

Lonza

**Pool and Spa Chemicals
Storage & Handling Guide**



Lonza Emergency Action Network "LEAN"
1-800-654-6911

CHEMTREC (Products, in Transit)
1-800-424-9300

For International Use
+1-423-780-2970

Lonza Advice Line for Damaged Products
1-800-253-9140

Material Safety Data Sheet (MSDS)
1-800-511-6737

Fire department _____
Police department _____
Physician _____
Other _____

This guide is intended for use by anyone who handles Arch Chemicals, Inc., a Lonza Company, and its affiliates (herein referred to as Lonza) pool and spa chemicals. Each year, Lonza supplies more than 100 million pounds of pool and spa chemicals for sanitizing and treating pool and spa water, and incidents involving these products are rare. It is vitally important, however, that pool and spa chemicals be transported, stored, used and disposed of according to the instructions on the product labels and Material Safety Data Sheets (MSDS).

Many of these products are regulated by the United States under The Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. § 136 et seq. "FIFRA", the Hazardous Materials Transportation Act, 49 U.S.C. § 5101, et seq., and the regulations issued pursuant to those statutes. Transportation, storage, handling and disposal of these products is also subject to other applicable federal, state and local laws, regulations, ordinances and codes, including local building and fire codes, and other standards, including but not limited to National Fire Protection Association (NFPA) codes and standards and / or the International Building and Fire codes.

Persons who store, transport or handle Lonza pool and spa chemicals are responsible for complying with all applicable laws, regulations, ordinances, codes and standards. Anyone who deals with these products should be aware of these requirements, and should be familiar with the characteristics of these products and proper emergency and first aid procedures.

Users should refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products, and should consult all applicable laws, regulations, ordinances, codes and standards to ensure compliance. Material Safety Data Sheets (MSDS) are available for all Lonza pool and spa chemicals and provide more specific information than this general Guide. Material Safety Data Sheets can be obtained by calling: 1-800-511-MSDS (6737).

DANGER Some pool and spa chemicals are chemically incompatible and are highly reactive when mixed with one another or when mixed with other incompatible materials. Pool and spa chemicals can also undergo rapid decomposition when stored at excessive temperatures. It is essential to follow proper storage, handling and spill cleaning procedures to prevent emergencies, such as fire, explosion or release of toxic gases.

In an Emergency Call the Fire Department and Then LEAN 1-800-654-6911.

This document is not a substitute for compliance and familiarity with federal, state, international and local laws, regulations and ordinances, including local building and fire codes and standards. All persons storing, handling or transporting Lonza pool and spa chemicals should refer to the product label and the applicable MSDS (available at 1-800-511-MSDS) for specific information regarding an individual product.

The information provided in this Storage & Handling Guide is supplied by Lonza to assist our employees, contractors, shippers, customers and warehouses in the proper handling, storage and transportation of Lonza pool and spa chemicals. This Guide is not a substitute for proper knowledge of applicable laws and regulations and is not intended to supersede information contained on a product label or in its Material Safety Data Sheet (MSDS). Lonza undertakes no duty to provide or update the information in this Storage & Handling Guide. No statement herein is intended as a representation or warranty regarding Lonza pool and spa products. Lonza does not warrant the information contained in this Guide nor does it warrant its fitness for a particular purpose. The recipient must make its own determination as to the utility of the information contained in this report for recipient's purposes.

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1 Introduction

Anyone who handles pool and spa chemicals must be fully aware of handling and storage requirements as well as emergency and first aid procedures to be used in case of an accident. Anyone who ships pool and spa chemicals must also be knowledgeable about and compliant with current laws including: Department of Transportation (DOT) regulations, Environmental Protection Agency (EPA) regulations, Occupational Safety and Health Administration (OSHA) regulations, locally adopted building and fire codes, and other applicable standards, including but not limited to National Fire Protection Association (NFPA¹) codes and standards and / or the International Building and Fire codes. If the authority having jurisdiction has not adopted building or fire codes, applicable standards, including but not limited to NFPA codes and standards, must be followed.

Different types of pool and spa chemicals, such as calcium hypochlorite, chlorinated isocyanurates and hydrogen peroxide, are chemically reactive with each other and with other materials. Pool and spa chemicals can also be chemically reactive with other chemicals used in pool and spa water treatment, such as algaecides, conditioners (stabilizers), clarifiers and cleaners. **Mixing pool and spa chemicals with each other or with other materials could result in fire, explosion or toxic fumes. Pool and spa chemicals can also undergo rapid decomposition when stored at temperatures in excess of the recommended temperature which can lead to evolution of chlorine gas and heat sufficient to cause a fire.** For more information on storage and handling of specific products, refer to the storage and handling section of this Guide, the product label, MSDS, the plan-o-gram (if applicable) and local regulations to determine which materials are incompatible with each other. It is essential to follow proper storage and handling procedures in order to prevent conditions which might cause emergencies, **such as a fire, explosion or release of toxic gases.**

¹ Specific references contained in this Guide to the NFPA codes and standards are to NFPA 1: Uniform Fire Code, current edition, National Fire Protection Association, and NFPA 400: Hazardous Materials Code, current edition

2 Product Stewardship

At Lonza we are committed to being unerringly safe and environmentally responsible every minute of every day. This commitment is embodied in our Vision is Zero initiative to reduce recordable injuries and environmental incidents to zero. Underlying this initiative is our philosophy that health, safety and environmental protection are an integral part of every product's life cycle – from manufacture, marketing and distribution to use, recycling and disposal. In the chemical industry this life cycle is known as Product Stewardship.

In practicing Product Stewardship, Lonza provides product information on how to safely transport, store, handle, use and dispose of Lonza products to warehouse operators, shippers, retailers and pool and spa owners. Product labels and Material Safety Data Sheets (MSDS) provide product-specific instructions for the safe storage, handling and use of Lonza pool and spa chemicals.

Lonza also provides product assistance help lines, and the Lonza Emergency Action Network (LEAN) hotline provides emergency-response support in cases of chemical emergencies. This Guide is an important part of Lonza's commitment to Product Stewardship.

Product Stewardship is the responsibility of Lonza and everyone involved in transporting, storing, handling, using and disposing of its chemical products. We take our responsibility to provide good and accurate information about our products very seriously. It is the responsibility of those who transport, store, handle, use and dispose of our products to do so safely, putting that information to its best possible use and avoiding injury to persons, property and the environment. Chemical product safety is everyone's responsibility. By working together, we can make it a reality. Lonza has made that commitment. Please make it your commitment as well.

Rick Walden

A handwritten signature in black ink that reads "Rick Walden". The signature is written in a cursive, flowing style.

3 General Product Information

3.1 Calcium Hypochlorite-based Pool and Spa Chemicals

Calcium hypochlorite (commonly called “cal-hypo”) is a chemical oxidizing agent used to disinfect and sanitize drinking water, swimming pools and spas and treat sewage effluent. It is also used as a sanitizer in a variety of industrial applications. These products are sold as free-flowing, white granules or tablets.

Calcium hypochlorite-based pool and spa chemicals are stable chemicals when properly stored and handled. They are not flammable, but if contaminated with combustible or reactive substances such as grease, oil, organics or dirt, they may react violently, resulting in the generation of heat, liberation of hazardous gases and intense fire.

Lonza sells a variety of calcium hypochlorite-based pool chemical products some of which are classified as NFPA Class 1 and others that are classified as Class 3 Oxidizers. The National Fire Protection Association (NFPA) defines an oxidizer as “any material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and can undergo a vigorous self-sustained decomposition due to contamination or heat exposure.”

The definition of an NFPA Class 1 Oxidizer is “an oxidizer that does not moderately increase the burning rate of combustible materials with which it comes into contact.” The definition of an NFPA Class 3 Oxidizer is “an oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes into contact.”

In an Emergency Call the Fire Department and Then LEAN 1-800-654-6911.

This document is not a substitute for compliance and familiarity with federal, state, international and local laws, regulations and ordinances, including local building and fire codes and standards. All persons storing, handling or transporting Lonza pool and spa chemicals should refer to the product label and the applicable MSDS (available at 1-800-511-MSDS) for specific information regarding an individual product.

DANGER Use care to keep all products dry in transportation, storage and handling. Calcium hypochlorite-based pool and spa chemicals can produce fires of extreme intensity if not handled or stored properly, particularly when large quantities are involved.

DANGER DO NOT MIX INCOMPATIBLE CHEMICALS – Calcium hypochlorite-based pool and spa chemicals are chemically incompatible with other pool and spa chemicals, such as chlorinated isocyanurate-based pool and spa chemicals (commonly known as dichlor and trichlor) and with other materials and must be kept separate from them to avoid intense fire, explosion or release of toxic gas.

NFPA Class 3 Oxidizer calcium hypochlorite-based pool chemical products are DOT 5.1 hazardous materials. NFPA Class 1 Oxidizer calcium hypochlorite-based pool chemical products may or may not be DOT 5.1 hazardous materials. Comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of all calcium hypochlorite-based pool and spa chemicals. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

Chemical Name: Calcium Hypochlorite

Formula: $\text{Ca}(\text{OCl})_2$

CAS Number: 7778-54-3

NFPA Oxidizer Classification: Class 1, 2 or 3

[depending on formulation]

DOT Class: See MSDS

NFPA ratings for calcium hypochlorite:

Health: 3

Flammability: 0

Reactivity: 1

Specific Hazard: Ox (oxidizer)

HMIS ratings for calcium hypochlorite:

Health: 3

Flammability: 0

Reactivity: 1

3.2 Chlorinated Isocyanurate-based Pool and Spa Chemicals

Chlorinated isocyanurate-based pool and spa chemicals (commonly called “isos”) are chemical oxidizing agents used to disinfect and sanitize swimming pools and spas. They are sometimes described as “stabilized,” because they contain cyanuric acid which stabilizes free chlorine in pool water.

Lonza sells two types of chlorinated isocyanurate-based pool and spa chemicals: trichloro-s-triazinetrione (“trichlor”) products and sodium dichloro-s-triazinetrione (“dichlor”) products. Trichlor-based products are sold in tablets, sticks and in a granular form for use as sanitizers or algaecides. Trichlor tablets are also sold in pre-filled plastic cartridges and floaters and because the tablets dissolve slowly, they are applied using floating dispensers and in-line feeders. Dichlor-based products are sold in granular form because they are fast dissolving and generally used as a shock treatment for pools and spas. These chemicals when improperly mixed may react.

Chlorinated isocyanurate-based pool and spa chemicals are stable chemicals when properly stored and handled. Both dichlor and trichlor are NFPA oxidizers and are corrosive to the skin. They are not flammable, but if contaminated, they may react violently, with the generation of heat, liberation of hazardous gases, and possible fire or explosion.

DANGER Use care to keep all products dry in transportation, storage and handling. Chlorinated isocyanurate-based pool and spa chemicals can produce explosive nitrogen trichloride gas when contaminated with small amounts of water or other materials. Exposure of chlorinated isocyanurates to high humidity, moisture or other contaminants can result in release of gas, and accelerated container deterioration.

DANGER DO NOT MIX INCOMPATIBLE CHEMICALS – Chlorinated isocyanurate-based pool and spa chemicals are chemically reactive with other pool and spa chemicals, such as calcium hypochlorite-based pool and spa chemicals and with other materials and must be kept separate from them to avoid intense fire, explosion or release of toxic gas.

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All chlorinated isocyanurates sold by Lonza are classified as NFPA Class 1 oxidizers. Some chlorinated isocyanurates are DOT 5.1 hazardous materials. Comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of chlorinated isocyanurate-based pool and spa chemicals. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

Chemical Name: Trichloroisocyanuric Acid

Formula: $N_3C_3O_3Cl_3$

CAS Number: 87-90-1

NFPA Oxidizer Classification: Class 1

DOT Class: See MSDS

NFPA ratings for trichloroisocyanuric acid:

Health: 2

Flammability: 0

Reactivity: 2

Specific Hazard: Ox (oxidizer)

HMS ratings for trichloroisocyanuric acid:

Health: 3

Flammability: 0

Reactivity: 2

Chemical Name: Sodium Dichloroisocyanurate Dihydrate

Formula: $NaN_3C_3O_3Cl_2 \cdot 2H_2O$

CAS Number: 51580-86-0

NFPA Oxidizer Classification: Class 1

DOT Class: Not applicable

NFPA ratings for sodium dichloroisocyanurate dihydrate:

Health: 2

Flammability: 0

Reactivity: 1

Specific Hazard: Ox (oxidizer)

HMS ratings for sodium dichloroisocyanurate dihydrate:

Health: 3*

Flammability: 0

Reactivity: 1

3.3 Sodium Hypochlorite

Sodium hypochlorite (commonly called “bleach”) is a chemical oxidizing agent used to disinfect and sanitize swimming pools and spas. Sodium hypochlorite is sold as a liquid solution containing 7–15 % active ingredient. The active chlorine in this solution will degrade with exposure to sunlight and heat.

Sodium hypochlorite is corrosive to the skin. It is not flammable, but if contaminated, sodium hypochlorite may react violently, with the generation of heat and liberation of hazardous gases. Compounds containing ammonia or ammonium hydroxide solution can also react violently with sodium hypochlorite and may produce dangerous gases such as chlorinated amines. Organic chemicals or fuels also may react violently or explosively. Any accidental blending of another chemical with sodium hypochlorite potentially can cause a dangerous reaction. A chlorine gas release will occur if sodium hypochlorite solutions are accidentally mixed with acids or acidic materials.

DANGER DO NOT MIX INCOMPATIBLE CHEMICALS – Sodium hypochlorite-based pool and spa chemicals are chemically reactive with numerous other chemicals and materials and must be kept separate from them.

Comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of sodium hypochlorite-based pool and spa chemicals. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

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Chemical Name: Sodium Hypochlorite Solution

Formula: NaOCl

CAS Number: 7681-52-9

NFPA Rating: Corrosive

DOT Class: Class 8 Corrosive

NFPA ratings for sodium hypochlorite solution:

Not rated

HMS ratings for sodium hypochlorite solution:

Health: 3

Flammability: 0

Reactivity: 2

3.4 Bromine-based Chemicals

Lonza bromine-based chemicals are used to disinfect and sanitize pools and spas. These products are sold by Lonza as free-flowing, white granules, nuggets or tablets. These oxidizers are not flammable. Because they are slow dissolving, they are usually applied by use of floating dispensers or other feeding devices and are generally not useful for shock treatment.

Bromine-based products are stable chemicals when properly stored and handled. They are corrosive and are NFPA Class 2 Oxidizers. These oxidizers are not flammable, but if contaminated, they may react violently, with the generation of heat, liberation of hazardous gases, and possible fire or explosion. The definition of an NFPA Class 2 Oxidizer is “an oxidizer that causes a moderate increase in the burning rate of combustible materials with which it comes in contact.”

DANGER Use care to keep all products dry in transportation, storage and handling. Exposure of bromine oxidizers to high humidity, moisture, or contamination can result in release of gas, and accelerated container deterioration. Bromine oxidizers are chemically incompatible with other pool and spa chemicals and other materials and must be kept separate from them.

Bromine oxidizers are classified by DOT and may or may not be 5.1 hazardous materials. Users must comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of bromine-based spa chemicals. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

Chemical Name: 1,3-Dibromo-5,5-dimethylhydantoin

Formula: $C_5H_6Br_2N_2O_2$

CAS Number: 77-48-5

NFPA Oxidizer Rating: Store according to Class 3

DOT Class: Division 5.1 oxidizer

NFPA ratings for 1,3-dibromo-5,5-dimethylhydantoin:

Health: 3

Flammability: 0

Reactivity: 0

Specific Hazard: Ox (oxidizer)

HMS ratings for 1,3-dibromo-5,5-dimethylhydantoin:

Health: 3

Flammability: 0

Reactivity: 0

Chemical Name: Hydantoin Blend

Chemical components:

1-bromo-3-chloro-5,5-dimethylhydantoin

Formula: $C_5H_6BrClN_2O_2$

CAS Number: 16079-88-2

NFPA Oxidizer Rating: Class 2

DOT Class: Division 5.1 oxidizer

1,3-dichloro-5,5-dimethylhydantoin

CAS Number: 118-52-5

NFPA Oxidizer Rating: Class 2

DOT Class: Division 5.1 oxidizer

1,3-dichloro-5-ethyl-5-methylhydantoin

CAS Number: 89415-87-2

NFPA Oxidizer Rating: Not rated

DOT Class: Not Rated

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NFPA Oxidizer Rating: Store according to Class 2
DOT Class: Division 5.1 oxidizer
NFPA ratings for hydantoin blend:
Not established
HMIS ratings for hydantoin blend:
Health: 3
Flammability: 0
Reactivity: 1

3.5 Hydrogen Peroxide-based Pool and Spa Chemicals

Hydrogen peroxide is a clear, odorless and colorless liquid used as an oxidizer in swimming pools and spas. Hydrogen peroxide is a stable chemical when properly stored and handled. This oxidizer is noncombustible, but is very reactive and may start fires and explosions if handled improperly.

This powerful oxidizing agent should be kept away from any contact with oxidizing agents (such as perchlorates, permanganates, chlorates, nitrates, chlorine, bromine and fluorine); strong bases (such as sodium hydroxide and potassium hydroxide); ketones; alcohols; strong acids (such as hydrochloric, sulfuric and nitric); fuels; iron; copper; chromium; brass; zinc; bronze; lead; silver; manganese and metal salts since violent reactions occur. Hydrogen peroxide is decomposed by ordinary dust or rust.

Hydrogen peroxide should be stored in a tightly closed container in a cool, well-ventilated area away from glycerol, organic materials, and radiant heat (including sunlight). Hydrogen peroxide in contact with combustibles may result in spontaneous combustion. Containers should be protected from physical and mechanical disturbances. Sources of ignition such as smoking and open flames are prohibited where hydrogen peroxide is used, handled, or stored in a manner that could create a potential fire or explosion hazard. Wherever large quantities of hydrogen peroxide are used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

DANGER Hydrogen peroxide-based pool and spa chemicals can produce explosive gases or spontaneously combust when in contact with a combustible. Additionally, if the water in hydrogen peroxide-based solutions is allowed to evaporate, the hydrogen peroxide will concentrate and become increasingly reactive and may cause spontaneous combustion. Use care to keep all products upright in transportation, storage and handling.

DANGER DO NOT MIX INCOMPATIBLE CHEMICALS – Hydrogen peroxide-based pool and spa chemicals are chemically reactive with other pool and spa chemicals and other materials and must be kept separate from them.

All hydrogen peroxide-based products sold by Lonza are classified as NFPA Class 1 oxidizers. Some hydrogen peroxide-based products are DOT 5.1 hazardous materials. Comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of hydrogen peroxide. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

Chemical name: Hydrogen Peroxide Aqueous Solution (27.5 % Active)

Formula: H_2O_2

CAS Number: 7722-84-1

NFPA Oxidizer Classification: Class 1

DOT Class: Division 5.1 Oxidizer

NFPA ratings for hydrogen peroxide aqueous solution (27.5 % active):

Health: 3

Flammability: 0

Reactivity: 1

Specific Hazard: Ox (oxidizer)

HMS ratings for hydrogen peroxide aqueous solution (27.5 % active):

Health: 3

Flammability: 0

Reactivity: 1

Chemical Name: Hydrogen Peroxide Aqueous Solution (7.5 % Active)

Formula: H_2O_2

CAS Number: 7722-84-1

NFPA Oxidizer Classification: Class 1

DOT Class: Not regulated by U.S. DOT

In an Emergency Call the Fire Department and Then LEAN 1-800-654-6911.

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NFPA ratings for hydrogen peroxide aqueous solution

{7.5 % active}:

Health: 2

Flammability: 0

Reactivity: 0

HMS ratings for hydrogen peroxide aqueous solution {7.5 % active}:

Health: 2

Flammability: 0

Reactivity: 0

3.6 Potassium Monopersulfate

Potassium monopersulfate compound is a free-flowing, white granular solid, soluble in water. It is a component of a triple salt including potassium monopersulfate, potassium sulfate and potassium bisulfate. Potassium monopersulfate compound provides non-chlorine oxidation for swimming pool and spa use.

Potassium monopersulfate should be stored in cool, dry areas, away from combustible materials, incompatible chemicals, and sources of heat such as space heaters and light fixtures. Potassium monopersulfate decomposition will be accelerated on contact with moisture. Storage conditions should also include provisions for prevention of contact with water, including high airborne humidity.

Incompatible materials that can react with potassium monopersulfate to form undesirable products and should not be transported or stored in proximity to potassium monopersulfate include the following:

- Cyanides, which can react to release toxic hydrogen cyanide gas.
- Transition “heavy” metals (such as copper, manganese, cobalt, or nickel) or their salts, oxides, hydroxides, etc., can accelerate decomposition with evolution of oxygen gas.
- Organic compounds.

DANGER Potassium monopersulfate should be stored in cool, dry areas away from combustible and incompatible materials and sources of heat.

DANGER DO NOT MIX INCOMPATIBLE CHEMICALS – Potassium monopersulfate-based pool and spa chemicals are chemically reactive with other pool and spa chemicals and other materials and must be kept separate from them.

Comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of potassium monopersulfate. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

Chemical Name: Potassium Monopersulfate

Formula: $2\text{KHSO}_5 \cdot \text{KHSO}_4 \cdot \text{K}_2\text{SO}_4$

CAS Number: 70693-62-8

NFPA Oxidizer Classification: Class 1

DOT Class: Corrosive 8 PG II

NFPA ratings for potassium monopersulfate:

Health: 3

Flammability: 0

Reactivity: 0

Specific Hazard: Ox (oxidizer)

HMS ratings for potassium monopersulfate:

Health: 3

Flammability: 0

Reactivity: 1

3.7 Liquid and Dry Pool Maintenance Products

There are a variety of diverse chemical formulations that are part of the group of products used in pools and spas known as Pool and Spa Maintenance Products. These products include, but are not limited to algaecides, oxidizers, chelating and sequestering agents, clarifiers, flocculants, stabilizers, enzymes, various cleaners for cleaning filters, covers and pool and spa surfaces, water balance adjusters, and fragrances. These products can be either in solid or liquid forms. The formulations vary and could contain multiple components that may include acids, bases, surfactants, dyes, perfumes, solvents, thickening agents, oxidizing or reducing agents.

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DANGER The hazard class associated with each Pool and Spa Maintenance Product will vary by product and can include, but are not limited to oxidizers, flammables, combustibles and corrosives. Therefore, it is critical to refer to the product's label and Material Safety Data Sheet (MSDS) to understand the exact hazards and handling procedures for each product.

Comply with all applicable laws, regulations, ordinances, codes and standards governing storage, handling and transportation of all Pool and Spa Maintenance Products. You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

4 Product Hazards

4.1 Heat Stability

All pool and spa chemicals should be stored in well ventilated, cool, dry conditions out of direct sunlight. In no event should any pool or spa chemical be stored where the temperature exceeds the maximum storage temperature set forth in the Material Safety Data Sheet (MSDS) for the particular product.

DANGER Storage of chlorinated pool and spa chemicals at temperatures in excess of the storage temperature stated in the MSDS may result in rapid decomposition, evolution of chlorine gas and heat sufficient to cause a fire.

Storage in a climate-controlled storage area or building is recommended in climates where high temperatures occur. Facilities in which pool and spa chemicals are stored should have temperature monitoring systems.

4.2 Chemical Incompatibility

Many pool and spa chemicals are chemically incompatible and are highly reactive. For instance, calcium hypochlorite ("cal-hypo")-based pool and spa chemicals and chlorinated isocyanurate ("isos")-based pool and spa chemicals are not chemically compatible with each other or with other materials. When in doubt about the hazard classification of a particular formulated product, it is best to assume that the product exhibits the characteristics of the most reactive ingredient.

Products from other manufacturers with similar Available Chlorine (AvCl) levels may have different hazard classifications. It is important to read each MSDS and product label carefully, and not assume a hazard classification based solely on the available chlorine level of the product.

DANGER Many pool and spa chemicals are chemically incompatible with each other and with other materials. Mixing pool and spa chemicals with each other or with other materials could result in fire, explosion or toxic fumes.

The following are general compatibility guidelines:

- Liquid and solid pool and spa chemicals should be kept separated due to the potential for reaction.
- Alkaline products should not be mixed with acidic products due to the potential formation of chlorine gas and other hazardous or toxic fumes.
- Pool and spa chemicals are stable when stored in a cool, dry, well-ventilated area and not contaminated by other materials, such as acids, bases, or easily oxidizable materials. They can become unstable and dangerous if mishandled, improperly stored or contaminated. They can undergo a decomposition reaction, which could produce intense heat, hazardous gases, fire or explosion.
- Dry chlorine products should be kept dry. If the products become damp, solid chlorine products may produce chlorine gas.
- Some pool and spa chemicals, such as trichlor, can give off toxic gases and form nitrogen trichloride (NCl_3) if small amounts of water are added. Special precautions should be used when handling these oxidizers. If containers of one of these oxidizers become wet, they could contain nitrogen trichloride (NCl_3), which could explode. Before handling oxidizers that have become wet, contact LEAN at 1-800-654-6911.
- Because of their potential to form explosive quantities of nitrogen trichloride, chlorinated isocyanurates should never be mixed with other chlorinating compounds, such as calcium hypochlorite. Chlorinated isocyanurates and calcium hypochlorite are not compatible in the presence of water or water-based products. If calcium hypochlorite is physically mixed with any of the chlorinated isocyanurates and becomes damp or wet, an explosion could occur.

In an Emergency Call the Fire Department and Then LEAN 1-800-654-6911.

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Because of their composition and properties, special precautions should be taken to prevent contamination of pool and spa chemical oxidizers with other chemicals. Special care should be taken to separate these chemicals in storage by using a buffer zone of inert products, a wall, or by keeping them separated by an appropriate distance. They should also be separated from liquids since they may react with them. Many pool and spa chemicals, such as oxidizers, are also incompatible with many of the other chemicals used in commerce, such as organic solvents, algacides, other oxidizers and pH adjusting materials. In storage, transportation or handling, calcium hypochlorite should be kept separate from chlorinated isocyanurates according to the all applicable regulations.

Compatibility testing of Lonza pool and spa chemicals has been conducted in order to generate plan-o-grams for retail shelves. These plan-o-grams should be followed strictly to ensure that incompatible chemicals are not stored next to each other. If a plan-o-gram is not available, the pool and spa chemicals should be treated according to the hazard characteristics of the most reactive ingredient.

4.3 Fire and Fume Hazards

Pool and spa chemicals, such as calcium hypochlorite, chlorinated isocyanurate, and hydrogen peroxide-based products are not combustible. However, if they become contaminated with incompatible materials (e.g., gasoline, oil, sawdust or floor sweepings) a chemical reaction can occur resulting in fire, explosion or release of toxic fumes.

Thermal decomposition is caused by storage of pool and spa chemicals in excess of the recommended temperatures which increases heat level and can cause a fire. Furthermore, there may also be the release of toxic fumes. Thermal decomposition can generate sufficient heat to ignite the product's packaging, paper and wood and cause a fire. Chlorinated oxidizers can produce dense clouds of gases that can be toxic, noxious and very difficult to see through.

DANGER Storage of chlorinated pool and spa chemicals at temperatures in excess of the storage temperature stated in the MSDS may result in rapid decomposition, evolution of chlorine gas and heat sufficient to cause a fire.

Decomposition can also be caused by external heat sources. Examples of heat sources capable of raising pure product temperatures above their decomposition points include:

- A lighted cigarette or match.
- A hot welding rod or molten particles from a welding operation.

- A hot bearing on a conveyor.
- A hot spot on conveying equipment caused by friction.

4.4 Environmental Hazards

Many pool and spa chemicals can be pesticides or be toxic to fish and aquatic organisms. Do not discharge effluent containing these products into lakes, ponds, streams, estuaries, oceans or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit administered by the EPA or other permitting authority, and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing these products to sewer systems without previously notifying the local sewage treatment plant authority. Refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products. For additional information, contact your State Water Board Regional Office or the EPA.

4.5 Corrosive Hazards

A number of Lonza pool and spa chemicals, including Pool and Spa Maintenance products, such as algacides, cleaning products, metal and stain removers are considered corrosive materials.

A corrosive material is a highly reactive substance that causes damage to living tissue. Corrosives can cause skin and eye chemical burns or irritation to broken skin. Safety glasses or goggles and rubber gloves should be worn when handling corrosive products. Corrosive products should not be mixed with other chemicals (oxidizers, bases or other reactive chemicals) because if mixed with incompatible chemicals there could be a release of toxic fumes which are irritating to eyes, lungs and mucous membranes. When handling corrosive products, avoid breathing vapors. Wash after handling. Vacate poorly ventilated areas as soon as possible and DO NOT allow anyone to enter until odors have dissipated.

You must refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products.

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4.6 Shelf-life

For optimal shelf-life, pool and spa chemicals must be stored where the average daily temperatures do not exceed 95° F (35° C) or as otherwise stated in the MSDS. High storage temperatures will shorten shelf life and cause pool and spa chemicals to deteriorate rapidly.

Shelf life (that is, the period of time before the product goes below stated label strength) is determined by storage time and temperatures. As a general rule, each increase of 10°F in the average storage temperature can shorten shelf life of chlorinated pool and spa chemicals by as much as 50 %. You must refer to product labels and MSDS for information about specific products.

Storage in a climate-controlled storage area or building is recommended in climates where high temperatures occur. Facilities in which pool and spa chemicals are stored should have temperature monitoring systems.

5 Personal Protective Equipment

In the normal handling of pool and spa chemicals, the following personal protective equipment is recommended:

At all times when there is a potential for exposure:

- goggles / safety glasses

When exposure to chemical is probable (e.g. when cleaning a spill):

- impervious gloves (rubber, neoprene or PVC)
- impervious boots (neoprene or PVC)
- coveralls
- aprons (neoprene or PVC)
- face shield
- appropriate respiratory protection

When in dusty areas:

- NIOSH-approved* chlorine gas / dust cartridge respirator

When fighting a fire:

- NIOSH-approved* positive pressure self-contained breathing apparatus

* If a NIOSH-approved respirator is used, personnel must comply with the requirements for use of respirators detailed in the US DOL OSHA Respiratory Protection Standard, 29CFR1910.134.

In an emergency situation:

- Be prepared to use the appropriate personal protective equipment, which may include Self-Contained Breathing Apparatus (SCBA), in an emergency. A NIOSH-approved, positive-pressure, Self-Contained Breathing Apparatus (SCBA) plus any other necessary personal protective equipment should be worn if toxic fumes are present. Chlorine and other toxic gases can be released during a fire or decomposing reaction.
- For small, controllable fires, use appropriate safety equipment. Only trained personnel should attempt to extinguish fires. Do not fight any fire alone.
- If pool and spa chemicals are involved in a fire or reaction, use large quantities of WATER. DO NOT USE dry chemical extinguishers because they can contain ammonium compounds, which could react and release toxic or explosive gases. Provisions should be made for the containment of runoff water (e.g., diking with sandbags, dirt or other suitable material). If there is a fire or if the pool or spa chemical is contaminated with another chemical, the area should be evacuated and the fire department called immediately even if the building has a sprinkler system.
- Direct unnecessary personnel away from the area.
- Consult the MSDS and product labels for information about specific products.

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6 First Aid & Emergency Procedures

6.1 General First Aid

Many pool and spa chemicals are corrosive and may be injurious to eyes, skin, lungs and mucous membranes. ALWAYS KEEP POOL AND SPA CHEMICALS OUT OF REACH OF CHILDREN. Wear protective equipment and clothing as stated on the product label and MSDS when handling pool and spa chemicals. Do not allow concentrated pool and spa chemicals onto your skin or into your eyes and do not swallow. Avoid breathing vapors, wash after handling pool and spa chemicals and vacate poorly ventilated area if fumes are present and do not return until odors have dissipated. Never mix pool chemicals because some are reactive chemicals and can react violently releasing toxic fumes and heat that can cause damage to the eyes, skin, lungs and mucous membranes.



Read the product label and MSDS before handling pool and spa chemicals so that you will know the specific first aid procedures to follow if exposed.

In the event of a chemical exposure emergency follow these steps:

- Follow the first aid instructions on the product label and the MSDS
- Call an emergency responder, a doctor or your nearest poison control center
- For additional emergency medical information call LEAN at 1-800-654-6911

First Aid (pool and spa chemical oxidizers):

- **If in eyes:** Hold eye open and rinse slowly and gently with water for 15–20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.
- **If on skin or clothing:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15–20 minutes. Call a poison control center or doctor for treatment advice.
- **If swallowed:** Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
- **If inhaled:** Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice. Have the product container or label with you when calling a poison control center or doctor, or when going for treatment.

Refer to product labeling and MSDS for information about specific procedures for a particular pool and spa chemical.

6.2 Emergency Procedures

Emergency Response Plans and Actions. It is the responsibility of each facility to have an emergency plan and train employees in the requirements of the plan. It is the primary responsibility of each facility employee to follow the pre-established guidelines set forth in an emergency plan.

An emergency plan commonly includes the following:

- Procedures (when and who) for contacting local fire department, ambulatory service or police department immediately
- Information to be given to the emergency responder, including nature of the emergency and type of assistance required
- Local emergency and LEAN (1-800-654-6911) numbers should be pre-set on all phones to assist calling. Numbers should be in bold or colored print

Do not use dry chemical fire extinguishers to extinguish a fire because they may contain ammonium compounds which could react and release toxic or explosive gases. Use of copious quantities of water is the best method to fight an oxidizer fire, i.e., “drown, cool and dilute.” Provision should be made for the containment of runoff water used to fight the fire. Means of containment include diking with sandbags, dirt or other material.

Responding to a significant spill of pool and spa chemicals:

- Contact appropriate emergency personnel. Responder should assess the nature and magnitude of the emergency
- If there are signs of a chemical reaction (e.g., hissing, bubbling, smoking, gassing, burning, or bulging or hot containers), evacuate the area immediately and contact the local fire department for assistance. If the product is not reacting but has mixed with other chemicals or other materials, contact your local fire department
- Call LEAN for assistance (1-800-654-6911)
- Apply water in large quantities. Water slows the decomposition reaction, reduces liberation of hazardous gas, and eliminates self-sustained decomposition
- When overpacking product, be sure that the product is not decomposing
- Have a sufficient water source available to control a chemical reaction or fire

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- Contamination and high temperatures are the major reasons an oxidizer reaction starts. During a cleanup, keep packaging materials free of contamination and temperatures of all packages below 95°F
- Do not place spilled chemicals into the trash. Contact with incompatible materials could cause a chemical reaction
- Keep spilled material dry (unless using large quantities of water as indicated above). If allowed to stand in damp or wet areas, hazardous vapors can result. Do not dampen the product during the cleanup process. Dampening the product with water during the cleanup process can cause a decomposition or a chemical reaction

Keep un-neutralized and chlorinated chemicals out of sewers, watersheds or water systems. Refer to product labeling and MSDS for information about emergency procedures for specific products.

6.3 Handling Spills

6.3.1 Procedure for Cleaning Contaminated Dry Spills

If the spill is wet or otherwise contaminated (there are signs of decomposition or reaction such as bubbling, burning, smoking, gassing, hissing, or bulging or hot containers):

- 1) Evacuate the area
- 2) Call the fire department
- 3) Contact:

Lonza Emergency Action Network “LEAN”
For International Use

1-800-654-6911
+1-423-780-2970

6.3.2 Procedure for Cleaning Uncontaminated Dry Spills

If the spill is dry and uncontaminated and there are no signs of decomposition or reaction (such as bubbling, burning, smoking, gassing, hissing, or bulging or hot containers) the following approach should be used. Alternate or additional procedures might be advisable, depending upon site-specific circumstances. Users must tailor the cleanup to their own particular circumstances. To discuss a site-specific circumstance, contact:

Lonza Chemicals Emergency Action Network "LEAN"	1-800-654-6911
For International Use	+1-423-780-2970

1 Evaluate and respond as follows:

- a) If reacting or decomposing, call the fire department
- b) If product is contaminated with any other chemical or material, call the fire department
- c) In the event of a large spill, call the fire department
- d) In the event of a small spill, proceed only if trained or refer to product label or MSDS
- e) Contact LEAN (1-800-654-6911)

2 Evacuate and isolate the area as follows:

- a) Evacuate the area
- b) Mark off area
- c) Trained emergency response personnel should don appropriate Personal Protective Equipment (PPE); see Section 5.0 or refer to MSDS
All other people should be kept away.

3 Ventilate the area by opening doors and windows

If conditions are dusty, wear a NIOSH-approved respirator

4 Clean-up procedures

- a) Obtain two plastic (or suitable) containers (be sure containers are large enough to hold spilled product)
- b) Line each container with two clean, clear plastic bags
- c) Place damaged container into one of the suitable containers, label the container(s) properly and identify contents, loosely place lid and leave unsealed

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- d) Do not place spilled chemical into original container
- e) Carefully sweep up spilled chemical
- f) Place spilled material in clean clear plastic bag
- g) Place plastic bag into second container. Place container lid on loosely
Identify contents by labeling the container properly
- h) Remove containers to isolated outdoor area as follows:
 - Be sure there is a clear, unobstructed route from the spill area to the outside of the building
 - Move waste material to a safe and protected location in case there is a decomposition reaction
 - Keep away from children and high traffic areas
 - Avoid getting spilled product wet
- i) Thoroughly wash area with water to remove residue
- j) Wash and dry the broom, shovel/ dust pan and any used protective clothing
- k) Contact LEAN (1-800-654-6911) for proper disposal instructions

6.3.3 Procedure for Cleaning Liquid Spills (Non-hydrogen Peroxide)

- a) Obtain two plastic (or suitable) containers (be sure containers are large enough to hold spilled product)
- b) Line each container with two clean, clear plastic bags
- c) Place the damaged product container into one of these lined containers and, tightly seal the lid and identify the contents by labeling the container properly
- d) Either of the following methods may be used for the spilled liquid Mop up spill with clean dry mop and water, rinse off mop in a pail of clean water and place rinse water into a second lined plastic container or absorb spill with appropriate absorbent material
- e) Dispose of the contents of the two containers properly, following all local, federal and state guidelines. Contact LEAN (1-800-654-6911) for advice on proper disposal information

6.3.4 Procedure for Cleaning Hydrogen Peroxide Spills

- a) Dilute with a large amount of water
- b) Discharge into a suitable treatment system, in accordance with all regulatory agencies. Contact LEAN (1-800-654-6911) for advice on proper disposal information

Spill Clean-up kit

Lonza recommends keeping a spill clean-up kit available with the following:

- Two clean dry containers
- One clean dry broom
- One clean mop and bucket
- One clean dry dust pan
- A minimum of four clear sturdy plastic bags
- Compatible absorbent material*
(such as spill clean up socks or pads, vermiculite, etc.)
*Do not use floor sweeping compounds when cleaning up pool and spa chemicals;
a reaction may occur
- Labels

6.3.5 Procedure for Neutralizing Spills Involving Pool and Spa Chemicals

DANGER All spills of trichlor-based pool and spa chemicals should be kept dry. If a trichlor spill becomes wet, there is potential for formation of explosive nitrogen trichloride. Call LEAN 1-800-654-6911.

This procedure may be used ONLY if local regulations permit disposal of solutions containing 1 ppm available chlorine in the sewer.

Do not mix calcium hypochlorite, bromine oxidizers, dichlor or trichlor in the same drum of water to neutralize. They are incompatible with each other and a reaction may occur. To neutralize a small spill of a pool and spa chemical oxidizer (10 lbs. or less) do the following:

1. Put on the appropriate protective gear (see Section 5.0)
2. Place a clean 55-gallon drum out of doors and away from the spill
Fill the drum with tap water to about 3 / 4 of its depth. Add the spilled chemical slowly

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NOTE: Always add the chemical to the water; NEVER add water to the chemical – toxic fumes can be evolved and a hazardous reaction can occur.

3. Allow the solution of oxidizer to dissolve and let stand until the available chlorine or bromine is within acceptable discharge levels according to local, state and federal regulations. Verify available chlorine or bromine is acceptable as determined with a pool water test kit or test strip. It may then be flushed to the sewer, IF LOCAL REGULATIONS PERMIT.

WARNING Do not discharge the effluent to the sewer system without prior approval from the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA.

7 Chemical Transportation

Transportation of Lonza pool and spa chemicals is governed by local, city, county, state, federal and international regulations, as well as carrier requirements. Shipping and transportation regulations and carrier requirements are subject to change at any time, so it is necessary to check the most current regulations and with the carrier before shipping and transporting any products.

WARNING This Guide is in no way meant to take the place of any DOT requirements for compliance. Every employee who ships DOT-regulated hazardous materials must first be properly trained, tested and certified and most shippers must be registered with the DOT prior to shipping any hazardous materials.

Lonza has procedures in place for handling chemical transport and medical emergencies. Lonza operates an emergency action network (24 hours per day, 365 days per year) to assist with incidents involving our products, including transportation incidents. The contact number for LEAN is 1-800-654-6911.

7.1 General Shipping Requirements

The U.S. Department of Transportation's Hazardous Materials Regulations describe the responsibilities of all U.S. shippers and carriers of hazardous materials. Compliance with the Federal Hazardous Materials Regulations is mandatory and it is each shipper's and carrier's responsibility to comply with all applicable regulations, which are subject to change at any time. Violators face considerable civil and/or criminal penalties.

Any material to be offered for transportation must first be evaluated based upon its properties and hazardous characteristics to see if it meets the definitions of a DOT hazardous material (9 different hazard classes). Pool and spa chemicals that are regulated by the DOT typically fall into one or more of the following hazard classes: Oxidizers, Corrosives, Flammables and Class 9 Hazardous Substances. The classification can be determined by reviewing the MSDS.

If it is determined that the material does not meet a DOT hazard class, then the material is not regulated by the DOT, but the shipper must still offer the material in a safe and adequate package and in compliance with any other applicable regulations or carrier requirements.

Generally, DOT regulations describe the most fundamental requirements as:

- Registration with the DOT as a Hazardous Materials Shipper and/or Carrier
- Training
- Security Assessment
- Classification
- Packaging Selection (tested and certified packaging requirements)
- Marking/Labeling/Placarding
- Documentation
- Certification
- Emergency Response Information – 24 hour manned telephone coverage with immediate emergency response information while hazardous material is in the transportation system
 - a third party response line such as CHEMTREC or INFOTRAC cannot be used unless the shipper is registered with that organization.

For questions about the DOT regulations, call the DOT Hazardous Materials Information Center at 800-467-4922 or visit their website at <http://hazmat.dot.gov> to view copies of the regulations as well as other helpful information.

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Multiple Product Shipments

Whenever two or more chemicals (hazardous or non-hazardous) are placed in a single outer package – it is the responsibility of the shipper to evaluate their compatibility to ensure that there is not a potential for any type of chemical reaction to occur which could lead to a fire, heat generation, explosion or release of gas. Due to the large variety of pool and spa chemicals available, it is impossible in this Guide to address all such combinations which could be shipped. It is the shipper's responsibility to package only compatible materials in a single package. If you have any doubt at all about the compatibility of a shipment, do not combine the products into a single outer package.

To improve safety and address ever-changing technologies, DOT regulations are in a constant state of revision. Accordingly, the shipper must have a system in place to ensure that it is shipping using the most current set of rules and regulations.

In addition to the shipper's responsibility to comply with the requirements imposed by the DOT, each carrier (e.g. UPS, FedEx Ground, FedEx Air or Cargo Air) has its own requirements which also must be met. These additional requirements are often more stringent than those imposed by the DOT and are also subject to change at any time. These additional restrictions can be determined by talking to the appropriate carrier.

7.2 Packaging

The packaging of many Lonza pool and spa chemicals is regulated by the DOT. The total package (including the carton, bottles, staples, plastic bags, etc.) is designed, tested and certified as per the DOT regulations. Any modifications or alterations, including shipping partial packages or replacing the glue or staples with a different type, alters the tested and certified package, and can make the packaging non-compliant with the regulations.

DOT-regulated hazardous materials must be shipped in packaging that is authorized by the applicable regulations. The shipper is responsible for using authorized packaging. Packages containing DOT-regulated hazardous materials must be marked and labeled in accordance with applicable regulations. The shipper is responsible for ensuring that each package is properly marked and labeled.

WARNING Modifications to Lonza packaging may cause the packaging to be out of compliance with DOT regulations. Do not make modifications to any Lonza packaging. All parties that ship Lonza pool and spa chemicals are responsible for ensuring that any packaging is in compliance with all applicable laws and regulations.

7.3 Shipping Guidance

It is the responsibility of the shipper to comply with all applicable laws and regulations, and to certify on the shipping documents that the materials described are properly classified, described, packaged, marked and labeled, and in proper condition for transportation according to applicable regulations. Violations can result in civil and criminal penalties.

Whenever a package contains more than one hazardous material – the shipping description and marks and labels for all hazardous materials must be on the shipping documentation and package.

7.4 Material of Trade (MOT) Exemption

There is an exemption within the DOT regulations that allows some relief from the regulations for persons who transport hazardous materials by private motor carrier in direct support of a principal business such as a pool service route.

The restrictions associated with the MOT are:

- Packaging must be leak tight for liquids and sift proof for solids – can use manufacturer's original packaging or equivalent or better
- Packages must be securely closed and secured against movement and protected against damage
- Outer packaging is not required for receptacles that are secured against movement in cages, bins, boxes or compartments

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- Each package must be marked with a common name or proper shipping name to identify the contents
- If a package contains a reportable quantity of a hazardous substance, it must be marked “RQ”
- Maximum amount of material in one package is 66 lbs. or 8 gallons
- Maximum amount of hazardous materials on one vehicle is limited to 440 lbs
- Operator of vehicle must know the materials are hazardous and be aware of MOT regulations
- MOT’s do not require shipping papers, emergency response information, placarding, formal training, or record keeping
- The exemption applies only to DOT-designated hazardous materials

7.5 Placarding

The shipper must offer the appropriate placards to the carrier according to DOT regulations.

Any vehicle transporting 1,001 lbs. (454 kg.) or more aggregate gross weight of DOT-regulated products must display the appropriate placards on all four sides [such as the “OXIDIZER” placards or “CORROSIVE” placards]. A “DANGEROUS” placard may be used if two or more categories of hazardous materials are loaded on the same vehicle. However, when 2,205 lbs. (1,000 kg.) aggregate gross weight or more of one category of hazardous material is loaded at one facility, the placard for that category must be displayed.

7.6 Loading and Segregation

The following are based on DOT regulations:

- Set vehicle handbrake
- Do not smoke
- Prevent containers from becoming wet
- Do not load oxidizers beneath or adjacent to corrosive liquids
- Brace containers to prevent all motion while in transit
- Placard vehicle according to DOT regulations

The following procedures are also based on DOT regulations and should be followed:

- Keep containers upright
- Do not roll, drop or skid containers. Always handle containers with care
- Inspect area in vehicle for nails, fasteners, hooks or other protrusions which might damage container. Floors especially must be checked for evidence of oil, grease, paint or other readily combustible organic materials, since an accidental spill could result in fire
- Some pool and spa chemicals are chemically incompatible with each other and with other chemicals. According to the DOT regulations, it is forbidden to ship a material in the same packaging, freight container, or over-pack with another material, the mixing of which is likely to cause a dangerous evolution of heat, or flammable or poisonous gases or vapors, or to produce corrosive materials. Refer to the MSDS for specific product compatibility
- Every effort must be made to segregate incompatible products by establishing buffer zones using wood pallets, plywood or other inert materials
- The DOT has segregation requirements for oxidizers, corrosives and flammables. They must be separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur

7.7 DOT Documentation / Shipping Papers

Each DOT-regulated hazardous material must be described on a shipping paper that accompanies the material in transportation. A shipping paper must accurately communicate the hazards of each hazardous material in the shipment. The shipping paper must contain the basic description plus any required additional descriptions or entries. The basic description includes the proper shipping name, the hazard class or division, the identification number (ID No.) and packing group (PG), if any is assigned; this information must be shown in sequence with no additional information interspersed.

Each shipment must have an applicable bill of lading with descriptions of all pool and spa chemicals, whether they are DOT-regulated hazardous materials or not. Bill of lading descriptions are indicated for each package type. The description to be used depends upon the description

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shown on the package. The bill of lading hazardous materials descriptions must coincide with descriptions on the packages.

Refer to the appropriate MSDS for information on a specific product's shipping paper and bill of lading designations and basic shipping description.

If you are registered with the American Chemistry Council Chemical Transportation Emergency Center (CHEMTREC), include CHEMTREC's 24-hour telephone number (1-800-424-9300) on each hazardous materials shipping paper. If you are not registered with CHEMTREC, you will need to provide another 24-hour emergency response telephone number on your hazardous materials shipping papers.

7.8 Product Return or Disposal / Receipt of Damaged Goods

Uncontaminated original containers of calcium hypochlorite products, chlorinated isocyanurate products, and other pool and spa chemicals may be returned if authorized by Lonza AND if the containers have maintained complete integrity and will withstand conditions normally experienced in transportation.

Do not accept material into storage or place back with the carrier if the material has been damaged during shipment. Call Lonza Customer Service and report the incident to LEAN 1-800-654-6911 for assistance.

Containers damaged to the extent that they have lost or may lose integrity during transportation must not be returned or sold. Lonza should be contacted immediately for advice on the proper handling of damaged containers at:

The Lonza Advice Line for Damaged Product: 1-800-253-9140

Disposal and handling of pool and spa chemicals should be initiated ONLY after consulting with The Lonza Advice Line for Damaged Product (1-800-253-9140) or LEAN (1-800-654-6911). Disposal must be in compliance with local, state and federal regulations.

DANGER Never ship contaminated material, including any damaged or abused containers or any containers that may have their contents contaminated by another substance.

8 Storage & Handling Guidelines

The storage and handling of pool and spa chemicals is governed by local, city, county, state, federal and international laws and regulations, local fire and building codes and NFPA codes and standards. Any party that stores or handles Lonza pool and spa chemicals must comply with all applicable laws, regulations, ordinances, codes and standards relating to the storage and handling of these products. This section contains general information about the laws, regulations, ordinances, codes and standards which apply to the storage and handling of pool and spa chemicals. The persons who ship, store and handle these products are solely responsible for compliance with all applicable requirements. Lonza neither has nor assumes any responsibility or liability for compliance or non-compliance by any person or entity.

DANGER Improper storage of pool and spa chemicals in volume or manner can result in a fire of great intensity, causing property damage, personal injury or death. It is essential to know, understand and comply with product labels and MSDS's, product information and literature such as this Guide, and all applicable federal, state and local laws, regulations, ordinance, codes and standards, as well as any applicable non-governmental codes and standards (e.g., those adopted by the NFPA). Failure to comply with applicable legal requirements may also result in enforcement proceedings and criminal liabilities.

8.1 General Guidelines

The general rules of safety, fire protection, housekeeping and strict stock rotation ("first-in, first-out") should be followed closely when handling and storing pool and spa chemicals. Pool and spa chemicals must be stored in tightly sealed original containers and in a cool, dry, well-ventilated area away from combustible or flammable products. For optimum shelf-life, the storage facility must be cool, where average daily temperatures do not exceed 95°F (35°C). In no event should storage temperatures be permitted to exceed the maximum recommended temperature stated in a particular product's MSDS. Storage in a climate-controlled storage area or building is recommended in climates where high temperatures occur. Facilities in which pool and spa chemicals are stored should have temperature monitoring systems.

In an Emergency Call the Fire Department and Then LEAN 1-800-654-6911.

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Keep all packaging clean and free of all contamination. Avoid contact with other pool and spa chemicals, acids, organic materials, nitrogen-containing compounds, oxidizers, all corrosive liquids, flammable or combustible materials. Use only water based fire extinguishers. Do not use dry powder fire extinguishers (containing ammonium compounds).

- Smoking: Smoking should be prohibited in all storage areas which contain oxidizing or flammable materials. “No Smoking” signs should be prominently placed within the area and at all entrances to such storage areas
- Waste Disposal: The accumulation of combustible waste should be prohibited. Spilled materials, and leaking or broken containers, should be immediately removed to a safe area to await disposal. Disposal should be in accordance with Lonza instructions and with all local, state and federal regulations
- Disposal Equipment: Items such as brooms and shovels should be dedicated to this use and kept clean, dry and uncontaminated. Clean polyethylene lined drums for disposal of spilled material should be kept nearby
- Forklifts: To minimize danger of contamination from spillage, forklifts should be either electric or propane. Diesel or gasoline-powered forklifts are not recommended

8.2 Storage Requirements

Refer to and comply with all applicable laws, regulations, ordinance, codes and standards for storage arrangement, separation and stacking height requirements. Lonza also has stacking height requirements for various package types contained in the MSDS or available by calling LEAN at 1-800-654-6911.

Storage shall be in accordance with the local adopted building and fire code and the applicable NFPA codes and standards such as NFPA 400. According to NFPA codes and standards², the permissible arrangement and quantity of oxidizers for safe storage depends on a number of factors:

- Class of Oxidizer (1, 2 or 3)
- Storage Quantity and Type

² Specific references contained in this Guide to the NFPA codes and standards are to NFPA 1: Uniform Fire Code, 2006 Edition © 2006, National Fire Protection Association, and NFPA 400: Hazardous Materials Code, 2010 Edition©. Your jurisdiction may use a different version of the NFPA codes and these are subject to change at any time.

- Building Usage (manufacturing or processing, warehouse, storage or mercantile / retail)
- Building Fire Protection (sprinklered or non-sprinklered)

The NFPA codes and standards also provide guidance on the storage arrangement for a building, including:

- Permissible size of the pile (length, width and height)
- Minimum separation distance (to next pile and to walls)
- Maximum quantity limit (per pile or per building, in tons)

A few tips:

- Place bottom layer on pallet to keep containers off floor
- Store on standard pallets, which must be clean and free of any oil or other combustible substance
- All products must be placed on the pallet in straight vertical alignment
- Follow Lonza recommendations for storage arrangements and stacking heights
- Temperature should be monitored to ensure that pool and spa chemicals are stored below the recommended storage temperatures contained in the MSDS

If the storage is to be considered sprinklered in accordance with the applicable codes, the sprinkler protection must conform to locally adopted building and fire codes, or to the applicable NFPA codes and standards if no local codes apply.

The same considerations applicable to bulk storage of pool and spa chemical products in a warehouse also apply to storage for sale to the ultimate consumer. A pool or spa chemical should be stored in such a way as to avoid contact with incompatible materials (including other pool and spa chemicals) which could react with the pool or spa chemical or catalyze its decomposition. Use solid shelving so no loose or dripping material can fall through on the items beneath. In deciding how to place various types of pool chemicals on shelves, use the following illustrative guidelines:

- When supplied, always follow the Lonza shelf diagram (plan-o-gram)
- Separate incompatibles according to the fire codes using distance or a barrier between incompatibles

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- If possible, keep incompatible pool and spa chemicals on their own shelves, in their own compartments, separated by solid vertical partitions
- Avoid putting compartments containing incompatible pool or spa chemicals next to one another
- If it is not possible to provide vertical partitions on a shelf, use packages of inert materials (such as filter aids like diatomaceous earth) to separate incompatible materials from one another
- Place liquids on bottom shelves to prevent dripping on other pool chemicals in the event of breakage or leakage

8.3 Storage Quantities and Type

Local building and fire codes govern the amount of pool and spa chemicals that may be legally and properly stored in a particular facility with or without additional safety measures such as an approved automatic sprinkler system. Set forth below is a discussion of some of the applicable fire and building code provisions and the various factors that can affect the amount of pool and spa chemicals that can be safely stored, such as the Class of the oxidizer, the amount (by volume or weight) of chemical stored, the use of the building and the type of permit obtained by the party storing the pool and spa chemical.

DANGER Improper storage of pool and spa chemicals in volume or manner can result in a fire of great intensity, causing property damage, personal injury or death. It is essential to know, understand and comply with product labels and MSDS's, product information and literature such as this Guide, and all applicable federal, state and local laws, regulations, ordinance, codes and standards, as well as any applicable non-governmental codes and standards (e.g., those adopted by the NFPA). Failure to comply with applicable legal requirements may also result in enforcement proceedings and criminal liabilities.

WARNING In addition to safety hazards listed above, the lack of a required building or fire code permit or failure to meet permit requirements may be grounds for local officials to stop the operation or use of a structure. Fire code permits are usually issued for place, process and operator and are nontransferable; any changes to use, amount or manner of storage should be cleared through all applicable rules and regulations.

In the evaluation of storage methods and volumes, consult, and comply with, all applicable laws, codes and standards. Local fire and building codes generally follow codes promulgated by the International Code Council (ICC) and the National Fire Protection Association (NFPA). The building and fire codes maintained by the ICC are the International Fire Code (IFC) and the International Building Code (IBC). The NFPA codes and standards include NFPA 5000 Building Construction and Safety Code and NFPA 1 Uniform Fire Code. Some states and /or communities also have their own building and fire codes. A number of communities are still using older building codes and fire codes that are not being updated or maintained. In addition to the building and fire codes, the NFPA has a number of codes with specific requirements that are referenced in some locally adopted building and fire codes. Facilities must comply with the local codes including all of the referenced requirements, such as those contained in NFPA 400 Chapter 15 Code for the Storage of Liquid and Solid Oxidizers. Comply with the applicable NFPA codes and standards if no local codes apply.

WARNING Compliance with local building and fire codes or NFPA codes and standards is your responsibility. All references in this Guide to NFPA codes and standards are to current published editions (NFPA 1 Fire Code, Current Edition, National Fire Protection Association, and NFPA 400: HazMat Code, Current Edition, Chapter on Oxidizer Solids and Liquids, Current Edition, National Fire Protection Association) and may not be applicable to your jurisdiction and are subject to change at any time. It is essential for anyone that stores and handles pool and spa chemicals to ensure compliance with the version of the building and fire code applicable to such person's jurisdiction.

8.3.1 Maximum Storage Amounts

All building occupancy classifications have a maximum amount that can be stored before a fire code permit is required. The maximums under the NFPA 400: Hazardous Materials Code Chapter 15, Current Edition, for the two most common pool and spa chemicals classifications (Oxidizer and Corrosives) are listed in the table below. The amount that requires a permit can vary according to the locally adopted code and /or local regulation. All parties that store pool and spa chemicals should determine whether or not a permit is required.

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Material	NFPA Oxidizer Classification	Maximum Amounts
Oxidizer, Solid & Liquid	Class 4	Any Amount
	Class 3	1 gallon / 10 pounds
	Class 2	10 gallons / 250 pounds
	Class 1	55 gallons / 500 pounds
Corrosives	Liquid	55 gallons
	Solid	1,000 pounds

8.3.2 Permits

If a fire or building permit is required to be obtained, the building and fire codes will include general requirements for occupancies with corresponding tables that list maximum allowable quantities of hazardous materials per control area. As the amount of material increases (depending on the code classification of the material), the specific measures that must be taken to store and handle a material in a facility will also increase.

Generally, the requirements of the building and fire codes are first determined by the building designation, such as the following:

A: Assembly	B: Business (e.g. office)	E: Educational	F: Manufacturing
H: Hazardous	I: Institutional	M: Mercantile	S: Storage
R: Residential	U: Utility-type		

Under the NFPA 1: Fire Code, Current Edition, the maximum storage amount allowed per control area for Group (M) or (S) occupancy in an un-sprinklered building are as follows:

Fire Code Classification	Maximum Allowable Quantity per Control Area* Pounds
Oxidizer	
NFPA Class 3	1,150
NFPA Class 2	2,250
NFPA Class 1	18,000
Corrosives	9,750

* Maximum allowable quantities may be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system. Maximum allowable quantities may also be increased 100 percent when stored in approved storage cabinets. When both approved storage cabinets and an approved automatic sprinkler system are used the 100 percent increases may be applied cumulatively.

For normal operations, end users (recreation pool centers) and retail sales facilities (pool dealers) may need to store larger quantities of pool products than the maximum amounts allowed in the general requirements.

If, the aggregate quantity of hazardous materials stored and displayed within a single control area of a Group (M) occupancy, or an outdoor control area, or stored in a single control area of a Group (S) occupancy, is allowed to exceed the maximum allowable quantity per control area, Group (H) Hazardous Storage may be required.

The following is an outline of the possible steps for obtaining a fire code permit for a NFPA class 3 Oxidizer:

- Contact the fire authority that has jurisdiction and ask what code and what edition has been adopted by the local community and ask if there are local amendments to the code that impact storage, use or handling
- Determine the specific code requirements for the products and quantities to be stored. Determine the use of the building and the location of the storage area. The requirements of the building and fire code vary depending on the use or occupancy of the building, the characteristics of the material stored and the amount of material to be stored
- Verify the permit conditions with local fire and building officials based on the products and quantities that are to be stored
- Confirm that whomever is handling the product is aware of the general safety and regulatory controls including:
 - Housekeeping, whereby any waste is immediately and properly removed from the area
 - Separation of incompatible materials
 - Containment of spills
 - Elimination of other combustible storage when possible
 - Adherence to quantity limits; and
 - Sales storage and display conditions
 - Adequate ventilation

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- Complete the fire code application form with the required information and submit the application to the authority having jurisdiction. The authority having jurisdiction will either approve the permit request as submitted or require additional mitigation measures.

8.3.3 Hazardous (H) Storage

Storage of Hazardous Materials in amounts exceeding Group M or S storage shall be in accordance with the appropriate Group (H) Hazardous storage requirements indicated in the building and fire codes. Once storage capacities exceed the amounts indicated in the Group M and S storage tables the Group (H) Hazardous Materials Occupancy Requirements must be met. These requirements include but are not limited to the following:

- Spill Prevention and Secondary Containment
- Acceptable Storage Methods
- Segregation of Incompatible Materials
- Building & Construction Conditions
- Quantity Limits – Sprinklered Building
- Storage Arrangements / Limitations
- Fire Sprinkler Protection & Storage Height
- Acceptable Storage Methods
- Adequate ventilation

A thorough knowledge and understanding of the building and fire codes is needed for the design of a Hazardous (H) Occupancy Building design. Utilization of a fire code specialist or consultant is recommended and may be required.

Persons who store, transport or handle Lonza pool and spa chemicals are responsible for complying with all applicable laws, regulations, ordinances, codes and standards. Anyone who deals with these products should be aware of these requirements, and should be familiar with the characteristics of these products and proper emergency and first aid procedures.

Users should refer to product labels and Material Safety Data Sheets (MSDS) for information about specific products, and should consult all applicable laws, regulations, ordinances, codes and standards to ensure compliance. Material Safety Data Sheets (MSDS) are available for all Lonza pool and spa chemicals and provide more specific information than this general Guide. Material Safety Data Sheets can be obtained by calling: 1-800-511-MSDS (6737).

Chemical product safety is everyone's responsibility. By working together, we can make it a reality. Lonza has made that commitment. Please make it your commitment as well.

The information provided in this Storage & Handling Guide is supplied by Lonza to assist our employees, contractors, shippers, customers and warehouses in the proper handling, storage and transportation of Lonza pool and spa chemicals. This Guide is not a substitute for proper knowledge of applicable laws and regulations and is not intended to supersede information contained on a product label or in its Material Safety Data Sheet (MSDS). Lonza undertakes no duty to provide or update the information in this Storage & Handling Guide. No statement herein is intended as a representation or warranty regarding Lonza pool and spa products. Lonza does not warrant the information contained in this Guide nor does it warrant its fitness for a particular purpose. The recipient must make its own determination as to the utility of the information contained in this report for recipient's purposes.

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Do Not's

- ☒ **DO NOT MIX** chemicals together or with other materials.
- ☒ **DO NOT STORE** chemicals where average daily temperatures exceed 95°F (35°C).
- ☒ **DO NOT PUT** spilled material back in the original container.
- ☒ **DO NOT ALLOW** un-neutralized or chlorinated materials into the sewer.
- ☒ **DO NOT DISPOSE** of spilled material without complying with safety instructions.
- ☒ **DO NOT ALLOW** children to handle pool and spa chemicals.

Do's

- ☑ Read and follow the guidance contained on the product label and MSDS.
- ☑ Have an established emergency response plan in place.
- ☑ Maintain good housekeeping standards.
- ☑ Wear or carry appropriate personal protective equipment.
- ☑ Know how to handle all spills promptly and correctly.
- ☑ Rotate inventory on a First In-First Out (FIFO) basis.
- ☑ Use water **ONLY** as an extinguishing media for small fires.

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