

**SAFETY DATA SHEET**Revised edition no : 2  
Date : 12/05/2014**Ethylene Oxide Pure**

PG 005

**SECTION 1. IDENTIFICATION OF THE PRODUCT AND COMPANY UNDERTAKING**

<b>Product name</b>	Ethylene Oxide
<b>Recommended intended purpose(s)</b>	Biocidal product Fumigant.
<b>Company:</b>	Puregas (Pty) Ltd PO Box 123884, Alrode, 1451, South Africa <b>Tel :</b> (011) 903 9760 <b>Fax:</b> (011) 903 9766 <b>Cellphone:</b> 082 889 6946 (1 <sup>st</sup> ) 082 885 7475 (2 <sup>nd</sup> ) <b>Email:</b> <a href="mailto:info@puregas.co.za">info@puregas.co.za</a> <b>Emergency Tel:</b> 0800 172 743 (Rapid Spill Response)

**SECTION 2. HAZARDS IDENTIFICATION**

<b>Classification of the substance or mixture.</b>	<b>Classification according to 67/548/EEC or 1999/45/EC</b> F+; R12 T; R23 Xi; R36/37/38 Carc. Cat. 2; R45 Muta. Cat. 2; R46 R6 <b>R-phrases</b> 45 May cause cancer. 46 May cause heritable genetic damage. 12 Extremely flammable. 36/37/38 Irritating to eyes, respiratory system and skin. 48/23 Toxic: danger of serious damage to health by prolonged exposure through inhalation 6 Explosive with or without contact with air. 23 Also toxic by inhalation.
<b>Hazard statements for physical hazards</b> H220 Extremely flammable gas H280 Contains gas under pressure; may explode if heated  <b>Hazard statements for health hazards</b> H302 Harmful if swallowed H319 Causes serious eye irritation H332 Harmful if inhaled H335 May cause respiratory irritation H340 May cause genetic defects H350 May cause cancer H372 Causes damage to the nervous system and to blood forming organs through prolonged or repeated exposure by inhalation.	



# SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

## Ethylene Oxide Pure

PG 005

### Precautionary Statements

#### Prevention

- P202 Do not handle until all safety precautions have been read and understood.  
P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking.  
P260 Do not breathe gas/vapours.

#### Response

- P304 + P340 IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.  
P308 + P313 IF exposed or concerned: Get medical advice/attention.

#### Storage

- P405 Store locked up  
P410 + P403 Protect from sunlight. Store in a well-ventilated place.

#### Labelling according to Regulation (EC) No 1272/2008 (CLP/GHS)

The product is classified and labelled in accordance with EC directives/German regulations on dangerous substances.



GHS02



GHS06



GHS08

### SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### Substances

CAS No	EC No	Name	% weight
75-21-8	200-849-9	ethylene-oxide	100

#### REACH

CAS No	Name	REACH registration number
75-21-8	ethylene-oxide	01-2119432402-53

#### Mixtures

Not applicable

### SECTION 4. FIRST AID MEASURES

#### General information

Remove contaminated soaked clothing immediately.  
Adhere to personal protective measures when giving first aid.  
Seek medical advice immediately.

#### In case of inhalation

Remove the casualty into fresh air and keep him immobile.  
In the event of pulmonary irritation treat initially with corticoid spray, e.g. Ventolair- or Pulmicort- metered-dose aerosol (Ventolair and Pulmicort are registered trademarks).  
Seek medical treatment immediately.  
In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Send for a doctor.

#### In case of skin contact

In case of frostbite rinse with plenty of water. Don't remove clothing.  
In case of frostbite spray with lukewarm (not hot) water for at least 15 minutes.



## SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

### Ethylene Oxide Pure

PG 005

<b>In case of eye contact</b>	Apply a sterile dressing. Obtain medical assistance. In case of contact with skin wash off immediately and for a long time (at least 15 minutes) with plenty of water. Refer for medical treatment.
<b>In case of ingestion</b>	Eye rinsing with water carefully while protecting unhurt eye. Call for a doctor immediately.
<b>Most important symptoms and effects, both acute and delayed Physician's information / possible symptoms</b>	Ingestion is not considered a potential route of exposure.
<b>Physician's information / possible dangers</b>	Redness / blebs on the skin. Coughing Cardiac arrhythmia (disordered cardiac rhythm). vomiting Headache Nausea
<b>Indication of any immediate medical attention and special treatment needed Treatment (Advice to doctor)</b>	Risk of bullous dermatitis on exposure to vapors. Risk of pulmonary oedema.
	Treat symptoms. Symptoms may not occur until several hours.

## SECTION 5. FIRE-FIGHTING MEASURES

<b>Suitable extinguishing media</b>	Foam Dry powder Carbon dioxide Water spray jet
<b>Unsuitable extinguishing media</b>	Full water jet
<b>Special hazards arising from the substance or mixture</b>	In case of fire formation of dangerous gases possible. Formation of explosive gas mixtures in air. In the event of fire the following can be released: Carbon monoxide (CO).
<b>Special protective equipment for fire-fighters</b>	Use breathing apparatus with independent air supply (isolated). Wear full protective clothing.
<b>Additional information</b>	Cool endangered containers with water spray jet. Exposure to fire may cause containers to rupture / explode. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

<b>Personal precautions</b>	Remove persons to safety.
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**SAFETY DATA SHEET**Revised edition no : 2  
Date : 12/05/2014**Ethylene Oxide Pure**

PG 005

<b>Environmental precautions</b>	Evacuate area. Personal protection by wearing close-fitting protective clothing and breathing apparatus. Eliminate all ignition sources if safe to do so. Keep away sources of ignition.  If possible, stop flow of product. Eliminate ignition sources. Do not discharge into the drains/surface waters/groundwater. If necessary, secure leaky pressure receptacles in a salvage packaging. Suppress gases/vapours/mists with water spray jet Do not discharge into the subsoil/soil.
<b>Methods for cleaning up</b>	Ensure adequate air ventilation. Flush away residues with water.
<b>Reference to other sections</b>	Information for safe handling see section 7. Information for personal protective equipment see section 8.

**SECTION 7. HANDLING AND STORAGE**

<b>Precautions for safe handling</b>	Use only in thoroughly ventilated areas. Transfer and handle only in enclosed systems. Containers' temperature may not be increased above 50 °C. Do not heat with open flames. The working pressure in the receptacle must not exceed 10 bar. Barrels and installations thoroughly earthing (grounding). Use antistatic tools. Treatment only in suitable rooms and systems. Provide good room ventilation even at ground level (vapours are heavier than air). Prevent cylinders from falling over. Ensure valve protection device is correctly fitted. Ensure valve outlet cap nut or plug (where provided) is correctly fitted. Open valve slowly to avoid pressure shock. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Do not allow back feed into the container. Suck back of water into the container must be prevented. No water to valves, flanges and other fittings. Purging of pipes and valves with inert gases - to avoid: water, solvents.
<b>General protective measures</b>	Do not inhale gases/vapours/aerosols.
<b>Hygiene measures</b>	At work do not eat, drink and smoke. Wash hands before breaks and after work.
<b>Advice on protection against fire and explosion</b>	The product is combustible. Because of risk of explosion avoid vapours getting into cellar, sewage system and holes. Take precautionary measures against static discharges. Formation of explosive gas mixtures in air. Use explosion-proof equipment / fittings and non-sparking tools.



## SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

### Ethylene Oxide Pure

PG 005

<p><b>Requirements for storage rooms and vessels</b></p>	<p>Keep in closed original container. Ventilate store-rooms thoroughly. Use transportable pressure equipment. Suitable materials: Normalised steel and carbon steel, tempered steel, aluminium alloys, stainless steel. Valve: Suitable materials: Brass, copper alloys, carbon steels, aluminium alloys, stainless steel.</p>
<p><b>Advice on storage compatibility</b></p>	<p>Do not store with spontaneously flammable materials. Do not store together with combustible liquids or combustible solids. Do not store together with animal feedstuffs. Do not store together with explosives. Do not store together with infectious substances. Do not store together with radioactive material. Do not store together with toxic liquids or toxic solids. Do not store together with food. Do not store together with oxidizing liquids or oxidizing solids.</p>
<p><b>Further information on storage conditions</b></p>	<p>Ensure valve protection device is correctly fitted. Keep container tightly closed and store at cool and aired place. Prevent cylinders from falling over. Protect of heat. Storage temperature may not exceed 50°C (=122°F). Recommended storage temperature: =&lt; 10 °C.</p>
<p><b>Recommendation(s) for intended use</b></p>	<p>Use the product in gaseous form. Dose rates and period of time needed for the biocidal effect have to be determined in each case. Use as biocidal product in accordance with Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products.</p>

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### Control parameters

#### Ingredients with occupational exposure limits to be monitored

CAS No	Name	Code	[mg/m <sup>3</sup> ]	[ppm]	Remark
75-21-8	Ethylene oxide	WEL, 8 hours	9.2	5	EH40, UK
75-21-8	Ethylene oxide	PEL, 8 hours Short-term		1 5	OSHA, USA
75-21-8	Ethylene oxide	TLV, 8 hours Short-term		1 3	ACGIH, USA
75-21-8	Ethylene oxide	REL, 8 hours Short-term	0.18 9	0,1 5	NIOSH, USA

### Additional advice

DMEL (workers, inhalation, long-term, systemic effects): 2mg/m<sup>3</sup>

DMEL (workers, inhalation, long-term, systemic effects) : 10mg/m<sup>3</sup>

### Exposure controls

Keep self-contained breathing apparatus readily available for



## SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

### Ethylene Oxide Pure

PG 005

<p><b>Respiratory protection</b></p>	<p>emergency use. In case of rescue and maintenance activities in storage containers use environment-independent breathing apparatus because of risk of suffocation by edging out of air oxygen Short-term: filter apparatus; filter AX, otherwise environment-independent breathing apparatus.</p>
<p><b>Hand protection</b></p>	<p>chemical-resistant gloves Leather gloves Glove material specification [make/type, thickness, permeation time/life]: IIR, &gt;= 0,7 mm, &gt; 30 min.</p>
<p><b>Eye protection</b></p>	<p>Safety goggles, in case of increased risk add protective face shield.</p>
<p><b>Skin and body protection</b></p>	<p>Safety shoes with steel toe. Body covering work clothing, or chemical resistant suit at increased risk.</p>
<p><b>Limitation and surveillance of the environment</b></p>	<p>PNEC (freshwater): 0.084 mg/l PNEC (marine water): 0.0084 mg/l / 0.84 mg/l (sporadic emission) PNEC (sewage treatment plant): 13 mg/l PNEC (freshwater sediment): 0.329 mg/kg sediment dw PNEC (marine water sediment): 0.0329 mg/kg sediment dw PNEC (soil): 0.0165 mg/kg See section 7</p>

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

### Information on basic physical and chemical properties

Form	Colour	Odour
Gaseous / liquefied under pressure	colourless	ethereal

### Important health, safety and environmental information

	Value	Temperature	at	Method	Remark
pH Value	Not applicable				
Boiling Point	10.4°C		1013hPa		
Melting Pont	-111°C				
Flash point	-57 °C			DIN 51755	
Vapourisation rate	No information available				
Flammable (solid)					Not applicable
Flammability (gas)					Flammable
Ignition temperature	429 °C			DIN 51794	
Lower explosion limit	2,6 Vol-%				
Self ignition temperature	no				
Upper explosion limit	99,9 Vol-%				
Vapour pressure	1440 hPa	20 °C			
Relative density	0,89 g/cm3	20 °C			liquid phase
Vapour density	1,52	20 °C	1013 hPa		air = 1



# SAFETY DATA SHEET

## Ethylene Oxide Pure

Revised edition no : 2  
Date : 12/05/2014

PG 005

Solubility in water					multimiscible
Solubility Other			Polar solvent		
Partition coefficient octano/water (log P O/W)	-0.3	25 °C			
Decomposition temperature	Ca. 560 °C				
Viscosity dynamics	0,25 mPa*s	20 °C			Liquid phase
Oxidising property					No
Explosive properties					Due to its structure the product is not classified explosive
Other information					Vapours are heavier than air

### SECTION 10. STABILITY AND REACTIVITY

<b>Reactivity</b>	See section "Possibility of hazardous reactions".
<b>Chemical Stability</b>	Stable under normal conditions
<b>Possibility of Hazardous reactions</b>	Strong exothermic reaction with acids. Risk of polymerisation.
<b>Conditions to avoid</b>	Formation of explosive gas/air mixtures. Heat sources / heat - risk of bursting.
<b>Incompatible materials</b>	Acids. Oxidants. Alkalis. Metallic oxides. Metallic salts. Amine.
<b>Hazardous decomposition products.</b>	Carbon monoxide Hydrogen Methane >= 560 °C
<b>Thermal decomposition</b>	

### SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects  
Acute toxicity/Irritability/Sensitization

Value/Validation	Species	Method	Remark
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# SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

## Ethylene Oxide Pure

PG 005

LD50 acute oral	330 mg/kg	rat		
LC50 acute dermal	No data available			Study scientifically not justified
LC50 acute inhalation	1460 ppm (4 h)	Rat (male)		
Irritability skin	irritant	rabbit		
Irritability eye	strong irritant	rabbit eye		
Skin sensitization	not determined			Study scientifically not justified
Sensitization respiratory system	not determined			Study scientifically not justified

### Subacute Toxicity - Carcinogenicity

	Value/Validation	Species	Method	Validation
Subchronic Toxicity	NOAEC 10 ppm	Mouse		May cause damage to the peripheral nervous system (reduced body weight increase, loss of reflexes)
	Subchronic toxicity (inhalation of vapours).			
Chronic Toxicity	NOAEC 10 ppm (2 a)	Rat	OECD 453	May cause damage to blood forming organs, reduced body weight increase.
	Target organ toxicity, repeated exposure (inhalation of vapours).			
Mutagenicity				Information on genotoxicity in vivo and in vitro available.
Reproduction - Toxicity	NOAEL 0,054 mg/l	Rat	OECD 415	No indication of toxic effects were observed in reproduction studies in animals
	Inhalation			
Carcinogenicity		Rat	OECD 453	Indications of carcinogenic effects are available from long-term trials
	Inhalation			



**SAFETY DATA SHEET**Revised edition no : 2  
Date : 12/05/2014**Ethylene Oxide Pure**

PG 005

**Specific target organ toxicity (single exposure)**

May cause respiratory irritation

**Specific target organ toxicity (repeated exposure)**

Causes damage to the nervous system and blood forming organs through prolonged or repeated exposure by inhalation

**Aspiration hazard**

Not applicable

**Toxicity test (Additional information)**

In animal studies carcinogenic effects proved.

**Experiences made from practice**

May cause frost bite

Gases have a suffocation effect.

**SECTION 12. ECOLOGICAL INFORMATION****Toxicity****Eco toxicological effects**

	Value	Species	Method	Validation
Fish	LC50 84 mg/l (96 h)	Pimephales promelas	EPA 660/3-75/009	
Daphnia	EC50 212 mg/l (48 h)	Daphnia magna	EPA660/3-75/009	
Algae	EC50 240 mg/l (96 h)	Selenastrum capricornutum		This product was not tested. The information was derived from products of similar structure or composition.
Bacteria	EC10 130 mg/l (3 h)	activated sludge	OECD 209	

**Persistence and degradability****Physico-chemical degradability:**

not determined

**Biological degradability:**

&gt;60 % (28 d)

OECD 301

Readily degradable

**Degradability:**

not determined

**Bioaccumulative potential:**Because of the n-octanol/water distribution coefficient (log K<sub>ow</sub>) accumulation in organisms is not expected**Mobility in soil:**

high mobility

Absorption in the soil is not likely

K<sub>oc</sub>: 0.51 – 0.67**Results of PBT and vPvB assessment:**

The substance does not meet the PBT/vPvB criteria of REACH, annex XIII

**Other adverse effects:**

Not known.

**Behaviour in sewage plant**

When low concentrations are discharged correctly into adapted biological sewage treatment plants, interference with the degradation activity of activated sludge is not likely.

**General regulation:**

Do not allow uncontrolled leakage of product into the environment.

**SECTION 13. DISPOSAL CONSIDERATIONS**

**SAFETY DATA SHEET**Revised edition no : 2  
Date : 12/05/2014**Ethylene Oxide Pure**

PG 005

**Disposal****Waste treatment methods****Waste code No.**

16 05 04\*

**Name of waste**

gases in pressure containers (including halons) containing dangerous substances

Wastes marked with an asterisk are considered to be hazardous waste pursuant to Directive 91/689/EEC on hazardous waste.

**Recommendations for the product**

Dispose of as hazardous waste.

**Recommendations for packaging**

Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

**SECTION 14. TRANSPORT INFORMATION**

	ADR/RID	IMDG	IATA-DGR
<b>UN Number</b>	1040	1040	1040
<b>UN Proper Shipping Name</b>	Ethylene Oxide	Ethylene Oxide with Nitrogen	Ethylene Oxide
<b>Transport Hazard Class(es)</b>	2	2.3 (2.1)	2.3 (2.1)
<b>Packing Group</b>	-	-	-
<b>Environmental Hazards</b>	No	No	No

**Special precautions for user**

The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**

Not applicable

No transport as bulk according IBC – Code

**Land and Inland navigation transport ADR/RID**

Hazard label 2.3 + 2.1

Tunnel restriction code B/D

Classification code 2TF

**Marine Transport IMDG**

Ems: F-D, S-U

**Air transport ICAO/IATA-DGR**

Forbidden

**SECTION 15. REGULATORY INFORMATION****Safety, health and environmental regulations/legislation specific for the substance or mixture****Other regulations (EU)**

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals

(REACH), Annex XVII No 28 - 30.

Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products.

Regulation (EC) No 689/2008 concerning the export and import of dangerous chemicals.

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of



## SAFETY DATA SHEET

Revised edition no : 2  
Date : 12/05/2014

### Ethylene Oxide Pure

PG 005

#### Chemicals

(REACH), Annex XVII No 40.

Directive 96/82/EC on the control of major-accident hazards involving dangerous substances.

#### VOC standard

**VOC content** >=99 % 20 °C 1440 hPa

#### Chemical Safety Assessment

For this substance a chemical safety assessment has been carried out.

Exposure scenarios (ESs) see <http://www.ghc.de/media/en/downloads/expo/1400.pdf>

International and national legislations

## SECTION 16. OTHER INFORMATION

#### Recommended uses and restrictions

Use as biocidal product in accordance with Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products.

National and local regulations concerning chemicals shall be observed.

Please note: EN 1422 - Sterilizers for medical purposes - Ethylene oxide sterilizers - Requirements and test methods.

Please note: EN ISO 11135 - Sterilization of health care products - Ethylene oxide - Requirements for the development, validation and routine control of a sterilization process for medical devices.

#### Further information

The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

#### Wording of the R/H-phrases specified in chapter 3 (not the classification of the mixture!)

R 12 Extremely flammable.

R 23 Toxic by inhalation.

R 36/37/38 Irritating to eyes, respiratory system and skin.

R 45 May cause cancer.

R 46 May cause heritable genetic damage.

R 6 Explosive with or without contact with air.

H220 Extremely flammable gas.

H280 Contains gas under pressure; may explode if heated.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H331 Toxic if inhaled.

H335 May cause respiratory irritation.

H340 May cause genetic defects (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)

H350 May cause cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)