

Carbon monoxide

019

Country : DE / Language : EN

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

1.1. Product identifier

Trade name : Carbon monoxide, CARBON MONOXID (N18, N25, N37, N47)
 SDS no : 019
 Chemical description : Carbon monoxide
 CAS-No. : 630-08-0
 EC-No. : 211-128-3
 EC Index-No. : 006-001-00-2
 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. Perform risk assessment prior to use.
 See the list of identified uses and exposure scenarios in the annex of the safety data sheet.
 Contact supplier for more information on uses.
 Uses advised against : Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification

Supplier

AIR LIQUIDE Deutschland GmbH
 Luise-Rainer-Straße 5
 40235 Düsseldorf - GERMANY
 T +49 (0)211 6699-0 - F +49 (0)211 6699-222
info@airliquide.de

E-Mail address (competent person) : info.SDB@airliquide.de

1.4. Emergency telephone number

Emergency telephone number : +49 (0)2151 398668
 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 1	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..

Carbon monoxide**019**

Country : DE / Language : EN

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 the gas, vapours.
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.
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely..
P381 - In case of leakage, eliminate all ignition sources.
P304+P340+P315 - IF INHALED : Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice / attention.
- Storage : P403 - Store in a well-ventilated place..
P405 - Store locked up..

Supplemental information

: Restricted to professional users.

2.3. Other hazards

: None.

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 (Registration-No.) 01-2119480165-39	100	Flam. Gas 1, 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 applicable.**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. Apply artificial respiration 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.
Refer to 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**

Carbon monoxide**019**

Country : DE / Language : EN

- 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**

- : Try to stop release.
Evacuate area.
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.
Eliminate ignition sources.
Ensure adequate air ventilation.
Act in accordance with local emergency plan.
Stay upwind.

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 : 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 regularly) checked for leaks before use.
Do not smoke while handling product.
Avoid exposure, obtain special instructions before use.

Carbon monoxide

019

Country : DE / Language : EN

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 cylinder 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.

Do not breathe gas.

Avoid release of product into atmosphere.

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 cylinders 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 cylinder 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 cylinder contents.

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)

OEL : Occupational Exposure Limits

EU	TWA IOELV (EU) 8 h [mg/m ³]	23 mg/m ³
	TWA IOELV (EU) 8 h [ppm]	20 ppm

Carbon monoxide

019

Country : DE / Language : EN

	STEL IOELV (EU) 15 min [mg/m ³]	117 mg/m ³
	STEL IOELV (EU) 15 min [ppm]	100 ppm
	Notes	SCOEL Recommendations (1995)
Germany	TWA (DE) OEL 8h [mg/m ³] TRGS 900	35 mg/m ³
	TWA (DE) OEL 8h [ppm] TRGS 900	30 ppm
	Peak exposure limitation factor (DE) OEL TRGS 900	2(II)
	Remark (TRGS 900)	DFG,Z

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) : No data available.

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.
 - Other : Consider the use of flame resistant anti-static safety clothing.
Standard EN ISO 14116 - Limited flame spread materials.
Standard EN ISO 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.
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.
- 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.

Carbon monoxide**019**

Country : DE / Language : EN

• Colour	: Colourless.
Odour	: Odourless.
Odour threshold	: Odour threshold is subjective and inadequate to warn of overexposure.
Melting point	: -205 °C
Boiling point	: -192 °C
Flash point	: Not applicable for gases and gas mixtures.
Flammability range	: 10.9 - 76 vol %
Relative vapour density at 20 °C	: Not applicable.
Evaporation rate (ether=1)	: Not applicable for gases and gas mixtures.
Vapour pressure [20°C]	: Not applicable.
Vapour pressure [50°C]	: Not applicable.
Relative density, gas (air=1)	: 1
Relative density, liquid (water=1)	: 0.79
Solubility in water	: 30 mg/l
pH value	: Not applicable for gases and gas mixtures.
Partition coefficient n-octanol/water [log Kow]	: 1.78
Decomposition point [°C]	: Not applicable.
Auto-ignition temperature	: 605 °C
Viscosity [20°C]	: No reliable data available.
Explosive Properties	: Not applicable.
Oxidising Properties	: Not applicable.

9.2. Other information

Molar mass	: 28 g/mol
Critical temperature [°C]	: -140 °C
Other data	: No additional information available

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.**10.6. Hazardous decomposition products**

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

Carbon monoxide**019**

Country : DE / Language : EN

SECTION 11: Toxicological information**11.1. Information on toxicological effects****Acute toxicity** : Toxic if inhaled.

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.
Reproductive toxicity :
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.

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.

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).
Refer to 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. 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).

Carbon monoxide

019

Country : DE / Language : EN

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 cylinder to supplier.
- List of hazardous waste codes (from Commission Decision 2001/118/EC) :
- 16 05 04 *: Gases in pressure containers (including halons) containing dangerous 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

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.

Carbon monoxide**019**

Country : DE / Language : EN

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 cylinder 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. Transport in bulk according to Annex II of Marpol and the IBC Code

: 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).

Seveso Directive : 2012/18/EU (Seveso III) : Covered.

National regulations

National legislation : Ensure all national/local regulations are observed.

Germany

Water hazard class (WGK) : Water hazard class (WGK) 1, low hazard to waters (Classification according to VwVwS, Annex 1 or 2; ID No. 257)

Other information, restrictions and prohibition regulations : [German regulations] BetriebssicherheitsV mit TRBSen insbesondere TRBS 3145 / TRGS 725 Ortsbewegliche Druckgasbehälter, TRBS 2141, BGR Regel 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.

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 453/2010.

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

Carbon monoxide

019

Country : DE / Language : EN

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

- Training advice** : Ensure operators understand the flammability hazard.
 Users of breathing apparatus must be trained.
 Ensure operators understand the toxicity hazard.
- Further information** : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.

Full text of H- and EUH-statements

Acute Tox. 3 (Inhalation:gas)	Acute toxicity (inhalation:gas) Category 3
Flam. Gas 1	Flammable gases, Category 1
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
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.
ERC2	Formulation of preparations
ERC6a	Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b	Industrial use of reactive processing aids
ERC8d	Wide dispersive outdoor use of processing aids in open systems
PROC1	Use in closed process, no likelihood of exposure
PROC2	Use in closed, continuous process with occasional controlled exposure
PROC3	Use in closed batch process (synthesis or formulation)
PROC4	Use in batch and other process (synthesis) where opportunity for exposure arises
PROC8b	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
SU14	Manufacture of basic metals, including alloys
SU15	Manufacture of fabricated metal products, except machinery and equipment
SU3	Industrial uses: Uses of substances as such or in preparations* at industrial sites

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.

Carbon monoxide**019**

Country : DE / Language : EN

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

Identified Uses	Es N°	Short title	Page
Formulation of mixtures in pressure receptacles	019-1	Industrial uses, closed contained conditions	12
Metal treatment	019-1	Industrial uses, closed contained conditions	12
Electronic component manufacture	019-1	Industrial uses, closed contained conditions	12
Manufacture of pharmaceutical products	019-1	Industrial uses, closed contained conditions	12
Intermediate (transported, on-site isolated)	019-1	Industrial uses, closed contained conditions	12
Transfilling in pressure receptacles	019-1	Industrial uses, closed contained conditions	12
Feedstock in chemical processes	019-1	Industrial uses, closed contained conditions	12
Controlling agent in catalytic reaction	019-1	Industrial uses, closed contained conditions	12
Monomer in polymer production	019-1	Industrial uses, closed contained conditions	12
Calibration of analysis equipment	019-1	Industrial uses, closed contained conditions	12

Carbon monoxide

019

Country : DE / Language : EN

1. 019-1: Industrial uses, closed contained conditions

1.1. Title section

Industrial uses, closed contained conditions

ES Ref.: 019-1

Association ref code: EIGA019-1

Revision date: 01/09/2016

Processes, tasks, activities covered	Industrial uses, including product transfers and associated laboratory activities within different closed or contained systems Formulation
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 of preparations
ERC6a	Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b	Industrial use of reactive processing aids
ERC8d	Wide dispersive outdoor use of processing aids in open systems

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	Use in closed process, no likelihood of exposure
-------	--

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	
--	--

Carbon monoxide

019

Country : DE / Language : EN

(industrial vs. professional) and level of containment/automation (as reflected in the PROCs and 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	Use in closed, continuous process with occasional controlled exposure
PROC3	Use in closed batch process (synthesis or formulation)
PROC4	Use in batch and other process (synthesis) 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 (industrial vs. professional) and level of containment/automation (as reflected in the PROCs and 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 preparation (charging/discharging) from/to vessels/large containers 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	
--	--

Carbon monoxide

019

Country : DE / Language : EN

(industrial vs. professional) and level of containment/automation (as reflected in the PROCs and 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/m ³	Indoor use , With LEV	< 0.01
Inhalation - Acute - systemic effects	0.023 mg/m ³	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/m ³	Indoor use , With LEV	0.585
	11.7 mg/m ³	Indoor use , Without LEV	0.585
Inhalation - Acute - systemic effects	23.4 mg/m ³	Indoor use , With LEV	0.234
	23.4 mg/m ³	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/m ³	Indoor use , With LEV	1.165
	23.3 mg/m ³	Indoor use , Without LEV	1.165
Inhalation - Acute - systemic effects	46.7 mg/m ³	Indoor use , With LEV	0.467
	46.7 mg/m ³	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
-------------------	--