
	<b>SAFETY DATA SHEET</b>	Revised edition no : 2 Next Revision Date : 09/23
	<b>Ethylene Oxide F90</b>	PG 004





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

<b>Product name</b>	Mixture Ethylene oxide 88-98 % / Carbon dioxide 2-12 %
<b>Recommended Intended Purpose</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 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>	
H315      Causes skin irritation H319      Causes serious eye irritation H331      Toxic if inhaled H335      May cause respiratory irritation H340      May cause genetic defects. H350      May cause cancer	
<b>Precautionary Statements</b>	
<b>Prevention</b>	
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.	
<b>Response</b>	
P304 + P340      IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.	

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P308 + P313 IF exposed or concerned: Get medical advice/attention.	
<b>Storage</b> P405 Store locked up P410 + P403 Protect from sunlight. Store in a well-ventilated place.	
<b>Labelling according to 1999/45/EC</b>	The product is classified and labelled in accordance with EC directives/German regulations on dangerous substances.  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">   <b>GHS02</b> </div> <div style="text-align: center;">   <b>GHS06</b> </div> <div style="text-align: center;">   <b>GHS08</b> </div> <div style="text-align: center;">   <b>GHS04</b> </div> </div>
<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 6 Explosive with or without contact with air 23 Also toxic by inhalation
<b>S-phrases</b>	53 Avoid exposure - obtain special instructions before use 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
<b>Hazardous ingredients for labelling</b>	ethylene-oxide, carbon dioxide
<b>Special rules for supplemental label elements for certain mixtures</b>	Read attached instructions before use. Restricted to professional users.
<b>Adverse human health effects and symptoms</b>	Contact with liquid may cause cold burns/frostbite. Asphyxiant in high concentrations.
<b>Information pertaining to special dangers for human and environment</b>	Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.


SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS				
<b>Substances</b>		not applicable		
<b>Mixtures</b>				
CAS No	EC No	Name	% Weight	Classification according to 67/548/EEC
124-38-9	204-696-9	Carbon dioxide	2 - 12	
75-21-8	200-849-9	ethylene-oxide	88 - 98	F+ R12; Carc.Cat.2 R45; Muta.Cat.2 R46; T R23; Xi R36/37/38; R6
CAS No	EC No	Name	% Weight	Classification according to Regulation (EC) No 1272/2008 [CLP/GHS]
124-38-9	204-696-9	Carbon dioxide	2 - 12	Liq. Gas, H280
75-21-8	200-849-9	ethylene-oxide	88 - 98	Flam. Gas 1, H220 / Liq. Gas, H280 / Carc. 1B, H350 / Muta. 1B, H340 /
<b>REACH</b>				Acute Tox. 3, H331 / Eye Irrit. 2, H319 / STOT SE 3, H335 / Skin Irrit. 2, H315

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

SECTION 4. FIRST AID MEASURES	
<b>General information</b>	Remove contaminated soaked clothing immediately. Adhere to personal protective measures when giving first aid. Seek medical advice immediately.
<b>In case of inhalation</b>	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.
<b>In case of skin contact</b>	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. Apply a sterile dressing. Obtain medical assistance.
<b>In case of eye contact</b>	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>Physician's information / possible symptoms</b>	Ingestion is not considered a potential route of exposure.  Redness / blebs on the skin. Coughing
<b>Physician's information / possible dangers</b>	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 vapours. 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</b>	

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<p><b>or mixture</b></p> <p><b>Special protective equipment for fire-fighters</b></p> <p><b>Additional information</b></p>	<p>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).</p> <p>Use breathing apparatus with independent air supply (isolated).          Wear full protective clothing.</p> <p>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.</p>
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### SECTION 6. ACCIDENTAL RELEASE MEASURES


<p><b>Personal precautions</b></p> <p><b>Environmental precautions</b></p> <p><b>Methods and material for containment and cleaning up</b></p> <p><b>Reference to other sections</b></p>	<p>See Section 8          Remove persons to safety.          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.</p> <p>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.</p> <p>Ensure adequate air ventilation.          Flush away residues with water.</p> <p>Information for safe handling see section 7.          Information for personal protective equipment see section 8.</p>
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### SECTION 7. HANDLING AND STORAGE

<p><b>Precautions for safe handling</b></p>	<p>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 the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.          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).</p>
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<p><b>General protective measures</b></p> <p><b>Hygiene measures</b></p> <p><b>Advice on protection against fire and explosion</b></p> <p><b>Requirements for storage rooms and vessels</b></p> <p><b>Advice on storage compatibility</b></p> <p><b>Further information on storage conditions</b></p> <p><b>Recommendation(s) for intended use</b></p>	<p>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.</p> <p>Do not inhale gases/vapours/aerosols.</p> <p>At work do not eat, drink and smoke.          Wash hands before breaks and after work.</p> <p>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.</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>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>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>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</p>
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	528/2012 concerning the making available on the market and use of biocidal products.
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### SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Control parameters**  
**Ingredients with occupational exposure limits to be monitored**

CAS No	Name	Code	[mg/m3]	[ppm]	Remark
75-21-8	Ethylene oxide	WEL, 8 hours	9.2	5	EH40, UK
75-21-8	Ethylene oxide	PEL, 8 hours		1	OSHA, USA
		Short-term		5	
75-21-8	Ethylene oxide	TLV, 8 hours		1	ACGIH, USA
		Short-term		3	
75-21-8	Ethylene oxide	REL, 8 hours	0.18	0,1	NIOSH, USA
		Short-term	9	5	
124-38-9	Carbon dioxide	WEL, 8 hours	9150	5000	EH40, UK
		Short-term	27400	15000	
124-38-9	Carbon dioxide	REL, 8 hours	9000	5000	NIOSH, USA
		Short-term	54000	30000	
124-38-9	Carbon dioxide	PEL, 8 hours	9000	5000	OSHA, USA

**Additional advice**

Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): DMEL (workers, inhalation, long-term, systemic effects): 1,6 mg/m<sup>3</sup> (0,9 ppm).

Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): DMEL (workers, inhalation, short-term, systemic effects): 5,0 mg/m<sup>3</sup> (2,7 ppm).

**Exposure controls**  
**Respiratory protection**

Keep self-contained breathing apparatus readily available for 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.

**Hand protection**

chemical-resistant gloves  
 Leather gloves  
 Glove material specification [make/type, thickness, permeation time/life]: IIR, >= 0,7 mm, > 30 min.

**Eye protection**

Safety goggles, in case of increased risk add protective face shield.


**Skin and body protection**

Safety shoes with steel toe.

**Limitation and surveillance of the environment**

Body covering work clothing, or chemical resistant suit at increased risk.

Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): PNEC

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	(freshwater): 0.084 mg/l Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): PNEC (marine water): 0.0084 mg/l / 0.84 mg/l (sporadic emission) Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): PNEC (sewage treatment plant): 13 mg/l Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): PNEC (freshwater sediment): 0.178 mg/kg Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): PNEC (marine sediment): 0.0178 mg/kg Ethylene oxide (EC-No: 200-849-9; CAS-No: 75-21-8): PNEC (soil): 0.0136 mg/kg See section 7.
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## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

### Information on basic physical and chemical properties

<b>Form</b>	<b>Colour</b>	<b>Odour</b>
Gaseous / liquefied under pressure	colourless	ethereal


### Important health, safety and environmental information

<b>pH value in delivery state</b>	Not applicable
<b>Boiling point</b>	Not determined
<b>Melting point</b>	Not determined

	Value	Temperature	at	Method	Remark
Flash point	-57 °C			DIN 51755	Information concerns to main component
Flammability (gas)					Flammable
Ignition temperature	429 °C			DIN 51794	Information concerns to main component
Lower explosion limit	2,6 Vol-%				Information concerns to main component
Upper explosion limit	99,9 Vol-%				Information concerns to main component
Vapour pressure	2580 – 8170 hPa	20 °C		calculated	
Relative density	0,863 - 0,874 g/cm <sup>3</sup>	20 °C		Calculated	liquid phase
Vapour density	1,52	20 °C	1013 hPa		air = 1
Solubility in water	Not determined				
Viscosity dynamic	Not determined				
Oxidising property					No
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</b>	Strong exothermic reaction with acids.

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<b>reactions</b>	Risk of polymerisation.
<b>Conditions to avoid</b>	Formation of explosive gas/air mixtures. Heat sources / heat - risk of bursting.
<b>Incompatible materials</b>	Copper, brass and other copper alloys Acids Oxidants Alkalis Metallic oxides Metallic salts Amine
<b>Hazardous decomposition products.</b>	Carbon monoxide Hydrogen Methane
<b>Thermal decomposition</b>	Not determine

## SECTION 11. TOXICOLOGICAL INFORMATION

### Information on toxicological effects

#### Acute toxicity/Irritability/Sensitization

	Value/Validation	Species	Method	Remark
LD50 acute oral	330 mg/kg	rat		Information concerns to main component
LC50 acute inhalation	1440 ppm (4 h)	rat		Information concerns to main component
Irritability skin	irritant	rabbit		Information concerns to main component
Irritability eye	strong irritant	rabbit eye		Information concerns to main component
Skin sensitization	not determined			
Sensitization respiratory system	not determined			

#### Sub-acute Toxicity - Carcinogenicity


	Value	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).			
	Information concerns to ethylene oxide.			
Chronic Toxicity	NOAEC 10 ppm (2 a)	Rat	OECD 453	May cause damage to blood forming organs, reduced body weight increase.



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Target organ toxicity, repeated exposure (inhalation of vapours) Information concerns to ethylene oxide.		
Mutagenicity		Information on genotoxicity in vivo and in vitro available.
	Information concerns to ethylene oxide.	
Reproduction - Toxicity	NOAEL 0,054 mg/l	Rat OECD 415
		No indication of toxic effects were observed in reproduction studies in animals
	Inhalation Information concerns to ethylene oxide.	
Carcinogenicity		Rat OECD 453
		Indications of carcinogenic effects are available from long-term trials
	Inhalation Information concerns to ethylene oxide	
<b>Experiences made from practice</b> May cause frostbite. Gases have a suffocating effect		
<b>Additional information</b> The product is a mixture of Carc. Cat. 2. The product is a mixture of Muta. Cat. 2. The product has not been tested. The information is derived from the properties of the individual components.		

SECTION 12. ECOLOGICAL INFORMATION				
<b>Toxicity</b>				
<b>Eco toxicological effects</b>				
	Value	Species	Method	Validation
Fish	LC50 84 mg/l (96 h)	Pimephales promelas	EPA 72-1	Information concerns to main component
Daphnia	EC50 137 mg/l (48 h)	Daphnia magna	EPA FIFRA OPP 72-2	Information concerns to main component
Algae	EC50 240 mg/l (96 h)	Selenastrum capricornutum		Information concerns to main component
Bacteria	EC10 130 mg/l (3 h)	Activated sludge	OECD 209	Information concerns to main component
<b>Persistence and degradability</b>				
<b>Physico-chemical degradability:</b>		not determined		
<b>Biological degradability:</b>		Readily degradable		
		The product has not been tested. The information was derived from products of similar structure or composition.		
<b>Degradability:</b>		not determined		
<b>Biological eliminability:</b>		not determined		
<b>Bio accumulative potential:</b>		No high bioaccumulation potential (estimated).		
<b>Mobility in soil:</b>		high mobility		

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<b>Results of PBT and vPvB assessment:</b>	The substances in this mixture do not meet the PBT/vPvB criteria of REACH, annex XIII.
<b>Other adverse effects:</b>	Not known.
<b>General regulation:</b>	Do not allow uncontrolled leakage of product into the environment. The information to ecology refers to main component.

### SECTION 13. DISPOSAL CONSIDERATIONS

#### Waste treatment methods

Waste code No.	Name of waste
16 05 04*	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

#### Land and inland navigation transport ADR/RID

UN 3300 ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE, 2.3 (2.1), (B/D), Classification code: 2TF

#### Marine transport IMDG

UN 3300 ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE, 2.3 (2.1)

Ems: F-D, S-U

#### Air transport ICAO/IATA-DGR

UN 3300 Ethylene oxide and carbon dioxide mixture, 2.3 (2.1)

FORBIDDEN

#### 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

No transport as bulk according IBC - Code

### 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 Chemicals

(REACH), Annex XVII No 40.

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

**VOC content** >=88<=98 % 20 °C 8170 hPa

**Chemical Safety Assessment**

Chemical safety assessments for substances in this mixture were carried out.

National and international legislation.

**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.

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

**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)