SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

Chlorine

Issue Date:	16.01.2013	Version: 1.3	SDS No.: 000010021781
Last revised date:	17.04.2023		1/38

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

1.1 Product identifier

Product name: Chlorine

Trade name: Gasart 464 Chlor 2.8, Gasart 465 Chlor 5.0, Chlor 4.0

Additional identification

Chemical name:	Chlorine
Chemical formula:	Cl2
INDEX No.	017-001-00-7
CAS-No.	7782-50-5
EC No.	231-959-5
REACH Registration No.	01-2119486560-35

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.
Bleaching agent.
Use as an Intermediate (transported, on-site isolated).
Use for electronic component manufacture.
Using gas alone or in mixtures for the calibration of analysis equipment.
Using gas as feedstock in chemical processes.
Using gas for metal treatment.
Water treatment.
Formulation of mixtures with gas in pressure receptacles.
Exempt from registration requirements.
Use of gas to manufacture pharmaceutical products.
Biocidal uses.

Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier

Linde Gas GmbH
Carl-von-Linde-Platz 1
A-4651 Stadl-Paura

Telephone: +43 50 4273

E-mail: office@at.linde-gas.com

1.4 Emergency telephone number: Emergency number UMCO: +49 89 220 61012 (German), +44 1865 407333 (English)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended.

Physical Hazards		
Oxidizing gases	Category 1	H270: May cause or intensify fire; oxidizer.
Gases under pressure	Liquefied gas	H280: Contains gas under pressure; may explode if heated.
Health Hazards		
Acute toxicity (Inhalation - gas)	Category 2	H330: Fatal if inhaled.
Skin irritation	Category 2	H315: Causes skin irritation.
Serious eye irritation	Category 2	H319: Causes serious eye irritation.
Specific Target Organ Toxicity - Single Exposure	Category 3	H335: May cause respiratory irritation.
Environmental Hazards		
Acute hazards to the aquatic environment	Category 1	H400: Very toxic to aquatic life.
Chronic hazards to the aquatic environment	Category 1	H410: Very toxic to aquatic life with long lasting effects.

2.2 Label Elements

Contains: Chlorine

Signal Word: Danger

Hazard Statement(s):
H270: May cause or intensify fire; oxidizer.
H280: Contains gas under pressure; may explode if heated.
H330: Fatal if inhaled.
H315: Causes skin irritation.
H319: Causes serious eye irritation.
H410: Very toxic to aquatic life with long lasting effects.

Precautionary Statements
General None.

Prevention:	P220: Keep away from clothing and other combustible materials. P244: Keep valves and fittings free from oil and grease. P260: Do not breathe gas/vapors. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection.
Response:	P302+P352: IF ON SKIN: Wash with plenty of water. P332+P313: If skin irritation occurs: Get medical advice/attention. P304+P340+P315: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice/attention. P305+P351+P338+P315: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention. P370+P376: In case of fire: Stop leak if safe to do so.
Storage:	P403: Store in a well-ventilated place. P405: Store locked up.
Disposal	None.

Supplemental information

EUH071: Corrosive to the respiratory tract.

2.3 Other hazards Contact with evaporating liquid may cause frostbite or freezing of skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Chlorine
INDEX No.:	017-001-00-7
CAS-No.:	7782-50-5
EC No.:	231-959-5
REACH Registration No.:	01-2119486560-35
Purity:	100% The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.
Trade name:	Gasart 464 Chlor 2.8, Gasart 465 Chlor 5.0, Chlor 4.0

Chemical name	Chemical formula	Concentration	CAS-No.	REACH Registration No.	M-Factor:	Notes
Chlorine	Cl2	100%	7782-50-5	01-2119486560-35	Aquatic Toxicity (Acute): 100; Aquatic Toxicity (Chronic): 1	#

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements. All concentrations are nominal.
This substance has workplace exposure limit(s).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

SECTION 4: First aid measures

General: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact:	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Contact with evaporating liquid may cause frostbite or freezing of skin.
Ingestion:	Ingestion is not considered a potential route of exposure.
4.2 Most important symptoms and effects, both acute and delayed:	Irritating to eyes, respiratory system and skin. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May be fatal if inhaled.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards:	Irritating to eyes, respiratory system and skin. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling. May be fatal if inhaled.
Treatment:	Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention. Treat with a corticosteroid spray as soon as possible after inhalation.

SECTION 5: Firefighting measures

General Fire Hazards:	Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media:	Use water spray to reduce vapors or divert vapor cloud drift. Water Spray or Fog. Dry powder. Foam. Carbon Dioxide.
Unsuitable extinguishing media:	None.
5.2 Special hazards arising from the substance or mixture:	Fire or excessive heat may produce hazardous decomposition products. Supports combustion.

5.3 Advice for firefighters

Special fire fighting procedures:	In case of fire: Stop leak if safe to do so. Use of water may result in the formation of very toxic aqueous solutions. Keep run-off water out of sewers and water sources. Dike for water control. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.
Special protective equipment for fire-fighters:	Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus. Guideline: EN 943-2 Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET)

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Evacuate area. In case of leakage, eliminate all ignition sources. Provide adequate ventilation. Monitor the concentration of the released product. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

6.2 Environmental Precautions:

Prevent further leakage or spillage if safe to do so. Reduce vapour with fog or fine water spray. Keep run-off water out of sewers and water sources. Dike for water control.

6.3 Methods and material for containment and cleaning up:

Provide adequate ventilation. Wash contaminated equipment or sites of leaks with copious quantities of water.

6.4 Reference to other sections:

Refer to sections 8 and 13.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling:

Only experienced and properly instructed persons should handle gases under pressure. Avoid exposure - obtain special instructions before use. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Keep equipment free from oil and grease. Open valve slowly to avoid pressure shock. Use only oxygen approved lubricants and sealants. Use only with equipment cleaned for oxygen service and rated for the pressure. Installation of a cross purge assembly between the container and the regulator is recommended. Excess pressure must be vented through an appropriate scrubber system. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

7.2 Conditions for safe storage, including any incompatibilities:

Containers should not be stored in conditions likely to encourage corrosion. Keep away from food, drink and animal feeding stuffs. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material. Avoid asphalted locations for storage, transfer and use (ignition risk if spilt). Segregate from flammable gases and other flammable materials being stored.

7.3 Specific end use(s):

None.

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Chlorine

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values	Source
Chlorine	STEL	0,5 ppm 1,5 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU, 2017/164/EU, as amended (12 2009)
	MAK CEIL	0,5 ppm 1,5 mg/m3	Austria. MAK List, OEL Ordinance (GwV), BGBl. II, no. 184/2001, as amended (04 2021)
	MAK	0,5 ppm 1,5 mg/m3	Austria. MAK List, OEL Ordinance (GwV), BGBl. II, no. 184/2001, as amended (04 2021)

DNEL-Values

Critical component	Type	Value	Remarks
Chlorine	Workers - Inhalation, Local, long-term	0,75 mg/m3	Repeated dose toxicity
	Workers - Inhalation, Systemic, long-term	0,75 mg/m3	Repeated dose toxicity
	Workers - Inhalation, Local, short-term	1,5 mg/m3	Repeated dose toxicity
	Workers - Inhalation, Systemic, short-term	1,5 mg/m3	Repeated dose toxicity
	Workers - Dermal, Systemic, short-term	0,5 %	Repeated dose toxicity

PNEC-Values

Critical component	Type	Value	Remarks
Chlorine	Sewage treatment plant	0,03 mg/l	-
Chlorine	Aquatic (freshwater)	0,21 µg/l	-
Chlorine	Aquatic (marine water)	0,042 µg/l	-

8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Provide adequate general and local exhaust ventilation. Keep concentrations well below occupational exposure limits. Gas detectors should be used when toxic quantities may be released. Gas detectors should be used when quantities of oxidizing gases may be released. Avoid oxygen rich (>23,5%) atmospheres. Systems under pressure should be regularly checked for leakages. Product to be handled in a closed system and under strictly controlled conditions. Only use permanent leak tight installations (e.g. welded pipes). Do not eat, drink or smoke when using the product.

Individual protection measures, such as personal protective equipment

General information:

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved. Protect eyes, face and skin from contact with product. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

Eye/face protection:

Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.

Skin protection

Hand Protection:

Guideline: EN 388 Protective gloves against mechanical risks.
Additional Information: Wear working gloves while handling containers
Guideline: EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.
Additional Information: Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Material: Chloroprene rubber.
Break-through time: > 30 min
Glove thickness: 0,4 mm
Additional Information: For short term use:
Material: Fluoroelastomer.
Break-through time: > 480 min
Glove thickness: 0,7 mm
Additional Information: For long term use:

Body protection:	No special precautions.
Other:	Wear safety shoes while handling containers Guideline: ISO 20345 Personal protective equipment - Safety footwear.
Respiratory Protection:	Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances. When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. Self-contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres Guideline: EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.Material: Filter ABEK Guideline: EN 14387 Respiratory protective devices. Gas filter(s) and combined filter(s). Requirements, testing, marking. Guideline: EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking.
Thermal hazards:	No precautionary measures are necessary.
Hygiene measures:	Obtain special instructions before use. Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.
Environmental exposure controls:	For waste disposal, see section 13 of the SDS.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	Gas
Form:	Liquefied gas
Color:	Greenish yellow
Odor:	Pungent irritating odor.
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
pH:	If dissolved in water pH-value will be affected.
Melting Point:	-101 °C

Boiling Point:	-34 °C
Sublimation Point:	Not applicable.
Critical Temp. (°C):	144,0 °C
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	This product is not flammable.
Flammability Limit - Upper (%):	Not applicable.
Flammability Limit - Lower (%):	Not applicable.
Vapor pressure:	6.780 hPa (20 °C) Experimental result, Key study
Vapor density (air=1):	2,5
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	5,1 g/l (30 °C)
Partition coefficient (n-octanol/water):	Not known.
Autoignition Temperature:	Not applicable.
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,013 mPa.s (20 °C) Gas
Explosive properties:	Not applicable.
Oxidizing properties:	Oxidizing
9.2 Other information:	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.
Molecular weight:	70,91 g/mol (Cl_2)

SECTION 10: Stability and reactivity

10.1 Reactivity:	No reactivity hazard other than the effects described in sub-section below.
10.2 Chemical Stability:	Stable under normal conditions.
10.3 Possibility of hazardous reactions:	Violently oxidises organic material. May react violently with combustible materials. May react violently with reducing agents.
10.4 Conditions to avoid:	Avoid moisture in the installation.

10.5 Incompatible Materials: Moisture. Combustible materials Reducing agents. Keep equipment free from oil and grease. For material compatibility see latest version of ISO-11114. Consider the potential toxicity hazard due to the presence of chlorinated or fluorinated polymers in high pressure (>30 bar) oxygen lines and equipment in case of combustion.

10.6 Hazardous Decomposition Products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

General information: None.

11.1 Information on toxicological effects

Acute toxicity - Oral

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

Chlorine: LD 50 (Rat): 8.910 mg/kg Remarks: Read-across from supporting substance (structural analogue or surrogate), Supporting study

Acute toxicity - Dermal

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

Chlorine: LD 50 (Rabbit): > 20.000 mg/kg Remarks: Read-across from supporting substance (structural analogue or surrogate), Key study

Acute toxicity - Inhalation

Product Fatal if inhaled.

Chlorine: LC 50 (Rat, 1 h): 293 ppm
LC 50 (Rat, 4 h): 146,5 ppm Remarks: Delayed fatal pulmonary oedema possible.

Repeated dose toxicity

Chlorine: NOAEL (Monkey(Female, Male), Inhalation, 1 yr): 0,5 ppm(m) Inhalation Experimental result, Key study

Skin Corrosion/Irritation

Product Causes skin irritation.

Chlorine	Severely irritating to skin.

Serious Eye Damage/Eye Irritation

Product	Causes serious eye irritation.
Chlorine	Severely irritating to eyes.

Respiratory or Skin Sensitization

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

Germ Cell Mutagenicity

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

Carcinogenicity

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

Reproductive toxicity

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

Specific Target Organ Toxicity - Single Exposure

Product	May cause respiratory irritation.

Specific Target Organ Toxicity - Repeated Exposure

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

Aspiration Hazard

Product	Not applicable to gases and gas mixtures..

SECTION 12: Ecological information

General information:	Avoid release to the environment. Product is not allowed to be discharged into ground water or the aquatic environment.

12.1 Toxicity

Acute toxicity

Product	Very toxic to aquatic life with long lasting effects.

Acute toxicity - Fish

Chlorine	LC 50 (Various, 96 h): 0,032 mg/l (flow-through) Remarks: Read-across from supporting substance (structural analogue or surrogate), Key study

Acute toxicity - Aquatic Invertebrates

Chlorine	NOAEL (Daphnia magna, 48 h): 50 µg/l (flow-through) Remarks: Read-across from supporting substance (structural analogue or surrogate), Key study

Toxicity to microorganisms

Chlorine	EC 50 (Algae (Scenedesmus subspicatus), 72 h): 0,001 mg/l

Chronic Toxicity - Fish

Chlorine	LOAEL (Various): 0,014 mg/l (flow-through) Read-across from supporting substance (structural analogue or surrogate), Supporting study NOAEL (Various): 0,014 mg/l (flow-through) Read-across from supporting substance (structural analogue or surrogate), Supporting study NOAEL (Various): 0,062 mg/l (flow-through) Read-across from supporting substance (structural analogue or surrogate), Supporting study

Chronic Toxicity - Aquatic Invertebrates

Chlorine	LOAEL (V. iris (Ambloplites rupestris) and Cottus carolinae (E. capsaeformis)): 30 µg/l (flow-through) Read-across from supporting substance (structural analogue or surrogate), Supporting study

Additional ecological information

None.

12.2 Persistence and Degradability

Product	Not applicable to gases and gas mixtures..

Biodegradation

Inorganic The product is not readily biodegradable.

12.3 Bioaccumulative potential

Product	The substance has no potential for bioaccumulation.

12.4 Mobility in soil

Product	The substance has low mobility in soil.

12.5 Results of PBT and vPvB assessment

Product	Not classified as PBT or vPvB.

12.6 Other adverse effects:

Other Ecological Information

May cause pH changes in aqueous ecological systems. Depending on local conditions and existing concentrations, disturbances in the biodegradation process of activated sludge are possible.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Must not be discharged to atmosphere. Consult supplier for specific recommendations.

Disposal methods: Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

European Waste Codes

Container: 16 05 04*: Gases in pressure containers (including halons) containing dangerous substances.

SECTION 14: Transport information

ADR

14.1 UN Number:	UN 1017
14.2 UN Proper Shipping Name:	CHLORINE
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.3, 5.1, 8
Hazard No. (ADR):	265
Tunnel restriction code:	(C/D)
14.4 Packing Group:	–
14.5 Environmental hazards:	Environmentally Hazardous
14.6 Special precautions for user:	–

RID

14.1 UN Number:	UN 1017
14.2 UN Proper Shipping Name	CHLORINE
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.3, 5.1, 8
14.4 Packing Group:	–
14.5 Environmental hazards:	Environmentally Hazardous
14.6 Special precautions for user:	–

IMDG

14.1 UN Number:	UN 1017
14.2 UN Proper Shipping Name:	CHLORINE
14.3 Transport Hazard Class(es)	
Class:	2.3
Label(s):	2.3, 5.1, 8
EmS No.:	F-C, S-U
14.4 Packing Group:	–
14.5 Environmental hazards:	MARINE POLLUTANT
14.6 Special precautions for user:	–

IATA

14.1 UN Number:	UN 1017
14.2 Proper Shipping Name:	Chlorine
14.3 Transport Hazard Class(es):	
Class:	2.3
Label(s):	–
14.4 Packing Group:	–
14.5 Environmental hazards:	Environmentally Hazardous
14.6 Special precautions for user:	–
Other information	
Passenger and cargo aircraft:	Forbidden.
Cargo aircraft only:	Forbidden.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: Not applicable

Additional identification: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: Regulatory information

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

EU Regulations

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex 1, as amended.:

Chemical	CAS-No.	Lower-tier Requirements	Upper-tier Requirements
Chlorine	7782-50-5	10 t	25 t

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work as amended:

Chemical name	CAS-No.	Concentration
Chlorine	7782-50-5	100%

National Regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 2016/425/EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2 Chemical safety assessment: Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information: Not relevant.

Key literature references and sources for data:

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/).
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances http://apps.echa.europa.eu/registered/registered-sub.aspx#search
European Industrial Gases Association (EIGA) Doc. 169 "Classification and Labelling guide", as amended.
International Programme on Chemical Safety (http://www.inchem.org/)
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
Substance specific information from suppliers.
Details given in this document are believed to be correct at the time of publication.

Wording of the H-statements in section 2 and 3

H270	May cause or intensify fire; oxidizer.
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.

Training information:

Users of breathing apparatus must be trained. Ensure operators understand the toxicity hazard. Ensure operators understand the hazards.

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Chlorine

Classification according to Regulation (EC) No 1272/2008 as amended.

Ox. Gas 1, H270
Press. Gas Liq. Gas, H280
Acute Tox. 2, H330
Skin Irrit. 2, H315
Eye Irrit. 2, H319
STOT SE 3, H335
Aquatic Acute 1, H400
Aquatic Chronic 1, H410

Other information: Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

Last revised date: 17.04.2023

Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

SAFETY DATA SHEET
According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended
Chlorine

Annex to the extended Safety Data Sheet (eSDS)

Content

Exposure Scenario 1)

Exposure Scenario worker

1.Industrial:, Formulation & (re)packing of substances and mixtures, Manufacture of fine chemicals, Metal surface treatment products, Manufacture of computer, electronic and optical products, electrical equipment, Bleaching agent, Use as an Intermediate (transported, on-site isolated)., Water treatment.

List of use descriptors	
Sector(s) of use	SU6b: Manufacture of pulp, paper and paper products SU9: Manufacture of fine chemicals SU14: Manufacture of basic metals, including alloys SU15: Manufacture of fabricated metal products, except machinery and equipment SU16: Manufacture of computer, electronic and optical products, electrical equipment SU23: Electricity, steam, gas water supply and sewage treatment
Product categories [PC]:	PC14: Metal surface treatment products PC21: Laboratory chemicals PC26: Paper and board treatment products PC33: Semiconductors PC37: Water treatment chemicals

Name of contributing environmental scenario and corresponding ERC	Industrial use: ERC6a: Use of intermediate ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)

Contributing Scenarios	Industrial use: PROC1: Chemical production or refinery in closed process without likelihood of 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 PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature

2.1.Contributing exposure scenario controlling environmental exposure for: Industrial use, Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid., Using gas as feedstock in chemical processes., Using gas for metal treatment., Purification of molten aluminium, Use for electronic component manufacture., Paper bleaching, Manufacture of optical fibres, Water treatment.

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.

Physical form of the product	See section 9 of the SDS.

Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,013 mPa.s (20 °C)

Amounts used

Regional use tonnage:	28611 tonnes/day

Frequency and duration of use

Batch process:	not relevant
Continuous process:	365 Emission days

Environment factors not influenced by risk management

Flow rate of receiving surface water (m^3/d):	Local freshwater dilution factor	Local marine water dilution factor	Other factors:	Remarks:
not relevant	10	100	not relevant	

Other given operational conditions affecting environmental exposure

type	Emission days	Emission factors			Remarks
		Air	Soil	Water	
Intermittent release	365	0,1 %	-	-	All waste product is assumed to be collected and returned for re-processing or use as a fuel.

Other relevant operational conditions	Release to air from process: 0 tonnes Negligible air emissions as process operates in a contained system. Release to waste water from process: 0 tonnes Negligible wastewater emissions as process operates without water contact.

Risk management measures (RMM)

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

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Handle substance within a closed system. Effectiveness: 99 %.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	Wastewater emission controls are not applicable as there is no direct release to wastewater.

Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	Onsite Sewage Treatment Plant
Discharge rate:	2.000 m3/d
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

Suitable recovery operations:	Treatment effectiveness	Remarks
See section 13 of the SDS		External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Industrial use, Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid., Using gas as feedstock in chemical processes., Using gas for metal treatment., Purification of molten aluminium, Use for electronic component manufacture., Paper bleaching, Manufacture of optical fibres, Water treatment.

Process Categories:	PROC1: Chemical production or refinery in closed process without likelihood of 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 PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	6780 hPa
Process temperature:	20 °C
Remarks	not relevant

Amounts used

Daily amount per site	The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. professional) and level of containment/automation (as reflected in the PROCs and technical conditions) is the main determinant of the process-intrinsic emission potential.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	> 4 h	220 days per year	PROC1, PROC3, PROC8b, PROC22
Covers daily exposures up to 8 hours			

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

Area of use	Room size:	Temperature:	Ventilation rate	Remarks
Indoor/Outdoor use.				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition, Transfer of substance or mixture (charging and discharging) at dedicated facilities, Manufacturing and processing of minerals and/or metals at substantially elevated temperature

Other relevant operational conditions:	. See section 8 of the SDS.

Risk management measures (RMM)

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

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).				Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with

				equivalent containment condition
Local exhaust ventilation				Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).				Transfer of substance or mixture (charging and discharging) at dedicated facilities
Local exhaust ventilation				Transfer of substance or mixture (charging and discharging) at dedicated facilities
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).				Manufacturing and processing of minerals and/or metals at substantially elevated temperature
Local exhaust ventilation				Manufacturing and processing of minerals and/or metals at substantially elevated temperature

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See section 7 of the SDS.
				Ensure operatives are trained to minimise exposures.
				Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

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

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See section 8 of the safety data sheet (Personal protection equipment)

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

3. Exposure estimation

Environment:
Industrial use, Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid., Using gas as feedstock in chemical processes., Using gas for metal treatment., Purification of molten aluminium, Use for electronic component manufacture., Paper bleaching, Manufacture of optical fibres, Water treatment.:
ERC6a, ERC6b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
freshwater	0,006 µg/l	0,0286		Not regarded as dangerous for the environment.

ERC6a, ERC6b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
marine water	0,006 µg/l	0,143		Not regarded as dangerous for the environment.

ERC6a, ERC6b:

Compartment	Predicted environmental	Risk characterisation ratio	Method	Remarks

	concentration (PEC)	(RCR)		
freshwater sediment	µg/l			Not regarded as dangerous for the environment.

ERC6a, ERC6b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
marine sediment	µg/l			Not regarded as dangerous for the environment.

ERC6a, ERC6b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
Sewage treatment plant	µg/l			Not regarded as dangerous for the environment.

Health:
Industrial use, Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid., Using gas as feedstock in chemical processes., Using gas for metal treatment., Purification of molten aluminium, Use for electronic component manufacture., Paper bleaching, Manufacture of optical fibres, Water treatment.:
PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, short-term, systemic, (acute)	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, short-term,	Indoor/Outd	0,54	0,36		none

systemic, (acute)	oor use.	mg/m³			

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, short-term, local, (acute)	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, short-term, local, (acute)	Indoor/Outdoor use.	0,54 mg/m³	0,36		none

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, long-term, systemic	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, long-term, systemic	Indoor/Outdoor use.	0,705 mg/m³	0,94		none

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, long-term, local	Indoor/Outd				Dermal exposure is

	oor use.				considered to be not relevant.

PROC1, PROC3, PROC8b, PROC22:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, long-term, local	Indoor/Outdoor use.	0,705 mg/m³	0,94		none

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

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see http://www.ecetoc.org/tra

Exposure Scenario 2)

Exposure Scenario worker

1.Professional:, Laboratory use, Water treatment.

List of use descriptors	
Sector(s) of use	SU23: Electricity, steam, gas water supply and sewage treatment SU24: Scientific research and development
Product categories [PC]:	PC21: Laboratory chemicals PC37: Water treatment chemicals

Name of contributing environmental scenario and corresponding ERC	Professional use: ERC8b: Widespread use of reactive processing aid (no inclusion into or onto article, indoor)

Contributing Scenarios	Professional use: PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC15: Use as laboratory reagent

2.1.Contributing exposure scenario controlling environmental exposure for: Professional use, Using gas alone or in mixtures for the calibration of analysis equipment., Water treatment.

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.

Physical form of the product	See section 9 of the SDS.

Viscosity:	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,013 mPa.s (20 °C)

Amounts used

Regional use tonnage:	28611 tonnes/day

Frequency and duration of use

Batch process:	not relevant
Continuous process:	365 Emission days

Environment factors not influenced by risk management

Flow rate of receiving surface water (m^3/d):	Local freshwater dilution factor	Local marine water dilution factor	Other factors:	Remarks:
not relevant	10	100	not relevant	

Other given operational conditions affecting environmental exposure

type	Emission days	Emission factors			Remarks
		Air	Soil	Water	
Intermittent release	365	0,1 %	-	-	All waste product is assumed to be collected and returned for re-processing or use as a fuel.

Other relevant operational conditions	Release to air from process: 0 tonnes Negligible air emissions as

	process operates in a contained system. Release to waste water from process: 0 tonnes Negligible wastewater emissions as process operates without water contact.

Risk management measures (RMM)

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

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Air	Handle substance within a closed system. Effectiveness: 99 %.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	Wastewater emission controls are not applicable as there is no direct release to wastewater.
Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	Onsite Sewage Treatment Plant
Discharge rate:	2.000 m3/d
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	not relevant

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
See section 13 of the SDS		External treatment and disposal of waste should comply with applicable local and/or national regulations.

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

Suitable recovery operations:	Treatment effectiveness	Remarks
See section 13 of the SDS		External recovery and recycling of waste should comply with applicable local and/or national regulations.

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded. Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Professional use, Using gas alone or in mixtures for the calibration of analysis equipment., Water treatment.

Process Categories:	PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities PROC15: Use as laboratory reagent

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 %.

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	6780 hPa
Process temperature:	20 °C
Remarks	not relevant

Amounts used

Daily amount per site	The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation (industrial vs. professional) and level of containment/automation (as reflected in the PROCs and technical conditions) is the main determinant of the process-intrinsic emission

	potential.

Frequency and duration of use

	Use duration:	Frequency of use:	Remarks
Hours per shift	> 4 h	220 days per year	PROC8b, PROC15
Covers daily exposures up to 8 hours			

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

Area of use	Room size:	Temperature:	Ventilation rate	Remarks
Indoor/Outdoor use.				Transfer of substance or mixture (charging and discharging) at dedicated facilities, Use as laboratory reagent

Other relevant operational conditions:	. See section 8 of the SDS.

Risk management measures (RMM)

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

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).				Transfer of substance or mixture (charging and discharging) at dedicated facilities
Local exhaust ventilation				Transfer of substance or mixture (charging and discharging) at dedicated facilities

Provide a good standard of controlled ventilation (10 to 15 air changes per hour).				Use as laboratory reagent
Local exhaust ventilation				Use as laboratory reagent

Organisational measures to prevent/limit releases, dispersion and exposure

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See section 7 of the SDS.
				Ensure operatives are trained to minimise exposures.
				Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed

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

inhalation exposure	dermal exposure	eye exposure	oral exposure	Remarks
				See section 8 of the safety data sheet (Personal protection equipment)

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

3. Exposure estimation

Environment:
Professional use, Using gas alone or in mixtures for the calibration of analysis equipment., Water treatment.:
ERC8b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
freshwater	0,006 µg/l	0,0286		Not regarded as dangerous for the environment.

ERC8b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
marine water	0,006 µg/l	0,143		Not regarded as dangerous for the environment.

ERC8b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
freshwater sediment	µg/l			Not regarded as dangerous for the environment.

ERC8b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
marine sediment	µg/l			Not regarded as dangerous for the environment.

ERC8b:

Compartment	Predicted environmental concentration (PEC)	Risk characterisation ratio (RCR)	Method	Remarks
Sewage treatment plant	µg/l			Not regarded as dangerous for the environment.

Health:
Professional use, Using gas alone or in mixtures for the calibration of analysis equipment., Water treatment.:
PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, short-term, systemic, (acute)	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, short-term, systemic, (acute)	Indoor/Outdoor use.	0,54 mg/m³	0,36		none

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, short-term, local, (acute)	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, short-term, local, (acute)	Indoor/Outdoor use.	0,54 mg/m³	0,36		none

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks

dermal, long-term, systemic	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, long-term, systemic	Indoor/Outdoor use.	0,705 mg/m³	0,94		none

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
dermal, long-term, local	Indoor/Outdoor use.				Dermal exposure is considered to be not relevant.

PROC8b, PROC15:

Route of Exposure	Specific condition	Exposure level	Risk characterisation ratio (RCR)	Method	Remarks
inhalative, long-term, local	Indoor/Outdoor use.	0,705 mg/m³	0,94		none

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

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see http://www.ecetoc.org/tra