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

1.1 Product identifier

Trade name/designation	Chlorine
Art-Nr(n).	0300-0320, 70030
Substance name	chlorine
Index No	017-001-00-7
EC No	231-959-5
REACH No.	01-2119486560-35
CAS No	7782-50-5

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

Sector of uses [SU]
SU3 Industrial uses
SU5 Manufacture of textiles, leather, fur
SU6b Manufacture of pulp, paper and paper products
SU8 Manufacture of bulk, large scale chemicals (including petroleum products)
SU9 Manufacture of fine chemicals
SU13 Manufacture of other non-metallic mineral products, e.g. plasters, cement
SU14 Manufacture of basic metals, including alloys
SU16 Manufacture of computer, electronic and optical products, electrical 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)
PROC13 Treatment of articles by dipping and pouring
PROC14 Production of preparations or articles by tabletting, compression, extrusion, pelletisation

* **Environmental release categories [ERC]**
ERC1 Manufacture of substances
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

Use of the substance/mixture
Basic substance
Biocidal product.

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
Ox. Gas 1, H270	
Press. Gas (Liq.), H280	
Acute Tox. 3, H331	
Skin Irrit. 2, H315	
Eye Irrit. 2, H319	
STOT SE 3, H335	
Aquatic Acute 1, H400	

Hazard statements for physical hazards
H270 May cause or intensify fire; oxidiser.
H280 Contains gas under pressure; may explode if heated.

Hazard statements for health hazards
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H335 May cause respiratory irritation.

Hazard statements for environmental hazards
H400 Very toxic to aquatic life.

* 2.2 Label elements

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

Hazard pictograms

GHS03 GHS06 GHS09

Signal word
Danger

Hazard statements
H270 May cause or intensify fire; oxidiser.
H280 Contains gas under pressure; may explode if heated.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H331 Toxic if inhaled.
H335 May cause respiratory irritation.
H400 Very toxic to aquatic life.

* **Precautionary statements**
P244 Keep valves and fittings free from oil and grease.
P261 Avoid breathing gas.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302 + P352 IF ON SKIN: Wash with plenty of water.
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.
P311 Call a doctor.
P403 Store in a well-ventilated place.
P405 Store locked up.

* **Supplemental hazard information**
Use as a biocidal product: Read attached instructions before use.
Please return container with residual pressure.

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	chlorine
Index No	017-001-00-7
EC No	231-959-5
REACH No.	01-2119486560-35
CAS No	7782-50-5
M-factor	M=100 (Aquatic Acute 1)
ATE	ATE(inhalation gas): 834 mg/m³

Additional information
Content: >= 99,8 %

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.

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**
Dyspnoea
Corrosion
Nausea
Strong eye irritation.
Respiratory tract irritation

Effects
Severe allergic skin reactions, bronchospasms and anaphylactic shock are possible.
Pulmonary oedema

4.3 Indication of any immediate medical attention and special treatment needed

Notes for the doctor
Treat symptomatically.
Symptoms may be delayted.
Subsequent observance for pneumonia and lung oedema.
To supervise the blood circulation.

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
alcohol resistant foam
Carbon dioxide (CO2)
Water spray jet

Unsuitable extinguishing media
Full water jet

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products
The substance / product enhances the combustion.
In case of fire formation of dangerous gases possible.
Hydrogen chloride (HCl)
Phosgene

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
Dilute with plenty of water.
Retain contaminated washing water and dispose it.

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 (where provided) 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 as a biocidal product: DE-0031461-02: Disinfection of swimming pool water, spa's and hot tubs compliant with high hygienic requirements by continuous dosing. Disinfection of swimming pool water not compliant with high hygienic requirements by continuous dosing. Disinfection of swimming pool water by shock dosing in case of contamination.
Use as a biocidal product: EU-0027044-0000: Disinfection of waste water after the waste water plant. Disinfection of drinking water at drinking water suppliers. Disinfection of water in reservoirs. Disinfection of water in collective systems. Disinfection of drinking water for animals.

* SECTION 8: Exposure controls/personal protection

* 8.1 Control parameters

* **Occupational exposure limit values**

CAS No	EC No	Substance name	occupational exposure limit value
7782-50-5	231-959-5	Chlorine	Short-term(ml/m³) 0,5 (1) Short-term(mg/m³) 1,5 (1) (1) 15 minutes reference period (IE)

DNEL worker

CAS No	Substance name	DNEL value	DNEL type	Remark
7782-50-5	chlorine	0.5 %	long-term dermal (local)	
7782-50-5	chlorine	0.75 mg/m³	long-term inhalative (local)	Assessment factor 2, repeated dose toxicity.
7782-50-5	chlorine	0.75 mg/m³	long-term inhalative (systemic)	Assessment factor 2, repeated dose toxicity.
7782-50-5	chlorine	1.5 mg/m³	acute inhalative (systemic)	Assessment factor 1
7782-50-5	chlorine	1.5 mg/m³	acute inhalative (local)	Assessment factor 1

* **DNEL Consumer**

CAS No	Substance name	DNEL value	DNEL type	Remark
7782-50-5	chlorine	0.5 %	long-term dermal (local)	
7782-50-5	chlorine	0.75 mg/m³	long-term inhalative (local)	Assessment factor 2, repeated dose toxicity.
7782-50-5	chlorine	0.75 mg/m³	long-term inhalative (systemic)	Assessment factor 2, repeated dose toxicity.
7782-50-5	chlorine	1.5 mg/m³	acute inhalative (systemic)	Assessment factor 1, repeated dose toxicity.
7782-50-5	chlorine	1.5 mg/m³	acute inhalative (local)	Assessment factor 1, repeated dose toxicity.

PNEC

CAS No	Substance name	PNEC Value	PNEC type	Remark
7782-50-5	chlorine	0.03 mg/L	sewage treatment plant (STP)	Assessment factor 100
7782-50-5	chlorine	0.042 mg/L	aquatic, marine water	Assessment factor 50
7782-50-5	chlorine	0.21 µg/L	aquatic, freshwater	Assessment factor 10
7782-50-5	chlorine	0.26 µg/L	aquatic, intermittent release	

CAS No	Substance name	PNEC Value	PNEC type	Remark
7782-50-5	chlorine	11.1 mg/kg food	Secondary Poisoning	Assessment factor 90

*** 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 [type, thickness, permeation time/life]: FKM, >= 0,7 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 B

Thermal hazards
Use cold-resistant protective equipment.

*** Remark**
Use as a biocidal product: The order of priority for protective measures prescribed in Article 6 of Directive 98/24/EC, according to which technical and organisational protective measures must be given priority, must also be observed for the use of biocidal products.
The personal protective equipment specified in the authorisation must therefore be used unless it can be replaced by technical and/or organisational measures. The wearing of personal protective equipment must not be a permanent measure.

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
yellowy-green

Odour
stinging

Safety relevant basis data

	Value	Method	Source, Remark
Odour threshold:	0.06- 0.2 ppm		
Melting point/freezing point			not applicable
Boiling point or initial boiling point and boiling range	-34.1 °C pressure 1013 hPa		
flammability			none

	Value	Method	Source, Remark
Lower and upper explosion limit			none
Flash point			not applicable
Auto-ignition temperature			not determined
Decomposition temperature			No decomposition if used as directed.
pH			not applicable
Viscosity			not applicable
Solubility(ies)	Water solubility 7.3 g/L (20°C)		
Partition coefficient n-octanol/water (log value)			not determined
Vapour pressure	6800 hPa (20°C)		
Density and/or relative density			not applicable
Relative vapour density	2.48		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	144 °C		

Other information
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

Reactions with numerous chemical compounds.
May react violently with reducing agents.
Violently oxidises organic material.
Reactions with ammonia.
At high temperatures (> 120 °C) chlorine reacts spontaneously with iron (chlorine / iron fire).

10.4 Conditions to avoid

Heat sources / heat - risk of bursting.
Ignition sources, open flames, glowing metal surfaces, etc.
Water / moisture.

10.5 Incompatible materials

Aluminium / Aluminium alloys.
Powdered metals
Organic substances (fats, oils).

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 No7782-50-5 chlorine Acute inhalation toxicity (gas) LC50: 834 mg/m³ Species Rat Exposure time 60 min	OECD 403	

* **Assessment/classification**
Toxic if inhaled.

Skin corrosion/irritation

Animal data

Result / Evaluation	Method	Source, Remark
reversible. Species Rabbit	OECD 404	Analogous to a similar product.

Assessment/classification
Causes skin irritation.

Serious eye damage/irritation

Animal data

Result / Evaluation	Method	Source, Remark
strongly irritant. Species Monkey	OECD 405	Analogous to a similar product.

Assessment/classification
Causes serious eye irritation.

Sensitisation to the respiratory tract

Other information
No data available

Skin sensitisation

Animal data

Result / Evaluation	Dose / Concentration	Method	Source, Remark
not sensitising.	Species Guinea pig	OECD 406	Analogous to a similar product.

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

* Germ cell mutagenicity

	Value	Method	Result / Evaluation	Remark
In vitro mutagenicity/genotoxicity		OECD 471	Data insufficient.	Analogous to a similar product.
In vivo mutagenicity/genotoxicity	Species Mouse	OECD 474	negative	Analogous to a similar product.

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

* **Carcinogenicity**

Animal data

	Value	Method	Result / Evaluation	Remark
Carcinogenicity	Species rat (male/female) Exposure duration 2 a		Longterm experiments do not indicate carcinogenic effects.	Inhalation.

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

Reproductive toxicity

Animal data

	Value	Method	Result / Evaluation	Remark
Reproductive toxicity	oral NOAEL(C): ≥ 5 mg/kg bw/day	OECD 415		Analogous to a similar product.

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

STOT-single exposure

STOT SE 3

Irritation to respiratory tract

Assessment/classification
May cause respiratory irritation.

STOT-repeated exposure

Animal data

	Effective dose	Method	Specific effects:	Organs affected:	Source, Remark
Inhalative specific target organ toxicity (repeated exposure)	NOAEL(C): 0.5 ppm Species Monkey Exposure time 90 d	OECD 413			

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

Aspiration hazard

Assessment/classification
Study technically not feasible.

11.2 Information on other hazards

Other information

Pulmonary dammage is possible.

* SECTION 12: Ecological information

*** 12.1 Toxicity**

*** Aquatic toxicity**

	Effective dose	Method,Evaluation	Source, Remark
Acute (short-term) fish toxicity	LC50: 0.06 mg/L Species Salmo Species Test duration 96 h		Analogous to a similar product.

	Effective dose	Method,Evaluation	Source, Remark
Chronic (long-term) fish toxicity	NOEC 0.04 mg/L Species Menidia peninsulae Test duration 28 d		Analogous to a similar product.
Acute (short-term) toxicity to crustacea	EC50 0.141 mg/L Species Daphnia magna (Big water flea) Test duration 48 h	OECD 202	Analogous to a similar product.
Chronic (long-term) toxicity to aquatic invertebrate	NOEC 7 µg/mL Species Fish Test duration 15 d		Analogous to a similar product.
Acute (short-term) toxicity to algae and cyanobacteria	EC50 0.023 mg/L Species Chlorella sorokiniana Test duration 20 h		Analogous to a similar product.
Chronic (long-term) toxicity to aquatic algae and cyanobacteria	not determined		
Toxicity to other aquatic plants/organisms	EC50 0.1 mg/L Species Myriophyllum spicatum Test duration 96 h		
Toxicity to microorganisms	EC50 3 mg/L Species activated sludge Test duration 3 h		Analogous to a similar product.

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
Study scientifically not necessary.

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

No data available

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 1017	UN 1017	UN 1017
14.2 UN proper shipping name	CHLORINE	CHLORINE	Chlorine
14.3 Transport hazard class(es)	2.3 (5.1, 8)	2.3 (5.1, 8)	2.3 (5.1, 8)
14.4 Packing group	-	-	-
14.5 Environmental hazards	ENVIRONMENTALLY HAZARDOUS	ENVIRONMENTALLY HAZARDOUS Marine pollutant	ENVIRONMENTALLY HAZARDOUS

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 1017
UN proper shipping name	CHLORINE
Transport hazard class(es)	2.3 (5.1, 8)
Hazard label(s)	2.3+5.1+8
Classification code	2TOC
Packing group	-
Environmental hazards	ENVIRONMENTALLY HAZARDOUS
Limited quantity (LQ)	0
Special provisions	-
Tunnel restriction code	C/D

Remark
ADR / RID: Environmentally hazardous substance - special marking: symbol "fish and tree".

Sea transport (IMDG)

UN number or ID number	UN 1017
UN proper shipping name	CHLORINE
Transport hazard class(es)	2.3 (5.1, 8)
Packing group	-
Environmental hazards	ENVIRONMENTALLY HAZARDOUS
Limited quantity (LQ)	0
Marine pollutant	Yes.
EmS	F-C, S-U

Air transport (ICAO-TI / IATA-DGR)

UN number or ID number	UN 1017
UN proper shipping name	Chlorine
Transport hazard class(es)	2.3 (5.1, 8)
Packing group	-
Environmental hazards	ENVIRONMENTALLY HAZARDOUS

* 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 (EU) No 528/2012 concerning the making available on the market and use of biocidal products.
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**
Ox. Gas 1: Oxidizing gases, Category 1
Press. Gas (Liq.): Liquefied gas (LG)
Skin Irrit. 2: Skin irritation, Category 2
Eye Irrit. 2: Eye irritation, Category 2
STOT SE 3, H335: Specific target organ toxicity (single exposure), Category 3
Aquatic Acute 1: Short-term (acute) aquatic hazard, Category 1
Aquatic Chronic 1: Long-term (chronic) aquatic hazard, Category 1
Acute Tox. 2, H330: Acute Toxicity (inhalation), Category 2
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)

H270	May cause or intensify fire; oxidiser.
H280	Contains gas under pressure; may explode if heated.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Indication of changes
* Data changed compared with the previous version

Annex: Exposure scenarios

1.Industrial use of the substance

Sector of use :

SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites,
SU5: Manufacture of textiles, leather, fur,
SU6b: Manufacture of pulp, paper and paper products,
SU8: Manufacture of bulk, large scale chemicals (including petroleum products),
SU9: Manufacture of fine chemicals,
SU13: Manufacture of other nonmetallic mineral products, e.g. plasters, cement,
SU14: Manufacture of basic metals, including alloys,
SU16: Manufacture of computer, electronic and optical products, electrical equipm.

Environmental release category:

ERC1: Manufacture of substances
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

Process category:

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 (charging/discharging) of substance or mixture from/to vessels/large containers at non-dedicated facilities.,
PROC8b: Transfer (charging/discharging) of substance or mixture from/to vessels/large containers at dedicated facilities.,
PROC9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing).,
PROC13: Treatment of articles by dipping and pouring,
PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation

2. Conditions of use - Exposure estimation and reference to its source

Control of environmental exposure:
General Information characteristic:

Pressurised liquified gas
Substance is a unique structure, Non-hydrophobic, inorganic, Hydrolyses readily., Not bioaccumulable.
Expected release to wastewater are negligible as substance destroyed rapidly with organic and inorganic material

Frequency and duration of use:
Number of emission days per year = 365

Operational conditions:
Risk from environmental exposure is driven by freshwater.

General risk management measures applicable to all activities:
Air : Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.
Water : Product must not be released into water without pre-treatment. Neutralize waste water before release.
Soil : Soil emission controls are not applicable as there is no direct release to soil.

Dispose of waste product or used containers according to local regulations.

Additional good practice advice beyond the REACH Chemical Safety Assessment

The indicated recommendations may not be applicable to all sites. You may thus have to adapt them to your own site using scaling.

Control of worker exposure :
General Information characteristic:

Pressurised liquified gas

Frequency and duration of use:
Covers frequency up to: daily yearly use. Covers daily exposures up to 8 hours (unless stated differently)

Annex: Exposure scenarios

Concentration of the Substance in Mixture/Article:
Covers the percentage of the substance in the product up to 100 % (unless stated differently).

General risk management measures applicable to all activities:
Ensure a good standard of occupational hygiene.

Assumes activities are at ambient temperature (unless stated differently)., Outdoor location is covered by the worst-case inside location.

3. Risk characterisation ratio:

Compartment:

All (environment)

Exposure Assessment Method:

Qualitative approach used to conclude safe use.

Exposure routes:

Inhalation exposure/**Dermal exposure**

Exposure Assessment Method:

Other (measured))

Qualitative approach used to conclude safe use.

Specific conditions :

Contributing Scenario	PROC	Operational conditions	Concentration of the Substance in Mixture/ Article	Risk Management Measures	Conditions and measures related to personal protection, hygiene and health evaluation	Risk characterisation ratio: (Long term)			Risk characterisation ratio: (Short term)		
						Inhalation	Dermal	Combined routes	Inhalation	Dermal	Combined routes
General exposures	PROC 1 PROC 2 PROC 3 PROC 4 PROC 5 PROC 8a PROC 8b PROC 9 PROC 13 PROC 14	Indoor		Handle substance within a closed system. Drain down and flush system prior to equipment opening or maintenance. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure dedicated sample points are provided. Provide extraction ventilation at points where emissions occur	Wear respiratory protection. Respirator with a gas filter or Self-contained breathing apparatus (EN 133) Wear suitable gloves (tested to EN374), coverall and eye protection.	0,75 - 1			0,1 – 0,5		

LE : Local effects, SE : Systemic effects

Annex: Exposure scenarios

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

For a given contributing scenario, several risk management measures can be proposed. It is your responsibility to select the configuration that best suits your activity.

Thesaurus:

PROC : Process category
SU : Sectors of end-use
PC : Product category
ERC : Environmental release category
RCR : Risk characterisation ratio:
DNEL : Derived No Effect Level (DNEL)
PNEC : Predicted No Effect Concentration