SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name : Carbon monoxide, Carbon monoxide N20, Kulilte, Carbon monoxide N47, Carbon monoxide N23

SDS no : NOAL_0019

Other means of identification : Carbon monoxide

CAS-No. : 630-08-0

EC-No. : 211-128-3

EC Index-No. : 006-001-00-2

REACH registration No : 01-2119480165-39

Chemical formula : CO

1.2. Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Industrial and professional uses. Perform risk assessment prior to use.
See the list of identified uses and exposure scenarios in the annex of the safety data sheet.
Perform risk assessment prior to use.
Contact supplier for more information on uses.

Uses advised against : Consumer use.
Uses other than those listed above are not supported, contact your supplier for more information on other uses.

1.3. Details of the supplier of the safety data sheet

Company identification

Supplier
AIR LIQUIDE NORWAY AS
Drammensveien 64 B
3050 Mjøndalen - NORWAY
T + 47 32 27 41 40
info.norway@airliquide.com

E-Mail address (competent person) : eunordic-sds@airliquide.com

1.4. Emergency telephone number

Emergency telephone number : 112 / Giftinformasjon: + 47 22 59 13 00
Availability
(24 / 7)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Physical hazards	Flammable gases, Category 1A	H220
	Gases under pressure : Compressed gas	H280
Health hazards	Acute toxicity (inhalation:gas) Category 3	H331
	Reproductive toxicity, Category 1A	H360D
	Specific target organ toxicity – Repeated exposure, Category 1	H372

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :

GHS02 GHS04 GHS06 GHS08

Signal word (CLP) : Danger

Hazard statements (CLP) : H220 - Extremely flammable gas.
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.

Precautionary statements (CLP)

- Prevention : P280 - Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P271 - Use only outdoors or in a well-ventilated area.
P260 - Do not breathe dust/fume/gas/mist/vapours/spray.
P264 - Wash hands, forearms and face thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

- Response : P308+P313 - IF exposed or concerned: Get medical advice.
P311 - Call a POISON CENTER or doctor.
P321 - Specific treatment (see supplemental first aid instruction on this label).
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - In case of leakage, eliminate all ignition sources.
P381 - In case of leakage, eliminate all ignition sources.

- Storage : P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
P405 - Store locked up.
P403 - Store in a well-ventilated place.
P410+P403 - Protect from sunlight. Store in a well-ventilated place.

- Disposal considerations : P501 - Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

Supplemental information : Restricted to professional users.

2.3. Other hazards

None.
Not classified as PBT or vPvB.
The substance/mixture has no endocrine disrupting properties.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	Composition [V-%]:	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Carbon monoxide	CAS-No.: 630-08-0 EC-No.: 211-128-3 EC Index-No.: 006-001-00-2 REACH registration No: 01-2119480165-39	100	Flam. Gas 1A, H220 Press. Gas (Comp.), H280 Acute Tox. 3 (Inhalation:gas), H331 Repr. 1A, H360D STOT RE 1, H372

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures Not established.

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.
  Provide oxygen.
- Skin contact : Adverse effects not expected from this product.
- Eye 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

Symptoms may include dizziness, headache, nausea and loss of co-ordination.
Delayed adverse effects possible.
See section 11.

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

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Water spray or fog.
  Dry powder.
- Unsuitable extinguishing media : Carbon dioxide.
  Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture

Specific hazards : Exposure to fire may cause containers to rupture/explode.
Hazardous combustion products : None that are more hazardous than the product itself.

5.3. Advice for firefighters

Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
If possible, stop flow of product.
Use water spray or fog to knock down fire fumes if possible.
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
Move containers away from the fire area if this can be done without risk.

Special protective equipment for fire fighters	:	Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. Standard EN 943-2: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Gas-tight chemical protective suits for emergency teams. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel	:	Act in accordance with local emergency plan. Try to stop release. Evacuate area. Ensure adequate air ventilation. Stay upwind. See section 8 of the SDS for more information on personal protective equipment
For emergency responders	:	Monitor concentration of released product. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. See section 5.3 of the SDS for more information.

6.2. Environmental precautions

Try to stop release.

6.3. Methods and material for containment and cleaning up

Ventilate area.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product	:	Do not breathe gas. Avoid release of product into atmosphere. The product must be handled in accordance with good industrial hygiene and safety procedures. Only experienced and properly instructed persons should handle gases under pressure. Consider pressure relief device(s) in gas installations. Ensure the complete gas system was (or is regularily) checked for leaks before use. Do not smoke while handling product. Avoid exposure, obtain special instructions before use. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Installation of a cross purge assembly between the container and the regulator is recommended. Avoid suck back of water, acid and alkalis. Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment. Purge air from system before introducing gas. Take precautionary measures against static discharge. Keep away from ignition sources (including static discharges). Consider the use of only non-sparking tools. Ensure equipment is adequately earthed.

Safe handling of the gas receptacle : Refer to supplier's container handling instructions.
Do not allow backfeed into the container.
Protect containers from physical damage; do not drag, roll, slide or drop.
When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
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.
If user experiences any difficulty operating valve discontinue use and contact supplier.
Never attempt to repair or modify container valves or safety relief devices.
Damaged valves should be reported immediately to the supplier.
Keep container valve outlets clean and free from contaminants particularly oil and water.
Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
Close container valve after each use and when empty, even if still connected to equipment.
Never attempt to transfer gases from one cylinder/container to another.
Never use direct flame or electrical heating devices to raise the pressure of a container.
Do not remove or deface labels provided by the supplier for the identification of the content of the container.
Suck back of water into the container must be prevented.
Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

Observe all regulations and local requirements regarding storage of containers.
Containers should not be stored in conditions likely to encourage corrosion.
Container valve guards or caps should be in place.
Containers should be stored in the vertical position and properly secured to prevent them from falling over.
Stored containers should be periodically checked for general condition and leakage.
Keep container below 50°C in a well ventilated place.
Store containers in location free from fire risk and away from sources of heat and ignition.
Keep away from combustible materials.
Segregate from oxidant gases and other oxidants in store.
All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Carbon monoxide (630-08-0)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Carbon monoxide
IOEL TWA	23 mg/m³
IOEL TWA [ppm]	20 ppm
IOEL STEL	117 mg/m³
IOEL STEL [ppm]	100 ppm
Remark	SCOEL Recommendations (1995)
Austria - Occupational Exposure Limits	
Local name	Kohlenstoffmonoxid

MAK (mg/m³)	33 mg/m³
MAK (OEL TWA) [ppm]	30 ppm
MAK (OEL STEL)	66 mg/m³
MAK (OEL STEL) [ppm]	60 ppm
Belgium - Occupational Exposure Limits	
Local name	Carbone (oxyde de) # Koolstofmonoxide
OEL TWA	29 mg/m³
OEL TWA [ppm]	25 ppm
Bulgaria - Occupational Exposure Limits	
Local name	Въглероден оксид
OEL TWA	40 mg/m³
OEL STEL	200 mg/m³
Croatia - Occupational Exposure Limits	
Local name	Ugljikov monksid
GVI (OEL TWA) [1]	35 mg/m³
GVI (OEL TWA) [2]	30 ppm
KGVI (OEL STEL)	232 mg/m³
KGVI (OEL STEL) [ppm]	200 ppm
Remark	F+, T BVG
Czech Republic - Occupational Exposure Limits	
Local name	Oxid uhelnatý
PEL (OEL TWA)	30 mg/m³
PEL (OEL TWA) [ppm]	26.2 ppm
NPK-P (OEL C)	150 mg/m³
NPK-P (OEL C) [ppm]	131 ppm
Denmark - Occupational Exposure Limits	
Local name	Carbonmonoxid (Kulilte; Kulmonoxid)
OEL TWA [1]	29 mg/m³
OEL TWA [2]	25 ppm
Estonia - Occupational Exposure Limits	
Local name	Süsinikmonooksiid heitgaasina
OEL TWA	4025 mg/m³
OEL TWA [ppm]	3520 ppm
OEL STEL	120 mg/m³
OEL STEL [ppm]	100 ppm

Finland - Occupational Exposure Limits	
Local name	Hiilimonoksidi
HTP (OEL TWA) [1]	35 mg/m³
HTP (OEL TWA) [2]	30 ppm
HTP (OEL STEL)	87 mg/m³
HTP (OEL STEL) [ppm]	75 ppm
France - Occupational Exposure Limits	
Local name	Oxyde de carbone
VME (OEL TWA)	55 mg/m³
VME (OEL TWA) [ppm]	50 ppm
Remark	Valeurs recommandées/admises; substance classée toxique pour la reproduction de catégorie 1a
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Kohlenstoffmonoxid
AGW (OEL TWA) [1]	35 mg/m³
AGW (OEL TWA) [2]	30 ppm
Remark	DFG,Z
Greece - Occupational Exposure Limits	
OEL TWA	55 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	330 mg/m³
OEL STEL [ppm]	300 ppm
Hungary - Occupational Exposure Limits	
Local name	SZÉN-MONOXID
AK (OEL TWA)	33 mg/m³
CK (OEL STEL)	66 mg/m³
Ireland - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA [1]	23 mg/m³
OEL TWA [2]	20 ppm
OEL STEL	115 mg/m³
OEL STEL [ppm]	100 ppm
Latvia - Occupational Exposure Limits	
Local name	Oglekļa(II)oksīds (oglekļamonoksīds)
OEL TWA	20 mg/m³

Netherlands - Occupational Exposure Limits	
Local name	Koolmonoxide
TGG-8u (OEL TWA)	29 mg/m³
Poland - Occupational Exposure Limits	
Local name	Tlenek węgla
NDS (OEL TWA)	23 mg/m³
NDSCh (OEL STEL)	117 mg/m³
Portugal - Occupational Exposure Limits	
Local name	Monóxido de carbono
OEL TWA [ppm]	25 ppm
Romania - Occupational Exposure Limits	
Local name	Oxid de carbon
OEL TWA	20 mg/m³
OEL TWA [ppm]	17.5 ppm
OEL STEL	30 mg/m³
OEL STEL [ppm]	26 ppm
Slovakia - Occupational Exposure Limits	
NPHV (OEL TWA) [1]	35 mg/m³
NPHV (OEL TWA) [2]	30 ppm
NPHV (OEL STEL)	35 mg/m³
Slovenia - Occupational Exposure Limits	
Local name	ogljikov monoksid
OEL TWA	35 mg/m³
OEL TWA [ppm]	30 ppm
OEL STEL	70 mg/m³
OEL STEL [ppm]	60 ppm
Spain - Occupational Exposure Limits	
Local name	Monóxido de carbono
VLA-ED (OEL TWA) [1]	29 mg/m³
VLA-ED (OEL TWA) [2]	25 ppm
Remark	TR1A (Cuando las pruebas utilizadas para la clasificación procedan principalmente de datos en humanos), VLB® (Agente químico que tiene Valor Límite Biológico específico en este documento).
Sweden - Occupational Exposure Limits	
Local name	Avgaser som kolmonoxid

NGV (OEL TWA)	25 mg/m³ 25 mg/m³ Avgaser 40 mg/m³ Se även Avgaser
NGV (OEL TWA) [ppm]	20 ppm 20 ppm Avgaser 35 ppm Se även Avgaser
KTV (OEL STEL)	120 mg/m³ Se även Avgaser
KTV (OEL STEL) [ppm]	100 ppm Se även Avgaser
United Kingdom - Occupational Exposure Limits	
Local name	Carbon monoxide
WEL TWA (OEL TWA) [1]	35 mg/m³
WEL TWA (OEL TWA) [2]	30 ppm
WEL STEL (OEL STEL)	232 mg/m³
WEL STEL (OEL STEL) [ppm]	200 ppm
Remark	BMGV (Biological monitoring guidance values are listed in Table 2)
Iceland - Occupational Exposure Limits	
Local name	Kolmónoxíð (kolsýrlingur)
OEL TWA	29 mg/m³
OEL TWA [ppm]	25 ppm
Norway - Occupational Exposure Limits	
Local name	Karbonmonoksid
Grenseverdi (OEL TWA) [1]	29 mg/m³
Grenseverdi (OEL TWA) [2]	25 ppm
Switzerland - Occupational Exposure Limits	
Local name	Kohlenmonoxid
MAK (OEL TWA) [1]	35 mg/m³ 35 mg/m³
MAK (OEL TWA) [2]	30 ppm 30 ppm
KZGW (OEL STEL)	70 mg/m³ 70 mg/m³
KZGW (OEL STEL) [ppm]	60 ppm 60 ppm
Remark	O^{L} B SS_{B} - $COHb^{KT\ HU}$ - NIOSH
USA - ACGIH - Occupational Exposure Limits	
Local name	Carbon monoxide
ACGIH OEL TWA [ppm]	25 ppm

Carbon monoxide (630-08-0)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Carbon monoxide
IOEL TWA	23 mg/m³
IOEL TWA [ppm]	20 ppm
IOEL STEL	117 mg/m³
IOEL STEL [ppm]	100 ppm
Remark	SCOEL Recommendations (1995)
Austria - Occupational Exposure Limits	
Local name	Kohlenstoffmonoxid
MAK (mg/m³)	33 mg/m³
MAK (OEL TWA) [ppm]	30 ppm
MAK (OEL STEL)	66 mg/m³
MAK (OEL STEL) [ppm]	60 ppm
Belgium - Occupational Exposure Limits	
Local name	Carbone (oxyde de) # Koolstofmonoxide
OEL TWA	29 mg/m³
OEL TWA [ppm]	25 ppm
Bulgaria - Occupational Exposure Limits	
Local name	Въглероден оксид
OEL TWA	40 mg/m³
OEL STEL	200 mg/m³
Croatia - Occupational Exposure Limits	
Local name	Ugljikov monksid
GVI (OEL TWA) [1]	35 mg/m³
GVI (OEL TWA) [2]	30 ppm
KGVI (OEL STEL)	232 mg/m³
KGVI (OEL STEL) [ppm]	200 ppm
Remark	F+, T BVG
Czech Republic - Occupational Exposure Limits	
Local name	Oxid uhelnatý
PEL (OEL TWA)	30 mg/m³
PEL (OEL TWA) [ppm]	26.2 ppm
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Local name	Carbonmonoxid (Kulilte; Kulmonoxid)
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Estonia - Occupational Exposure Limits	
Local name	Süsinikmonooksiid heitgaasina
OEL TWA	4025 mg/m³
OEL TWA [ppm]	3520 ppm
OEL STEL	120 mg/m³
OEL STEL [ppm]	100 ppm
Finland - Occupational Exposure Limits	
Local name	Hiilimonoksidi
HTP (OEL TWA) [1]	35 mg/m³
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HTP (OEL STEL)	87 mg/m³
HTP (OEL STEL) [ppm]	75 ppm
France - Occupational Exposure Limits	
Local name	Oxyde de carbone
VME (OEL TWA)	55 mg/m³
VME (OEL TWA) [ppm]	50 ppm
Remark	Valeurs recommandées/admises; substance classée toxique pour la reproduction de catégorie 1a
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Kohlenstoffmonoxid
AGW (OEL TWA) [1]	35 mg/m³
AGW (OEL TWA) [2]	30 ppm
Remark	DFG,Z
Greece - Occupational Exposure Limits	
OEL TWA	55 mg/m³
OEL TWA [ppm]	50 ppm
OEL STEL	330 mg/m³
OEL STEL [ppm]	300 ppm
Hungary - Occupational Exposure Limits	
Local name	SZÉN-MONOXID
AK (OEL TWA)	33 mg/m³
CK (OEL STEL)	66 mg/m³

Ireland - Occupational Exposure Limits	
Local name	Carbon monoxide
OEL TWA [1]	23 mg/m³
OEL TWA [2]	20 ppm
OEL STEL	115 mg/m³
OEL STEL [ppm]	100 ppm
Latvia - Occupational Exposure Limits	
Local name	Oglekļa(II)oksīds (oglekļamonoksīds)
OEL TWA	20 mg/m³
Netherlands - Occupational Exposure Limits	
Local name	Koolmonoxide
TGG-8u (OEL TWA)	29 mg/m³
Poland - Occupational Exposure Limits	
Local name	Tlenek węgla
NDS (OEL TWA)	23 mg/m³
NDSCh (OEL STEL)	117 mg/m³
Portugal - Occupational Exposure Limits	
Local name	Monóxido de carbono
OEL TWA [ppm]	25 ppm
Romania - Occupational Exposure Limits	
Local name	Oxid de carbon
OEL TWA	20 mg/m³
OEL TWA [ppm]	17.5 ppm
OEL STEL	30 mg/m³
OEL STEL [ppm]	26 ppm
Slovakia - Occupational Exposure Limits	
NPHV (OEL TWA) [1]	35 mg/m³
NPHV (OEL TWA) [2]	30 ppm
NPHV (OEL STEL)	35 mg/m³
Slovenia - Occupational Exposure Limits	
Local name	ogljikov monoksid
OEL TWA	35 mg/m³
OEL TWA [ppm]	30 ppm
OEL STEL	70 mg/m³
OEL STEL [ppm]	60 ppm

Spain - Occupational Exposure Limits	
Local name	Monóxido de carbono
VLA-ED (OEL TWA) [1]	29 mg/m³
VLA-ED (OEL TWA) [2]	25 ppm
Remark	TR1A (Cuando las pruebas utilizadas para la clasificación procedan principalmente de datos en humanos), VLB® (Agente químico que tiene Valor Límite Biológico específico en este documento).
Sweden - Occupational Exposure Limits	
Local name	Avgaser som kolmonoxid
NGV (OEL TWA)	25 mg/m³ 25 mg/m³ Avgaser 40 mg/m³ Se även Avgaser
NGV (OEL TWA) [ppm]	20 ppm 20 ppm Avgaser 35 ppm Se även Avgaser
KTV (OEL STEL)	120 mg/m³ Se även Avgaser
KTV (OEL STEL) [ppm]	100 ppm Se även Avgaser
United Kingdom - Occupational Exposure Limits	
Local name	Carbon monoxide
WEL TWA (OEL TWA) [1]	35 mg/m³
WEL TWA (OEL TWA) [2]	30 ppm
WEL STEL (OEL STEL)	232 mg/m³
WEL STEL (OEL STEL) [ppm]	200 ppm
Remark	BMGV (Biological monitoring guidance values are listed in Table 2)
Iceland - Occupational Exposure Limits	
Local name	Kolmónoxíð (kolsýrlingur)
OEL TWA	29 mg/m³
OEL TWA [ppm]	25 ppm
Norway - Occupational Exposure Limits	
Local name	Karbonmonoksid
Grenseverdi (OEL TWA) [1]	29 mg/m³
Grenseverdi (OEL TWA) [2]	25 ppm
Switzerland - Occupational Exposure Limits	
Local name	Kohlenmonoxid
MAK (OEL TWA) [1]	35 mg/m³ 35 mg/m³
MAK (OEL TWA) [2]	30 ppm 30 ppm

KZGW (OEL STEL)	70 mg/m³ 70 mg/m³
KZGW (OEL STEL) [ppm]	60 ppm 60 ppm
Remark	O^{L} B SS_{B} - $COHb^{KT\ HU}$ - NIOSH
USA - ACGIH - Occupational Exposure Limits	
Local name	Carbon monoxide
ACGIH OEL TWA [ppm]	25 ppm

Carbon monoxide (630-08-0)	
DNEL: Derived no effect level (Workers)	
Acute - local effects, inhalation	100 ppm
Acute - systemic effects, inhalation	100 ppm
Long-term - local effects, inhalation	20 ppm
Long-term - systemic effects, inhalation	20 ppm

Carbon monoxide (630-08-0)	
DNEL: Derived no effect level (Workers)	
Acute - local effects, inhalation	100 ppm
Acute - systemic effects, inhalation	100 ppm
Long-term - local effects, inhalation	20 ppm
Long-term - systemic effects, inhalation	20 ppm

PNEC (Predicted No-Effect Concentration) : None established.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Product to be handled in a closed system and under strictly controlled conditions.
Provide adequate general and local exhaust ventilation.
Preferably use permanent leak-tight installations (e.g. welded pipes).
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
Gas detectors should be used when toxic gases may be released.
Consider the use of a work permit system e.g. for maintenance activities.

8.2.2. Individual protection measures, e.g. personal protective equipment

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:
PPE compliant to the recommended EN/ISO standards should be selected.

• Eye/face protection : Wear safety glasses with side shields.
Standard EN 166 - Personal eye-protection - specifications.

• Skin protection
- Hand protection : Wear working gloves when handling gas containers.
Standard EN 388 - Protective gloves against mechanical risk, performance level 1 or higher.

- Other	:	Consider the use of flame resistant anti-static safety clothing. Standard EN ISO 14116 - Limited flame spread materials. Standard EN 1149-5 - Protective clothing: Electrostatic properties. Wear safety shoes while handling containers. Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
• Respiratory protection	:	Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Consult respiratory device supplier´s product information for the selection of the appropriate device. Never use any kind of filtering respiratory protection equipment when working with this substance due to it having poor or no warning properties. Keep self contained breathing apparatus readily available for emergency use. Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.
• Thermal hazards	:	None in addition to the above sections.

8.2.3. Environmental exposure controls

Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance		
- Physical state at 20°C / 101.3kPa	:	Gas
- Colour	:	Colourless.
Odour	:	Odourless. Odour threshold is subjective and inadequate to warn of overexposure.
pH	:	Not applicable for gases and gas mixtures.
Melting point / Freezing point	:	-205 °C -205 °C
Boiling point	:	-192 °C
Flash point	:	Not applicable for gases and gas mixtures.
Flammability	:	Extremely flammable gas
Explosive limits	:	10.9 – 76 vol %
Lower explosion limit	:	Not available
Upper explosion limit	:	Not available
Vapour pressure [20°C]	:	Not applicable.
Vapour pressure [50°C]	:	Not applicable.
Density	:	Not applicable
Vapour density	:	Not applicable for gases and gas mixtures.
Relative density, liquid (water=1)	:	0.79
Relative density, gas (air=1)	:	1
Water solubility	:	30 mg/l
Partition coefficient n-octanol/water (Log Kow)	:	1.78
Auto-ignition temperature	:	605 °C
Decomposition temperature	:	Not applicable.
Viscosity, kinematic	:	No reliable data available.
Particle characteristics	:	Not applicable for gases and gas mixtures.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosive properties	:	Not applicable.
Oxidising properties	:	Not applicable.
Tci	:	15.2 %
Critical temperature [°C]	:	-140 °C

9.2.2. Other safety characteristics

Molar mass	:	28 g/mol
Evaporation rate	:	Not applicable for gases and gas mixtures.
Gas group	:	Compressed gas

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

None.

Reactivity : This mixture contains components with the following reactivity : Can form explosive mixture with air. May react violently with oxidants.

10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).
Avoid moisture in installation systems.

10.5. Incompatible materials

For additional information on compatibility refer to ISO 11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity : Toxic if inhaled.

LC50 Inhalation - Rat [ppm]	3760 ppm/1h 1300 ppm/4h

Carbon monoxide (630-08-0)	
LC50 Inhalation - Rat [ppm]	3760 ppm/1h 1300 ppm/4h

Skin corrosion/irritation : No known effects from this product.

Serious eye damage/irritation : No known effects from this product.

Respiratory or skin sensitisation : No known effects from this product.

Germ cell mutagenicity : No known effects from this product.

Carcinogenicity : No known effects from this product.

Toxic for reproduction : Fertility : No known effects from this product.

Toxic for reproduction : unborn child : May damage the unborn child.

STOT-single exposure : Suppresses the oxygen uptake by red blood cells.

Target organ(s) : Blood.

STOT-repeated exposure : Causes damage to organs through prolonged or repeated exposure.

Target organ(s) : heart.

Aspiration hazard : Not applicable for gases and gas mixtures.

11.2. Information on other hazards

Other information : The substance/mixture has no endocrine disrupting properties.

SECTION 12: Ecological information

12.1. Toxicity

Assessment : No ecological damage caused by this product.

EC50 48h - Daphnia magna [mg/l] : Study scientifically unjustified.
EC50 72h - Algae [mg/l] : Study scientifically unjustified.
LC50 96 h - Fish [mg/l] : Study scientifically unjustified.

Carbon monoxide (630-08-0)	
EC50 48h - Daphnia magna [mg/l]	Study scientifically unjustified.
EC50 72h - Algae [mg/l]	Study scientifically unjustified.
LC50 96 h - Fish [mg/l]	Study scientifically unjustified.

12.2. Persistence and degradability

Assessment : Will not undergo hydrolysis.
Not readily biodegradable.

12.3. Bioaccumulative potential

Assessment : Not expected to bioaccumulate due to the low log Kow (log Kow < 4).
See section 9.

12.4. Mobility in soil

Assessment : Because of its high volatility, the product is unlikely to cause ground or water pollution.
Partition into soil is unlikely.

12.5. Results of PBT and vPvB assessment

Assessment : Not classified as PBT or vPvB.

12.6. Endocrine disrupting properties

The substance/mixture has no endocrine disrupting properties.

12.7. Other adverse effects

Other adverse effects : No known effects from this product.
Effect on the ozone layer : None.
Effect on global warming : Contains greenhouse gas(es).

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contact supplier if guidance is required.
Do not discharge into areas where there is a risk of forming an explosive mixture with air.
Waste gas should be flared through a suitable burner with flash back arrestor.
Must not be discharged to atmosphere.
Ensure that the emission levels from local regulations or operating permits are not exceeded.
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.
Return unused product in original container to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended) : 16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.

13.2. Additional information

External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

14.1. UN number or ID number

In accordance with ADR / RID / IMDG / IATA / ADN
UN-No. : 1016

14.2. UN proper shipping name

Transport by road/rail (ADR/RID) : CARBON MONOXIDE, COMPRESSED
Transport by air (ICAO-TI / IATA-DGR) : Carbon monoxide, compressed
Transport by sea (IMDG) : CARBON MONOXIDE, COMPRESSED

14.3. Transport hazard class(es)

Labelling :

2.3 : Toxic gases.
2.1 : Flammable gases.

Transport by road/rail (ADR/RID)

Class : 2
Classification code : 1TF
Hazard identification number : 263
Tunnel Restriction : B/D - Tank carriage : Passage forbidden through tunnels of category B, C, D and E. Other carriage : Passage forbidden through tunnels of category D and E

Transport by sea (IMDG)

Class / Div. (Sub. risk(s)) : 2.3 (2.1)
Emergency Schedule (EmS) - Fire : F-D
Emergency Schedule (EmS) - Spillage : S-U

14.4. Packing group

Transport by road/rail (ADR/RID) : Not established.
Transport by air (ICAO-TI / IATA-DGR) : Not established.
Transport by sea (IMDG) : Not established.

14.5. Environmental hazards

Transport by road/rail (ADR/RID) : None.
Transport by air (ICAO-TI / IATA-DGR) : None.
Transport by sea (IMDG) : None.

14.6. Special precautions for user

Packing Instruction(s)

Transport by road/rail (ADR/RID) : P200
Transport by air (ICAO-TI / IATA-DGR)
Passenger and Cargo Aircraft : Forbidden.
Cargo Aircraft only : Forbidden.
Transport by sea (IMDG) : P200

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 containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure 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.

14.7. Maritime transport in bulk according to IMO instruments

Not applicable.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU-Regulations

Restrictions on use : Restricted to professional users (Annex XVII REACH).
National legislation : Ensure all national/local regulations are observed.
Seveso Directive : 2012/18/EU (Seveso III) : Covered.

National regulations

Ensure all national/local regulations are observed.

France	
Occupational diseases	
Code	**Description**
RG 64	Professional poisoning by carbon monoxide
RG 66	Occupational rhinitis and asthma

Germany

Water hazard class (WGK) : WGK 1, Slightly hazardous to water (Classification according to AwSV)
National Rules and Recommendations : [German regulations] BetriebssicherheitsV mit TRBSen insbesondere TRBS 3145 / TRGS 725 Ortsbewegliche Druckgasbehälter", TRBS 2141, BGRegel 500 Teil 2.33: "Umgang mit Gasen", GefahrstoffV mit Technischen Regeln Gefährliche Stoffe TRGS insbesondere TRGS 407 "Tätigkeiten mit Gasen - Gefährdungsbeurteilung", TRGS 400, 500, 510, 900." BGR 104, TRBS 2152.

Netherlands

SZW-lijst van kankerverwekkende stoffen : The substance is not listed
SZW-lijst van mutagene stoffen : The substance is not listed
SZW-lijst van reprotoxische stoffen – Borstvoeding : The substance is not listed
SZW-lijst van reprotoxische stoffen – Vruchtbaarheid : The substance is not listed
SZW-lijst van reprotoxische stoffen – Ontwikkeling : The substance is not listed

Denmark

Danish National Regulations : Young people below the age of 18 years are not allowed to use the product
Pregnant/breastfeeding women working with the product must not be in direct contact with the product

Switzerland

Storage class (LK) : LK 2 - Liquefied or pressurized gases

15.2. Chemical safety assessment

A CSA has been carried out.

SECTION 16: Other information

Indication of changes : Safety data sheet in accordance with commission regulation (EU) No 2020/878.

Abbreviations and acronyms : ATE - Acute Toxicity Estimate
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
EINECS - European Inventory of Existing Commercial Chemical Substances
CAS# - Chemical Abstract Service number
PPE - Personal Protection Equipment
LC50 - Lethal Concentration to 50 % of a test population
RMM - Risk Management Measures
PBT - Persistent, Bioaccumulative and Toxic
vPvB - Very Persistent and Very Bioaccumulative
STOT- SE : Specific Target Organ Toxicity - Single Exposure
CSA - Chemical Safety Assessment
EN - European Standard
UN - United Nations
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road
IATA - International Air Transport Association
IMDG code - International Maritime Dangerous Goods
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail
WGK - Water Hazard Class
STOT - RE : Specific Target Organ Toxicity - Repeated Exposure
UFI : Unique Formula Identifier

Training advice : Ensure operators understand the flammability hazard.
Users of breathing apparatus must be trained.
Ensure operators understand the toxicity hazard.

Further information : Classification in accordance with the procedures and calculation methods of Regulation (EC) 1272/2008 (CLP).
Key literature references and sources of data are maintained in EIGA doc 169 : 'Classification and Labelling Guide', downloadable at http://www.Eiga.eu .

Full text of H- and EUH-statements	
Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Flam. Gas 1A	Flammable gases, Category 1A
H220	Extremely flammable gas.
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.
Press. Gas (Comp.)	Gases under pressure : Compressed gas
Repr. 1A	Reproductive toxicity, Category 1A
STOT RE 1	Specific target organ toxicity – Repeated exposure, Category 1

DISCLAIMER OF LIABILITY : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
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.

Annex to the safety data sheet

This Annex documents the Exposure Scenarios (ESs) related to the identified uses of the registered substance. The ESs detail protective measures for workers and the environment in addition to those described in sections 7, 8, 11, 12 and 13 of the SDS that are required to ensure that the potential exposure to workers and the environment remains within acceptable levels for each of the identified uses.

Table of contents of the Annex

1. EIGA019-1: Industrial uses, closed contained conditions

1.1. Title section

	Industrial uses, closed contained conditions	
	ES Ref.: EIGA019-1 Revision date: 9/1/2016	

Processes, tasks, activities covered	Industrial uses, including product transfers and associated laboratory activities within different closed or contained systems

Environment	Use descriptors
CS1	ERC2, ERC6a, ERC6b, ERC8d

Worker	Use descriptors
CS2	PROC1
CS3	PROC2, PROC3, PROC4
CS4	PROC8b, PROC9

Assessment method	ECETOC TRA 2.0

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: ERC2, ERC6a, ERC6b, ERC8d

ERC2	Formulation into mixture
ERC6a	Use of intermediate
ERC6b	Use of reactive processing aid at industrial site (no inclusion into or onto article)
ERC8d	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)

Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %

Amount used, frequency and duration of use (or from service life)	
The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release	
Covers frequency up to:	5 days/week
Emission Days (days/year)	220

Technical and organisational conditions and measures	
Wastewater emission controls are not applicable as there is no direct release to wastewater	
Soil emission controls are not applicable as there is no direct release to soil	
Ensure operatives are trained to minimise releases	

Conditions and measures related to sewage treatment plant	
Not applicable as there is no release to wastewater	

Conditions and measures related to treatment of waste (including article waste)	
External treatment and disposal of waste should comply with applicable local and/or national regulations	
See section 13 of the SDS	

Other conditions affecting environmental exposure	
No additional information	

1.2.2. Control of worker exposure: PROC1

PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and level of containment/automation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential.	
Exposure duration	≤ 8 h/day
Covers frequency up to:	5 days/week

Technical and organisational conditions and measures	
Handle product within a closed system	
Ensure operatives are trained to minimise exposure	
Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed	

Conditions and measures related to personal protection, hygiene and health evaluation	
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.	
See section 8 of the SDS.	

Other conditions affecting workers exposure	
Indoor or outdoor use	

1.2.3. Control of worker exposure: PROC2, PROC3, PROC4

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises

Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and level of containment/automation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential.	
Exposure duration	≤ 8 h/day
Covers frequency up to:	5 days/week

Technical and organisational conditions and measures	
Handle product within a closed system	
Ensure operatives are trained to minimise exposure	
Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed	

Conditions and measures related to personal protection, hygiene and health evaluation	
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.	
See section 8 of the SDS.	

Other conditions affecting workers exposure	
Indoor or outdoor use	

1.2.4. Control of worker exposure: PROC8b, PROC9

PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Product (article) characteristics	
Physical form of product	See section 9 of the SDS, No additional information
Concentration of substance in product	≤ 100 %

Amount used (or contained in articles), frequency and duration of use/exposure	
The actual tonnage handled per shift is not considered to influence the exposure as such for this scenario. Instead, the combination of the scale of operation and level of containment/automation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential.	
Exposure duration	≤ 8 h/day
Covers frequency up to:	5 days/week

Technical and organisational conditions and measures	
Handle product within a closed system	
Ensure operatives are trained to minimise exposure	
Ensure supervision is in place to check that the RMMs are in place and are being used correctly and that the OCs are being followed	

Conditions and measures related to personal protection, hygiene and health evaluation	
Self contained breathing apparatus is recommended, where unknown exposure may be expected, e.g. during maintenance activities on installation systems.	

Other conditions affecting workers exposure	
Indoor or outdoor use	

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: ERC2, ERC6a, ERC6b, ERC8d

The exposure of aquatic, terrestrial, sediment and sewage treatment microorganisms is considered to be negligible because the substance partitions primarily to air when released to the environment. ,The resulting environmental exposure is not expected to add significantly to already present background levels of the gas in the environment

1.3.2. Worker exposure: PROC1

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	0.011 mg/m³	Indoor use , With LEV	< 0.01

Inhalation - Acute - systemic effects	0.023 mg/m³	Indoor use , With LEV	< 0.001

1.3.3. Worker exposure: PROC2, PROC3, PROC4

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	11.7 mg/m³	Indoor use , With LEV	0.585
	11.7 mg/m³	Indoor use , Without LEV	0.585
Inhalation - Acute - systemic effects	23.4 mg/m³	Indoor use , With LEV	0.234
	23.4 mg/m³	Indoor use , Without LEV	0.234

1.3.4. Worker exposure: PROC8b, PROC9

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	23.3 mg/m³	Indoor use , With LEV	1.165
	23.3 mg/m³	Indoor use , Without LEV	1.165
Inhalation - Acute - systemic effects	46.7 mg/m³	Indoor use , With LEV	0.467
	46.7 mg/m³	Indoor use , Without LEV	0.467

1.4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

1.4.1. Environment

Guidance - Environment	Check that RMMs and OCs are as described above or of equivalent efficiency

1.4.2. Health

Guidance - Health	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. For scaling see : http://www.ecetoc.org/tra

End of document