

# Safety Data Sheet

## carbon monoxide

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878  
Reference number: D-CO-019  
Issue date: 4/1/2015 Revision date: 8/9/2023 Supersedes version of: 8/2/2023 Version: 4.7

### Danger



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

### 1.1. Product identifier

Trade name : carbon monoxide  
SDS no : D-CO-019  
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 : See the list of identified uses and exposure scenarios in the annex of the safety data sheet.  
Perform risk assessment prior to use.  
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

Messer Industriegase GmbH  
Messer- Platz 1  
D - 65812 Bad Soden am Taunus  
Germany  
T +49 (0) 6196 7760-200 - F +49 (0) 6196 7760-280  
[SDB.de@messergroup.com](mailto:SDB.de@messergroup.com) - [www.messer.de](http://www.messer.de)

### 1.4. Emergency telephone number

Emergency telephone number : Messer Produktionsgesellschaft mbH Salzgitter, +49 (0) 5341 21-9333, erreichbar Montags 0:00 bis Sonntags 24:00

## 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 1B	H221
	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

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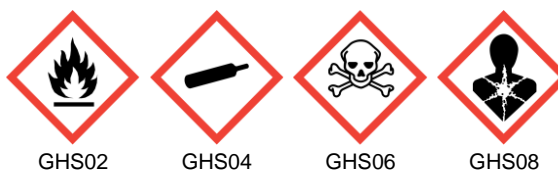
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### 2.2. Label elements

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

Hazard pictograms (CLP) :



Signal word (CLP) :

Danger

Hazard statements (CLP) :

H221 - 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

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

- Response

: P304+P340+P315 - IF INHALED : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice / attention.  
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.  
P381 - In case of leakage, eliminate all ignition sources.

- Storage

: P405 - Store locked up.  
P403 - Store in a well-ventilated place.

Supplemental information :

Restricted to professional users.

### 2.3. Other hazards

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	%	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 1B, H221 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.

Not applicable

### 3.2. Mixtures

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

- Inhalation

: Provide oxygen.  
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.

- 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.  
Carbon dioxide.  
Shutting off the source of the gas is the preferred method of control.  
Be aware of the risk of formation of static electricity with the use of CO2 extinguishers. Do not use them in places where a flammable atmosphere may be present.
- Unsuitable extinguishing media : 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.  
Eliminate ignition sources.  
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.  
Consider the risk of potentially explosive atmospheres.  
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

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

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.

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### 7.2. Conditions for safe storage, including any incompatibilities

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.  
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.

### 7.3. Specific end use(s)

None.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

carbon monoxide (630-08-0)	
<b>Germany - Occupational Exposure Limits (TRGS 900)</b>	
Local name	Kohlenstoffmonoxid
AGW (OEL TWA) [1]	35 mg/m <sup>3</sup>
AGW (OEL TWA) [2]	30 ppm
Peak exposure limitation factor	2(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); Z - Ein Risiko der Fruchtschädigung kann auch bei Einhaltung des AGW und des BGW nicht ausgeschlossen werden; EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich)
Regulatory reference	TRGS900
<b>Germany - Biological limit values (TRGS 903)</b>	
Local name	Kohlenstoffmonoxid (Kohlenmonoxid)
Biological limit value	5 % Parameter: CO-Hb - Untersuchungsmaterial: B = Vollblut - Probenahmezeitpunkt: b) Expositionsende, bzw. Schichtende - Festlegung/Begründung: 05/2013 DFG
Remark	Ableitung des BGW als Höchstwert wegen akut toxischer Effekte. Gesonderte Bewertung für Raucher
Regulatory reference	TRGS 903

carbon monoxide (630-08-0)	
DNEL: Derived no effect level (Workers)	
Acute - local effects, inhalation	117 ppm
Acute - systemic effects, inhalation	117 mg/m <sup>3</sup>
Long-term - local effects, inhalation	23 ppm
Long-term - systemic effects, inhalation	23 mg/m <sup>3</sup>

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 risks, 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 : Never use any kind of filtering respiratory protection equipment when working with this substance due to it having poor or no warning properties.  
Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres.  
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.  
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.
- 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.
Melting point / Freezing point	: -205 °C
Boiling point	: -191.5 °C
Flammability	: Flammable gas.
Lower explosion limit	: 10.9 vol %
Upper explosion limit	: 76 vol %
Flash point	: Not applicable for gases and gas mixtures.
Auto-ignition temperature	: 620 °C
Decomposition temperature	: Not applicable.
pH	: Not applicable for gases and gas mixtures.

Viscosity, kinematic	: No reliable data available.
Water solubility [20°C]	: 30 mg/l
Partition coefficient n-octanol/water (Log Kow)	: 1.78
Vapour pressure [20°C]	: Not applicable.
Vapour pressure [50°C]	: Not applicable.
Density and/or relative density	: Not applicable for gases and gas mixtures.
Relative vapour density (air=1)	: 1
Particle characteristics	: Not applicable for gases and gas mixtures. Nanofoms are not relevant for gases and gas mixtures.

### 9.2. Other information

#### 9.2.1. Information with regard to physical hazard classes

Oxidising properties	: No oxidising properties.
Critical temperature [°C]	: -140 °C

#### 9.2.2. Other safety characteristics

Molar mass	: 28 g/mol
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## 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

Can form explosive mixture with air.  
May react violently with oxidants.

### 10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking.  
Avoid moisture in installation systems.

### 10.5. Incompatible materials

Air, Oxidisers.  
For additional information on compatibility refer to ISO 11114.  
See also 'EIGA Doc.95: Avoidance of Failure of CO and of CO/CO2 Mixtures Cylinders' at [www.eiga.eu](http://www.eiga.eu).

### 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.

LD50 oral rat	≤
LC50 Inhalation - Rat [ppm]	3760 ppm/1h (ADR) 1300 ppm/4h (CLP)

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.

<b>Toxic for reproduction : Fertility</b>	: No known effects from this product.
<b>Toxic for reproduction : unborn child</b>	: May damage the unborn child.
<b>STOT-single exposure</b>	: Suppresses the oxygen uptake by red blood cells.
<b>Target organ(s)</b>	: Blood.
<b>STOT-repeated exposure</b>	: Causes damage to organs through prolonged or repeated exposure.
<b>Target organ(s)</b>	: heart.
<b>Aspiration hazard</b>	: Not applicable for gases and gas mixtures.

### 11.2. Information on other hazards

Other information	: The substance/mixture has no endocrine disrupting properties.
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## SECTION 12: Ecological information

### 12.1. Toxicity

Assessment	: No ecological damage caused by this product.
EC50 48h - Daphnia magna [mg/l]	: No data available.
EC50 72h - Algae [mg/l]	: No data available.
LC50 96 h - Fish [mg/l]	: No data available.

### 12.2. Persistence and degradability

Assessment	: Will not undergo hydrolysis. Not readily biodegradable.
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### 12.3. Bioaccumulative potential

No additional information available

### 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.
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### 12.5. Results of PBT and vPvB assessment

Assessment	: Not classified as PBT or vPvB.
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### 12.6. Endocrine disrupting properties

Assessment	: The substance/mixture has no endocrine disrupting properties.
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### 12.7. Other adverse effects

Other adverse effects	: No known effects from this product.
Effect on the ozone layer	: No effect on the ozone layer.
Effect on global warming	: No known effects from this product.

## 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.  
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.eu> for more guidance on suitable disposal methods.  
Must not be discharged to atmosphere.  
Return unused product in original container to supplier.  
16 05 04 \*: Gases in pressure containers (including halons) containing hazardous substances.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended)



### 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 applicable.

Transport by air (ICAO-TI / IATA-DGR) : Not applicable.

Transport by sea (IMDG) : Not applicable.

### 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).  
Other information, restriction and prohibition regulations : Not listed on the PIC list (Regulation EU 649/2012).  
Not listed on the POP list (Regulation EU 2019/1021).  
Seveso Directive : 2012/18/EU (Seveso III) : Covered.

#### National regulations

- Water hazard class (WGK) : 1 - Slightly hazardous to water.  
Kenn-Nr. : 257  
Regulatory reference : Ensure all national/local regulations are observed.  
Gesetz zum Schutz der arbeitenden Jugend (Jugendarbeitsschutzgesetz-JArbSchG)  
Betriebssicherheitsverordnung-BetrSichV  
TRBS 3145/TRGS 745 - Ortsbewegliche Druckgasbehälter – Füllen, Bereithalten, innerbetriebliche Beförderung, Entleeren  
TRGS 510 - Lagerung von Gefahrstoffen in ortsbeweglichen Behältern  
TRGS 407 - Tätigkeiten mit Gasen – Gefährdungsbeurteilung  
TRBS 2141 - Gefährdungen durch Dampf und Druck - Allgemeine Anforderungen.  
Gesetz zum Schutz von Müttern bei der Arbeit, in der Ausbildung und im Studium (Mutterschutzgesetz – MuSchG)  
Verordnung über Verbote und Beschränkungen des Inverkehrbringens gefährlicher Stoffe, Zubereitungen und Erzeugnisse nach dem Chemikaliengesetz (Chemikalien-Verbotsverordnung-ChemVerbotsV) .  
TRGS 725 - Gefährliche explosionsfähige Atmosphäre -Mess-, Steuer- und Regeleinrichtungen im Rahmen von Explosionsschutzmaßnahmen.  
Zwölfte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (12. BImSchV-Störfall-Verordnung).  
Vierte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über genehmigungsbedürftige Anlagen - 4. BImSchV) Anhang 2 Stoffliste zu Nr. 9.3 des Anhangs 1.  
TA Luft.  
Classification for storage according to TRGS 510: 2A Gase (ohne Aerosolpackungen und Feuerzeuge).

### 15.2. Chemical safety assessment

A CSA has been carried out.

## SECTION 16: Other information

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

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## carbon monoxide

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2020/878  
Reference number: D-CO-019

### 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 1B	Flammable gases, Category 1B
H221	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

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Intermediate (transported, on-site isolated)	EIGA019-1	Industrial uses, closed contained conditions	13
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# Exposure scenario

carbon monoxide

Annex to the safety data sheet

Reference number: D-CO-019

CAS-No.: 630-08-0 Product form: Substance Physical state: Gas

## 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
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Environment	Use descriptors
CS1	ERC2, ERC6a, ERC6b, ERC8d

Worker	Use descriptors
CS2	PROC1
CS3	PROC2
CS4	PROC3, PROC4
CS5	PROC8b
CS6	PROC9

Assessment method	ECETOC TRA 2.0
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### 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

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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
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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	
Apply a good standard of general or controlled ventilation when maintenance activities are carried out.	
See sections 2 and 7 of the SDS.	
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	

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## 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

PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
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## Product (article) characteristics

Physical form of product See section 9 of the SDS, No additional information

Concentration of substance in product  $\leq 100 \%$

## 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  $\leq 8$  h/day

Covers frequency up to: 5 days/week

## Technical and organisational conditions and measures

Handle product within a closed system

During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points where emissions could occur. Outdoor, LEV is not generally required.

Ensure samples are obtained under containment or extract ventilation.

Drain down and flush system prior to equipment break-in or maintenance.

Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

See sections 2 and 7 of the SDS.

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.

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See section 8 of the SDS.

### Other conditions affecting workers exposure

Indoor or outdoor use

#### 1.2.4. Control of worker exposure: PROC3, PROC4

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	
During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points where emissions could occur. Outdoor, LEV is not generally required.	
Ensure samples are obtained under containment or extract ventilation.	
Drain down and flush system prior to equipment break-in or maintenance.	
Apply a good standard of general or controlled ventilation when maintenance activities are carried out.	
See sections 2 and 7 of the SDS.	
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.	



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### Other conditions affecting workers exposure

Indoor or outdoor use

### 1.2.5. Control of worker exposure: PROC8b

PROC8b

Transfer of substance or mixture (charging and discharging) at dedicated facilities

### 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

During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points where emissions could occur. Outdoor, LEV is not generally required.

Fill containers at dedicated fill points supplied with local extract ventilation.

Ensure samples are obtained under containment or extract ventilation.

Drain down and flush system prior to equipment break-in or maintenance.

Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

See sections 2 and 7 of the SDS.

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

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### 1.2.6. Control of worker exposure: PROC9

PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
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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	
During indoor processes or in cases where natural ventilation is not sufficient, LEV should be in place at points where emissions could occur. Outdoor, LEV is not generally required.	
Fill containers at dedicated fill points supplied with local extract ventilation.	
Ensure samples are obtained under containment or extract ventilation.	
Drain down and flush system prior to equipment break-in or maintenance.	
Apply a good standard of general or controlled ventilation when maintenance activities are carried out.	
See sections 2 and 7 of the SDS.	
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	

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### 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/m <sup>3</sup>	Indoor use, Without LEV	< 0.001
Inhalation - Acute - systemic effects	0.023 mg/m <sup>3</sup>	Indoor use, Without LEV	≤ 0.001

#### 1.3.3. Worker exposure: PROC2

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	5.84 mg/m <sup>3</sup>	Indoor use, With LEV	0.254
Inhalation - Acute - systemic effects	11.7 mg/m <sup>3</sup>	Indoor use, With LEV	0.1

#### 1.3.4. Worker exposure: PROC3, PROC4

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	11.7 mg/m <sup>3</sup>	Indoor use, With LEV	0.509
Inhalation - Acute - systemic effects	23.4 mg/m <sup>3</sup>	Indoor use, With LEV	0.2

#### 1.3.5. Worker exposure: PROC8b

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	17.5 mg/m <sup>3</sup>	Indoor use, With LEV	0.761
Inhalation - Acute - systemic effects	35 mg/m <sup>3</sup>	Indoor use, With LEV	0.299

#### 1.3.6. Worker exposure: PROC9

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	0.025 mg/m <sup>3</sup>	Measured value	0.001
Inhalation - Acute - systemic effects	46.6 mg/m <sup>3</sup>	Indoor use, With LEV	0.398

### 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
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### 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**