# Safety Data Sheet

## Section 01 Identification

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| **Product Identifier** | Chlorine<br>Chlorine Liquified Gas, NSF® - 60 |
| **Other Means of Identification** | Liquid chlorine, chlorine gas, liquefied chlorine gas, chlor, molecular chlorine. |
| **Product Use and Restrictions on Use** | Used in water treatment as a disinfectant and oxidizer; production of chlorinated organic and inorganic chemicals; bleaching of paper, textiles and fabrics. |
| **Initial Supplier Identifier** | ClearTech Industries Inc<br>1500 Quebec Avenue<br>Saskatoon, SK. Canada<br>S7K 1V7<br><br>Phone: 800.387.7503<br>Fax: 888.281.8109<br>www.cleartech.ca |
| **Prepared By** | ClearTech Industries Inc. technical writer |
| **24-Hour Emergency Phone** | 306.664.2522 |

## Section 02 Hazard Identification

### Physical Hazards

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|---|---|
| **Oxidizing gas** | Category 1 |
| **Gas under pressure** | Liquified gas |

### Health Hazards

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| **Acute toxicity - inhalation** | Category 2 |
| **Skin corrosion / irritation** | Category 2 |
| **Serious eye damage / eye irritation** | Category 2 |
| **Specific target organ toxicity - single exposure** | Category 3 |
| **Hazardous to the aquatic environment - acute hazard** | Category 1 |

### Signal Word

**Danger**

### Hazard Statements

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.

**Pictograms**

**Precautionary Statements**

**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.
P264 Wash affected body parts thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves, eye protection, face protection
P284 In case of inadequate ventilation wear respiratory protection.

**Response**

P303 P352 P332 P313 P362 P364 IF ON SKIN (or hair): Wash with plenty of water. If skin irritation occurs: Get medical advice / attention. Take off contaminated clothing and wash it before reuse.
P304 P340 P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor.
P305 P351 P338 P337 P313 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice or attention.
P370 P376 In case of fire: Stop leak if safe to do so.
P391 Collect spillage.

**Storage**

P403 Store in a well-ventilated place.
P233 Keep container tightly closed.
P405 Store locked up.
P410 Protect from sunlight.

**Disposal**

P501 Dispose of contents / container in accordance with all federal, provincial and / or local regulations including the Canadian Environmental Protection Act.

**Hazards Not Otherwise Classified**

Not available

**Supplemental Information**

Not available

## Section 03 Composition / Information on Ingredients

**Hazardous Ingredients:**

| Chemical name | Common name(s) | CAS number | Concentration (w/w%) |
|---|---|---|---|
| Chlorine | Not available | 7782-50-5 | 99.5-100% |

## Section 04 First-Aid Measures

**Description of necessary first-aid measures**

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| **Inhalation** | Take precautions to ensure your own safety before attempting a rescue (wear appropriate protective equipment, use the buddy system). Remove source of exposure or move person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor. If breathing has stopped, trained personnel should begin rescue breathing or if the heart has stopped, immediately start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Avoid mouth to mouth contact by using a barrier device. Call a POISON CENTER or doctor if you feel unwell. |
| **Ingestion** | Rinse mouth. Get medical advice / attention if you feel unwell or are concerned. |
| **Skin contact** | Avoid direct contact. Wear chemical protective clothing, if necessary. Take off immediately contaminated clothing, shoes and leather goods. Rinse skin with lukewarm, gently flowing water / shower for 15 to 20 minutes. Get medical advice / attention. Wash contaminated clothing before re-use, or discard. |
| **Eye contact** | Remove source of exposure or move person to fresh air. Rinse eyes cautiously with lukewarm, gently flowing water for several minutes, while holding the eyelids open. Remove contact lenses, if present and easy to do. Continue rinsing for 15 to 20 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. If eye irritation persists: Get medical advice / attention. |

**Most important symptoms and effects, both acute and delayed**

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| **Inhalation** | Fatal if inhaled. May cause respiratory irritation. Nasal discharge, coughing, pain, nausea, vomitting, headache, dizziness, pulmonary edema, hypoxia |
| **Ingestion** | May cause discomfort or nausea. Not an expected route of exposure, see inhalation. |
| **Skin contact** | Causes skin irritation. Dermatitus, with liquid contact: frostbite. |
| **Eye contact** | Causes serious eye irritation. Burning and tears |
| **Further information** | For further information see Section 11 Toxicological Information. |

## Section 05 Fire Fighting Measures

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| **Suitable extinguishing media** | Extinguish fire using extinguishing agents suitable for the surrounding fire. |
| **Unsuitable extinguishing media** | Do NOT use dry chemical fire extinguishing agents containing ammonium compounds (such as some A:B:C agents), since an explosive compound can be formed. Water jets are not recommended in fires involving chemicals. Use water with caution, as it reacts with chlorine to form highly corrosive hypochlorous acid. |
| **Specific hazards arising from the chemical** | Stored under pressure, may explode in the event of a fire. Oxidizing agent, may react with other chemicals, such as water and organic chemicals to generate heat or an explosion. Chlorine is heavy than air and may collect in low lying areas. |
| **Special protective equipment for fire-fighters** | Wear NIOSH-approved self-contained breathing apparatus and chemical-protective clothing. It is reccomended that a full body chemical resistant suit be worn. |

## Section 06 Accidental Release Measures

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| **Personal Precautions / Protective Equipment / Emergency Procedures** | Wear appropriate personal protective equipment (See Section 08 Exposure Controls and Personal Protection). Keep away from clothing and other combustible materials. Stay upwind, ventilate area. Do not breathe gas. |
| **Environmental Precautions** | Prevent material from entering waterways, sewers or confined spaces. Notify local health and wildlife officials. Notify operators of nearby water intakes. |
| **Methods and Materials for Containment and Cleaning Up** | LARGE SPILLS or LEAKS: Ventilate the area to prevent the gas from accumulating, especially in confined spaces. If possible, turn leaking container so that gas escapes rather than liquefied gas. Knock down gas with fog or fine water spray. Do not direct water at spill or source. |

Get expert advice before treating the spilled product with other chemicals to make it less hazardous. May be absorbed and neutralized into water solutions of caustic soda or soda ash and placed in steel, cast iron or lead containers. This disposal operation should be conducted by trained personnel only. This reaction can give off substantial amounts of heat. The caustic solution can be hazardous.

## Section 07 Handling and Storage

**Precautions for Safe Handling**

Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Prevent the release of gas into the workplace air.

Inspect containers for damage or leaks before handling. If the original label is damaged or missing replace with a workplace label. Have suitable emergency equipment for fires, spills and leaks readily available.

Never return contaminated material to its original container.

**Conditions for Safe Storage**

Store in a cool, dry, well-ventilated area, away from heat sources and incompatible materials. Always store in original labeled container. Keep containers tightly closed when not in use and when empty. Empty containers may contain hazardous residues. Protect label and keep it visible. Do not store below ground level or in confined spaces.

**Incompatibilities**

Reducing agents, such as hydrogen, sodium borohydride, sulphur dioxide, thiosulphates, hydrazine, phosphites, carbon, and oxalic, formic and ascorbic acid.

Organic material, such as wood, paper, gasoline, diesel, solvents and some glycol based heat transfer fluids

Water, ammonia and ammonia-based compounds, powdered metal.

## Section 08 Exposure Controls and Personal Protection

### Exposure limits

| Component | Regulation | Type of listing | Value |
|---|---|---|---|
| Chlorine | ACGIH | TWA | 0.1 ppm (0.29 mg/m³) |
| | ACGIH | STEL/Ceiling | 0.4 ppm (1.16 mg/m³) |

### Engineering controls

**Ventilation Requirements**

Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided in accordance with all fire codes and regulatory requirements. Supply sufficient replacement air to make up for air removed by exhaust systems.

**Other**

A soak hose and eyewash station or emergency shower and eyewash station should be available, tested, and be in close proximity to the product being handled in accordance with provincial regulations. It is not recommended that the safety shower be in the same room as the chlorine cylinders, due to the possibility of hazardous reactions between chlorine and water.

### Protective equipment

The following are recommendations only. It is the responsibility of the employer / user to conduct a hazard assessment of the process in which this product being used and determine the proper engineering controls and PPE for their process. Additional regulatory and safety information should be sought from local authorities and, if needed, a professional industrial hygienist.

**Eye and face protection**

Where there is potential eye or face exposure, tightly fitting chemical goggles are recommended. Contact lenses are not recommended; they may contribute to severe eye injury.

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| **Hand and body protection** | Disposable latex or nitrile gloves are recommended to prevent incidental contact. Butyl rubber, neoprene, or PVC skin protection is recommended for extended contact. Leather gloves are not recommended for chemical protection. Refer to manufacturer's specifications for breakthrough times and permeability information; note that breakthrough times and permeability vary with temperature, application and age of material. Continued use of contaminated safety gear or clothing is not recommended; wash before reuse or discard. |
| **Respiratory protection** | In case of insufficient ventilation wear suitable respiratory equipment.<br><br>**NIOSH respirator recommendations for: Chlorine**<br><br>**Up to: 5 ppm**<br>(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against Chlorine<br>(APF = 10) Any supplied-air respirator<br><br>**Up to: 10 ppm**<br>(APF = 25) Any supplied-air respirator operated in a continuous-flow mode<br>(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against Chlorine<br>(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against Chlorine<br>(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Chlorine<br>(APF = 50) Any self-contained breathing apparatus with a full facepiece.<br>(APF = 50) Any supplied-air respirator with a full facepiece<br><br>**Emergency or planned entry into unknown concentrations or IDLH conditions:**<br>(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode<br>(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus<br><br>**Escape:**<br>(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against Chlorine<br>Any appropriate escape-type, self-contained breathing apparatus |
| **Thermal hazards** | Not available |

## Section 09 Physical and Chemical Properties

**Appearance**

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| **Physical state** | Compressed liquified gas |
| **Colour** | Green-yellow gas; amber liquid |
| **Odour** | Pungent |
| **Odour threshold** | 0.06 ppm (detection) |

**Property**

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|---|---|
| **pH** | Not available |
| **Melting point / freezing point** | -101.05 °C @ 101.3 kPa |

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| **Initial boiling point and boiling range** | -34.05 °C @ 101.3 kPa |
| **Flash point** | Not applicable |
| **Evaporation rate** | Not applicable (gas) |
| **Flammability** | Not flammable |
| **Upper flammable limit** | Not available |
| **Lower flammable limit** | Not available |
| **Vapour pressure** | 678 kPa (6.69 atm) @ 20 °C |
| **Vapour density** | 2.46 @ 0 °C |
| **Relative density** | Not applicable |
| **Solubility** | 7.41 g/L water @ 20 °C |
| **Partition coefficient: n-octanol/water** | Not applicable |
| **Auto-ignition temperature** | Not applicable |
| **Decomposition temperature** | Not available |
| **Viscosity** | Not applicable |
| **Specific gravity** | Not applicable |
| **Particle characteristics** | Not applicable |
| **Formula** | $Cl_2$ |
| **Molecular weight** | 70.91 g/mol |

## Section 10 Stability and Reactivity

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| **Reactivity** | This product is an oxidizer and will react with reducing agents and organic compounds such as paper or wood to produce heat and could potentially catch fire. |
| **Stability** | This product is stable if stored according to the recommendations in Section 07. |
| **Possibility of hazardous reactions** | Reacts with water to produce large amount of heat and highly corrosive hypochlorous acid. |
| **Conditions to avoid** | Avoid contact with incompatible materials. Do not heat. |
| **Incompatible materials** | Reducing agents, such as hydrogen, sodium borohydride, sulphur dioxide, thiosulphates, hydrazine, phosphites, carbon, and oxalic, formic and ascorbic acid.<br>Organic material, such as wood, paper, gasoline, diesel, solvents and some glycol based heat transfer fluids<br>Water, ammonia and ammonia-based compounds, powdered metal. |
| **Hazardous decomposition products** | Hydrogen chloride gas, hypochlorous acid |

## Section 11 Toxicological Information

**Acute Toxicity (LD50 / LC50 values)**

| Component | Route | Species | Value | Exposure time |
|---|---|---|---|---|
| Chlorine | Inhalation | Mouse | 137 ppm | 1 hour |
| | Inhalation | Rat | 260-344 ppm | 1 hour |

**Toxic Health Effect Summary**

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| **Chemical characteristics** | Chlorine readily reacts with water to form highly corrosive hypochlorous acid. This is of particular concern for inhalation as it will cause significant and sometimes fatal damage to the respiratory system. |
| **Skin** | Causes skin irritation. Dermatitus, with liquid contact: frostbite.May cause skin irritation. May react with water or sweat to form corrosive hypochlorous and hydrochloric acids, causing irritation and burns. |
| **Ingestion** | May cause discomfort or nausea. Not an expected route of exposure, see inhalation. Not an expected route of exposure |
| **Inhalation** | Fatal if inhaled. May cause respiratory irritation. Nasal discharge, coughing, pain, nausea, vomitting, headache, dizziness, pulmonary edema, hypoxia May be fatal if inhaled. Will readily react with all wet surfaces, such as all of the components of the respiratory system, causing irritation, pain and in some cases permanent damage or death. |
| **Eye contact** | Causes serious eye irritation. Burning and tears Causes irritation, tears and pain. |
| **Sensitization** | This product and its components at their listed concentration have no known sensitizing effects. |
| **Mutagenicity** | This product and its components at their listed concentration have no known mutagenic effects. |
| **Carcinogenicity** | This product and its components at their listed concentration have no known carcinogenic effects. |
| **Reproductive toxicity** | This product and its components at their listed concentration have no known reproductive effects. |
| **Specific organ toxicity** | May aggreviate existing lung conditions such as asthma. |
| **Aspiration hazard** | Not available |
| **Synergistic materials** | Not available |

## Section 12 Ecological Information

**Ecotoxicity**

| Component | Type | Species | Value | Exposure Time |
|---|---|---|---|---|
| Chlorine | LC50 | Daphnia magna (Water flea) | 0.063 mg/L | 1 hour |
| | LC50 | Oncorhyncus kisutch (Coho salmon) | 0.208 mg/L | 1 hour |
| | LC50 | Lepomis macrochirus (Bluegill sunfish) | 0.44 mg/L | 96 hours |

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| **Biodegradability** | The domestic substance list categorizes Chlorine as persistent. |
| **Bioaccumulation** | The domestic substance list categorizes Chlorine as non-bioaccumulative. |
| **Mobility** | This product is water soluble, is not predicted to adsorb to soil and may contaminate ground water. This product will evaporate and may be spread via wind. |
| **Other adverse effects** | The domestic substance list categorizes Chlorine as inherently toxic to aquatic organisms. |

## Section 13 Disposal Considerations

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| **Waste From Residues / Unused Products** | Dispose in accordance with all federal, provincial, and local regulations including the Canadian Environmental Protection Act. |
| **Contaminated Packaging** | Do not remove label, follow label warnings even after the container is empty. Empty containers should be recycled or disposed of at an approved waste handling facility. |

## Section 14 Transport Information

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| **UN number** | UN1017 |
| **UN proper shipping name and description** | CHLORINE |
| **Transport hazard class(es)** | 2.3 (5.1) (8) |
| **Packing group** | Not applicable |
| **Excepted quantities** | None |
| **Environmental hazards** | Listed as a marine pollutant under Canadian TDG Regulations, schedule III. |
| **Special precautions** | |
| **Transport in bulk** | ERAP index: 500 kg<br><br>MARPOL 73/78 and IBC Code:<br>This product is not listed in Chapter 17 of the IBC Code. |
| **Additional information** | Secure containers (full or empty) during shipment and ensure all caps, valves, or closures are secured in the closed position. |

**TDG PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and published test data regarding the classification of this product are listed in the references at section 16 of this SDS.**

## Section 15 Regulatory Information.

**NOTE: THE PRODUCT LISTED ON THIS SAFETY DATA SHEET HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN HAZARDOUS PRODUCTS REGULATIONS. THIS SAFETY DATA SHEET CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.**

All components of this product appear on the domestic substance list.

NSF Certification: Product is certified under NSF / ANSI Standard 60 for disinfection and oxidation at a maximum dosage of 30 mg/L. NSF product use restrictions based on requirements obtained from the NSF website; consult NSF website for current requirements.

Chlorine is listed in the National Pollutant Release Inventory (NPRI). Reporting threshold: 10 tonnes manufactured, processed or otherwise used.

## Section 16 Other Information

**Date of latest revision: April 16, 2021**

**Note:** The responsibility to provide a safe workplace remains with the buyer / user. The buyer / user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the buyer / user to comply with all applicable laws and regulations regarding handling, using, reselling and shipping this product.

**Attention: Receiver of the chemical goods / SDS coordinator**

As part of our commitment to the RDC Responsible Distribution® initiative, ClearTech Industries Inc. and its associated companies require, as a condition of sale, that you forward the attached Safety Data Sheet(s) to all affected employees, customers, and end-users. ClearTech will send any available supplementary handling, health, and safety information to you at your request.

If you have any questions or concerns please call our customer service center.

**References:**

1) CHEMINFO
2) TOXNET
3) eChemPortal
4) ECHA
5) Transportation of Dangerous Goods Canada
6) HSDB
7) PAN