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

1.1. Product identifier

Name of product	Chlorine Art-Nr(n).: 0300, 0304, 70030
Name of substance	chlorine
Index No	017-001-00-7
EC No	231-959-5
REACH registration number	01-2119486560-35
CAS No	7782-50-5

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

Identified uses

Sector of uses [SU]
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
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

Process categories [PROC]
PROC1 - Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions.
PROC2 - Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3 - Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4 - Chemical production where opportunity for exposure arises
PROC5 - Mixing or blending in batch processes
PROC8a - Transfer of substance or mixture (charging and discharging) at non- 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 - Tabletting, compression, extrusion, pelletisation, granulation
PROC8b - Transfer of substance or mixture (charging and discharging) at dedicated facilities

Environmental release categories [ERC]
ERC1 - Manufacture of the substance
ERC4 - Use of non-reactive processing aid at industrial site (no inclusion into or onto article)
ERC6a - Use of intermediate
ERC6b - Use of reactive processing aid at industrial site (no inclusion into or onto article)

Remark
Restricted to professional users.

! **Recommended intended purpose(s)**
Basic substance.
Biocidal product.
Oxidising agent.

1.3. Details of the supplier of the safety data sheet

Manufacturer/distributor	GHC Gerling, Holz & Co. Handels GmbH Ruhrstraße 113, D-22761 Hamburg Phone +49 40 853 123-0, Fax +49 40 853 123-66 E-Mail hamburg@ghc.de Internet www.ghc.com

Advice	GHC Gerling, Holz & Co. Handels GmbH Phone +49 40 853 123-0 Fax +49 40 853 123-66 E-mail (competent person): msds@ghc.de

1.4. Emergency telephone number

Emergency advice	Giftinformationszentrum Mainz - 24 h Phone +49 6131 19240

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]

Hazard classes and Hazard categories	Hazard Statements	Classification procedure
Ox. Gas 1	**H270**	
Press. Gas (Liq.)	**H280**	
Acute Tox. 2	**H330**	**On basis of test data.**
Skin Irrit. 2	**H315**	
Eye Irrit. 2	**H319**	
STOT SE 3	**H335**	
Aquatic Acute 1	**H400**	
Aquatic Chronic 1	**H410**	

Hazard statements for physical hazards

H270	**May cause or intensify fire; oxidiser.**
H280	**Contains gas under pressure; may explode when heated.**

Hazard statements for health hazards

H315	**Causes skin irritation.**
H319	**Causes serious eye irritation.**
H330	**Fatal if inhaled.**
H335	**May cause respiratory irritation.**

Hazard statements for environmental hazards

H400	**Very toxic to aquatic life.**
H410	**Very toxic to aquatic life with long lasting effects.**

Additional hints
Listed substance (Regulation (EC) No 1272/2008, Annex VI, part 3).

2.2. Label elements
Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

GHS03 **GHS06** **GHS09**

Signal word
Danger

Hazard statements for physical hazards

H270	**May cause or intensify fire; oxidiser.**

H280 **Contains gas under pressure; may explode when heated.**

Hazard statements for health hazards

H315 **Causes skin irritation.**
H319 **Causes serious eye irritation.**
H330 **Fatal if inhaled.**
H335 **May cause respiratory irritation.**

Hazard statements for environmental hazards

H410 **Very toxic to aquatic life with long lasting effects.**

Precautionary Statements

Prevention

P244 Keep valves and fittings free from oil and grease.
P260 Do not inhale gas/vapours.
P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

P304 + P340 IF INHALED: Move person to fresh air and ensure unhindered 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.
P332 + P313 If skin irritation occurs: Get medical advice/attention.

Storage

P403 Store in a well-ventilated place.
P405 Store locked up.

Supplemental Hazard information (EU)

Health properties
Corrosive to the respiratory tract.

Special rules for supplemental label elements for certain mixtures
Restricted to professional users.

Additional information

Remark
Malta: 2018-04-17-B02
In case of use as a biocidal product: Read attached instructions before use.
Use as a biocidal product: Disinfection of bathing and drinking water. Preservation of water or other liquids used in cooling and processing systems.

2.3. Other hazards
Information pertaining to special dangers for human and environment
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.
Contact with liquid may cause cold burns/frostbite.
Receptacle under pressure.
Risk of skin resorbation.

Results of PBT and vPvB assessment
This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

SECTION 3: Composition/ information on ingredients

3.1. Substances

Description
Content: > 99 %

CAS No 7782-50-5 **chlorine**
EC No 231-959-5
Index No 017-001-00-7
REACH registration number 01-2119486560-35

3.2. Mixtures

not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

General information
Remove contaminated soaked clothing immediately.
Adhere to personal protective measures when giving first aid.
Seek medical advice immediately.

In case of inhalation
Remove the affected person into fresh air and keep him immobile.
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).
Seek medical treatment immediately.
In case of respiratory standstill give artifical respiration by respiratory bag (Ambu bag) or respirator. Send for a doctor.

In case of skin contact
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.
In case of contact with skin wash off immediately and for a long time (at least 15 minutes) with plenty of water.

In case of eye contact
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Call for a doctor immediately.

In case of ingestion
Ingestion is not considered a potential route of exposure.

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

Physician's information / possible symptoms
Strong eye irritation.
Respiratory tract irritation
Corrosion
Shortness of breath
vomiting
Contact with liquid may cause cold burns/frostbite.

Physician's information / possible dangers
Severe allergic skin reactions, bronchospasms and anaphylactic shock are possible.
Risk of pulmonary oedema

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

Treatment (Advice to doctor)
Continue to monitor for pneumonia and pulmonary oedema.
Monitor circulation.
Symptoms may not occur until several hours.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media

Product does not burn, fire-extinguishing activities according to surrounding.
Alcohol-resistant foam
Carbon dioxide
Water spray jet

Unsuitable extinguishing media

Full water jet

5.2. Special hazards arising from the substance or mixture

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

5.3. Advice for firefighters

Special protective equipment for fire-fighters

Use breathing apparatus with independent air supply (isolated).
Wear full protective clothing.

Additional information

Cool endangered containers with water spray jet.
Exposure to fire may cause rupture / explosion of the containers.
Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.
Collect contaminated firefighting water separately, should not be discharged into the drains.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Evacuate area.
Keep people away and stay on the upwind side.

For emergency responders

Move people to safety.
Personal protection by wearing close-fitting protective clothing and breathing apparatus.

6.2. Environmental precautions

Collect contaminated water / firefighting water separately.
Do not discharge into the drains/surface waters/groundwater.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
If necessary, secure leaky pressure receptacles using a salvage container.
Suppress gases/vapours/mists with water spray jet
Do not discharge into the subsoil/soil.

6.3. Methods and material for containment and cleaning up

Ensure adequate air ventilation.
Dispose of contaminated material in accordance with regulations.

Additional Information

No water on the leaks.

6.4. Reference to other sections
Safe handling: see section 7
Disposal: see section 13
Personal protection equipment: see section 8

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Advice on safe handling
Use only in thoroughly ventilated areas.
Transfer and handle only in enclosed systems.
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.
Provide good room ventilation even at ground level (vapours are heavier than air).
Prevent cylinders from falling over.
Ensure valve outlet cap nut or plug is correctly fitted.
Ensure valve protection device is correctly fitted.
Open valve slowly to avoid pressure shock.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature.
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.

General protective measures
Do not inhale gases/vapours/aerosols.

Hygiene measures
At work do not eat, drink or smoke.
Wash hands before breaks and after work.

Advice on protection against fire and explosion
The product is not combustible, but supports burning.
The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air, oxygen or other oxidants, it may become flammable.
Pay attention to general rules of internal fire prevention.

7.2. Conditions for safe storage, including any incompatibilities
Requirements for storage rooms and vessels
Keep in closed original container.
Ventilate store-rooms thoroughly.
Only use containers that are approved specifically for the substance/product.
Suitable materials: Normalised carbon steel, tempered alloy steel, austenitic stainless steels.
Valve: Suitable materials: Brass, copper alloys, carbon steels, austenitic stainless steels.
Further material details see ISO 11114.
All regulations and local requirements for the storage of containers have to be respected.
Unsuitable materials: Aluminium alloys.

Advice on storage compatibility
Do not store with combustible materials.
Do not store together with spontaneously flammable materials.
Do not store together with animal feedstuff.
Do not store together with explosives.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with toxic liquids or toxic solids.
Do not store together with food.
Do not store together with oxidizing liquids or oxidizing solids.

Further information on storage conditions
Protect from heat and direct solar radiation.

7.3. Specific end use(s)
Recommendation(s) for intended use
Exposure scenarios (ES) see annex to this safety data sheet.
Use as a biocidal product in accordance with Regulation (EU) No 528/2012 concerning the provision on the market and use of biocidal products.
Use as a biocidal product: Disinfection of bathing and drinking water. Preservation of water or other liquids used in cooling and processing systems.

! SECTION 8: Exposure controls/personal protection

8.1. Control parameters
! Ingredients with occupational exposure limits to be monitored

CAS No	Name	Code	[mg/m3]	[ppm]	Remark
7782-50-5	Chlorine	WEL, 8 hours Short-term	 1.5	 0.5	EH 40, United Kingdom

DNEL-/PNEC-values
DNEL worker

CAS No	Substance name	Value	Code	Remark
7782-50-5	chlorine	0,5 %	DNEL long-term dermal (local)	
		0,75 mg/m3	DNEL long-term inhalative (systemic)	Assessment factor 2, repeated dose toxicity.
		1,5 mg/m3	DNEL acute inhalative (systemic)	Assessment factor 1
		0,75 mg/m3	DNEL long-term inhalative (local)	Assessment factor 2, repeated dose toxicity.
		1,5 mg/m3	DNEL acute inhalative (local)	Assessment factor 1

DNEL Consumer

CAS No	Substance name	Value	Code	Remark
7782-50-5	chlorine	0,5 %	DNEL long-term dermal (local)	
		0,75 mg/m3	DNEL long-term inhalative (systemic)	Assessment factor 2, repeated dose toxicity.
		1,5 mg/m3	DNEL acute inhalative (local)	Assessment factor 1, repeated dose toxicity.
		0,75 mg/m3	DNEL long-term inhalative (local)	Assessment factor 2, repeated dose toxicity.
		0,25 mg/kg bw/day	DNEL long-term oral (repeated)	Assessment factor 200, repeated dose toxicity.
		1,5 mg/m3	DNEL acute inhalative (systemic)	Assessment factor 1, repeated dose toxicity.

PNEC

CAS No	Substance name	Value	Code	Remark
7782-50-5	chlorine	0,042 mg/l	PNEC aquatic, marine water	Assessment factor 50, Extrapolation
		0,26 µg/l	PNEC aquatic, intermittent release	Assessment factor 100, Extrapolation
		11,1 mg/ kg food	PNEC Secondary Poisoning	Assessment factor 90
		0,21 µg/l	PNEC aquatic, freshwater	Assessment factor 10, Extrapolation
		0,03 mg/l	PNEC sewage treatment plant (STP)	Assessment factor 100, Extrapolation

8.2. Exposure controls

Respiratory protection
Breathing apparatus in the event of high concentrations.
Keep self contained breathing apparatus readily available for emergency use.
Short term: filter apparatus, Filter B
Respiratory protection complying with EN 137.

Hand protection
Leather gloves
Safety gloves according to EN 374.
Safety gloves according to EN 388
Glove material specification [type, thickness, permeation time/life]: FKM, >= 0,7 mm, > 480 min

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

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

Appropriate engineering controls
Transfer and handle only in enclosed systems.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance
compressed liquified gas

Colour
yellowy-green

Odour
pungent

Odour threshold
not determined

Important health, safety and environmental information

	Value	Temperature	at	Method	Remark
pH value	not applicable				
Acid number	not applicable				

	Value	Temperature	at	Method	Remark
boiling point	-34,1 °C		1013 hPa		
melting point	-100,98 °C				
Flash point	not applicable				
Vapourisation rate	not applicable				
Flammable (solid)	not applicable				
Flammability (gas)	no				
Ignition temperature	no				
Self ignition temperature	no				
Lower explosion limit	no				
Upper explosion limit	no				
Vapour pressure	6800 hPa	20 °C			
Relative density	3,2149 kg/m3	0 °C	1013 mbar		
Vapour density	2,48	0 °C			Air = 1.
Solubility in water	7,3 g/l	20 °C			
Solubility/other	not determined				
Partition coefficient n-octanol/water (log P O/W)	not determined				
Decomposition temperature	not determined				
Viscosity	not determined				

Oxidising properties
No information available.

Explosive properties
no

9.2. 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
Stable under recommended conditions of use and storage (see section 7).

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

10.4. Conditions to avoid
Heat sources / heat - risk of bursting.
Humidity.
Sources of ignition.

10.5. Incompatible materials
Substances to avoid
Ammonia
Metals in powder form.
Reducing agents.
Organic substances (fats, oils).
Water / moisture.

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

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity/Irritation/Sensitization

	Value/Validation	Species	Method	Remark
LD50 acute oral	Study technically not feasible.			
LD50 acute dermal	Study technically not feasible.			
LC50 acute inhalation	1,462 mg/l (30 min)	rat	OECD 403	
Skin irritation	low irritant effect			experiences
Eye irritation	irritant - risk of strong eye injuries			experiences
Skin sensitization	non-sensitizing	Guinea pig	OECD 406	Analogous to a similar product.

Subacute Toxicity - Carcinogenicity

	Value	Species	Method	Validation
Subchronic Toxicity	NOAEL 0,5 ppm (90 d) Inhalation (6 h/d, 5 d/w)	Monkey	OECD 413	Also in case of a repeated intake the main effect is the local irritation.
Mutagenicity			OECD 471	Data insufficient.
Reproduction-Toxicity	Oral Analogous to a similar product.	Rat (male / female)		No indications of toxic effects were observed in reproduction studies in animals.
Carcinogenicity	Inhalation.	Rat (male / female)		No indications of carcinogenic effects are available from long-term trials.

Specific target organ toxicity (single exposure)
May cause respiratory irritation.

Specific target organ toxicity (repeated exposure)
Based on available data, the classification criteria are not met.

Aspiration hazard
Based on available data, the classification criteria are not met.

Toxicity test (Additional information)
No experimental indication of genotoxicity in vitro (Ames-test negative).

Experiences made from practice
Risk of strong health injuries in case of long-term exposition.
May cause frostbite.
Irritates respiratory tract.
Pulmonary dammage is possible.

SECTION 12: Ecological information

12.1. Toxicity

Ecotoxicological effects

	Value	Species	Method	Validation
Fish	LC50 0,06 mg/l (96 h)	Salmo Species		Analogous to a similar product.
Daphnia	EC50 0,141 mg/l (48 h)	Daphnia magna		Analogous to a similar product.
Algae	EC50 0,023 mg/l (20 h)	Chlorella sorokiniana		Analogous to a similar product.
Bacteria	EC50 3 mg/l (3 h)	activated sludge		Analogous to a similar product.

12.2. Persistence and degradability

	Elimination rate	Method of analysis	Method	Validation
Biological degradability	Inorganic product, cannot be eliminated from the water by biological purification processes.			

12.3. Bioaccumulative potential
Does not bioaccumulate.

12.4. Mobility in soil
High mobility
Adsorption in soil is not likely.

12.5. Results of PBT and vPvB assessment
This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

12.6. Other adverse effects
Behaviour in sewage plant
When discharged into biological sewage treatment plants, interference with the degradation activity of activated sludge is possible, depending on the local conditions and concentrations involved.
Treat by state-of-the-art technology before discharging into drains.

General regulation
M-factor: 100
Do not allow uncontrolled leakage of product into the environment.
Product is not allowed to be discharged into the ground water or aquatic environment.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste code No.	Name of waste
16 05 04*	gases in pressure containers (including halons) containing hazardous substances

Wastes marked with an asterisk are considered to be hazardous waste pursuant to Directive 2008/98/EC on hazardous waste.

Recommendations for the product
Dispose of as hazardous waste.

Recommendations for packaging
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

SECTION 14: Transport information

	ADR/RID	IMDG	IATA-DGR
14.1. UN number	1017	1017	1017
14.2. UN proper shipping name	CHLOR	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	-	-	-

	ADR/RID	IMDG	IATA-DGR
14.5. Environmental hazards	Yes	Yes	Yes

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. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
not applicable
No transport as bulk according IBC - Code.

Land and inland navigation transport ADR/RID
Hazard label(s) 2.3 + 5.1 + 8
Tunnel restriction code C/D
Classification code 2TOC
ADR / RID: Environmentally hazardous substance - special marking: symbol "fish and tree".

Marine transport IMDG
MARINE POLLUTANT
Ems: F-C, S-U

Air transport ICAO/IATA-DGR
FORBIDDEN

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Other regulations (EU)
Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.
Biocide Directive (2012/528EU).

15.2. Chemical Safety Assessment
For this substance a chemical safety assessment has been carried out.

SECTION 16: Other information

Recommended uses and restrictions
National and local regulations concerning chemicals shall be observed.
EN 15363 - Chemicals used for treatment of swimming pool water - Chlorine.
EN 937 - Chemicals used for treatment of water intended for human consumption - Chlorine.

Further information
All declarations of safety-data-sheet refer to pure substance.
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.

Indication of changes: "!" = Data changed compared with the previous version. Previous version: 18.5
Sources of key data used
For the preparation of this safety data sheet, information from our suppliers as well as data from the "database of registered substances" of the European Chemicals Agency (ECHA) and the "GESTIS Database of substances" were used.

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