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

* 1.1 Product identifier

Trade name/designation	Sulphur Dioxide
Art-Nr(n).	0800 - 0805, 70080
Substance name	sulphur dioxide
Index No	016-011-00-9
EC No	231-195-2
REACH No.	01-2119485028-34
CAS No	7446-09-5

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

Sector of uses [SU]
SU3 Industrial uses
SU4 Manufacture of food products
SU6b Manufacture of pulp, paper and paper products
SU8 Manufacture of bulk, large scale chemicals (including petroleum products)
SU9 Manufacture of fine chemicals
SU10 Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU13 Manufacture of other non-metallic mineral products, e.g. plasters, cement
SU14 Manufacture of basic metals, including alloys
SU15 Manufacture of fabricated metal products, except machinery and equipment

Process categories [PROC]
PROC1 Use in closed process, no likelihood of exposure
PROC2 Use in closed, continuous process with occasional controlled exposure
PROC3 Use in closed batch process (synthesis or formulation)
PROC4 Use in batch and other process (synthesis) where opportunity for exposure arises
PROC5 Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC8b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC19 Manual activities involving hand contact
PROC22 Manufacturing and processing of minerals and/or metals at substantially elevated temperature
PROC23 Open processing and transfer operations at substantially elevated temperature

Environmental release categories [ERC]
ERC2 Formulation into mixture
ERC4 Industrial use of processing aids in processes and products, not becoming part of articles
ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b Industrial use of reactive processing aids
ERC6d Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)
ERC7 Use of functional fluid at industrial site

Product Categories [PC]
PC14 Metal surface treatment products
PC15 Non-metal-surface treatment products
PC16 Heat transfer fluids
PC19 Intermediate (precursor)
PC20 Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents
PC21 Laboratory chemicals
PC26 Paper and board treatment products
PC29 Pharmaceuticals
PC37 Water treatment chemicals

1.3 Details of the supplier of the safety data sheet

Supplier
GHC Gerling, Holz & Co. Handels GmbH
Ruhrstraße 113
D-22761 Hamburg
Telephone +49 40 853 123 0
E-mail hamburg@ghc.de
Website www.ghc.com

Department responsible for information:
GHC Gerling, Holz & Co. Handels GmbH
Telephone +49 40 853 123 0

E-mail (competent person):
msds@ghc.de

1.4 Emergency telephone number

EN: Poison Information Center Mainz +49 6131 19240

* SECTION 2: Hazards identification

* 2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP]	Classification procedure
Press. Gas (Liq.), H280	
Acute Tox. 3, H331	
Skin Corr. 1B, H314	
STOT SE 1, H370	

Hazard statements for physical hazards
H280 Contains gas under pressure; may explode if heated.

Hazard statements for health hazards
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.
H370 Causes damage to the respiratory system by inhalation.

* 2.2 Label elements

* Labelling according to Regulation (EC) No 1272/2008 [CLP]

Hazard pictograms

GHS05 GHS06 GHS08

Signal word
Danger

Hazard statements
H280 Contains gas under pressure; may explode if heated.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.
H370 Causes damage to the respiratory system by inhalation.

* **Precautionary statements**
P260 Do not breathe gas/vapours.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P315 Get immediate medical advice/attention.
P403 Store in a well-ventilated place.

Supplemental hazard information
EUH071 Corrosive to the respiratory tract.

Special rules for supplemental label elements for certain mixtures
In case of use as a food additive: 'E 220', 'for food' and 'not for retail sale'.

2.3 Other hazards

Adverse human health effects and symptoms
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.
Contact with liquid may cause cold burns/frostbite.

Other adverse effects
The substance/mixture does not contain components identified as having endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated Regulation (EU) 2017/2100 or Commission Delegated Regulation (EU) 2018/605 in quantities of 0.1% or more.

Results of PBT and vPvB assessment
The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

SECTION 3: Composition / information on ingredients

3.1 Substances

Substance name	sulphur dioxide
Index No	016-011-00-9
EC No	231-195-2
REACH No.	01-2119485028-34
CAS No	7446-09-5
Specific concentration limit (SCL)	Acute Tox. 3;H331: ATE = 1000 ppmV

Additional information
Content: >= 99 %

3.2 Mixtures

not applicable

SECTION 4: First aid measures

4.1 Description of first aid measures

General information
Remove contaminated, saturated clothing immediately.
First aider: Pay attention to self-protection!
Call a physician immediately.
Symptoms may develop several hours following exposure; medical observation therefore necessary for at least 48 hours.

Following inhalation
Remove casualty to fresh air and keep warm and at rest.
In the event of pulmonary irritation treat initially with corticoid spray, e.g. Ventolair- or Pulmicort- metered-dose aerosol (Ventolair and Pulmicort are registrated trademarks).
In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Obtain medical assistance.

Following skin contact
In case of skin contact rinse with warm water.
In case of frostbite, wash with plenty of water; do not remove clothing.
In case of frostbite rinse with lukewarm (not hot) water for at least 15 minutes. Do not remove clothing frozen to the skin.
Thaw with lukewarm water. Apply a sterile dressing. Obtain medical assistance.

After eye contact
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical assistance.

Following ingestion
Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms
Respiratory tract irritation
Dyspnoea
Cough

Effects
Pulmonary oedema

4.3 Indication of any immediate medical attention and special treatment needed

Notes for the doctor
Subsequent observance for pneumonia and lung oedema.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media
The product itself does not burn. The product itself does not burn. Match extinguishing measures to surrounding fire.
Extinguishing powder
Foam
Water spray jet
Carbon dioxide (CO_2)

Unsuitable extinguishing media
Full water jet

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products
In case of fire formation of dangerous gases possible.
Sulphur oxides

5.3 Advice for firefighters

Special protective equipment for firefighters
Wear a self-contained breathing apparatus and chemical protective clothing.

Additional information
If possible, shut off gas valves and move containers to a safe location.
Use water spray jet to protect personnel and to cool endangered containers.
Exposure to fire may cause rupture / explosion of the containers.
Dispose of fire residues and contaminated extinguishing water in accordance with local, official regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel
Use personal protection equipment.
Leave the danger area.
Keep people away and stay on the upwind side.

For emergency responders
Personal protection by wearing close-fitting protective clothing and breathing apparatus.
Pay attention to extension of gas especially at ground (heavier than air) and in direction of the wind.
Remove persons to safety.

6.2 Environmental precautions

If possible, stop flow of product.
Do not allow to enter into soil/subsoil.
Do not allow to enter into surface water or drains.

6.3 Methods and material for containment and cleaning up

For containment
If necessary, secure leaky pressure receptacles using a salvage container.
Prevent the liquid from spreading over a wide area (set up barriers, cover sewage systems).
Limit expansion of the gas (water spray jet).

For cleaning up
Leave to vapourize.
Provide adequate ventilation.

6.4 Reference to other sections

Disposal: see section 13
Personal protection equipment: see section 8

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Protective measures
Use only in well-ventilated areas.
Transfer and handle product only in closed systems.
Usual measures for fire prevention.
Containers' temperature should not be increased above 50 °C.
The working pressure in the receptacle must not exceed the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.
Prevent cylinders from falling over.
Ensure valve protection device is correctly fitted.
Ensure valve outlet cap nut or plug is correctly fitted.
Open valve slowly to avoid pressure shock.
Do not allow backflow into the container.
Entering of water into the container must be prevented.
No water to valves, flanges and other fittings.
Purging of pipes and valves with inert gases - to avoid: water, solvents.

Advices on general occupational hygiene
When using do not eat, drink, smoke, sniff.
Wash hands before breaks and after work.
Remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels
All regulations and local requirements for the storage of containers have to be respected.
Keep container tightly closed and in a well-ventilated place.
Containers' temperature should not be increased above 50 °C.
Prevent cylinders from falling over.
Only use containers specifically approved for the substance/product.
Information on suitable materials for receptacles and valves see ISO 11114.

Materials to avoid
Do not store together with explosives.
Do not store together with flammable liquids.
Do not store together with flammable solids.
Do not store together with pyrophoric and self-heating substances.
Do not store together with oxidizing liquids or oxidizing solids.
Do not store together with toxic liquids or toxic solids.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with food or feed.

7.3 Specific end use(s)

Recommendation
Exposure scenarios (ES) see annex to this safety data sheet.
Use in foods in accordance with regulation (EC) No 178/2002 laying down the general principles and requirements of food law and regulation (EC) No 1333/2008 on food additives.

* SECTION 8: Exposure controls/personal protection

* 8.1 Control parameters

* **Occupational exposure limit values**

CAS No	EC No	Substance name	occupational exposure limit value
7446-09-5	231-195-2	Sulphur dioxide	0,5 [ml/m³(ppm)] 1,3 [mg/m³] Short-term(ml/m³) 1 (1) Short-term(mg/m³) 2,7 (1) (1) 15 minutes average value (IE)

DNEL worker

CAS No	Substance name	DNEL value	DNEL type	Remark
7446-09-5	sulphur dioxide	2.7 mg/m³	acute inhalative (local)	
7446-09-5	sulphur dioxide	2.7 mg/m³	long-term inhalative (local)	

DNEL Consumer

CAS No	Substance name	DNEL value	DNEL type	Remark
7446-09-5	sulphur dioxide	0.53 mg/m³	long-term inhalative (local)	

8.2 Exposure controls

Appropriate engineering controls

Technical measures to prevent exposure
Transfer and handle only in enclosed systems.

Personal protection equipment

Eye/face protection
Protective goggles according to EN 166, in case of increased risk add protective face shield.

Hand protection
Safety gloves according to EN 374:
Glove material specification [make/type, thickness, permeation time/life]: CR; >= 0,5 mm; >= 480 min

Body protection:
Safety shoes with steel toecap.
Body covering work clothing or chemical resistant suit at increased risk.

Respiratory protection
Keep self contained breathing apparatus readily available for emergency use.
Respiratory protection necessary at:
high concentrations
Suitable respiratory protection apparatus:
Respiratory protection complying with EN 137.
Short term: filter apparatus, filter E
In case of rescue and maintenance activities in storage containers use environment-independent breathing apparatus because of risk of suffocation due to displacement of oxygen.

Thermal hazards
Use cold-resistant protective equipment.

Environmental exposure controls

Remark
Prevent release to the environment.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state
Gaseous / liquefied under pressure.

Colour
colourless

Odour
stinging

Safety relevant basis data

	Value	Method	Source, Remark
Odour threshold:			not determined
Melting point/freezing point			not applicable
Boiling point or initial boiling point and boiling range	-10 °C pressure 1013 hPa		
flammability			none
Lower and upper explosion limit			none
Flash point			not applicable
Auto-ignition temperature			none
Decomposition temperature			No decomposition if used as directed.
pH			not applicable
Viscosity			not applicable
Solubility(ies)	Water solubility 114 g/L (20°C)		
Partition coefficient n-octanol/water (log value)			not determined
Vapour pressure	3271 hPa (20°C)		
Density and/or relative density			not applicable
Relative vapour density	2.27 (20°C)		air = 1
particle characteristics			not applicable

9.2 Other information

Information with regard to physical hazard classes

Gases under pressure

Safety characteristics

	Value	Method, Result	Source, Remark
Critical temperature	157 °C		

Other information
Product effects hygroscopic.
Vapours are heavier than air.

SECTION 10: Stability and reactivity

10.1 Reactivity

See section "Possibility of hazardous reactions".

10.2 Chemical stability

The substance is chemically stable under recommended conditions of storage, use and temperature.

10.3 Possibility of hazardous reactions

Risk of explosion in contact with fluorine.
Reactions with strong oxidising agents.
Reactions with ammonia.
Reactions with amines.

10.4 Conditions to avoid

Heat sources / heat - risk of bursting.
Humidity.

10.5 Incompatible materials

Alkali (lye)
Chlorine
Metallic oxides.

10.6 Hazardous decomposition products

When handled and stored appropriately, no dangerous decomposition products are known.

* SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

*** Acute toxicity**

*** Animal data**

	Effective dose	Method,Evaluation	Source, Remark
Acute oral toxicity			Study technically not feasible.
Acute dermal toxicity			Study technically not feasible.
Acute inhalation toxicity	CAS No7446-09-5 sulphur dioxide Acute inhalation toxicity (gas) LC50: 965 ppm Species Rat Exposure time 4 h		

Assessment/classification
Toxic if inhaled.

Skin corrosion/irritation

Assessment/classification
Causes severe burns.

Serious eye damage/irritation

Assessment/classification
Causes serious eye damage.

Sensitisation to the respiratory tract

Assessment/classification
non-sensitizing; Guinea pig

Skin sensitisation

Other information
Study technically not feasible.

Germ cell mutagenicity

Value	Method	Result / Evaluation	Remark
In vitro mutagenicity/genotoxicity		negative	

	Value	Method	Result / Evaluation	Remark
In vivo mutagenicity/genotoxicity			negative	

Assessment/classification
Based on available data, the classification criteria are not met.

Carcinogenicity

Other information
No data available

Reproductive toxicity

Animal data

	Value	Method	Result / Evaluation	Remark
Reproductive toxicity	inhalative NOAEL(C): 30 ppm Species Mouse			

Assessment/classification
Based on available data, the classification criteria are not met.

* **STOT-single exposure**

* **STOT SE 1 and 2**

* **Assessment/classification**
Causes damage to the respiratory system by inhalation.

STOT-repeated exposure

Animal data

	Effective dose	Method	Specific effects:	Organs affected:	Source, Remark
Inhalative specific target organ toxicity (repeated exposure)	NOAEL(C): 5 ppm Species Rat Exposure duration 28 d				

Assessment/classification
Based on available data, the classification criteria are not met.

Aspiration hazard

Remark
Study technically not feasible.

11.2 Information on other hazards

No data available

SECTION 12: Ecological information

12.1 Toxicity

Aquatic toxicity

	Effective dose	Method,Evaluation	Source, Remark
Acute (short-term) fish toxicity			Study scientifically not necessary.
Chronic (long-term) fish toxicity			Study scientifically not necessary.
Acute (short-term) toxicity to crustacea			Study scientifically not necessary.
Chronic (long-term) toxicity to aquatic invertebrate			Study scientifically not necessary.
Acute (short-term) toxicity to algae and cyanobacteria			Study scientifically not necessary.

	Effective dose	Method,Evaluation	Source, Remark
Chronic (long-term) toxicity to aquatic algae and cyanobacteria			Study scientifically not necessary.
Toxicity to other aquatic plants/organisms			Study scientifically not necessary.
Toxicity to microorganisms			Study scientifically not necessary.

12.2 Persistence and degradability

Assessment/classification
Study scientifically not necessary.

12.3 Bioaccumulative potential

Assessment/classification
Study scientifically not necessary.

12.4 Mobility in soil

Assessment/classification
No data available

12.5 Results of PBT and vPvB assessment

The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

12.6 Endocrine disrupting properties

	Effective dose	Method,Evaluation	Source, Remark
Endocrine disrupting properties			See section 2.3

12.7 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Waste codes/waste designations according to EWC/AVV

Waste code product	Waste name
160504 *	gases in pressure containers (including halons) containing hazardous substances

Appropriate disposal / Product
Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.
Prevent release to the environment. No disposal via the sewage.

Appropriate disposal / Package
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

SECTION 14: Transport information

	Land transport (ADR/RID)	Sea transport (IMDG)	Air transport (ICAO-TI / IATA-DGR)
14.1 UN number or ID number	UN 1079	UN 1079	UN 1079
14.2 UN proper shipping name	SULPHUR DIOXIDE	SULPHUR DIOXIDE	Sulphur dioxide
14.3 Transport hazard class(es)	2.3 (8)	2.3 (8)	2.3 (8)
14.4 Packing group	-	-	-
14.5 Environmental hazards	No	No	No

14.6 Special precautions for user

The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

14.7 Maritime transport in bulk according to IMO instruments

No carriage in bulk.

Land transport (ADR/RID)

UN number or ID number	UN 1079
UN proper shipping name	SULPHUR DIOXIDE
Transport hazard class(es)	2.3 (8)
Hazard label(s)	2.3+8
Classification code	2TC
Packing group	-
Environmental hazards	No
Limited quantity (LQ)	0
Special provisions	-
Tunnel restriction code	C/D

Sea transport (IMDG)

UN number or ID number	UN 1079
UN proper shipping name	SULPHUR DIOXIDE
Transport hazard class(es)	2.3 (8)
Packing group	-
Environmental hazards	No
Limited quantity (LQ)	0
Marine pollutant	No
EmS	F-C, S-U

Air transport (ICAO-TI / IATA-DGR)

UN number or ID number	UN 1079
UN proper shipping name	Sulphur dioxide
Transport hazard class(es)	2.3 (8)
Packing group	-
Environmental hazards	No

SECTION 15: Regulatory information

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

EU legislation

Restrictions of occupation
Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.
Observe restrictions to employment for juvenils according to the 'juvenile work protection guideline' (94/33/EC).

Other regulations (EU)

To follow:
Regulation (EC) No 1333/2008 on food additives.
Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.
National and local regulations concerning chemicals shall be observed.

15.2 Chemical Safety Assessment

National regulations

For this substance a chemical safety assessment has been carried out.

* SECTION 16: Other information

* **Abbreviations and acronyms**
Press. Gas (Liq.): Liquefied gas (LG)
Skin Corr. 1B: Skin corrosion, Sub-category 1B
STOT SE 1: Specific target organ toxicity (single exposure), Category 1
Acute Tox. 3, H331: Acute Toxicity (inhalation), Category 3

Key literature references and sources for data
Information from our suppliers and data from the "GESTIS Substances Database" and the "Registered Substances" database of the European Chemicals Agency (ECHA) were used to create this safety data sheet.

Additional information
The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

Relevant H- and EUH-phrases (Number and full text)

H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H331	Toxic if inhaled.

Indication of changes
* Data changed compared with the previous version

Exposure Scenario 1: Manufacture of sulphur dioxide

List of use descriptors

Sectors of use [SU]:
SU 3: Industrial uses
SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9: Manufacture of fine chemicals

Products Category: PC 19: Intermediate (precursor)

Application

Activities and processes:
Unloading of waste (sulphuric acid, sulfur): Discharging of waste from road and rail tank cars into closed systems.
Furnace operations: Spraying for decomposition in rotary furnace, operations in the post-combustion chamber and/or burning of sulfur.
Adsorption/Desorption: Cooling, absorption, desorption, drying, compression, condensation.
Filling of flasks/barrels: Connecting and disconnecting operations.
Discharging and filling of road/rail tank cars: Connecting and disconnecting operations.

Environment:
Manufacture of the substance.

Contributing Scenarios:

1	Manufacture of sulphur dioxide (environment)
2	General information, applies to all contributing exposure scenarios related to exposure scenario 1: Manufacture of sulphur dioxide (worker)
3	Unloading of waste: sulphuric acid, sulfur (worker)
4	Furnace operations (worker)
5	Adsorption/Desorption (worker)
6	Connecting and disconnecting of flasks/barrels; Discharging and filling operations (worker)
7	Discharging and filling of road/rail tank cars (worker)

Contributing exposure scenario 1

Manufacture of sulphur dioxide (environment)

List of use descriptors

Environmental release categories [ERC]:
ERC 1: Manufacture of the substance

Operational conditions

Product characteristics: Gaseous
Duration and frequency of use: 365 d/y
Other relevant operational conditions:
Annual amount, EU: 864,715 t
Annual amount per site: 86,472 t

Process within closed systems.

Other information:
Methods used: EUSES default.

PNEC (Air) = 0,00665 mg/m³

Exposure prediction

Exposure estimation and reference to its source:
Predicted environmental concentration:
PEC (Air) = 0,001035 mg/m³ (maximum)

Risk characterisation ratio (RCR):
< 0,95

Risk management measures

Technical conditions and measures at process level (source) to prevent release:
Measures to limit air emissions:
< 7 t/y: none
> 7 t/y: Gas scrubber

Negligible wastewater emissions as process operates without water contact.
After contact with water: control of pH value, if applicable Neutralization.

Disposal considerations

Conditions and measures related to sewage treatment plant:

Not applicable

Conditions and measures related to external treatment of waste for disposal:

Solid waste: not applicable

Conditions and measures related to external recovery of waste:

Solid waste: not applicable

Contributing exposure scenario 2

General information, applies to all contributing exposure scenarios related to exposure scenario 1: Manufacture of sulphur dioxide (worker)

Operational conditions

Concentration of the substance in a mixture:

Not restricted

Human factors not influenced by risk management:

Respiration volume under conditions of use: 10 m³ per shift.

Other relevant operational conditions:

Process within closed systems.

Other information: Methods used: MEASE - tool.

DNEL (inhalation) = 0,5 ppm = 1,3 mg/m³

Risk management measures

Operational conditions and risk management measures:

Do not inhale substance.
Assumes a good basic standard of occupational hygiene is implemented.
When using do not eat, drink or smoke.
Wear suitable protective clothing.

Conditions and measures related to personal protection, hygiene and health evaluation:

Eye protection: Tightly sealed goggles according to EN 166. Wear face protection.
Body protection: Protective work clothing, safety shoes.
Hand protection: Protective gloves according to EN 374.

Avoid direct skin contact with product.

Other information: Observe occupational exposure limit values: Sulfuric acid

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Contributing exposure scenario 3

Unloading of waste: sulphuric acid, sulfur (worker)

List of use descriptors

Process categories [PROC]: PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Operational conditions

Product characteristics: Aqueous solution, liquid, massive

Other relevant operational conditions:

Process pressure: not relevant.
Assumes activities are at ambient temperature (unless stated differently).

Other information: Emission factor: very low.

Exposure prediction

Exposure estimation and reference to its source:

Not relevant

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Observe and take care for proper conditions of sealings and connection threads.

Contributing exposure scenario 4

Furnace operations (worker)

List of use descriptors

Process categories [PROC]: PROC 22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature

Operational conditions

Product characteristics: Gaseous

Other relevant operational conditions:

Process pressure: not relevant..
Process temperature: < 1500 °C.

Other information: Emission factor: high

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,2 ppm (measured)
Dermal: not derived

Risk characterisation ratio (RCR):

0,4

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Closed system; with local exhaust ventilation (10 mbar).

Contributing exposure scenario 5

Adsorption/Desorption (worker)

List of use descriptors

Process categories [PROC]: PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Operational conditions

Product characteristics: Liquefied gas, gaseous

Concentration of the substance in a mixture:

Not restricted

Other relevant operational conditions:

Process pressure: not relevant.
Process temperature: < 100 °C.

Other information: Emission factor: high

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,01 ppm (measured)
Dermal: not derived

Risk characterisation ratio (RCR):

0,02

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Process within closed systems.

Contributing exposure scenario 6

Connecting and disconnecting of flasks/barrels; Discharging and filling operations (worker)

List of use descriptors

Process categories [PROC]: PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Operational conditions

Product characteristics: Liquefied gas

Other relevant operational conditions:

Process pressure: 3000 - 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Other information: Emission factor: high

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,2 ppm (measured)
Dermal: not derived

Risk characterisation ratio (RCR):

0,4

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar.
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Contributing exposure scenario 7

Discharging and filling of road/rail tank cars (worker)

List of use descriptors

Process categories [PROC]: PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Operational conditions

Product characteristics: Liquefied gas

Other relevant operational conditions:

Process pressure: 3000 - 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Other information: Emission factor: high

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,03 ppm (measured)
Dermal: not derived

Risk characterisation ratio (RCR):

0,07

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar.
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Guidance for downstream users to evaluate if thier use is within the boundaries of the ES

not applicable

Exposure Scenario 2: Discharge and filling for trading and distribution

List of use descriptors

Sectors of use [SU]:
SU 3: Industrial uses
SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

Products Category:
PC 19: Intermediate (precursor)
PC 21: Laboratory chemicals

Application

Activities and processes:
Connecting and disconnecting of flasks/barrels: Discharging and filling operations (including formulation steps in closed systems)
Discharging and filling of road/rail tank cars: Discharging and filling operations (including formulation steps in closed systems)

Environment:
Formulation into mixture.

Contributing Scenarios:
1 Discharge and filling for trading and distribution (environment)
2 General information, applies to all contributing exposure scenarios related to exposure scenario 2: Discharge and filling for trading and distribution (worker)
3 Connecting and disconnecting of flasks/barrels (worker)
4 Discharging and filling of road/rail tank cars (worker)

Contributing exposure scenario 1

Discharge and filling for trading and distribution (environment)

List of use descriptors

Environmental release categories [ERC]:
ERC 2: Formulation into mixture

Operational conditions

Product characteristics: Gaseous

Duration and frequency of use: 365 d/y

Other relevant operational conditions:
Annual amount, EU: 864,715 t
Annual amount per site: 86,472 t

Process within closed systems.

Other information:
Methods used: EUSES default.

PNEC (Air) = 0,00665 mg/m³

Exposure prediction

Exposure estimation and reference to its source:
Predicted environmental concentration:
PEC (Air) = 0,001035 mg/m³ (maximum)

Risk characterisation ratio (RCR):
< 0,95

Risk management measures

Technical conditions and measures at process level (source) to prevent release:
Measures to limit air emissions:
< 7 t/y: none
> 7 t/y: Gas scrubber

Negligible wastewater emissions as process operates without water contact.
After contact with water: control of pH value, if applicable Neutralization.

Disposal considerations

Conditions and measures related to sewage treatment plant:
Not applicable

Conditions and measures related to external treatment of waste for disposal:
Solid waste: not applicable

Conditions and measures related to external recovery of waste:
Solid waste: not applicable

Contributing exposure scenario 2

General information, applies to all contributing exposure scenarios related to exposure scenario 2: Discharge and filling for trading and distribution (worker)

List of use descriptors

Process categories [PROC]: PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Operational conditions

Product characteristics: Liquefied gas

Concentration of the substance in a mixture:
Not restricted

Human factors not influenced by risk management:
Respiration volume under conditions of use: 10 m³ per shift.

Other relevant operational conditions:
Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).
Process within closed systems.

Other information: Methods used: MEASE - tool.

Emission factor: high
DNEL (inhalation) = 0,5 ppm = 1,3 mg/m³

Risk management measures

Technical conditions and measures at process level (source) to prevent release:
Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar.
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Operational conditions and risk management measures:
Do not inhale substance.
Assumes a good basic standard of occupational hygiene is implemented.
When using do not eat, drink or smoke.
Wear suitable protective clothing.

Conditions and measures related to personal protection, hygiene and health evaluation:
Eye protection: Tightly sealed goggles according to EN 166. Wear face protection.
Body protection: Protective work clothing, safety shoes.
Hand protection: Protective gloves according to EN 374.

Avoid direct skin contact with product.

Other information: Observe occupational exposure limit values: Sulfuric acid.

Contributing exposure scenario 3

Connecting and disconnecting of flasks/barrels (worker)

Exposure prediction

Exposure estimation and reference to its source:
Inhalative: 0,2 ppm
Dermal: not derived

Risk characterisation ratio (RCR):
0,4

Contributing exposure scenario 4

Discharging and filling of road/rail tank cars (worker)

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,03 ppm

Dermal: not derived

Risk characterisation ratio (RCR):

0,07

Risk management measures

Conditions and measures related to personal protection, hygiene and health evaluation:

Respiratory protection mask: Safety factor 30 (ABEK1).

Guidance for downstream users to evaluate if thier use is within the boundaries of the ES

not applicable

Exposure Scenario 3: Industrial use in the production of foundry cores (Semi-closed process)

List of use descriptors

Sectors of use [SU]: SU 3: Industrial uses
SU 14: Manufacture of basic metals, including alloys

Products Category: PC 19: Intermediate (precursor)

Application

Activities and processes: Connecting and disconnecting of flasks/barrels: Discharging operations (including formulation steps in closed systems).
Discharging and filling of road/rail tank cars: Discharging operations (including formulation steps in closed systems).
Manufacture of foundry cores (semi-closed process): Manual operations at core shooting machines, and finishing of foundry cores.

Environment:
Formulation into mixture.
Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers.

Contributing Scenarios:

1	Industrial use in the production of foundry cores (semi-closed process); (environment)
2	General information, applies to all contributing exposure scenarios related to exposure scenario 3: Industrial use in the production of foundry cores (Semi-closed process); (worker)
3	Connecting and disconnecting of flasks/barrels (worker)
4	Discharging and filling of road/rail tank cars (worker)
5	Manufacture of foundry cores (worker)

Contributing exposure scenario 1

Industrial use in the production of foundry cores (semi-closed process); (environment)

List of use descriptors

Environmental release categories [ERC]:
ERC 2: Formulation into mixture
ERC 6d: Use of reactive process regulators in polymerisation processes at industrial site (inclusion or not into/onto article)

Operational conditions

Product characteristics: Gaseous

Duration and frequency of use: 365 d/y

Other relevant operational conditions:
Annual amount, EU: 864,715 t
Annual amount per site: 86,472 t

Process within closed systems.

Other information: Methods used: EUSES default.

PNEC (Air) = 0,00665 mg/m³

Exposure prediction

Exposure estimation and reference to its source:
Predicted environmental concentration:
PEC (Air) = 0,001035 mg/m³ (maximum)

Risk characterisation ratio (RCR):
< 0,95

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Measures to limit air emissions:
< 7 t/y: none
> 7 t/y: Gas scrubber

Negligible wastewater emissions as process operates without water contact.
After contact with water: control of pH value, if applicable Neutralization.

Disposal considerations

Conditions and measures related to sewage treatment plant:

Not applicable

Conditions and measures related to external treatment of waste for disposal:

Solid waste: not applicable

Conditions and measures related to external recovery of waste:

Solid waste: not applicable

Contributing exposure scenario 2

General information, applies to all contributing exposure scenarios related to exposure scenario 3: Industrial use in the production of foundry cores (Semi-closed process); (worker)

Operational conditions

Concentration of the substance in a mixture:

Not restricted

Human factors not influenced by risk management:

Respiration volume under conditions of use: 10 m³ per shift.

Other relevant operational conditions:

Process within closed systems.

Other information:

Methods used: MEASE - tool.

Emission factor: high
DNEL (inhalation) = 0,5 ppm = 1,3 mg/m³

Risk management measures

Operational conditions and risk management measures:

Do not inhale substance.
Assumes a good basic standard of occupational hygiene is implemented.
When using do not eat, drink or smoke.
Wear suitable protective clothing.

Conditions and measures related to personal protection, hygiene and health evaluation:

Eye protection: Tightly sealed goggles according to EN 166. Wear face protection.
Body protection: Protective work clothing, safety shoes.
Hand protection: Protective gloves according to EN 374.

Avoid direct skin contact with product.

Other information:

Observe occupational exposure limit values: Sulfuric acid

Contributing exposure scenario 3

Connecting and disconnecting of flasks/barrels (worker)

List of use descriptors

Process categories [PROC]:

PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Operational conditions

Product characteristics:

Liquefied gas

Other relevant operational conditions:

Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,2 ppm
Dermal: not derived

Risk characterisation ratio (RCR):

0,4

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar.
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Contributing exposure scenario 4

Discharging and filling of road/rail tank cars (worker)

List of use descriptors

Process categories [PROC]:

PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Operational conditions

Product characteristics: Liquefied gas

Other relevant operational conditions:

Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,03 ppm
Dermal: not derived

Risk characterisation ratio (RCR):

0,07

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar.
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Conditions and measures related to personal protection, hygiene and health evaluation:

Respiratory protection mask: Safety factor 30 (ABEK1).

Contributing exposure scenario 5

Manufacture of foundry cores (worker)

List of use descriptors

Process categories [PROC]:

PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities

Operational conditions

Product characteristics: Liquefied gas/gaseous

Other relevant operational conditions:

Process pressure: approx. 1,013 bar.
Process temperature: not restricted.

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,41 ppm
Dermal: not derived

Risk characterisation ratio (RCR):

0,82

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

PROC 2, 3: Local exhaust ventilation - efficiency of at least [%]: 90.

Guidance for downstream users to evaluate if thier use is within the boundaries of the ES

not applicable

Exposure Scenario 4: Use in closed process/semi-closed process (industrial)

List of use descriptors

Sectors of use [SU]:
SU 3: Industrial uses
SU 4: Manufacture of food products
SU 6b: Manufacture of pulp, paper and paper products
SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)
SU 9: Manufacture of fine chemicals
SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU 13: Manufacture of other non-metallic mineral products, e.g. plasters, cement
SU 14: Manufacture of basic metals, including alloys
SU 15: Manufacture of fabricated metal products, except machinery and equipment

Products Category:
PC 14: Metal surface treatment products
PC 15: Non-metal surface treatment products
PC 19: Intermediate (precursor)
PC 20: Processing aids such as pH-regulators, flocculants, precipitants, neutralisation agents
PC 26: Paper and board treatment products
PC 29: Pharmaceuticals
PC 37: Water treatment chemicals

Application

Activities and processes:
Industrial use in the paper, sugar and starch industry, the production of pharmaceutical products, in industrial water treatment, glass coating/lubricate rollers in glass manufacture, in metal casting/mining/purification and as refrigerant agent.
Connecting and disconnecting of flasks/barrels: Discharging operations.
Discharging and filling of road/rail tank cars: Discharging operations.
Use in closed process: Maintenance and supervision activities at closed systems.
Use in semi-closed processes: Manual operations (e.g. sampling, additional dosing of fine chemicals), maintenance and use as inert gas in metal alloy production and casting.

Environment:
Formulation into mixture.
Industrial use of processing aids in processes and products, not becoming part of articles.
Industrial use resulting in manufacture of another substance (use of intermediates).
Industrial use of reactive processing aids.

Contributing Scenarios:
1 Use in closed process/semi-closed process (industrial); (environment)
2 General information, applies to all contributing exposure scenarios related to exposure scenario 4: Use in closed process/semi-closed process (industrial); (worker)
3 Connecting and disconnecting of flasks/barrels (worker)
4 Discharging and filling of road/rail tank cars (worker)
5 Use in closed process (worker)
6 Use in semi-closed processes (worker)

Contributing exposure scenario 1

Use in closed process/semi-closed process (industrial); (environment)

List of use descriptors

Environmental release categories [ERC]:
ERC 2: Formulation into mixture
ERC 4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC 6a: Use of intermediate
ERC 6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Operational conditions

Product characteristics: Gaseous/liquefied gas
Duration and frequency of use: 365 d/y

Other relevant operational conditions:

Annual amount, EU: 864,715 t
Annual amount per site: 86,472 t

Process within closed systems.

Other information: Methods used: EUSES default.

PNEC (Air) = 0,00665 mg/m³

Exposure prediction

Exposure estimation and reference to its source:

Predicted environmental concentration:
PEC (Air) = 0,001035 mg/m³ (maximum)

Risk characterisation ratio (RCR):

< 0,95

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Measures to limit air emissions:
< 7 t/y: none
> 7 t/y: Gas scrubber

Negligible wastewater emissions as process operates without water contact.
After contact with water: control of pH value, if applicable Neutralization.

Disposal considerations

Conditions and measures related to sewage treatment plant:

Not applicable

Conditions and measures related to external treatment of waste for disposal:

Solid waste: not applicable

Conditions and measures related to external recovery of waste:

Solid waste: not applicable

Contributing exposure scenario 2

General information, applies to all contributing exposure scenarios related to exposure scenario 4: Use in closed process/semi-closed process (industrial); (worker)

Operational conditions

Concentration of the substance in a mixture:

Not restricted

Human factors not influenced by risk management:

Respiration volume under conditions of use: 10 m³ per shift.

Other relevant operational conditions:

Process within closed systems.

Other information: Methods used: MEASE - tool.

Emission factor: high
DNEL (inhalation) = 0,5 ppm = 1,3 mg/m³

Risk management measures

Operational conditions and risk management measures:

Do not inhale substance.
Assumes a good basic standard of occupational hygiene is implemented.
When using do not eat, drink or smoke.
Wear suitable protective clothing.

Conditions and measures related to personal protection, hygiene and health evaluation:

Eye protection: Tightly sealed goggles according to EN 166. Wear face protection.
Body protection: Protective work clothing, safety shoes.
Hand protection: Protective gloves according to EN 374.

Avoid direct skin contact with product.

Other information: Observe occupational exposure limit values: Sulfuric acid

Contributing exposure scenario 3

Connecting and disconnecting of flasks/barrels (worker)

List of use descriptors

Process categories [PROC]: PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Operational conditions

Product characteristics: Liquefied gas
Other relevant operational conditions:
Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Exposure prediction

Exposure estimation and reference to its source:
Inhalative: 0,2 ppm
Dermal: not derived
Risk characterisation ratio (RCR):
0,4

Risk management measures

Technical conditions and measures at process level (source) to prevent release:
Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar.
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Contributing exposure scenario 4

Discharging and filling of road/rail tank cars (worker)

List of use descriptors

Process categories [PROC]: PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Operational conditions

Product characteristics: Liquefied gas
Other relevant operational conditions:
Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Exposure prediction

Exposure estimation and reference to its source:
Inhalative: 0,03 ppm
Dermal: not derived
Risk characterisation ratio (RCR):
0,07

Risk management measures

Technical conditions and measures at process level (source) to prevent release:
Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.
Conditions and measures related to personal protection, hygiene and health evaluation:
Respiratory protection mask: Safety factor 30 (ABEK1).

Contributing exposure scenario 5

Use in closed process (worker)

List of use descriptors

Process categories [PROC]: PROC 1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Operational conditions

Product characteristics: Liquefied gas/gaseous

Other relevant operational conditions:

Process pressure: not restricted
Process temperature: not restricted

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,01 ppm
Dermal: not derived

Risk characterisation ratio (RCR):

0,02

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Process within closed systems.

Contributing exposure scenario 6

Use in semi-closed processes (worker)

List of use descriptors

Process categories [PROC]: PROC 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment conditions
PROC 4: Chemical production where opportunity for exposure arises
PROC 5: Mixing or blending in batch processes
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature
PROC 23: Open processing and transfer operations at substantially elevated temperature

Operational conditions

Product characteristics: Liquefied gas/gaseous

Other relevant operational conditions:

Process pressure: approx. 1,013 bar
Process temperature: not restricted

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,41 ppm
Dermal: not derived

Risk characterisation ratio (RCR):

0,82

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

PROC 2, 3: local exhaust ventilation - efficiency of at least [%]: 90.

Guidance for downstream users to evaluate if thier use is within the boundaries of the ES

not applicable

Exposure Scenario 5: Professional use in winemaking/ refilling of refrigeration equipment

List of use descriptors

Sectors of use [SU]: SU 22: Professional uses

Products Category: PC 16: Heat transfer fluids
PC 19: Intermediate (precursor)

Application

Activities and processes: Connecting and disconnecting of flasks/barrels. manual dosing from flasks into wine casks/refrigeration equipment.

Environment:
Industrial use resulting in manufacture of another substance (use of intermediates).
Industrial use of substances in closed systems.

Contributing Scenarios:

1 Professional use in winemaking/ refilling of refrigeration equipment (environment)
2 General information, applies to all contributing exposure scenarios related to exposure scenario 5: Professional use in winemaking/ refilling of refrigeration equipment (worker)
3 Connecting and disconnecting of flasks/barrels (worker)
4 Manual dosing from flasks into wine casks/refrigeration equipment (worker)

Contributing exposure scenario 1

Professional use in winemaking/ refilling of refrigeration equipment (environment)

List of use descriptors

Environmental release categories [ERC]:

ERC 6a: Use of intermediate
ERC 7: Use of functional fluid at industrial site

Operational conditions

Product characteristics: Gaseous/liquefied gas

Duration and frequency of use: 365 d/y

Other relevant operational conditions:

Annual amount, EU: 864,715 t
Annual amount per site: 86,472 t

Process within closed systems.

Other information: Methods used: EUSES default.

PNEC (Air) = 0,00665 mg/m³

Exposure prediction

Exposure estimation and reference to its source:

Predicted environmental concentration:
PEC (Air) = 0,001035 mg/m³ (maximum)

Risk characterisation ratio (RCR):

< 0,95

Risk management measures

Technical conditions and measures at process level (source) to prevent release:

Measures to limit air emissions:
< 7 t/y: none
> 7 t/y: Gas scrubber

Negligible wastewater emissions as process operates without water contact.
After contact with water: control of pH value, if applicable Neutralization.

Disposal considerations

Conditions and measures related to sewage treatment plant:

Not applicable

Conditions and measures related to external treatment of waste for disposal:

Solid waste: not applicable

Conditions and measures related to external recovery of waste:

Solid waste: not applicable

Contributing exposure scenario 2

General information, applies to all contributing exposure scenarios related to exposure scenario 5: Professional use in winemaking/ refilling of refrigeration equipment (worker)

Operational conditions

Product characteristics: Liquefied gas

Concentration of the substance in a mixture:
Not restricted

Human factors not influenced by risk management:
Respiration volume under conditions of use: 10 m³ per shift

Other relevant operational conditions:
Process within closed systems.

Other information: Methods used: MEASE - tool.
Emission factor: high
DNEL (inhalation) = 0,5 ppm = 1,3 mg/m³

Risk management measures

Operational conditions and risk management measures:
Do not inhale substance.
Assumes a good basic standard of occupational hygiene is implemented.
When using do not eat, drink or smoke.
Wear suitable protective clothing.

Conditions and measures related to personal protection, hygiene and health evaluation:
Eye protection: Tightly sealed goggles according to EN 166. Wear face protection.
Body protection: Protective work clothing, safety shoes.
Hand protection: Protective gloves according to EN 374.
Avoid direct skin contact with product.

Other information: Observe occupational exposure limit values: Sulfuric acid

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Contributing exposure scenario 3

Connecting and disconnecting of flasks/barrels (worker)

List of use descriptors

Process categories [PROC]: PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)

Operational conditions

Duration and frequency of use: 480 minutes (not restricted)

Other relevant operational conditions:
Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Exposure prediction

Exposure estimation and reference to its source:
Inhalative: 0,4 ppm
Dermal: not derived

Risk characterisation ratio (RCR):
0,8

Risk management measures

Technical conditions and measures at process level (source) to prevent release:
Use extracted booth/cabinet. Ensure on-tool extraction is used. Pressure: < 100 mbar
Observe and take care for proper conditions of sealings and connection threads.
Use in semi-automated and predominantly enclosed filling lines.

Contributing exposure scenario 4

Manual dosing from flasks into wine casks/refrigeration equipment (worker)

List of use descriptors

Process categories [PROC]: PROC 8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC 8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing)
PROC 19: Manual activities involving hand contact

Operational conditions

Duration and frequency of use: < 15 minutes (not relevant)

Other relevant operational conditions:

Process pressure: < 4000 hPa.
Assumes activities are at ambient temperature (unless stated differently).

Exposure prediction

Exposure estimation and reference to its source:

Inhalative: 0,4 ppm
Dermal: not derived

Risk characterisation ratio (RCR):

0,8

Guidance for downstream users to evaluate if thier use is within the boundaries of the ES

not applicable