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

1.1. Product identifier

Product form : Substance  
Name : Chlorine  
EC index no : 017-001-00-7  
EC no : 231-959-5  
CAS No : 7782-50-5  
REACH registration No : 01-2119486560-35  
Formula : Cl₂

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

1.2.1. Relevant identified uses

Use of the substance/mixture : Industrial uses: Uses of substances as such or in preparations at industrial sites  
Manufacture of textiles, leather, fur  
Manufacture of pulp, paper and paper products  
Manufacture of bulk, large scale chemicals (including petroleum products)  
Manufacture of fine chemicals  
Manufacture of other non-metallic mineral products, e.g. plasters, cement  
Manufacture of basic metals, including alloys  
Manufacture of computer, electronic and optical products, electrical equipment

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

MSSA S.A.S.  
111, Rue de la Volta - Pomblière  
73600 SAINT-MARCEL - France  
T +33 (0)4 79 24 70 70 - F +33 (0)4 79 24 70 50  
fds-msds@metauxspeciaux.fr

1.4. Emergency telephone number

<table>
<thead>
<tr>
<th>Country</th>
<th>Organisation/Company</th>
<th>Address</th>
<th>Emergency number</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>National Poisons Information Service (Birmingham Centre)</td>
<td>Dudley Road B18 7QH Birmingham</td>
<td>0844 892 0111 (UK only, Monday to Friday, 08.00 to 18.00 hours)</td>
<td></td>
</tr>
</tbody>
</table>

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Ox. Gas 1 H270  
Press. Gas Liq. H280  
Acute Tox. 2 (Inhalation) H330  
Skin Irrit. 2 H315  
Eye Irrit. 2 H319  
STOT SE 3 H335  
Aquatic Acute 1 H400 (M=100)  
Aquatic Chronic 1 H410

Full text of hazard classes and H-statements : see section 16

Adverse physicochemical, human health and environmental effects

Oxidizing. Fatal if inhaled. Corrosive to the respiratory tract. Causes skin irritation. Causes serious eye irritation. Very toxic to aquatic life with long lasting effects.
2.2. Label elements

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

Hazard pictograms (CLP):

- GHS03
- GHS04
- GHS06
- GHS09

Signal word (CLP): Danger

Hazard statements (CLP):
- 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
- H410 - Very toxic to aquatic life with long lasting effects

Precautionary statements (CLP):
- P220 - Keep/Store away from clothing, combustibles
- P244 - Keep reduction valves free from grease and oil
- P260 - Do not breathe gas
- P273 - Avoid release to the environment
- P280 - Wear protective gloves, protective clothing, eye protection, face protection
- P370+P376 - In case of fire: stop leak if safe to do so
- P302+P352 - IF ON SKIN: Wash with plenty of soap and water
- 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
- P332+P313 - If skin irritation occurs: Get medical advice/attention
- P403 - Store in a well-ventilated place
- P405 - Store locked up

EUH-statements:
- EUH071 - Corrosive to the respiratory tract

2.3. Other hazards

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII

This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

SECTION 3: Composition/information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (Note U)</td>
<td>(CAS No) 7782-50-5</td>
<td>100</td>
<td>Ox. Gas 1, H270 Press. Gas Liq., H280 Acute Tox. 2 (Inhalation), H330 Skin Irrit. 2, H315 Eye Irrit. 2, H319 STOT SE 3, H335 Aquatic Acute 1, H400 (M=100) Aquatic Chronic 1, H410</td>
</tr>
<tr>
<td></td>
<td>(EC no) 231-959-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(EC index no) 017-001-00-7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(REACH-no) 01-2119486560-35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Full text of H-statements: see section 16

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation: Move the affected person away from the contaminated area and into the fresh air. Remove contaminated clothing. Provide oxygen and/or ventilation assistance, if needed. Call a physician immediately. Transport to hospital immediately. Keep victim warm and rested. Delayed adverse effects possible.

First-aid measures after skin contact: Immediately remove contaminated clothing or footwear. Rinse immediately with plenty of water. If necessary seek medical advice.

First-aid measures after eye contact: Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Consult an eye specialist immediately.

First-aid measures after ingestion: Not specifically applicable.
4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation
Exceeding the exposure limits atmospheric concentrations may lead to immediate and severe irritation of the upper respiratory tract, severe coughing, choking and bronchospasm (15-20 ppm), shortness of breath, chest pain, nausea and vomiting (30 ppm). There are indications that some exposures may cause bronchial hyperactivity in some sensitive individuals. Fainting and death may occur after exposure above 50 ppm (depending on the duration of exposure). Chemical tracheobronchitis, pulmonary edema may occur up to 48 hours after exposure (above 40 ppm).

Symptoms/injuries after skin contact
Causes skin irritation.

Symptoms/injuries after eye contact
Causes serious eye irritation.

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

SECTION 5: Firefighting measures

5.1. Extinguishing media
Suitable extinguishing media
All extinguishing agents can be used. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire.

5.2. Special hazards arising from the substance or mixture
Fire hazard
May intensify fire; oxidiser.

5.3. Advice for firefighters
Firefighting instructions
Clear the danger area. Combat the gas with a water-spray. Contain the extinguishing fluids by bunding (the product is hazardous for the environment). Use water spray or fog for cooling exposed containers. If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire. Keep upwind.

Protection during firefighting
Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
General measures
Ensure adequate ventilation. Do not breathe vapours. Avoid any direct contact with the product. Access forbidden to unauthorised personnel.

6.1.1. For non-emergency personnel
Emergency procedures
Mark out the contaminated area with signs and prevent access to unauthorised personnel. Consult an expert immediately. Avoid any direct contact with the product. Do not breathe vapours. Prevent wind dispersal. Keep upwind.

6.1.2. For emergency responders
Protective equipment
Do not attempt to take action without suitable protective equipment. For further information refer to section 8: “Exposure controls/personal protection”.

6.2. Environmental precautions
Stop leak if safe to do so. Use water curtains to contain the toxic clouds. Contain the spilled material by bunding. Turn leaking containers leak-side up to prevent the escape of liquid. Notify authorities if product enters sewers or public waters.

6.3. Methods and material for containment and cleaning up
Methods for cleaning up
Combat the gas with a water-spray. Suck towards a neutralization installation. Wash with sodium carbonate solution (5% Na2 CO3).

6.4. Reference to other sections
For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Precautions for safe handling
Ensure good ventilation of the work station. Avoid any direct contact with the product. Smoking is forbidden. Avoid contact of substance with water. Do not breathe gas. Closed system. Vapour extraction at source. Only oil the equipment with specialist greases (chlorofluorinated).

Hygiene measures
Do not drink, eat or smoke in the workplace. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities
Technical measures
The floor of the depot should be impermeable and designed to form a water-tight basin. Storage areas must be equipped with a high and low ventilation and connected to a neutralization / absorption unit.

Storage conditions
Keep container tightly closed and dry. Store in a cool, well-ventilated place. Protect from sunlight. Keep away from heat. Keep at temperature not exceeding 50 °C.
Incompatible materials: Combustible materials, reducing materials, Organic materials, Finely divided metals (Al, Mg, Zn), Hydrogen, Acetylene, Ethylene, ethane, Hydrazine, Phosphorus, Arsenic, antimony, Fats, Silicons. (Risk of violent reaction - Ignition).

Storage temperature: < 50 °C

Packaging materials: Recommended materials: Ordinary steel, Polytetrafluoroethylene (PTFE), PVC. Packing material to avoid: Metals, Titanium, Aluminium. Some plastics.

7.3. Specific end use(s)
No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Chlorine (7782-50-5)</th>
<th>United Kingdom</th>
<th>Local name</th>
<th>Chlorine</th>
<th>WEL STEL (mg/m³)</th>
<th>United Kingdom</th>
<th>WEL STEL (ppm)</th>
</tr>
</thead>
</table>

Chlorine (7782-50-5)
DNEL/DMEL (Workers)

Acute - systemic effects, inhalation 1.5 mg/m³
Acute - local effects, inhalation 1.5 mg/m³
Long-term - local effects, dermal 0.5% in mixture
Long-term - systemic effects, inhalation 0.75 mg/m³
Long-term - local effects, inhalation 0.75 mg/m³
DNEL/DMEL (General population)

Acute - systemic effects, inhalation 1.5 mg/m³
Acute - local effects, inhalation 1.5 mg/m³
Long-term - systemic effects, oral 0.25 mg/kg bodyweight/day
Long-term - systemic effects, inhalation 0.75 mg/m³
Long-term - local effects, dermal 0.5% in mixture
Long-term - local effects, inhalation 1.5 mg/m³

PNEC (Water)

PNEC aqua (freshwater) 0.21 µg/l
PNEC aqua (marine water) 0.042 µg/l
PNEC aqua (intermittent, freshwater) 0.26 µg/l
PNEC (Oral)
PNEC oral (secondary poisoning) 11.1 mg/kg dwt
PNEC (STP)
PNEC sewage treatment plant 0.03 mg/l

8.2. Exposure controls

Appropriate engineering controls:
Ensure good ventilation of the work station. Extraction to remove vapours at their source. Safety shower. Eye fountain. Monitor the atmosphere at regular intervals.

Hand protection:
Neoprene protective gloves. Breakthrough time: refer to the recommendations of the supplier. The protective gloves to be used must comply with the specifications of EC directive 89/686/EEC and the resultant standard EN 374

Eye protection:
Safety glasses. Face-shield

Skin and body protection:
Protective clothing

Respiratory protection:
Gas mask with filter type B

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state: Gas
Colour: Slightly yellow to green.
Chlorine
Safety Data Sheet
according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Odour : Pungent.
Odour threshold : 0.3 - 0.5 ppm
pH : Not applicable
Relative evaporation rate (butylacetate=1) : No data available
Melting point : -101 °C
Freezing point : No data available
Boiling point : -34 °C
Flash point : Not applicable
Auto-ignition temperature : No data available
Decomposition temperature : No data available
Flammability (solid, gas) : No data available
Vapour pressure : 6780 hPa (20 °C)
Relative vapour density at 20 °C : No data available
Relative density : 2.49
Density : 1.411 g/cm³
Solubility
- Benzene : 318 g/kg (20 °C).
- Acetic acid : 121 g/kg (15 °C).
- Tetrachloromethane : 114 g/kg (20 °C).
- Water : 7.41 g/l (20 °C).
Log Pow : No data available
Viscosity, kinematic : No data available
Viscosity, dynamic : 0.0134 mPa.s (20 °C)
Explosive properties : Not explosive.
Oxidising properties : Oxidizing.
Explosive limits : Not applicable

SECTION 10: Stability and reactivity

10.1. Reactivity
Oxidizing. Contact with combustible material may cause fire.

10.2. Chemical stability
Stable at ambient temperature and under normal conditions of use.

10.3. Possibility of hazardous reactions

10.4. Conditions to avoid
Moisture.

10.5. Incompatible materials

10.6. Hazardous decomposition products
On contact with water : Hydrochloric acid. Hypochlorous acid.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity
- Inhalation: Fatal if inhaled.

Chlorine (7782-50-5)

| LD50 oral rat | 1100 mg/kg (OECD 401) (Read accross) |
| LC50 oral rabbit | > 20000 mg/kg (OECD 402) (Read accross) |
| LC50 inhalation rat | 1321 mg/m³ (60 minutes) (equivalent or similar to OECD Guideline 403) |

Skin corrosion/irritation : Causes skin irritation.
\[ pH: \text{Not applicable} \]

Additional information : (OECD 404 method) (read-across)
# Chlorine

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serious eye damage/irritation</strong></td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td>(OECD 405) (read-across)</td>
</tr>
<tr>
<td><strong>Respiratory or skin sensitisation</strong></td>
<td>Does not cause cutaneous sensitisation for guinea-pigs (OECD 406) (read-across)</td>
</tr>
<tr>
<td><strong>Germ cell mutagenicity</strong></td>
<td>Not classified (Conclusive but not sufficient for classification)</td>
</tr>
<tr>
<td><strong>Mutagenicity</strong></td>
<td>Ames test: negative (OECD 471) (read-across)</td>
</tr>
<tr>
<td><strong>Carcinogenicity</strong></td>
<td>No carcinogenic effects reported (read-across)</td>
</tr>
<tr>
<td><strong>Reproductive toxicity</strong></td>
<td>Not classified (Conclusive but not sufficient for classification)</td>
</tr>
<tr>
<td><strong>STOT-single exposure</strong></td>
<td>May cause respiratory irritation.</td>
</tr>
<tr>
<td><strong>STOT-repeated exposure</strong></td>
<td>Not classified (Conclusive but not sufficient for classification)</td>
</tr>
</tbody>
</table>

### Chlorine (7782-50-5)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOAEL (oral, rat, 90 days)</strong></td>
<td>20 mg/kg bodyweight/day (OECD 408) (Read accross)</td>
</tr>
<tr>
<td><strong>NOAEL (oral, rat, 90 days)</strong></td>
<td>20 mg/kg bodyweight/day (OECD 408) (Read accross)</td>
</tr>
<tr>
<td><strong>Aspiration hazard</strong></td>
<td>Not classified (Technical impossibility to obtain the data)</td>
</tr>
</tbody>
</table>

### Chlorine (7782-50-5)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Viscosity, kinematic</strong></td>
<td>0.00949681 mm²/s</td>
</tr>
</tbody>
</table>

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general: Very toxic to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chlorine (7782-50-5)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LC50 fish</strong></td>
<td>0.06 mg/l/96h (Salmo gairdneri) (Read accross)</td>
</tr>
<tr>
<td><strong>EC50 Daphnia</strong></td>
<td>0.141 mg/l/48h (Daphnia magna) (Read accross)</td>
</tr>
<tr>
<td><strong>ErC50 (algae)</strong></td>
<td>&lt; 0.05 mg/l/48h (Arcaita) (Read accross)</td>
</tr>
<tr>
<td><strong>ErC50 (other aquatic plants)</strong></td>
<td>0.1 - 0.4 mg/l (Myriophyllum spicatum)</td>
</tr>
<tr>
<td><strong>NOEC chronic fish</strong></td>
<td>0.04 mg/l (Menidia peninsulae) (Read accross)</td>
</tr>
<tr>
<td><strong>NOEC chronic crustacea</strong></td>
<td>0.01 mg/l (E. capsaeformis) (Read accross)</td>
</tr>
<tr>
<td><strong>Additional information</strong></td>
<td>Activated sludge: EC50 &gt; 3 mg/l (3h)</td>
</tr>
</tbody>
</table>

### 12.2. Persistence and degradability

**Chlorine (7782-50-5)**

- **Persistence and degradability**
  - **hydrolysis:** In water, formation of hypochlorous acid and hypochlorites according to the environmental pH.
  - **Photodegradation in air:** Chlorine deteriorates during the day with half-lives ranging from a few minutes to a few hours depending on latitude, season and time of the day.
  - **Photodegradation in water:** The half-life varies between 12 min at pH 8 and 60 min at pH 5.
  - **Photodegradation in soil:** No data available.

### 12.3. Bioaccumulative potential

**Chlorine (7782-50-5)**

- **Bioaccumulative potential**
  - Not bioaccumulation due to its water solubility and its high reactivity.

### 12.4. Mobility in soil

**Chlorine (7782-50-5)**

- **Ecology - soil**
  - Very volatile, easily degradable in the soil.
12.5. Results of PBT and vPvB assessment

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

12.6. Other adverse effects

Other adverse effects: No additional information available. In general, chlorine is known for its toxic effects on living organisms.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste treatment methods: Vacuum to a soda neutralization system. Clean contaminated packagings with a solution of sodium carbonate. After cleaning, recycle or dispose of at an authorised site.

Additional information: The user's attention is drawn to the possible existence of specific european, national or local regulations regarding disposal.

SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

<table>
<thead>
<tr>
<th>ADR</th>
<th>IMDG</th>
<th>IATA</th>
<th>ADN</th>
<th>RID</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1. UN number</td>
<td>1017</td>
<td>1017</td>
<td>1017</td>
<td>1017</td>
</tr>
<tr>
<td>14.2. UN proper shipping name</td>
<td>CHLORINE</td>
<td>Chlorine</td>
<td>CHLORINE</td>
<td>CHLORINE</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>2.3 (5.1, 8)</td>
<td>2.3 (5.1, 8)</td>
<td>2.3 (5.1, 8)</td>
<td>2.3 (5.1, 8)</td>
</tr>
</tbody>
</table>

14.4. Packing group

Not applicable

14.5. Environmental hazards

<table>
<thead>
<tr>
<th>Dangerous for the environment</th>
<th>Dangerous for the environment</th>
<th>Dangerous for the environment</th>
<th>Dangerous for the environment</th>
<th>Dangerous for the environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Marine pollutant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14.6. Special precautions for user

- Overland transport
  - Classification code (ADR): 2TOC
  - Limited quantities (ADR): 0
  - Excepted quantities (ADR): E0
  - Packing instructions (ADR): P200
  - Mixed packing provisions (ADR): MP9
  - Portable tank and bulk container instructions (ADR): (M), T50
  - Portable tank and bulk container special provisions (ADR): TP19
  - Tank code (ADR): P22DH(M)
  - Tank special provisions (ADR): TA4, TT9, TT10
  - Vehicle for tank carriage: AT
  - Transport category (ADR): 1
Chlorine
Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

Special provisions for carriage - Loading, unloading and handling (ADR) : CV9, CV10, CV36

Special provisions for carriage - Operation (ADR) : S14

Hazard identification number (Kemler No.) : 265

Orange plates :

Tunnel restriction code (ADR) : C/D
EAC code : 2XE
APP code : A(c)

- Transport by sea

Limited quantities (IMDG) : 0
Excepted quantities (IMDG) : E0
Packing instructions (IMDG) : P200
Tank instructions (IMDG) : T50
Tank special provisions (IMDG) : TP19
EmS-No. (Fire) : F-C
EmS-No. (Spillage) : S-U
Stowage category (IMDG) : D
Stowage and handling (IMDG) : SW2

Properties and observations (IMDG) :
Non-flammable, toxic and corrosive yellow gas with a pungent odour. Corrosive to glass and to most metals. Much heavier than air (2.4). Highly irritating to skin, eyes and mucous membranes. Powerful oxidant which may cause fire.

MFAG-No : 124

- Air transport

Transport regulations (IATA) : Passenger aircraft : FORBIDDEN
PCA Limited quantities (IATA) : Forbidden
PCA limited quantity max net quantity (IATA) : Forbidden
PCA packing instructions (IATA) : Forbidden
PCA max net quantity (IATA) : Forbidden
CAO packing instructions (IATA) : Forbidden
CAO max net quantity (IATA) : Forbidden
Special provisions (IATA) : A2
ERG code (IATA) : 2CP

- Inland waterway transport

Classification code (ADN) : 2TOC
Limited quantities (ADN) : 0
Excepted quantities (ADN) : E0
Equipment required (ADN) : PP, EP, TOX, A
Ventilation (ADN) : VE02
Number of blue cones/lights (ADN) : 2

- Rail transport

Classification code (RID) : 2TOC
Limited quantities (RID) : 0
Excepted quantities (RID) : E0
Packing instructions (RID) : P200
Mixed packing provisions (RID) : MP9
Portable tank and bulk container instructions (RID) : T50(M)
Portable tank and bulk container special provisions (RID) : TP19

Tank codes for RID tanks (RID) : P22DH(M)
Special provisions for RID tanks (RID) : TU38, TE22, TE25, TA4, TT9, TT10, TM6
Transport category (RID) : 1
Special provisions for carriage - Loading, unloading and handling (RID) : CW9, CW10, CW36

Hazard identification number (RID) : 265

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

No REACH Annex XVII restrictions
Chlorine is not on the REACH Candidate List
Chlorine is not on the REACH Annex XIV List

15.1.2. National regulations

Listed on the United States TSCA (Toxic Substances Control Act) inventory
Subject to reporting requirements of United States SARA Section 313
Listed on the Canadian DSL (Domestic Substances List)

15.2. Chemical safety assessment

A chemical safety assessment has been carried out

SECTION 16: Other information

Indication of changes:
This sheet was updated (refer to the date at the top of this page). SDS changed section(s) : 9.


Other information : Safety data sheet established by : LISAM SERVICES - TELEGIS
17 rue de la Couture F-60400 Passel www.lisam-telegis.fr.

Full text of H- and EUH-statements:

<table>
<thead>
<tr>
<th>Acute Tox. 2 (Inhalation)</th>
<th>Acute toxicity (inhal.), Category 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Acute 1</td>
<td>Hazardous to the aquatic environment — Acute Hazard, Category 1</td>
</tr>
<tr>
<td>Aquatic Chronic 1</td>
<td>Hazardous to the aquatic environment — Chronic Hazard, Category 1</td>
</tr>
<tr>
<td>Eye Irrit. 2</td>
<td>Serious eye damage/eye irritation, Category 2</td>
</tr>
<tr>
<td>Ox. Gas 1</td>
<td>Oxidising Gases, Category 1</td>
</tr>
<tr>
<td>Press. Gas Liq.</td>
<td>Gases under pressure : Liquefied gas</td>
</tr>
<tr>
<td>Skin Irrit. 2</td>
<td>Skin corrosion/irritation, Category 2</td>
</tr>
<tr>
<td>STOT SE 3</td>
<td>Specific target organ toxicity — Single exposure, Category 3, Respiratory tract irritation</td>
</tr>
<tr>
<td>H270</td>
<td>May cause or intensify fire; oxidizer</td>
</tr>
<tr>
<td>H280</td>
<td>Contains gas under pressure; may explode if heated</td>
</tr>
<tr>
<td>H315</td>
<td>Causes skin irritation</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation</td>
</tr>
<tr>
<td>H330</td>
<td>Fatal if inhaled</td>
</tr>
<tr>
<td>H335</td>
<td>May cause respiratory irritation</td>
</tr>
<tr>
<td>H400</td>
<td>Very toxic to aquatic life</td>
</tr>
<tr>
<td>H410</td>
<td>Very toxic to aquatic life with long lasting effects</td>
</tr>
<tr>
<td>EUH071</td>
<td>Corrosive to the respiratory tract</td>
</tr>
</tbody>
</table>

SDS EU (REACH Annex II)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.
<table>
<thead>
<tr>
<th>Identified Uses</th>
<th>Es N°</th>
<th>Short title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>End uses of chlorine as such or preparations at industrial sites</td>
<td>1</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>
# Chlorine Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

---

## 1. ES2: End uses of chlorine as such or preparations at industrial sites

### 1.1. Title section

<table>
<thead>
<tr>
<th>End uses of chlorine as such or preparations at industrial sites</th>
<th>ES Ref.: ES2</th>
<th>Date of issue: 25/07/2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>ERC1, ERC4, ERC6b</td>
<td></td>
</tr>
<tr>
<td>Worker</td>
<td>PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC14</td>
<td></td>
</tr>
</tbody>
</table>

### 1.2. Conditions of use affecting exposure

#### 1.2.1. Control of environmental exposure: Contributing scenario controlling environmental exposure (ERC1, ERC4, ERC6b)

<table>
<thead>
<tr>
<th>ERC1</th>
<th>Manufacture of substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERC4</td>
<td>Industrial use of processing aids in processes and products, not becoming part of articles</td>
</tr>
<tr>
<td>ERC6b</td>
<td>Industrial use of reactive processing aids</td>
</tr>
</tbody>
</table>

### Product characteristics

- **Physical form of product**: Liquefied gas
- **Concentration of substance in product**: 100%

#### Amount used, frequency and duration of use (or from service life)

- **Regional use tonnage (tonnes/year)**: 10443000
- **Emission Days (days/year)**: 365

### Technical and organisational conditions and measures

- **Practically no release to waste water and soil**
- **Immediately notify the appropriate authorities in case of gas spill. Do not discharge the product into the environment**
- **All personnel are trained**

#### Conditions and measures related to sewage treatment plant

- **Size of the STP (by default)**: 2000 m³/d

### Conditions and measures related to treatment of waste (including article waste)

- **Product residual disposal complies with applicable regulations**

#### Other conditions affecting environmental exposure

- **Local freshwater dilution factor**: 10
- **Local marine water dilution factor**: 100

#### 1.2.2. Control of worker exposure: Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC14)

<table>
<thead>
<tr>
<th>PROC1</th>
<th>Use in closed process, no likelihood of exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROC2</td>
<td>Use in closed, continuous process with occasional controlled exposure</td>
</tr>
<tr>
<td>PROC3</td>
<td>Use in closed batch process (synthesis or formulation)</td>
</tr>
<tr>
<td>PROC4</td>
<td>Use in batch and other process (synthesis) where opportunity for exposure arises</td>
</tr>
<tr>
<td>PROC5</td>
<td>Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</td>
</tr>
<tr>
<td>PROC8a</td>
<td>Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non dedicated facilities</td>
</tr>
<tr>
<td>PROC8b</td>
<td>Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</td>
</tr>
<tr>
<td>PROC9</td>
<td>Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</td>
</tr>
<tr>
<td>PROC13</td>
<td>Treatment of articles by dipping and pouring</td>
</tr>
<tr>
<td>PROC14</td>
<td>Production of preparations or articles by tabletting, compression, extrusion, pelletisation</td>
</tr>
</tbody>
</table>

### Product characteristics

- **Physical form of product**: Liquefied gas
### Chlorine Safety Data Sheet


<table>
<thead>
<tr>
<th>Concentration of substance in product</th>
<th>100 %</th>
</tr>
</thead>
</table>

**Amount used (or contained in articles), frequency and duration of use/exposure**

<table>
<thead>
<tr>
<th>Exposure duration</th>
<th>&gt; 4 h/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use frequency</td>
<td>220 days/yr</td>
</tr>
</tbody>
</table>

**Technical and organisational conditions and measures**

The opening of chlorine system takes place only after it has been emptied, purged, completely degassed, shut-off via blind flange and disconnected. In case of chlorine leaks, detection and monitoring are performed. Loading and unloading: Gaseous chlorine is transferred via pipelines to on-site users and chlorine is filled into the reaction vessel through closed systems, while off-gases from the reactor are treated before release to the atmosphere. When tankers or cylinders are used for smaller productions, the transfer of chlorine is done through loading stations adapted to the size of the vessel.

Plants are equipped with chlorine detectors in different locations. They can generally detect 0.1 ppmV and have a pre-alarm level of 0.25 ppmV and an alarm level of 0.5 ppmV. The measuring device used for chlorine monitoring is an electrochemical sensor, which is sensible not only to chlorine, but also to other chlorinated substances present in the air. Chlorine concentration measured in the atmosphere of a Chlor-Alkali plant takes into account the exposure coming from the production of various substances (chlorine and, in most cases, other chlorinated chemicals).

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


**Other conditions affecting workers exposure**

<table>
<thead>
<tr>
<th>Body weight</th>
<th>70 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiration volume</td>
<td>10 m³/d</td>
</tr>
</tbody>
</table>

**1.3. Exposure estimation and reference to its source**

#### 1.3.1. Environmental release and exposure Contributing scenario controlling environmental exposure (ERC1, ERC4, ERC6b)

**Information for contributing exposure scenario**

Total chlorine emission (release) from such industrial activity is estimated a bit higher as 100 t/y and globally, with the natural release comparison, this value don’t account it-self of the chlorine balance in the atmosphere and water.

#### 1.3.2. Worker exposure Worker Contributing Scenario (PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC13, PROC14)

**Information for contributing exposure scenario**

Worker exposure is limited taking into account that productions processes take place in closed system; exposure to chlorine is possible only in case of accident or leak. Worst case assumption.

<table>
<thead>
<tr>
<th>Route of exposure and type of effects</th>
<th>Exposure estimate</th>
<th>RCR</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation - Long-term - systemic effects</td>
<td>0.705 mg/m³</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Sum RCR - Long-term - systemic effects</td>
<td></td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Inhalation - Acute</td>
<td>0.54 mg/m³</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Sum RCR - Acute</td>
<td></td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Acute - Local - Inhalation</td>
<td>0.54 mg/m³</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>Long term - Local - Inhalation</td>
<td>0.705 mg/m³</td>
<td>0.94</td>
<td></td>
</tr>
</tbody>
</table>

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

#### 1.4.1. Environment

**Guidance - Environment**

No additional risk management measures required.

#### 1.4.2. Health

**Guidance - Health**

No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.