Issue Date :- September 01,2011
Revision date :- September 01,2017
Supersedes :- September 01,2015

MATERIAL SAFETY DATA SHEET (MSDS)

PART 1- ETHYLENE OXIDE

PART 2- CARBON DIOXIDE

We request the users of this product to study this MSDS and become aware of the product hazards and safety information. To promote safe use of this product, the user should notify employees, agents, transporters, handlers and contractors of the information in this MSDS and of any other known product hazards and safety information relating with the danger, security and proper use of the product.

Since the product is a mixture of two materials in varying ratios, this MSDS is divided into two parts providing information of both the materials in separate sections. For workplace, personal and environmental safety, we request the users to follow the best practices of Industrial Safety and follow the MSDS along with the local rules and regulations as a matter of abundant caution irrespective of the ratio of the gases in the gas mixtures.

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MATERIAL SAFETY DATA SHEET (MSDS)

PART 1 – ETHYLENE OXIDE

SECTIONS:

Issue Date :- September 01,2011
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SECTION 1 : PRODUCT IDENTIFICATION

Product Name	: Stericon/Stericon 90/Stericon 80/Stericon 30/Stericon 20/Stericon 10.
Product Uses	: Sterilizing agent for use in Ethylene Oxide sterilizers for controlling microorganisms in heath care applications; fumigant for controlling Insect infestation in whole and ground spices , etc

SECTION 2: COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	: Ethylene oxide (C_2H_4O). (Main Ingredient)
CAS Number	: 75-21-8
Synonyms	: Dihydrooxirene, dimethylene oxide, EO, 1,2-epoxyethane, EtO, ETO, oxacyclopropane,oxidoethane, alpha/beta-oxidoethane, oxiran, oxirane.

SECTION 3 : HAZARD IDENTIFICATION

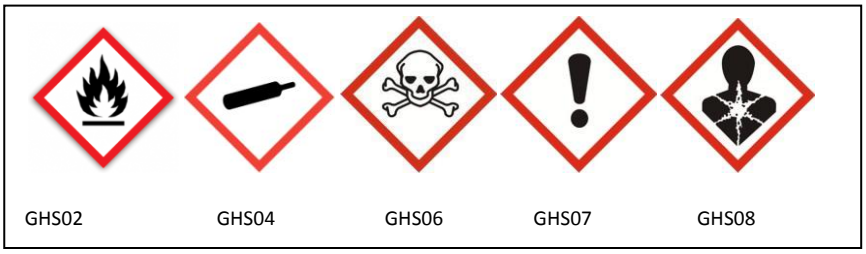
EMERGENCY OVERVIEW

Specific Physical Form : Compressed gas

Appearance and odour : Colourless liquid and gas in normal temperature and pressure. Odour not detectable except at concentrations greater than 500 ppm. Non residual sweet, ether-like odour above 500– 700 ppm concentrations.

Immediate Health hazard : Cylinders and Cartridges contain flammable liquefied gas under pressure which Can burn in absence of oxygen and can explode when exposed at high temperatures. Causes severe skin and eye irritation or burn and respiratory tract irritation. Effects may be delayed. Harmful if swallowed, ingested or absorbed through the skin.

Hazard pictograms(GHS-US) :



Signal word (GHS-US) : **DANGER**

Hazard statements (GHS-US) : H220 - EXTREMELY FLAMMABLE GAS
H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
H315+H320 - CAUSES SKIN AND EYE IRRITATION
H317 - MAY CAUSE AN ALLERGIC SKIN REACTION

H331 - TOXIC IF INHALED
H335 - MAY CAUSE RESPIRATORY IRRITATION
H340 - MAY CAUSE GENETIC DEFECTS
H350 - MAY CAUSE CANCER
H360 - MAY DAMAGE FERTILITY OR THE UNBORN CHILD
H372 - CAUSES DAMAGE TO ORGANS (NERVOUS SYSTEM, KIDNEYS) THROUGH PROLONGED OR REPEATED EXPOSURE
CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
CGA-HG11 - SYMPTOMS MAY BE DELAYED

Precautionary statements : P201 - Obtain special instructions before use
P202 - Do not handle until all safety precautions have been read and understood
P210 - Keep away from Heat/Open flames/Sparks/Hot surfaces. - No smoking
P260 - Do not breathe gas P262 - Do not get in eyes, on skin, or on clothing
P271+P403 - Use and store only outdoors or in a well-ventilated place
P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
P381 - Eliminate all ignition sources if safe to do so
P405 - Store locked up
P501 - Dispose of contents/container in accordance with container Supplier/owner instructions
CGA-PG05 - Use a back flow preventive device in the piping
CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure
CGA-PG12 - Do not open valve until connected to equipment prepared for use
CGA-PG06 - Close valve after each use and when empty
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)

Carcinogenicity : OSHA classifies Ethylene Oxide as a cancer/reproductive hazard and considers that at excessive levels, Ethylene Oxide may present reproductive, mutagenic, genotoxic neurologic and shin sensitization hazards.

SECTION 4: FIRST AID MEASURES

Eye Contact :Flush immediately with water thoroughly including the entire eye surface and under the eyelids and continue for at least 15 minutes. The help of an ophthalmologist should be sought urgently. **Note: - Never wear contact lenses when working with Ethylene Oxide**

Skin Contact : Immediately remove contaminated clothing and wash skin copiously with soap and water. Aerate, wash or clean contaminated clothing. Discard leather goods and shoes. Call a physician.

Inhalation : Remove to fresh air, and administer Oxygen if breathing is difficult. If breathing stops, start artificial respiration. Call a physician.

Swallowing / Ingestion : Give at least 2 glasses of water. DO NOT INDUCE VOMITING. This material is corrosive, keep head lower than hips to avoid aspiration, should vomiting occur. Get medical help immediately.

Pre existing medical conditions : Pre existing skin, eye and respiratory disorders, lung, blood, nervous system and peripheral nerve disorders are aggravated by exposure.

Note to physician : (1) Persons exposed to ETO may develop severe and intractable vomiting, requiring the use of antiemetic given intravenously.
(2) Prolonged or high vapor concentration exposure may result in the development of pulmonary edema after a latent phase of several hours. Also, respiratory tract injury caused by ETO may predispose to the development of a secondary respiratory infection. Consider oxygen administration
(3) If a chemical burn is present decontaminate skin and treat as any thermal burn. Following skin contact, primary irritation and blister formation may be delayed in onset.

SECTION 5: FIRE FIGHTING MEASURES

Flash Point : -4 ° F ; -20 ° C (Test method TAG Closed Cup)
Auto ignition : 804º F (in air); 1058º F (pure ETO)
Upper Flammable Limit in Air : (% by volume): 100% (via decomposition)
Lower Flammable Limit in Air : (% by volume): 3% (30.000 ppm)
Extinguishing media : Use water spray, Carbon Dioxide, dry chemical, alcohol-type or universal foams applied by manufacturer's recommended technique. Use fire extinguishers with class B extinguishing agent. Evacuate all personnel from danger area. Dilution of liquid Ethylene Oxide with 23 volumes of water should render it non flammable and dilution with 100 parts water to one part of Ethylene Oxide may be required to control build up of flammable vapour in closed systems.
Protection of firefighters : Wear full protective equipment and a self-contained breathing apparatus.
Hazardous decomposition Products : Carbon monoxide and carbon dioxide.
Unusual fire and explosion Hazards : Extremely flammable. Ethylene oxide is dangerously explosive under fire conditions, it may form explosive mixtures with air and oxidizing agents and can burn in the absence of oxygen. Liquid Ethylene Oxide is lighter than water (floats) and the vapours are heavier than air and may travel along the ground long distance to sources of ignition and the flash back. Explosive atmosphere may linger. Before entering area, specially confined areas, check atmosphere with appropriate device. No part of a Cylinder/cartridge should be subjected to a temperature higher than 52ºC (Approximately 125ºF). Vapors can burn without the presence of air or oxidizing agents. ETO can decompose violently under certain conditions.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Precaution : Always treat any Ethylene Oxide leak as an emergency, evacuate all personnel from hazard area, except those directly involved in stopping the leak or in cleaning up. The spill should be cleaned up by qualified personnel. Remove all ignition sources such as flames, smoking materials, and electrical spark sources. Reduce vapors with fog or fire water spray. Shut off leak if without risk. Ventilate area of leak or move leaking assembly to well ventilated area. Prevent runoff; collect for disposal Use only non-sparking tools. Ventilate the area with fresh air. Contain spill. If possible, seal leaking container. Flood spills with water spray. Place leaking containers in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors on an

impermeable surface until appropriate packaging for the leaking container or its contents is available. Close cylinder. If the cylinder can't be closed, place in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors. Avoid contact with incompatible materials listed in the Reactivity Data Section. Cover spill area with fire-extinguishing foam designed for use on solvents, such as alcohols and acetone, which can dissolved in water. An AR - AFFF type foam is recommended. Clean up residue with an appropriate organic solvent. Read and follow safety precautions on the solvent label and MSDS. Place in a metal container approved for transportation by appropriate authorities. Seal the container. Dispose of collected material as soon as possible. **Danger**: May form explosive mixtures with air. Immediately evacuate all personnel from danger area. Wear self-Contained breathing apparatus operated in the pressure demand mode and protective clothing.

SECTION 7: HANDLING AND STORAGE

Danger : Be sure to read and understand all labels and other instructions supplied with all containers of this product. For industrial and professional use only. Extremely flammable liquefied gas under pressure. May form explosive mixtures with air. Do not breathe vapor. Can cause rapid suffocation due to oxygen deficiency. Avoid contact with eyes, skin or clothing. Safety showers and eyewash fountains should be immediately available. Use piping and equipment adequately designed to withstand pressures to be encountered. Ground all equipment. Only use spark-proof tools ad explosion-proof equipment. Keep away from heat, sparks and open flame. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty. Wash thoroughly after handling

Engineering Controls : Ethylene Oxide is a major fire hazard can burn in the absence of oxygen. All electrical devices used in areas processing or handling Ethylene Oxide must be engineered and designed to applicable local electrical and Fire codes and safeguards should include designing electrical devices as flameproof, explosive proof and /or intrinsically safe.

Other handling and storage Conditions : Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, and then repair the leak. Do not incinerate EO cylinders, cartridges, tanks or other containers. Compatibility with plastics should be confirmed prior to use.

Storage recommendations : Store cylinders and cartridges in an upright position. Have established handling and emergency response procedures in place prior to use. Protect cylinders and cartridges from physical damage and regularly inspect them for cracks or leaks. Wear leather safety gloves and safety shoes when handling cylinders; do not drag, roll, slide or drop the cylinders.

While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve.

If the valve is hard to open, discontinue use and contact your supplier. Close the cylinder valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. Store Ethylene oxide in a dry, cool and well ventilated area away from incompatible sources of ignition like Aqueous Alkalines; Amines; Mineral Acids; Metal Chlorides; and Metal Oxides. Store away from acids; Keep away from heat, sparks, lighted cigarettes, matches, open flame, pilot lights and all sources of ignition. DO NOT STORE IN DIRECT SUNLIGHT.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits : ETHYLENE OXIDE (75-21-8)

OSHA ACTION LEVEL (8 HR TWA)	0.5 PPM
OSHA PEL (8 HR TWA)	1 PPM
OSHA 15 MIN EXCURSION LIMIT STEL	5 PPM
ACGIHTVL / TWA	1 PPM
IDHL	800 PPM

Eye protection : Avoid eye contact. Avoid eye contact with vapors, mists, or spray Never wear contact lenses when working with ethylene oxide. Use Indirect vented goggles, face-shield, or safety glasses, for protection from rapidly expanding gases and splashes of liquid Ethylene .

Ventilation : Use with adequate ventilation to maintain oxygen levels above 19.5% in the workplace. Local exhaust ventilation is preferred, because it prevents Ethylene dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen and the presence of potentially flammable air-gas mixtures. Install and operate general and local exhaust ventilation designed in such a manner that no person is exposed to concentrations of ETO exceeding the OSHA PEL of 1 ppm or the OSHA excursion limit of 15 ppm.

Hand Protection : Wear mechanically-resistant gloves when handling cylinders of this gas. Use low temperature protective gloves when working with containers/ cartridges of liquid Ethylene.

Skin and Body protection : Avoid skin contact. Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder change out or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable).

Other protection : Sterilizers must be electrically grounded/bonded. Practice good personal hygiene; always wash thoroughly after using this material. Do not eat, drink or smoke in work areas.

Special Instructions : The OSHA EO standard (29 CFR 1910.1047) requires a written emergency plan for spills or leaks. The plan must include procedures for alerting, evacuating, rescuing, training, and medically treating personnel overcome by EO. Procedures for reporting an emergency to appropriate authorities and determining when it is safe to re-enter a spill area must be included.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Vapour Density	: 1.261 kg/m3 (0.078 lb/ft3)
Specific Gravity (Air = 1)	: 0.98
Solubility In Water	: Soluble (100%)
Evaporation Rate (Nbuac = 1)	: Not Applicable
Odor Threshold	: 270 Ppm (Detectable) 600-700 Ppm (Recognizable)
Coefficient Water/ Oil Distribution	: Not Applicable
Ph	: 7, neutral (100 gm/liter of water)
Freezing Point	: -169°C (-272°F)
Boiling Point	: 10.5 °C (51.26 °F)
Expansion Ratio	: 489
Vapor Pressure	: @ 21º C 1,095 mmHG (21,1 psig)
Vapor Density	: (air=1) 1.52
Appearance, Odor And Colour	: Colorless gas with a sweet odor. The cryogenic liquid is also colorless and has a sweet odor
Warning Properties	: Here are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

SECTION 10: STABILITY AND REACTIVITY

Stability	: Stable at standard temperatures and pressures. Explosive decomposition may occur in the absence of air at high temperatures (360°C) and pressures (17 MPa). Decomposition can occur at lower temperatures and pressures in the presence of high energy initiators (e.g. hot wire plus gun cotton, exploding wire, or electricity).
Chemical Stability	:Exothermic polymerization is possible (see incompatible materials)
Decomposition Properties	: When ignited in the presence of oxygen, this gas will decompose to produce carbon monoxide and carbon dioxide.
Incompatible Materials	: Ethylene may react violently with the following materials: Strong oxidizers (e.g., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride); aluminum chloride, organic peroxides, copper, nitrogen dioxide, ozone, halocarbons, halogen acids, and hydrochloric acid
Polymerization	: May occur at elevated temperatures and in the presence of oxidizers
Conditions To Avoid	: Contact with incompatible materials and exposure to heat, sparks, static discharge and other sources of ignition and high pressures.

SECTION 11: TOXICOLOGICAL INFORMATION

Toxicological-acute dermal	: No dermal information LC 50 is available on this product. It is expected to be corrosive to rabbit skin.
Toxicological-chronic dermal	: No chronic dermal toxicity data are available on this product.
Toxicological-eye	: No eye irritating animal data are available on this product. It is expected to be very irritating to rabbit eyes though.
Toxicological-acute ingestion	: The acute oral LC 50 for this product is 72 mg/kg rat.

Toxicological-chronic ingestion	: The effects of chronic ingestion of this product are unknown.
Toxicological-acute inhalation	: LC 50 (1 HR Exposure) 5748 PPM (male rat) 4439 (female rat) 5029 (rat-combined sex) Various mammalian species exposed to lethal concentrations had symptoms of mucous membrane irritation, central nervous system depression, lachrymation, nasal discharge, salivation, nausea, vomiting, diarrhea, respiratory irritation, in coordination, and convulsions.
Toxicological-chronic inhalation	: Symptoms of chronic exposure are similar to those observed in acute studies, including lung, kidney and liver damage and testicular tube degeneration in some species. Studies demonstrated neuromuscular effects as the most sensitive indicator of ethylene oxide over exposure.
Carcinogenicity	: Warning: Contains a chemical which can cause cancer. (75-21-8) (NTP anticipated human carcinogen, IARC human carcinogen 1, ACGIH suspected human carcinogen A2)
Mutagenicity	: No data available.
Reproductive Effects	: Contains a chemical or chemicals which can cause birth defects or other reproductive harm.
Other effects & information	: Endocrine Tissue Effects: Signs/symptoms may include disruption of gonadal, thyroid, adrenal or pancreatic function.
Gastrointestinal effects	: Signs/symptoms may include stomach upset; nausea, vomiting and diarrhea.
Liver effects	: Signs/symptoms may include loss of appetite, weight loss, fatigue, weakness, abdominal tenderness and jaundice.
Central nervous system (CNS)	: Signs/symptoms may include headache, dizziness, drowsiness, in coordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.
Peripheral neuropathy	: Signs/symptoms may include tingling or numbness of the extremities, in coordination, weakness of the hands and feet, tremors and muscle atrophy.
Olfactory effects	: Signs/symptoms may include decreased ability to detect odors and/or complete loss of smell. Kidney Effects: Signs/symptoms may include reduced or absent urine production, increased serum creatinine, lower back pain, increased protein in urine, and increased blood urea nitrogen (BUN).
Pulmonary edema	: Signs/symptoms may include chest discomfort, shortness of breath, significant cough with frothy sputum production, bluish colored skin (cyanosis), increased heart rate, respiratory failure and may be fatal.

SECTION 12: ECOLOGICAL INFORMATION

Biological treatment	: ETO is amenable to disposal in standard bacteriological waste treatment facilities under controlled conditions after proper acclimation of system.
Aquatic toxicity	: Ethylene oxide is moderately toxic to aquatic life as indicated by a 96-hour median lethal concentration (LC50)* of 84 mg/L with fathead minnows and a 48-hours LC50 of about 200 mg/L with Daphnia. Laboratory biological treatment plants have effectively treated industrial wastewater containing concentrations of ethylene oxide up to 250mg/L. Rather sensitive bacterial growth inhibition tests with mixed bacterial cultures (sewage) have indicated some growth inhibition from ethylene oxide concentrations ranging from 10 to 100 mg/L
Biodegradation	: Biochemical oxygen demand (BOD) studies show that ethylene oxide and its derivatives biodegrade at a fairly rapid rate (20-day BOD 50% complete), which

would prevent persistence and reduce any potential for long-term toxic concentrations.

Hydrolysis : In fresh water, ethylene oxide hydrolyzes to ethylene glycol with a measured half life of 14 days. A hydrolysis half-life on nine days was measured in salt water, yielding ethylene glycol and ethylene chlorohydrin in a 4:1 ratio. A High absorption in soil is expected.

Volatilization : Ethylene oxide volatilizes from water to the atmosphere at a rate 40% that oxygen. Literature indicates that ethylene oxide is nonpersistent in air due to washout by rain and degradation via free-radical processes. This substance is expected to be rapidly removed from the aquatic and terrestrial compartments by vaporization.

Summary of environmental Impact : Ethylene oxide is a non persistent chemical structure which would not be expected to accumulate in the environment. Its moderate level of aquatic toxicity coupled with this non persistence should prevent any long-term toxic effects on aquatic systems.

Environmental precautions : Try to stop release, prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous. No known ecological damage caused by this product.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste management / disposal : Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations. Ethylene Oxide is highly toxic to most forms of life and is considered a potential environmental pollutant. Indiscriminate dumping into sewers or waterways must be avoided. Avoid to discharge at atmosphere Do not discharge into any place where its accumulation could be dangerous. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Additionally it can be disposed in facilities specially conditioned to this purpose.

Special Instructions : Do not contaminate water, food, or feed by storage and disposal.
Cylinders / Cartridges should be stored in a well ventilated area.
Return cylinder with residual product to supplier.
Do not reuse this container for any other purpose. Do not refill this cylinder; return to supplier.

SECTION 14: TRANSPORT INFORMATION

Proper Shipping Name : Ethylene Oxide
Hazard Class Number And Description : 2.3 (Flammable Liquid)
Hazard Label(S) Required : Class 2.3 (Flammable Liquid)
Special Provisions : None
Marine Pollutant : Not applicable
UN-No. (IMDG) : 1040
Packing Group : II
Emergency Action Code : 2PE

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product cylinders: - Ensure there is adequate ventilation. - Ensure that cylinders are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

SECTION 15: REGULATORY INFORMATION

This 16 Section , MSDS format is based on the guidance provided in

Indian Regulations	: Manufacture, Storage And Import Of Hazardous Chemicals Rule. 1989 The Factories Act 1948, Gas Cylinders Rules 2004
International Regulations	: European SDS Directive ANSI MSDS Standard ISO 11014-11994 WHMIS Requirements
United States	: Hazard Communication Standard
Canada	:Hazardous Products Act And Controlled Products Regulations
Europe	:Dangerous Substance And Preparations Directives
Australia	:National Model Regulations For The Control Of Workplace Hazardous Substance

SECTION 16: OTHER INFORMATION / GLOSSARY

Glossary:
ACGIH- American Conference of Governmental Industrial Hygienists
CERCLA- Comprehensive Environmental Response, Compensation and Liability Act.
CAS- Chemical Abstract Service
CFR- Code of Federal Regulations
CNS- Central Nervous System
DOT- U.S. Environmental Protection Agency
HMIS- Hazardous Materials information Sheet
IARC- International Agency for Research on Cancer
IDL- Ingredient Disclosure List
IDLH- Immediately dangerous to life and health HAP- Hazardous Air Pollutant
LC50- Median lethal dose that kills 50 % of an exposed population by the inhalation route
LC50- Median lethal dose that kills 50 % of an exposed population by oral (or dermal) route
NESHAPS- National Emission standards for Hazardous Air Pollutants
NFPA- National fire Protection Association
NIOSH- National Institute of Occupational Safety and health
NTP- National Toxicology Program
OSHA- Occupational Safety and health Administration
P/P- parts per part
PEL- Permissible Exposure Limit
PVC- Polyvinyl chloride
PPM- Parts per million

P.S.I.G- Pounds per square inch (gauge pressure)
RCRA- resource, Conservation and recovery Act
SARA- Superfund Amendment and Reauthorization Avt of 1990
STEL- Short- term exposure limit
TDG- Transportation of Dangerous Goods
TVL- Threshold Limit Value
TSCA- Toxic Substance Control Act
TWA- Time Weighted Average
VOC- Volatile Organic compound
WHMIS- Workplace Hazardous Material Information System

SECTIONS:

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End of MSDS (Part 1- Ethylene Oxide)

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MATERIAL SAFETY DATA SHEET (MSDS)

PART 2 – CARBON DIOXIDE

SECTIONS:

Issue Date :- September 01,2011
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SECTION 1 : PRODUCT AND COMPANY IDENTIFICATION

Product Name	: Stericon/Stericon 90/Stericon 80/Stericon 30/Stericon 20/Stericon 10.
Product Uses	: Industrial use, Use as directed, Balance gas for mixtures

SECTION 2: COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	: Carbon Dioxide (C_2O). (Main Ingredient)
CAS Number	: 124-38-9
Synonyms	: Carbonic Acid Gas.

SECTION 3 : HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Specific Physical Form : Compressed gas

Appearance and odour : Carbon Dioxide gas is colorless. At low concentrations, the gas is odorless. At higher concentrations it has a sharp, acidic odor. It will act as an asphyxiant and an irritant. Carbon Dioxide is a powerful cerebral dilator. At concentrations between 2 and 10%, Carbon Dioxide can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Above 8% nausea and vomiting appear. Above 10%, suffocation and death can occur within minutes. Contact with the cold gas can cause freezing of exposed tissue. Moisture in the air can lead to formation of carbonic acid that can irritate the eyes. All forms of Carbon Dioxide are noncombustible. Carbon Dioxide is heavier than air and should not be accumulate in low lying areas.

Immediate Health hazard : Carbon dioxide does not support life. It can act as a simple asphyxiant by diluting the concentration of oxygen in air below the levels necessary to support life. As it is heavier than air it will tend to concentrate at lower levels.

Hazard pictograms(GHS-US) :

GHS04

Signal word (GHS-US) : **WARNING**

Hazard statements (GHS-US) : H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION

	CGA-HG01 - MAY CAUSE FROSTBITE
	CGA-HG03 - MAY INCREASE RESPIRATION AND HEART RATE
Precautionary statements	: P202 - Do not handle until all safety precautions have been read and understood
	P261 - Avoid breathing gas
	P262 - Do not get in eyes, on skin, or on clothing
	P271+P403 - Use and store only outdoors or in a well-ventilated place
	CGA-PG05 - Use a back flow preventive device in the piping
	CGA-PG10 - Use only with equipment rated for cylinder pressure
	CGA-PG06 - Close valve after each use and when empty
	CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F)
Carcinogenicity	: Not known to cause cancer

SECTION 4: FIRST AID MEASURES

Eye Contact	: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.
Skin Contact	: MAY CAUSE FROSTBITE. For exposure to liquid, cold vapor, or solid carbon dioxide (dry ice), immediately warm frostbite area with warm water not to exceed 41°C (105°F). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.
Inhalation	: Remove to fresh air and keep at rest in a position comfortable for breathing. . If not breathing, give artificial respiration, with supplemental oxygen given by qualified personnel. If breathing is difficult, qualified personnel should give oxygen. Call a physician.
Swallowing / Ingestion	: Ingestion is not considered a potential route of exposure

SECTION 5: FIRE FIGHTING MEASURES

Flammability	: Not Flammable.
Auto ignition	: Not Applicable
Upper Flammable Limit in Air	: Not Applicable
Lower Flammable Limit in Air	: Not Applicable
Extinguishing media	: Carbon dioxide is an extinguishing medium. Use extinguishing agent suitable for surrounding fire.
Protection of firefighters	: Wear full protective equipment and a self-contained breathing apparatus.
Hazardous decomposition Products	: None known
Unusual fire and explosion Hazards	: Heat of fire can build pressure in container and cause it to rupture. No part of the container should be subjected to a temperature higher than 125°F (52°C).

SECTION 6: ACCIDENTAL RELEASE MEASURES

Precaution : Increase ventilation to area or move leaking container to a well-ventilated and secure area. Vapour or gas may accumulate in hazardous amounts in low-lying areas especially inside confined spaces, if ventilation is not sufficient. Stop or reduce leak if safe to do so. Ventilate the area to prevent the gas from accumulating, especially in confined spaces. Evacuate all non-essential personnel.

SECTION 7: HANDLING AND STORAGE

Danger : Be sure to read and understand all labels and other instructions supplied with all containers of this product. For industrial and professional use only. As carbon dioxide is a simple asphyxiant, avoid any areas where spillage has taken place. Only enter once testing has proved the atmosphere to be safe, and remember that gas is heavier than air. Avoid contact with eyes or skin. Use piping and equipment adequately designed to withstand pressures to be encountered. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty.

Engineering Controls : Engineering control measures are preferred to reduce exposure to oxygen-depleted atmospheres. General methods include forced draught ventilation, separate from other exhaust ventilation systems. Ensure that sufficient fresh air enters at, or near, floor level.

Other handling and storage Conditions : Never work on a pressurized system. If there is a leak, close the cylinder valve, blow down the system by venting to a safe place, and then call the supplier. Do not incinerate cylinders, tanks or other containers.

Storage recommendations : Store cylinders and cartridges in an upright position. Have established handling and emergency response procedures in place prior to use. Protect cylinders and cartridges from physical damage and regularly inspect them for cracks or leaks. Wear leather safety gloves and safety shoes when handling cylinders; do not drag, roll, slide or drop the cylinders.

While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the cylinder valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. Store cylinders in a dry, cool and well ventilated Store away from acids; Keep away from heat, sparks, lighted cigarettes, matches, open flame, pilot lights and all sources of ignition. DO NOT STORE IN DIRECT SUNLIGHT.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits : CARBON DIOXIDE (124-38-9)

OSHA PEL (8 HR TWA)	5000 PPM
OSHA 15 MIN EXCURSION LIMIT STEL	9000 PPM
ACGIHTVL / TWA	5000 PPM
IDHL	40000 PPM

Eye protection : Avoid eye contact. Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder change out or whenever contact with product is possible.

Ventilation : Use with adequate ventilation to maintain oxygen levels above 19.5% and carbon dioxide concentration does not exceed 5000 ppm in the workplace. Local exhaust at points of emission preferred because it prevents gas mixture dispersion into the work place by eliminating it at its source.
If appropriate, install automatic monitoring equipment to detect the level of oxygen and the presence of potentially flammable air-gas mixtures. Install and operate general and local exhaust ventilation .

Hand Protection : Wear mechanically-resistant gloves when handling cylinders of this gas. Use low temperature protective gloves when working with cylinders

Skin and Body protection : Avoid skin contact. Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder change out or wherever contact with product is possible.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable).

Other protection : Sterilizers must be electrically grounded/bonded. Practice good personal hygiene; always wash thoroughly after using this material. Do not eat, drink or smoke in work areas.

Special Instructions : The OSHA EO standard (29 CFR 1910.1047) requires a written emergency plan for spills or leaks. The plan must include procedures for alerting, evacuating, rescuing, training, and medically treating personnel overcome by gas leakage. Procedures for reporting an emergency to appropriate authorities and determining when it is safe to re-enter a spill area must be included.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight : 44.01

Specific volume @ 20°C & 101,325 kPa : 547 ml/g

Density gas @ 20°C & 101,325 kPa : 1.839 kg/m3

Relative density (Air=1) @ 101,325 kPa : 1,522

Colour : None

Taste : Acidic

Odour : None

Warning Properties	: Here are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

SECTION 10: STABILITY AND REACTIVITY

Stability	: Stable at standard temperatures and pressures.
Decomposition Properties	: Electrical discharges and high temperatures decompose carbon dioxide into carbon monoxide and oxygen.
Incompatible Materials	: Alkali metals, Alkaline earth metals, Acetylide forming metals, Chromium, Titanium > 1022°F (550°C), Uranium (U) > 1382°F (750°C), Magnesium > 1427°F (775°C).
Conditions To Avoid	: None under recommended storage and handling conditions.

SECTION 11: TOXICOLOGICAL INFORMATION

Acute Toxicity	: TLV 5000 VPM
Skin & eye contact	: No known effect
Chronic Toxicity	: No known effect
Carcinogenicity	: No known effect
Mutagenicity	: No known effect
Reproductive Hazards	: No known effect

SECTION 12: ECOLOGICAL INFORMATION

General	: No known ecological damage is caused by Carbon dioxide, When discharged in large quantities may contribute to the greenhouse effect

SECTION 13: DISPOSAL CONSIDERATIONS

Waste management / disposal	: Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations. Contact supplier if guidance is required.
Special Instructions	: Do not contaminate water, food, or feed by storage and disposal. Cylinders / Cartridges should be stored in a well ventilated area. Return cylinder with residual product to supplier. Do not reuse this container for any other purpose. Do not refill this cylinder; return to supplier.

SECTION 14: TRANSPORT INFORMATION

Proper Shipping Name	: Carbon dioxide
Hazard Class Number And Description	: 2.2 - - Non-flammable compressed gas 49 CFR 173.115
Hazard Label(S) Required	: Class 2.2 - Non-flammable gas
Special Provisions	: None

Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
Before transporting product cylinders: - Ensure there is adequate ventilation. - Ensure that cylinders are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

SECTION 15: REGULATORY INFORMATION

This 16 Section , MSDS format is based on the guidance provided in

Indian Regulations : Manufacture, Storage And Import Of Hazardous Chemicals Rule. 1989
The Factories Act 1948, Gas Cylinder Rules 2004.

International Regulations : European SDS Directive
ANSI MSDS Standard
ISO 11014-11994
WHMIS Requirements

United States : Hazard Communication Standard and TSCA (Toxic Substances Control Act) inventory

Canada :Hazardous Products Act And Controlled Products Regulations and the Canadian DSL (Domestic Substances List)

Europe :Dangerous Substance And Preparations Directives and the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Australia :National Model Regulations For The Control Of Workplace Hazardous Substance and the AICS (Australian Inventory of Chemical Substances)

SECTION 16: OTHER INFORMATION / GLOSSARY

Product Composition **: Stericon 90** (90% Ethylene Oxide + 10% Carbon Dioxide - Gas Mixture in 35 Kg cylinder)
Stericon 80 (80% Ethylene Oxide + 20% Carbon Dioxide - Gas Mixture in 30 Kg cylinder)
Stericon 30 (30% Ethylene Oxide + 70% Carbon Dioxide - Gas Mixture in 30 Kg cylinder)
Stericon 20 (20% Ethylene Oxide + 80% Carbon Dioxide - Gas Mixture in 30 Kg cylinder)
Stericon 10 (10% Ethylene Oxide + 90% Carbon Dioxide - Gas Mixture in 30 Kg cylinder)

Other Information : Irrespective of the ratio of Carbon dioxide in the gas mixture for personal and environment safety, ensure all national/local regulations are observed. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process, a thorough material compatibility and safety study should be carried out.

Glossary:
ACGIH- American Conference of Governmental Industrial Hygienists
CERCLA- Comprehensive Environmental Response, Compensation and Liability Act.
CAS- Chemical Abstract Service
CFR- Code of Federal Regulations
CNS- Central Nervous System

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DOT- U.S. Environmental Protection Agency
HMIS- Hazardous Materials information Sheet
IARC- International Agency for Research on Cancer
IDL- Ingredient Disclosure List
IDLH- Immediately dangerous to life and health HAP- Hazardous Air Pollutant
LC50- Median lethal dose that kills 50 % of an exposed population by the inhalation route
LC50- Median lethal dose that kills 50 % of an exposed population by oral (or dermal) route
NESHAPS- National Emission standards for Hazardous Air Pollutants
NFPA- National fire Protection Association
NIOSH- National Institute of Occupational Safety and health
NTP- National Toxicology Program
OSHA- Occupational Safety and health Administration
P/P- parts per part
PEL- Permissible Exposure Limit
PVC- Polyvinyl chloride
PPM- Parts per million
P.S.I.G- Pounds per square inch (gauge pressure)
RCRA- resource, Conservation and recovery Act
SARA- Superfund Amendment and Reauthorization Avt of 1990
STEL- Short- term exposure limit
TDG- Transportation of Dangerous Goods
TVL- Threshold Limit Value
TSCA- Toxic Substance Control Act
TWA- Time Weighted Average
VOC- Volatile Organic compound
WHMIS- Workplace Hazardous Material Information System

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End of MSDS (Part 2- Carbon Dioxide)