

## SAFETY DATA SHEET

H2 0,03 %;CO 0,04 %;O2 5 %;N2 94,93 %

Issue Date: 20.12.2012

Version: 1.0

SDS No.: 000010004020

Last revised date: 30.11.2015

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**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifier****Product name:** H2 0,03 %;CO 0,04 %;O2 5 %;N2 94,93 %**1.2 Relevant identified uses of the substance or mixture and uses advised against****Identified uses:** Industrial and professional. Perform risk assessment prior to use.  
**Uses advised against** Consumer use.**1.3 Details of the supplier of the safety data sheet****Supplier**Linde Gas GmbH  
Carl-von-Linde-Platz 1  
A-4651 Stadl-Paura**Telephone:** +43 50 4273**E-mail:** office@at.linde-gas.com**1.4 Emergency telephone number:** Emergency number Linde: + 43 50 4273 (during business hours), Poisoning Information Center: +43 1 406 43 43**SECTION 2: Hazards identification****2.1 Classification of the substance or mixture****Classification according to Directive 67/548/EEC or 1999/45/EC as amended.**

Not classified

**Classification according to Regulation (EC) No 1272/2008 as amended.****Physical Hazards**

Gases under pressure

Compressed gas H280: Contains gas under pressure; may explode if heated.

**2.2 Label Elements****Signal Words:** Warning**Hazard Statement(s):** H280: Contains gas under pressure; may explode if heated.

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## Precautionary Statement

**Prevention:** None.  
**Response:** None.  
**Storage:** P403: Store in a well-ventilated place.  
**Disposal:** None.

## Supplemental label information

EIGA-As: Asphyxiant in high concentrations.

2.3 Other hazards: None.

## SECTION 3: Composition/information on ingredients

## 3.2 Mixtures

Chemical name	Chemical formula	Concentration	CAS-No.	EC No.	REACH Registration No.	Notes
Hydrogen	H <sub>2</sub>	300PPM	1333-74-0	215-605-7	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	
carbon monoxide	CO	400PPM	630-08-0	211-128-3	01-2119480165-39	#
Oxygen	O <sub>2</sub>	5%	7782-44-7	231-956-9	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	
Nitrogen	N <sub>2</sub>	94,9300%	7727-37-9	231-783-9	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements. All concentrations are nominal.

# This substance has workplace exposure limit(s).

PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

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## Classification

Chemical name	Classification		Notes
Hydrogen	DSD:	F+; R12	
	CLP:	Flam. Gas 1;H220, Press. Gas Compr. Gas;H280	Note U
carbon monoxide	DSD:	F+; R12 Repr. 1; R61 T; R23, R48/23	
	CLP:	Flam. Gas 1;H220, Press. Gas Compr. Gas;H280, Repr. 1A;H360D, Acute Tox. 3;H331, STOT RE 1;H372	
Oxygen	DSD:	O; R8	
	CLP:	Oxid. Gas 1;H270, Press. Gas Compr. Gas;H280	
Nitrogen	DSD:	none	
	CLP:	Press. Gas Compr. Gas;H280	

DSD: Directive 67/548/EEC.

CLP: Regulation No. 1272/2008.

Note U: When put on the market gases have to be classified as 'Gases under pressure', in one of the groups compressed gas, liquefied gas, refrigerated liquefied gas or dissolved gas. The group depends on the physical state in which the gas is packaged and therefore has to be assigned case by case.

The full text for all R-phrases and H-statements is displayed in section 16.

## SECTION 4: First aid measures

**General:** In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

## 4.1 Description of first aid measures

**Inhalation:** In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

**Eye contact:** Adverse effects not expected from this product.

**Skin Contact:** Adverse effects not expected from this product.

**Ingestion:** Ingestion is not considered a potential route of exposure.

**4.2 Most important symptoms and effects, both acute and delayed:** Respiratory arrest.

## 4.3 Indication of any immediate medical attention and special treatment needed

**Hazards:** None.

**Treatment:** None.

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**SECTION 5: Firefighting measures****General Fire Hazards:** Heat may cause the containers to explode.**5.1 Extinguishing media****Suitable extinguishing media:** Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.**Unsuitable extinguishing media:** None.**5.2 Special hazards arising from the substance or mixture:** None.**Hazardous Combustion Products:** None.**5.3 Advice for firefighters****Special fire fighting procedures:** In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.**Special protective equipment for fire-fighters:** Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.**SECTION 6: Accidental release measures****6.1 Personal precautions, protective equipment and emergency procedures:** Evacuate area. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Guideline EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.**6.2 Environmental Precautions:** Prevent further leakage or spillage if safe to do so.**6.3 Methods and material for containment and cleaning up:** Provide adequate ventilation.**6.4 Reference to other sections:** Refer to sections 8 and 13.

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**SECTION 7: Handling and storage:**
**7.1 Precautions for safe handling:**

Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminants particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

**7.2 Conditions for safe storage, including any incompatibilities:**

Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material.

**7.3 Specific end use(s):**

None.

**SECTION 8: Exposure controls/personal protection**
**8.1 Control Parameters**
**Occupational Exposure Limits**

Chemical name	type	Exposure Limit Values	Source
carbon monoxide	MAK	30 ppm 33 mg/m <sup>3</sup>	Austria. MAK List, OEL Ordinance (GwV), BGBl. II, no. 184/2001 (09 2007)
	MAK STEL	60 ppm 66 mg/m <sup>3</sup>	Austria. MAK List, OEL Ordinance (GwV), BGBl. II, no. 184/2001 (09 2007)

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## DNEL-Values

Critical component	type	Value	Remarks
carbon monoxide	Worker - inhalative, long-term - systemic	23 mg/m <sup>3</sup>	-
	Worker - inhalative, short-term - systemic	117 mg/m <sup>3</sup>	-
	Worker - inhalative, long-term - local	23 mg/m <sup>3</sup>	-
	Worker - inhalative, short-term - local	117 mg/m <sup>3</sup>	-

## PNEC-Values

Critical component	type	Value	Remarks
carbon monoxide			PNEC not available.

## 8.2 Exposure controls

**Appropriate engineering controls:**

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product.

**Individual protection measures, such as personal protective equipment****General information:**

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

**Eye/face protection:**

Wear eye protection to EN 166 when using gases.  
 Guideline: EN 166 Personal Eye Protection.

**Skin protection****Hand Protection:**

Wear working gloves while handling containers  
 Guideline: EN 388 Protective gloves against mechanical risks.

**Body protection:**

No special precautions.

**Other:**

Wear safety shoes while handling containers  
 Guideline: ISO 20345 Personal protective equipment - Safety footwear.

**Respiratory Protection:**

Not required.

**Thermal hazards:**

No precautionary measures are necessary.

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**Hygiene measures:** Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

**Environmental exposure controls:** For waste disposal, see section 13 of the SDS.

<b>SECTION 9: Physical and chemical properties</b>
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## 9.1 Information on basic physical and chemical properties

## Appearance

<b>Physical state:</b>	Gas
<b>Form:</b>	Compressed gas
<b>Color:</b>	H <sub>2</sub> : Colorless CO: Colorless O <sub>2</sub> : Colorless N <sub>2</sub> : Colorless
<b>Odor:</b>	H <sub>2</sub> : Odorless CO: Odorless O <sub>2</sub> : Odorless N <sub>2</sub> : Odorless gas
<b>Odor Threshold:</b>	Odor threshold is subjective and is inadequate to warn of over exposure.
<b>pH:</b>	not applicable.
<b>Melting Point:</b>	No data available.
<b>Boiling Point:</b>	No data available.
<b>Sublimation Point:</b>	not applicable.
<b>Critical Temp. (°C):</b>	No data available.
<b>Flash Point:</b>	Not applicable to gases and gas mixtures.
<b>Evaporation Rate:</b>	Not applicable to gases and gas mixtures.
<b>Flammability (solid, gas):</b>	This product is not flammable.
<b>Flammability Limit - Upper (%):</b>	not applicable.
<b>Flammability Limit - Lower (%):</b>	not applicable.
<b>Vapor pressure:</b>	No reliable data available.
<b>Vapor density (air=1):</b>	0,99 (calculated) (15 °C)
<b>Relative density:</b>	No data available.
<b>Solubility(ies)</b>	
<b>Solubility in Water:</b>	No data available.
<b>Partition coefficient (n-octanol/water):</b>	Not known.
<b>Autoignition Temperature:</b>	not applicable.
<b>Decomposition Temperature:</b>	Not known.
<b>Viscosity</b>	
<b>Kinematic viscosity:</b>	No data available.
<b>Dynamic viscosity:</b>	No data available.

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**Explosive properties:** Not applicable.  
**Oxidizing properties:** not applicable.

**9.2 Other information:** None.

**SECTION 10: Stability and reactivity**

**10.1 Reactivity:** No reactivity hazard other than the effects described in sub-section below.

**10.2 Chemical Stability:** Stable under normal conditions.

**10.3 Possibility of Hazardous Reactions:** None.

**10.4 Conditions to Avoid:** None.

**10.5 Incompatible Materials:** No reaction with any common materials in dry or wet conditions.

**10.6 Hazardous Decomposition Products:** Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**SECTION 11: Toxicological information**

**General information:** Carbon monoxide: Has been shown to produce adverse effects to the cardiovascular, central nervous, and reproductive systems in laboratory animals and chronically exposed humans.

**11.1 Information on toxicological effects**

**Acute toxicity - Oral Product** Based on available data, the classification criteria are not met.

**Acute toxicity - Dermal Product** Based on available data, the classification criteria are not met.

**Acute toxicity - Inhalation Product** ATEmix (4 h): 3250000 ppm

**Component Information**  
 carbon monoxide  
 LC 50 (Rat, 4 h): 1300 ppm  
 LC 50 (Rat, 1 h): 3760 ppm

**Repeated dose toxicity Component Information**  
 carbon monoxide  
 LOAEC (Rat, Inhalation): 200 ppm (Target Organ(s): Respiratory system)



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**Skin Corrosion/Irritation****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

Not classified as an irritant.

**Serious Eye Damage/Eye Irritation****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

Not classified as an irritant.

**Respiratory or Skin Sensitization****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

No known effects from this product.

**Germ Cell Mutagenicity****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

There is no evidence of mutagenic potential.

**Carcinogenicity****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

No evidence of carcinogenic effects.

**Reproductive toxicity****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

May damage fertility or the unborn child.

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10/16**Reproductive toxicity (Fertility)****Component Information**

carbon monoxide NOAEC (embryotoxicity): 65 ppm

**Developmental toxicity (Teratogenicity)****Component Information**

carbon monoxide LOAEC: 125 ppm

**Specific Target Organ Toxicity - Single Exposure****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

Route of Exposure: Inhalation

Target Organ(s): Blood

Causes damage to red blood cells (haemolytic poison). Carbon monoxide binds reversibly to haemoglobin (Hb) to form carboxyhaemoglobin (CoHb), reducing the capacity of the blood to transport oxygen.

**Specific Target Organ Toxicity - Repeated Exposure****Product**

Based on available data, the classification criteria are not met.

**Component Information**

carbon monoxide

Route of Exposure: Inhalation

Target Organ(s): Heart

Risk of serious health injuries in case of long term exposure.

**Aspiration Hazard****Product**

Not applicable to gases and gas mixtures..

**SECTION 12: Ecological information****12.1 Toxicity****Acute toxicity****Product**

No ecological damage caused by this product.

**12.2 Persistence and Degradability****Product**

Not applicable to gases and gas mixtures..

**Component Information**

carbon monoxide

Will not undergo hydrolysis.

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**Biodegradation****Component Information**

carbon monoxide

Not readily biodegradable. Inorganic compound.

**12.3 Bioaccumulative Potential****Product**

The product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

**Component Information**

carbon monoxide

Because of the low log K<sub>ow</sub>, accumulation in organisms is not expected.**12.4 Mobility in Soil****Product**

Because of its high volatility, the product is unlikely to cause ground or water pollution.

**Component Information**

carbon monoxide

Because of its high volatility, the product is unlikely to cause ground or water pollution.

**12.5 Results of PBT and vPvB assessment****Product**

Not classified as PBT or vPvB.

**12.6 Other Adverse Effects:****Global Warming Potential**

Global warming potential: 0  
 Contains greenhouse gas(es) not covered by 842/2006/EC. When discharged in large quantities may contribute to the greenhouse effect.

**Component Information**

carbon monoxide

Global warming potential: 1,9

<b>SECTION 13: Disposal considerations</b>
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**13.1 Waste treatment methods****General information:**

Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place.

**Disposal methods:**

Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

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12/16**European Waste Codes****Container:** 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.**SECTION 14: Transport information****ADR**

14.1 UN Number: UN 1956  
14.2 UN Proper Shipping Name: COMPRESSED GAS, N.O.S.(Nitrogen, Carbon Monoxide)  
14.3 Transport Hazard Class(es)  
Class: 2  
Label(s): 2.2  
Hazard No. (ADR): 20  
Tunnel restriction code: (E)  
14.4 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -

**RID**

14.1 UN Number: UN 1956  
14.2 UN Proper Shipping Name: COMPRESSED GAS, N.O.S.(Nitrogen, Carbon Monoxide)  
14.3 Transport Hazard Class(es)  
Class: 2  
Label(s): 2.2  
14.4 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -

**IMDG**

14.1 UN Number: UN 1956  
14.2 UN Proper Shipping Name: COMPRESSED GAS, N.O.S.(Nitrogen, Carbon Monoxide)  
14.3 Transport Hazard Class(es)  
Class: 2.2  
Label(s): 2.2  
EmS No.: F-C, S-V  
14.3 Packing Group: -  
14.5 Environmental hazards: not applicable  
14.6 Special precautions for user: -

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## IATA

14.1 UN Number: UN 1956  
 14.2 Proper Shipping Name: Compressed gas, n.o.s.(Nitrogen, Carbon Monoxide)  
 14.3 Transport Hazard Class(es):  
   Class: 2.2  
   Label(s): 2.2  
 14.4 Packing Group: -  
 14.5 Environmental hazards: not applicable  
 14.6 Special precautions for user: -  
   Other information  
     Passenger and cargo aircraft: Allowed.  
     Cargo aircraft only: Allowed.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: not applicable

**Additional identification:**

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 containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

<b>SECTION 15: Regulatory information</b>
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## 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

## EU Regulations

## Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use:

Chemical name	CAS-No.	Concentration
Hydrogen	1333-74-0	- <0,1%
carbon monoxide	630-08-0	- <0,1%

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:

Chemical name	CAS-No.	Concentration
carbon monoxide	630-08-0	0 - <0,1%

Directive 96/61/EC: concerning integrated pollution prevention and control (IPPC): Article 15, European Pollution Emission Registry (EPER):

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Chemical name	CAS-No.	Concentration
carbon monoxide	630-08-0	0 - <0,1%

**Directive 96/82/EC (Seveso II): on the control of major accident hazards involving dangerous substances:**

Chemical name	CAS-No.	Concentration
Oxygen	7782-44-7	1,0 - 10%
Hydrogen	1333-74-0	0 - <0,1%
carbon monoxide	630-08-0	0 - <0,1%

**Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:**

Chemical name	CAS-No.	Concentration
Oxygen	7782-44-7	1,0 - 10%
Hydrogen	1333-74-0	0 - <0,1%
carbon monoxide	630-08-0	0 - <0,1%

### National Regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 89/686/EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.

This Safety Data Sheet has been produced to comply with Regulation (EU) 453/2010.

**15.2 Chemical safety assessment:** No Chemical Safety Assessment has been carried out.

### SECTION 16: Other information

**Revision Information:** Not relevant.

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**Key literature references and sources for data:**

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:

Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>).

European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.

European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search>

European Industrial Gases Association (EIGA) Doc. 169 Classification and Labelling guide.

International Programme on Chemical Safety (<http://www.inchem.org/>)

ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.

Matheson Gas Data Book, 7th Edition.

National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.

The ESIS (European chemical Substances Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).

The European Chemical Industry Council (CEFIC) ERICards.

United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)

Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).

Substance specific information from suppliers.

Details given in this document are believed to be correct at the time of publication.

**Wording of the R-phrases and H-statements in section 2 and 3**

H220	Extremely flammable gas.
H270	May cause or intensify fire; oxidizer.
H280	Contains gas under pressure; may explode if heated.
H331	Toxic if inhaled.
H360D	May damage the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
R8	Contact with combustible material may cause fire.
R12	Extremely flammable.
R23	Toxic by inhalation.
R48/23	Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R61	May cause harm to the unborn child.

**Training information:**

Users of breathing apparatus must be trained. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the hazards.

**Classification according to Regulation (EC) No 1272/2008 as amended.**

Press. Gas Compr. Gas, H280

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**Other information:**

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

**Last revised date:**

30.11.2015

**Disclaimer:**

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.