-2 - Einecs Nr.231-633-2 - TOF LC50 = [> 100 mg/l; 96 h]- OECD Test Guideline 203 - [freshwater fish: *Oncorhynchus mykiss*] / TOF NOEC = [100 mg/l;96 h] - OECD Test Guideline 203 - [freshwater fish: *Oncorhynchus mykiss*] / TDOAI EC50 = [$>$ 100 mg/l; 48 h] - OECD Test Guideline 202 - [Water flea: *Daphnia magna*]**12.1.2.2 PNEC : Predicted No-Effect Concentration**

Unknown at that date.

12.1.2.3. Substance:

Non relevant.

12.1.3. Soil :

Unknown at that date.

Soluble phosphates can be leached out of the unused product.

Carry out a leaching test to determine values according to local legislation.

12.1.4. Flora:

Unknown at that date.

12.1.5. Fauna:

Unknown at that date.

12.1.6. Bee:

Unknown at that date.

12.2. Persistence and degradability

Unknown at that date.

Inorganic salts are basically not biodegradable.

12.3. Bioaccumulative potential

No.

12.4. Mobility in soil

Unknown at that date.

12.5. Results of PBT and vPvB assessment

Unknown at that date.

12.6. Other adverse effects

Unknown at that date.

The product components are not classified as environmentally hazardous.

However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment;

SECTION 13: Disposal considerations

13.0. DIRECTIVE 2008/98/EC ON INDUSTRIAL WASTE.

13.1. WASTE TREATMENT METHODS

Please consult local regulations and statutory European Union provisions

Dispose of substance in suitable containers in accordance with local, regional, national or international regulation. Do not dispose in waterways.

Offer surplus to a licensed disposal company.

Recycling and disposal of packaging has to be organised in cooperation with a suitable waste disposal company. The re-use of packaging is not recommended.

Do not flush into drains or surface water

13.1.1. DISPOSAL OPERATIONS

Unknown at that date.

13.1.2. RECOVERY OPERATIONS

R 5 Recycling/reclamation of other inorganic materials.

13.1.3. PROPERTIES OF WASTE WHICH RENDER IT HAZARDOUS

H 8 (Corrosive): substances and preparations which may destroy living tissue on contact.

13.2. POTENTIAL DANGER FROM THE WASTE:

Unknown at that date.

Soluble phosphates can be leached out of the unused product.

Before destruction and disposal of the refractory lining, customers are advised to evaluate any changes to the product that may be induced by the introduction of substances, or operating conditions outside the control of the Vendor

13.3. EUROPEAN LIST OF HAZARDOUS WASTES (2000/532/EC)

As this product can be used in multiple industries, all categories are potentially valid.

Waste code according to EWC/AVV: 060316

10 02 : Wastes from the iron and steel industry

10 02 06 : Spent linings and refractories

10 03 : Wastes from aluminium thermal metallurgy

10 03 99 : Wastes not otherwise specified

10 04 : Wastes from lead thermal metallurgy

10 04 08 : Spent linings and refractories

10 05 : Wastes from zinc thermal metallurgy

10 05 07 : Spent linings and refractories

10 06 : Wastes from copper thermal metallurgy

10 06 08 : Spent linings and refractories

10 07 : Wastes from silver, gold and platinum thermal metallurgy

10 07 06 : Spent linings and refractories
10 08 : Wastes from other non-ferrous thermal metallurgy
10 08 07 : Spent linings and refractories
10 09 : Wastes from casting of ferrous pieces
10 09 99 : Wastes not otherwise specified
10 10 : Wastes from casting of non-ferrous pieces
10 10 99 : Wastes not otherwise specified
10 11 : Wastes from manufacture of glass and glass products
10 11 08 : Spent linings and refractories
10 12 : Wastes from manufacture of ceramic goods, bricks, tiles and construction products
10 12 07 : Spent linings and refractories
10 13 : Wastes from manufacture of cement, lime and plaster and articles and products made from them
10 13 08 : Spent linings and refractories

SECTION 14: Transport information

ADR/RID/ADN class:

Non relevant to the UN classification on dangerous goods.

ICAO-TI / IATA-DGR class:

Non relevant to the UN classification on dangerous goods.

IMDG (marine) class:

Non relevant to the IMDG classification on dangerous goods.

14.1. UN number

Non relevant.

14.2. UN proper shipping name

Non relevant.

14.3. Transport hazard class(es)

Non relevant to the UN classification on dangerous goods.

14.4. Packing group:

Non relevant.

14.5. Environmental hazards:

Unknown at that date.

SECTION 15: Regulatory information

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

15.1.4. Regulation 1272/2008/EC on the GHS/CLP, including the EC 605/2014 (6th ATP)

The classification of this product has been established according to this regulation.

15.1.5. Regulation 453/2010/EC amending Regulation (EC) No 1907/2006

This SDS has been created according to this regulation.

15.1.6. Directive 2006/8/EC on CMR and hazardous substances for environment.

This product does not meet the criteria for classification in that directive.

15.1.7. Directive 94/9/EC on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX 95)

This product does not meet the criteria for classification in that directive.

15.1.8. Directive 1999/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (ATEX 137)

This product does not meet the criteria for classification in that directive.

15.1.9. Decision No 2455/2001/EC on the list of priority substances in the field of water policy.

This product does not meet the criteria for classification in that directive.

15.1.10. MONTREAL Protocol on Substances That Deplete the Ozone Layer (7th revision)

This product does not meet the criteria for classification in that protocol: Mixture of inert minerals.

15.1.11. IBC: Institutional Biosafety Committee

This product does not meet the criteria for any biosafety classification.

15.1.12. MARPOL 73/78 (the International Convention for the Prevention of Pollution from Ships)

This product does not meet the criteria for classification in that directive.

15.1.13. STOCKHOLM convention on persistent organic pollutants (POPs)

This product does not meet the criteria for classification in that directive.

15.1.14. ROTTERDAM Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

This product does not meet the criteria for classification in that directive.

15.1.15. Directive 96/29 EURATOM :

This product does not meet the criteria for classification in that directive.

15.2. Chemical Safety Assessment

This product doesn't require a Chemical Safety Assessment.

15.3. Occupational illness

Commission Recommendation of 19 September 2003 concerning the European schedule of occupational diseases (Text with EEA relevance) (notified under document number C(2003) 3297)
Non relevant.

15.5. Other national relevant Safety, health and environmental regulations/legislation specific for the substance or mixture:

15.5.- (a) TA Air/TA Luft (German Technical Instructions on Air Quality Control)

Contains: Boric acid; CAS Nr. 10043-35-33 - Reproduction Toxic Substances 5.2.7.1.3

Contains: Orthophosphoric acid; CAS Nr. 7664-38-2 - Total Dust including Micro Dust 5.2.1

15.5.- (b) WgK: German Water hazard class (from the Administrative Regulation on substances hazardous to water - assessment):

The product, (according to German regulation) is classified as (in the sense of 18.04.2017):
WGK 1: slightly hazardous to water (self-classification)

SECTION 16: Other information

16.0. Additionnal safety information:

As announced in the Sub-section 2.1.3. find below the full text of the Hazard statement phrases (H - EUH) and Precautionary statement phrases (P) from GHS/CLP phrases indicated.

This product is classified according to the cited regulations, but other classified substances are present without changing the final classification. See paragraph 16.2.2.

16.1. GHS/CLP Pictograms

16.1.1. Symbol(s) in black/white or colour according to the Regulation (EC) No 1272/2008 [CLP/GHS]:



16.1.2. Labelling according to the Regulation (EC) No 1272/2008 [CLP/GHS]:

Eye Dam.1; H318 - Skin Irrit.2; H315 - Met.Corr.1; H290

16.1.3. Classification according to the GHS/CLP regulation:

Liquid corrosive to metals, hazard category 1

Skin irritation, hazard category 2

Serious eye damage, hazard category 1

16.1.4. Signal word:

Danger

16.1.5. GHS/CLP Hazard statement phrases (H - EUH):

H290: May be corrosive to metals.

H315: Causes skin irritation.

H318: Causes serious eye damage.

16.2. Hazardous substances present, below EU classification limits:

16.2.2. Substance as GHS/CLP:

Boric acid - CAS Nr.10043-35-33 - Einecs Nr.233-139-2 - Label: Repr.1B; H360F, H360D

16.5. GHS/CLP Hazard statement phrases (H - EUH):

H360F : May damage fertility.

H360D : May damage the unborn child.

16.6. GHS/CLP Precautionary statement phrases (P)

P280: Wear protective gloves, protective clothing, eye protection and a face protection.

P302+P352: IF ON SKIN: Wash with plenty of soap and water.

P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing.
Rinse skin with water/shower.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact

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lenses, if present and easy to do. Continue rinsing.
P333+P313: If skin irritation or rash occurs: Get medical advice/attention.
P337+P313: If eye irritation persists: Get medical advice/attention.
P501: Dispose of contents/containers in accordance with local regulation

16.7. Training:

Non relevant.

16.8. Other informations :

This safety data sheet (SDS) has been compiled according to Directive 453/2010/CE
The limits shown are from annex I of the European Directive 67/548 EEC modified on 17th of March 2007.

The limits shown are from annex VI of the GHS as of 07/10/2012

SDS status :

Modifier	JP Targe	Modification Date : 09/06/2016
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Modification:

New
As the Directive 1999/45 / EC [DPD] is obsolete now, this Safety Data Sheet does not contain anymore information related to the old system. All data information are now related only to Regulation (EC) No. 1272/2008 [CLP / GHS], Regulation (EU) No 453/2010 and to the Commission Regulation (EU) 2015/830 (28th of May 2015) on compilation of e-SDS. Therefore, all sections and sub-sections have been modified.

Acronyms and abbreviations used:

AAA = DNEL Long Term exposure - Chronic effect - Local
ADR: European regulation on transport of dangerous goods by road.
AOEL: Acceptable Operator Exposure Level
AOX: Adsorbable Organic Halogen
BBB = DNEL Long Term exposure - Acute effect - Local
BCF: Bioconcentration factor
BOD: Biochemical Oxygen Demand (BOD)
CAS: Chemical Abstracts Service
CCC = DNEL Short Term exposure - Chronic effect - Local
CLP : Classification, Labelling and Packaging of chemicals
CMR : Carcinogenic, Mutagenic or Toxic for Reproduction
COD: Chemical Oxygen Demand.
CSA : Chemical Safety Assessment
CSR : Chemical Safety Report
DDD = DNEL Short Term exposure - Acute effect - Local
DNEL : Derived No-Effect Level
EC: Ecotoxicity
EC50: Half maximal effective concentration
ECHA : European Chemical Agency
EINECS: European Inventory of Existing Commercial Chemical Substance.
ES : Exposure Scenario
eSDS : extended Safety Data Sheet
GefStoffV: German regulation on hazardous substances.
GHS : Global Harmonized System of classification and labelling of chemicals
GHS/CLP: Globally Harmonized System of Classification, Labelling and Packaging of chemicals
IATA: International Air Transport Association.
IATA-DGR: Dangerous Goods Regulation by the International Air Transport Association
ICAO: International Civil Aviation Organization.
ICAO-TI: Technical Instruction by the International Air Transport Association
IMDG: International Maritime code for Dangerous Goods.
JAP-ISHA-C.O.Nr. = Japanese Industrial Safety and Health Act - Cabinet Order Nr.
JAP-PDSA-C.O.Nr. = Japanese Poisonous and Deleterious Substances Control Act - Cabinet Order Nr.
JAP-PRTR-C.O.Nr. = Japanese Pollutant Release and Transfer Register - Cabinet Order Nr.
LC50: Lethal Concentration, 50%.
LD50: Lethal Dose, 50%.
LOAEL: Lowest observed adverse effect level
MFSU: Manufacture, Formulation, Supply and Use
NEC: No effect concentration
NOEC: No Observed Effect Concentration
N.O.S. : Not Otherwise Specified
NLP : No-Longer Polymers
OECD: Organisation for Economic Co-operation and Development

PAH: Polycyclic Aromatic Hydrocarbon.
PBT : Persistent, Bioaccumulative and Toxic
PEC : Predicted Environmental Concentration
PNEC : Predicted No-Effect Concentration
PNEC Co = PNEC Coral
PNEC FW = PNEC Freshwater
PNEC Sd = PNEC Sediment
PNEC So = PNEC Soil
PNEC SW = PNEC Seawater
PNEC WIR = PNEC Water intermittent release
POP: Persistent Organic Pollutant
CSFF: Crystalline Silica Fine Fraction (according to the standard EN 481)
REACH : Registration, Evaluation, Authorisation and Restriction of Chemical substances
RID: International regulation on transport of dangerous goods by railway.
RIP : REACH Implementation Project
RMM : Risk Management Measure
ROEX = Route of Exposure
SVHC : Substance of Very High Concern
TDOAI EC50 = Toxicity to daphnia and other aquatic invertebrates (EC50)
TDOAI NOEC = Toxicity to daphnia and other aquatic invertebrates NOEC
TGD : Technical Guidance Document
ThOD: Theoretical Oxygen Demand
TOF LC50 = Toxicity on fish LC50
TOF NOEC = Toxicity on fish NOEC
TTA EC10 = Toxicity to algae EC10
TTA EC50 = Toxicity to algae EC50
TTA NOEC = Toxicity to algae NOEC
TTB EC0 = Toxicity to Bacteria (EC0)
TTB NOEC = Toxicity to Bacteria NOEC
UVCB : Substances of Unknown Variable composition, complex reaction products or Biological materials
vPvB: very Persistent very Bioaccumulative

17. Annexes:

Attached annex : Medical toxicology units
Attached annex: HS Devices - Personal protection
Attached annex : Borates scenario exposure
Attached annex : Phosphoric acid scenario exposure

Annex: MEDICAL TOXICOLOGY UNITS

Australia:

1- South Australian Poisons Information Centre Women's and Children's Hospital,
72 King William Road North Adelaide SA 5006 - Tel: +61 82 04 72 22 - Fax: +61 82 04 60 49
2 - Canberra A.C.T. Poisons Information Service, Woden Valley Hospital, Garran, Yamba Drive -
Tel: +61 62443333 / +61 62852852 - Fax: +61 6244 3334

Belgique:

Brussels / Bruxelles : Centre Anti-Poisons/Antigifcentrum, Hôpital Militaire Reine Astrid, Rue Bruyn,
Brussels B -1120 - Emergency telephone: +32 70 245 245 - Fax: +32 2 264 9646

Brazil:

Centro de Informacao Toxicologica, Rua Domingos Cresencio, 132/8 andar CEP 90650-090
Porto Alegre-RS - Tel: +55 51-223-6110 - Fax: +55 51 2299067

Bulgaria - България

Национална Токсикологична информационен център, Институт за спешна медицинска
"Пирогов", 21 Tottleben Boulevard, 1606 София - Телефон за спешни случаи: +359 2 9154 409

Croatia - Hrvatska

Otrovi Kontrolni centar, Institut za medicinska istraživanja i medicinu rada, Ksaverska cesta 2,
PP Box 291, HR-10000 Zagreb - Hitna Telefon: +385 1 234 8342

Czech Republic - česká republika

Toxikologické informační středisko, Klinika pro pracovní lékařství, 1. lékařská fakulta Univerzity Karlovy
Na Bojišti 1, 128 00 Praha 2 - Nouzové telefonní číslo: +42 2 2491 9293
nebo +42 2 2491 5402 - Fax: +42 2 2491 4570

Denmark:

Giftinformationscentralen - Bispebjerg Hospital, Bispebjerg Bakke 23, 60, 1, DK-2400 København NV -
Nødtelefon, offentlige: +45 82 12 12 12

España:

Servicio Nacional de Toxicología, c/Luis Cabrera, 9 – 28002 Madrid, Tel: +34 915 62 04 20
Unitat de Toxicologia Clinica, Servicio de Urgencias, Hospital Clinic I Provincial de Barcelona,
C/Villarroel, 170 , E-08036 Barcelona - Telèfon d'urgències: +34 93 227 98 33 or +34 93 227 54 00

Finland - SUOMI

Myrkytystietokeskuksen P.O.B 790 (Tukholmankatu 17), SF - 00029 HUS, Helsinki -
Puhelin: +358 9 471 977, Fax: +358 9 4717 47 02

France:

système ORFILA, tél: 33 (0)1.45.42.59.59 (24h/24h)

Germany - DEUTSCHLAND

Giftnotruf Berlin, Berliner Betrieb für Zentrale Gesundheitliche Aufgaben, Institut für Toxikologie,
Oranienburger Straße 285, 13437 Berlin - Notrufnummer: +49 30 19240

Greece - ΕΛΛΑΔΑ, Αθήνα Αθηνών:

Νοσοκομείο Παιδών "Αγλαΐα Κυριακού" - 11527 Αθήνα - Τηλ: +30 1 779 3777 - Fax: +30 1748 6114

Hungary - Magyarország

Egészségügyi Toxikológiai Tájékoztató Szolgálat - 1097 Budapest, Nagyvárad tér 2.
Telefon: +36 80 20 11 99, Fax: +36 1 476 1138

India:

Poison Information Centre National Institute of Occupational Health Meghani Nagar, Ahmedabad -
India 320016 - Tel: +91-272-867351 - Fax: +91-272-866630

Italia:

Roma : Centro Antiveleni, Dipartimento di Tossicologia Clinica, Università Cattolica del Sacro Cuore,
Largo Agostino Gemelli 8, I-00168 Roma - Telefono di emergenza: +39 06 305 4343

Nederland:

Rijkinstituut voor Volksgezondheid, Antonie van Leeuwenhoeklaan 9, 3720BA Bilthoven
Tel: +31 302 541 5 11 – Fax: +31 302 748 888

Norway - NORGE

Gift Informasjon, Direktoratet for Sosial-og helsedirektoratet, P.O. Box 7000, St. Olavs Plass,
0130 Oslo - Emergency telefon: +47 22 591300

Osterreich: Vergiftungsinformationszentrale

Stubenring 6, 1010 Wien - Notruf: +43 1 406 43 43 - Informationen & Anfragen: + 43 1 406 68 98 11

Poland - Polska:

Warszawa, Poison Control Warszawie i Centrum Informacji, Szpital Praski, Al. Solidarności 67, P-03 401
Warszawa
Telefon alarmowy: +48 22 619 66 54, +48 22 619 08 97

Romania:

S.O.S Vitan Birzesti 9, Sector 4, 75889 București - Tel: +401 6 34 38 90 135 – Fax: +401 3 21 02 60
Departamentul de Toxicologie Clinică, Spitalul de Urgenta Floreasca, Calea Floreasca, București
De telefon de urgență: +40 21 230 8000

RSA - South-Africa

Poison Information Centre, University of Cape Town, Department of Paediatrics and Child Health,
Red Cross War Memorial Children's Hospital, Klipfontein Road, Rondebosch, Cape 7700,
South Africa - Tel: +27 21 658 5308 - Fax: +27 21 689 1287

Russia - Российская Федерация:

МЧС России - Центральный офис: 109012 Г.МОСКВА, ТЕАТРАЛЬНЫЙ ПР.,3 -
Телефон: (495) 449-99-99 или 122 (мобильный телефон) - Сайт: <http://www.mchs.gov.ru>
Исследования и прикладной токсикологии Центра (RATC) Федерального медико-
биологического агентства, 3 Большая Сухаревская площадь, Блок 7, Москва 129090 -
Телефон экстренной связи: +7 495 628 16 87 (только на русском)

Slovenská republika:

Národné toxikologické informačné centrum SR :
24 – hodinová konzultačná služba pri akútnych intoxikáciách: +421 2 5477 4166
Univerzitná Nemocnica Bratislava, Limbová 5, 833 05 Bratislava - e-mail: ntic@ntic.sk
Tel: +421 2 5465 2307, Fax.: +421 2 5477 4605, Mobil: +421 911 166 066,

Sweden - SVERIGE

Svenska Giftinformationscentralen, Karolinska sjukhuset, SE-171 76 Stockholm - Telefonnummer för
nödsituationer: +46 8 33 12 31 (International) 112 (Nationella)

Turkey - Türkiye

Toksikoloji Anabilim Dalı ve Zehir Merkezi, Refik Saydam Hıfızısıhha Merkez Araştırma
Enstitüsü
Cemal Gürsel Cad yok. 18, Sıhhiye, Ankara 06100 - Acil telefon numarası: 0 800 314 7900
(Türkiye), veya +90 0312 433 70 01 - Faks: +90 0312 433 70 00

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United Kingdom:

The UK National Poisons Emergency number is 0870 600 6266

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ROUTE OF EXPOSURE			
EYES	SKIN	HANDS	INHALATION
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	FFP3
DEDICATED USAGE: Non labelled, cast, hydraulic bonded products, cold conditions.			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	ISO6942	407 - 2122	FFP3
DEDICATED USAGE: Non labelled, cast, hydraulic bonded products, hot conditions.			
Face shield			
166 rev, F4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	FFP3
DEDICATED USAGE: Non labelled, gunned, hydraulic bonded products, cold conditions.			
Face shield			
166 rev, F4KN2	Clothes	Gloves	Mask
	ISO6942	407 - 2122	FFP3
DEDICATED USAGE: Non labelled, gunned, hydraulic bonded products, hot conditions.			
Face shield			
166 rev, F4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	FFP3
DEDICATED USAGE: Non labelled chemical bonded gunning mixes, cold installation			
Face shield			
166 rev, F4KN2	Clothes	Gloves	Mask
	ISO6942	407 - 2122	FFP3
DEDICATED USAGE: Non labelled chemical bonded gunning mixes, hot installation			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	FFP3
DEDICATED USAGE: Labelled hydraulic bonded products, cold installation			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	ISO6942	407 - 2122	EN 141:2000
DEDICATED USAGE: Labelled hydraulic bonded products, hot installation			
Face shield			
166 rev, F4KN2	Clothes	Gloves	Mask
	ISO6529-463	3121 - 1994	Local rules
DEDICATED USAGE: Phosphate bonded products			
Face shield			
166 rev, F4KN2	Clothes	Gloves	Mask
	ISO17491-3	3121 - 1994	Local rules
DEDICATED USAGE: Sodium silicate bonded products			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	EN 141:2000
DEDICATED USAGE: Labelled dry mixes			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	FFP3
DEDICATED USAGE: Non labelled dry mixes			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	Local rules
DEDICATED USAGE: Non labelled plastics or ramming mixes			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	FFP3
DEDICATED USAGE: Resin bonded products, cold installation.			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	ISO6942	407 - 2122	EN 141:2000
DEDICATED USAGE: Resin bonded products, hot installation			
Glasses with lateral protection			
166 rev, S4KN2	Clothes	Gloves	Mask
	340 rev	388 - 3111	Local rules
DEDICATED USAGE: Non labelled cement, patched, sprayed or trowelled products			

REACH Borates Consortium		
Industrial use of refractory products		
Sector of use	SU3	Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	PROC19 PROC7	Hand-mixing with intimate contact and only PPE available Industrial spraying
Chemical product category	PC0	Refractory linings
Contributing scenario 1: preparing and applying refractory mixes		
Product characteristics		
There are a variety of refractory products containing borates. Products may be supplied in dry or as moist products with liquid binders present containing between 0.7 and 5% borate. The equivalent boron content is between 0.08 and 1.1%. The refractory mixes are supplied in bags and are mixed with aggregate and/or liquid binder, to produce a castable mixture. Hot gunning refractory mixes are usually supplied in a moist state ready for use, or may be added to water and mixed using a paddle mixer.		
Amounts used:		
The amount of refractory used will depend on the work being carried out. Some mixes are used to make repairs to furnace linings, which may only require a few kgs of material. Some refractory mixes are used for hot-gunning, where the mixture is sprayed onto the refractory lining as a coating. This activity may take several days, depending on the size of the furnace or kiln. Some refractories are cast into shapes for use e.g. crucibles. Some tasks may require several hundred kgs of refractory material.		
Frequency and duration of use		
The frequency and duration of use of refractory materials will depend on whether workers are working intermittently on repairs and relinings of furnaces or kilns in their own workplaces, or whether the workers are specialists who carry out this type of work on a daily basis.		
Human factors not influenced by risk management		
None		
Other given operational conditions affecting workers' exposure		
The work takes place indoors. If carrying out hot gunning repairs, the temperature will be high. Workers may be working in a confined spaces inside kilns and furnaces.		
Technical conditions and measures at process level (source) to prevent release		
None		
Technical conditions and measures to control dispersion from source towards the worker		
Refractory materials are sometimes supplied in a damp, ready to use form. If spraying, the mixture is wet.		
Organisational measures to prevent/limit releases, dispersion and exposure		
Training of operatives and routine maintenance and testing of equipment.		
Conditions and measures related to personal protection, hygiene and health evaluation		
Operatives wear overalls, gloves, safety glasses/goggles. If spraying inside a kiln/furnace, a full-face, powered respirator should be worn to give protection against airborne dust. If there is potential for oxygen deficiency, a suitable compressed airline should be used in conjunction with the full-face respirator to provide an independent supply of fresh air. Where RPE is used, the worker should be airtight tested to ensure that a good face seal can be obtained. The RPE above rely on a tight face seal and will not provide the required protection unless they fit the contours of the face properly and securely. The employer and self-employed persons have legal responsibilities for the maintenance and issue of respiratory protective equipment and the management of their correct use in the workplace. Therefore, they should define and document a suitable policy for a respiratory protective equipment programme including training of the workers.		
Information on estimated exposure		
There is no exposure data available for using refractory materials. ART has been used to model		

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exposure during mixing and spraying of refractory coatings. The estimated inhalation exposure for these activities is 0.012mgB/m³. This estimation takes no account of respiratory protective equipment. This value is well below the inhalation DNEL of 1.45mgB/day.

There is no data available for dermal exposure. Dermal exposure has been modelled using MEASE. The estimated exposure for hand-mixing the refractory is 0.04mgB/day assuming that the boron content of the refractory mix is between 1 and 5%. The estimated exposure during spraying is 0.002mgB/day. The total value for these activities is 0.042mgB/day. This value is well below the dermal DNEL of 24mgB/day.

Refractory material may be applied by hand in or behind moulds. The refractory material will be wet, so the opportunity for inhalation exposure will be negligible, but there will be the potential for dermal exposure. MEASE was used to estimate dermal exposure during this activity. The estimated dermal exposure during this activity was 0.24mgB/day, taking into account the use of suitable gloves. This value is well below the dermal DNEL of 24mgB/day.

ES3: Professional use of orthophosphoric acid linked to Refractory activity.
1.Short title of ES3 (exposure scenario 3) : Professional use of orthophosphoric acid
2.Description of activities and processes covered in the exposure scenario:
Sector of use (SU):
SU 14: Manufacture of basic metals, including alloys
SU 19: Hand-mixing with intimate contact
SU 22: Professional uses: public domain
SU 24: Scientific research and development
Product category (PC):
PC 9a: Coatings and paints, thinners, paint removers
PC 9b: Fillers, putties, plasters, modelling clay
PC 21: Laboratory chemicals
Process category (PROC):
PROC 8a: Transfer of chemicals from/to vessels/ large containers at non dedicated facilities
PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC 9: transfer of substance or preparation into small containers (dedicated filling line including weighing)
PROC 10: Roller application or brushing
PROC 13: Treatment of articles by dipping and pouring
PROC 15: Use as a laboratory reagent
PROC 19: Hand-mixing with intimate contact (only PPE available)
PROC 21: Low energy manipulation of substances bound in materials and/or articles
PROC 23: Open processing and transfer operations with minerals/metals at elevated temperature
PROC 25: Other hot work operations with metals
Article category (AC):
Non relevant for refractory phosphoric binded.
Environment al release category (ERC):
ERC 8a: Wide dispersive indoor use of processing aids in open systems
ERC 8b: Wide dispersive indoor use of reactive substances in open systems
ERC 8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix
ERC 8e: Wide dispersive outdoor use of reactive substances in open systems
3. Operational conditions:
3. 1 Operational conditions related with frequency and quantities of use.
Duration of exposure at workplace:
Construction and building applications:
No information about the duration and frequency of tasks is available. In the first tier assessment a frequency of once per day with an exposure duration of > 4 hours is considered as a worst case. No information on concentration is available; therefore a worst-case approach will be taken. The concentration of solid phosphoric in construction products is assumed to be >25% whereas the concentration in liquids products is assumed to be between 5 and 25%.
Frequency of exposure at workplace:
Annual amount used per site:
The daily and annual amount/emission per site is not considered to be the main determinant for environmental exposure.

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3.2 Operational conditions related with substance/ product
Physical state: Solid / Liquid
Concentration of substance in mixture: See above, §3.1
3.3 Other relevant operational conditions
The amount used per professional workers varies from activity to activity. The maximum duration > 4 h/day was considered as worst case assumption.

4. Risk Management Measures
4.1 RMMs related to workers:
Organisational measures:
Professional users should wear appropriate personal protection equipment, such as gloves and safety glasses during processes. The employer must ensure that the required PPE is available and used according to instructions (provide training if necessary). Safety showers and eye washes are installed to be available in the case of accidental contact.
Technical measures:
Use closed/ automated systems or covering of open containers (e.g. screens) to avoid irritating mists, sprayings and potential splashes. (Good practice)
Store in cool, dry, clean, well ventilate areas. (Good practice).
Respiratory protection:
Personal respiratory equipment (PRE): In case of dust or aerosol formation (e.g. spraying): use respiratory protection with approved filter.
Hand protection:
Hand protection is required: Impervious chemical resistant protective gloves are required.
Material of gloves: Chloroprene, Neoprene or PVC gloves
Eye protection:
Wearing of eye/face protection is required as substance is corrosive. Goggles or face protection shield should be consistent with EN 166 or equivalent.
Skin and body protection:
Wearing of suitable protective clothing and rubber boots is recommended.
Hygiene measures:
Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work. Keep work clothes separate.
4.2 RMMs related to the environment
Organisational measures:
Procedural and/or control technologies are required to minimise emissions and the resulting exposure during cleaning and maintenance procedures.
Abatement measures related to wastewater:
Different rules apply to professional users regarding control of their effluents. It is required that the flow of release to municipal wastewater or to surface water do not cause significant in pH changes. It is then dependant whether or not discharging is done to municipal wastewater equipped with sewage treatment plant or not.

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Abatement measures waste air and solid waste:
Orthophosphoric acid is not expected to be found in the solid waste nor to reach the air compartment, due to its low vapour pressure. Therefore, no specific risk management measures for air emissions are provided.
4.3 Waste related measures:
Type of waste:
Liquid waste, solid residues, packaging material
Disposal technique:
The release of phosphates to wastewater is highly regulated, In addition pH changes in receiving waters should be minimised. The residue of the containers or the used container itself should be disposed in accordance with local and national requirements. See Section 13 of the SDS for more information.
Fraction released to environment during waste treatment:
Not determined. The pH of wastewater released from manufacturing sites should be between pH 6-9.

5. Prediction of exposure and comparison of predicted exposure with DNELs (Derived no effect level = Risk Characterisation)
5.1. Human exposure
Exposure estimation tool(s)
Workers, inhalation / dermal, TIER 1 (all uses): MEASE (EBRC), ver 1.02. Workers, inhalation / dermal, TIER 2 (spray applications): UK POEM
Workers (oral):
The professional uses of orthophosphoric acid will not notably contribute to the oral intake of phosphates.

SEE TABLES: RCR, worker exposure to phosphoric acid from professional uses.

Workers (dermal):
No systemic toxicity effects are expected due to the inorganic nature of the substance however local effects may occur but these effects will not be dose-dependent but will depend on the concentration of the substance present in the mixture/solution used in a specific application. It is therefore recommended that the appropriate PPE is used.
Indirect exposure via the environment:
No indirect exposure of humans via the environment is expected for orthophosphoric acid. Thus, no assessment of indirect exposure of humans via the environment is required.
Consumers:
5.2. Environmental exposure (qualitative assessment):
Environmental release :
The production of orthophosphoric acid can potentially result in aquatic emissions and locally increase the phosphate concentration while decreasing the pH in the aquatic environment. However, the pH of industrial effluents is normally measured frequently and can be neutralized easily.
Waste water treatment plants (WWTP):
Not relevant. Orthophosphoric acid dissociates in H ⁺ and PO ₄ ³⁻ and will be neutralised before reaching WWTP.

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Aquatic pelagic compartment:
The predominant adverse effects of orthophosphoric acid in aquatic systems are pH-related effects, as a result of the acidic nature of orthophosphoric acid. As phosphoric acid is a triprotic acid it will dissociate up to 3 times; releasing a phosphate anion (H ₂ PO ₄ ⁻ , HPO ₄ ²⁻ or PO ₄ ³⁻) and a H ⁺ ion at each dissociation. The fate of the H ⁺ ions (and subsequently the resultant pH) will depend on the chemical composition of the receiving water body; the higher the buffering capacity of the water, the lower the effect on pH will be.
Sediments:
Not relevant. Orthophosphoric acid will progressively dissociate in water to give H ⁺ and PO ₄ ³⁻ ions. Due to its high water solubility and low vapour pressure it is predicted that any un-dissociated phosphoric acid will remain in the water phase and will not absorb onto particulate.
Soil and groundwater:
Not relevant. Orthophosphoric acid entering soil and ground water will be partially neutralised, dispersed and diluted. There will be no absorption of phosphoric acid on particulate matter or surfaces. The dissociation product of orthophosphoric acid, phosphate ions may absorb onto soil but will not result in toxicity as these are essential nutrients.
Atmospheric compartment:
Not relevant. Orthophosphoric acid release is negligible, due to its low vapour
Secondary poisoning:
Bioaccumulation in organisms is not relevant for orthophosphoric acid.

RCR, worker exposure to phosphoric acid from professional uses. – Tier 1							
Activity type: Professional (Prof) - Location: Indoors (In) and Outdoors (Out)							
Workers (inhalation): DNEL /OEL : Worker, longterm, inhalation: 1 mg/m ³							
H₃PO₄, solid, low dustiness							
Process	Category of location	LEV	Duration (hours)	FRE (% efficiency)	Content (% w/w)	Inhalation exposure (mg/m ³)	Conclusion
8a - Transfer of substance or preparation (charging /disch from/to vessels/large containers at non -dedicated facilities.	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,356	Risk adequately controlled
8b - Transfer of substance or preparation (charging /disch from/to vessels/large	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
		Ventilation					Risk

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containers at dedicated facilities.	Prof / out	effect	> 4	NO	> 25	0,356	adequately controlled
9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing).	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,356	Risk adequately controlled
10 - Roller application or brushing.	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,356	Risk adequately controlled
11 - Non industrial spraying.	Prof / In	NO	> 4	NO	> 25	1	RMMs required to control risk.
	Prof / in	Ventilation effect	> 4	NO	> 25	0,275	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,713	Risk adequately controlled

RCR, worker exposure to phosphoric acid from professional uses. – Tier 1							
Activity type: Professional (Prof) - Location: Indoors (In) and Outdoors (Out)							
Workers (inhalation): DNEL /OEL : Worker, longterm, inhalation: 1 mg/m3							
H ₃ PO ₄ , solid, low dustiness							
Process	Category of location	LEV	Duration (hours)	FRE (% efficiency)	Content (% w/w)	Inhalation exposure (mg/m3)	Conclusion
13 - Treatment of articles by dipping and pouring.	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,356	Risk adequately controlled

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15 - Use as a laboratory agent	Prof / In	NO	> 4	NO	> 25	0,1	Risk adequately controlled
19 - Hand-mixing with intimate contact and only PPE available.	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,5	Risk adequately controlled
21 – Low energy manipulation of substances bound in materials and or articles	Prof / In	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,5	Risk adequately controlled
23 – Open processing and transfer operations with minerals / metals at evaluated temperature (Process temperature >Melting point)	Prof / out	NO	> 4	NO	> 25	5	RMMs required to control risk.
	Prof / out	Ventilation effect	> 4	NO	> 25	0, 5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	3,563	RMMs required to control risk.
	Prof / out	Ventilation effect	> 4	75% (APF = 4)	> 25	0,891	Risk adequately controlled

RCR, worker exposure to phosphoric acid from professional uses. – Tier 1							
Activity type: Professional (Prof) - Location: Indoors (In) and Outdoors (Out)							
Workers (inhalation): DNEL /OEL : Worker, longterm, inhalation: 1 mg/m3							
Process	Category of location	LEV	Duration (hours)	FRE (% efficiency)	Content (% w/w)	Inhalation exposure (mg/m3)	Conclusion
	Prof / in	NO	> 4	NO	> 25	4	RMMs required

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25 - Other hot work operations with metals.							to control risk.
	Prof / in	Yes 90% efficiency	> 4	NO	> 25	0, 4	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	2,85	RMMs required to control risk.
	Prof / out	Ventilation effect	> 4	75% (APF = 4)	> 25	0,9	Risk adequately controlled
H₃PO₄, liquid, low volatility (high concentrations – mixing and formulation tasks only)							
8a: Transfer of substance or preparation (charging / discharging) from / to vessels/large containers at non-dedicated facilities. (MEASE)	Prof / in	NO	> 4	NO	> 25	100.204	RMMs required to control risk.
	Prof / in	Yes 90% efficiency	> 4	NO	> 25	10.02	RMMs required to control risk.
	Prof / in	Yes 90% efficiency	> 4	95% (APF = 20)	> 25	0.501	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	71.396	RMMs required to control risk.
	Prof / out	Ventilation effect	> 4	95% (APF = 20)	> 25	3.57	RMMs required to control risk.

RCR, worker exposure to phosphoric acid from professional uses. – Tier 1							
Activity type: Professional (Prof) - Location: Indoors (In) and Outdoors (Out)							
Workers (inhalation): DNEL /OEL : Worker, longterm, inhalation: 1 mg/m3							
H₃PO₄, liquid, low volatility (high concentrations – mixing and formulation tasks only)							
	Category		Duration	FRE	Content	Inhalation	

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Process	of location	LEV	(hours)	(% efficiency)	(% w/w)	exposure (mg/m3)	Conclusion
PROC 8a - Transfer of substance or preparation (charging / discharging) from / to vessels/large containers at non-dedicated facilities. (ART)	Prof / in	Yes 50% efficiency	> 4	NO	100	0,77	Risk adequately controlled
	Prof / in	Yes 50% efficiency	> 4	NO	50-90	0,54	Risk adequately controlled
	Prof / out	Yes 90% efficiency	> 4	NO	100	2,1	RMMs required to control risk.
	Prof / out	Ventilation effect	> 4	75% (APF=4)	100	0,525	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	50-90	1,5	RMMs required to control risk.
	Prof / out	Ventilation effect	> 5	75% (APF=4)	50-90	0,375	Risk adequately controlled
9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing).	Prof / in	NO	> 4	NO	> 25	40.082	RMMs required to control risk.
	Prof / in	Yes 90% efficiency	> 4	NO	> 25	4.008	RMMs required to control risk.
	Prof / out	Yes medium efficiency	> 4	80% (APF=5)	> 25	0.802	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	28.558	RMMs required to control risk.
	Prof / out	Ventilation effect	> 4	97% (APF=40)	> 25	0.714	Risk adequately controlled

RCR, worker exposure to phosphoric acid from professional uses. – Tier 1
Activity type: Professional (Prof) - Location: Indoors (In) and Outdoors (Out)

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Workers (inhalation): DNEL /OEL : Worker, longterm, inhalation: 1 mg/m3							
H₃PO₄, liquid, low volatility (high concentrations – mixing and formulation tasks only)							
Process	Category of location	LEV	Duration (hours)	FRE (% efficiency)	Content (% w/w)	Inhalation exposure (mg/m3)	Conclusion
15 – Use as a laboratory reagent	Prof / in	NO	> 4	NO	> 25	20.041	RMMs required to control risk.
	Prof / in	Yes 90% efficiency	> 4	NO	> 25	2.004	RMMs required to control risk.
	Prof / in	Yes 90% efficiency	> 4	75% (APF=4)	> 25	0.501	Risk adequately controlled
19 - Hand-mixing with intimate contact and only PPE available.	Prof / in	NO	> 4	NO	> 25	0,5	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	> 25	0,5	Risk adequately controlled
H3PO4, liquid, low volatility (aqueous solutions containing 5-25% phosphoric acid)							
8a: Transfer of substance or preparation (charging / discharging) from/to vessels/large containers at non-dedicated facilities	Prof / in	NO	> 4	NO	5 to 25	0.03	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	5 to 25	0.021	Risk adequately controlled
8b: Transfer of substance or preparation (charging / discharging) from/to	Prof / in	NO	> 4	NO	5 to 25	0.03	Risk adequately controlled

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vessels/large containers at dedicated facilities	Prof / out	Ventilation effect	> 4	NO	5 to 25	0.021	Risk adequately controlled
9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing).	Prof / in	NO	> 4	NO	5 to 25	0.03	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	5 to 25	0.007	Risk adequately controlled

RCR, worker exposure to phosphoric acid from professional uses. – Tier 1							
Activity type: Professional (Prof) - Location: Indoors (In) and Outdoors (Out)							
Workers (inhalation): DNEL /OEL : Worker, longterm, inhalation: 1 mg/m3							
H3PO4, liquid, low volatility (aqueous solutions containing 5-25% phosphoric acid)							
Process	Category of location	LEV	Duration (hours)	FRE (% efficiency)	Content (% w/w)	Inhalation exposure (mg/m3)	Conclusion
10 - Roller application or brushing	Prof / in	NO	> 4	NO	5 to 25	0.03	Risk adequately controlled
	Prof / out	Ventilation effect	> 4	NO	5 to 25	0.021	Risk adequately controlled
11 - Non industrial spraying.	Prof / in	NO	> 4	NO	5 to 25	12	RMMs required to control risk.
	Prof / in	Yes 77% efficiency	> 4	NO	5 to 25	2.7	RMMs required to control risk.
	Prof / in	Yes 77% efficiency	> 4	75% (APF = 4)	5 to 25	0.675	Risk adequately controlled
	Prof / in	NO	> 4	95% (APF = 20)	5 to 25	0.6	Risk adequately controlled

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		Prof / out	Ventilation effect	> 4	NO	5 to 25	8.55	RMMs required to control risk.
		Prof / out	Ventilation effect	> 4	90% (APF = 10)	5 to 25	0.855	Risk adequately controlled
	13 - Treatment of articles by dipping and pourin	Prof / in	NO	> 4	NO	5 to 25	0.03	Risk adequately controlled
		Prof / out	Ventilation effect	> 4	NO	5 to 25	0.021	Risk adequately controlled
	19 - Hand-mixing with intimate contact and only PPE available.	Prof / in	NO	> 4	NO	5 to 25	0.03	Risk adequately controlled
		Prof / out	Ventilation effect	> 4	NO	5 to 25	0.03	Risk adequately controlled