

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B
 Revision date: 2/1/2024
 Supersedes version of: 12/21/2022
 Version: 10.0

Danger



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

1.1. Product identifier

Trade name	: Nitrous oxide (refrigerated)
SDS no	: 093B
UFI	: R080-00NF-R00U-6WTQ
Other means of identification	: Nitrous oxide (refrigerated)
	CAS-No. : 10024-97-2
	EC-No. : 233-032-0
	EC Index-No. : ---
REACH registration No	: 01-2119970538-25-0011 (SOL SPA) / 01-2119970538-25-0012 (SOL NEDERLAND B.V.)
Chemical formula	: N ₂ O

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

Relevant identified uses	: Test gas/Calibration gas. Laboratory use. Medical applications. Food applications. 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	: Do not inhale product on purpose because of the risk of asphyxiation.

1.3. Details of the supplier of the safety data sheet

Company identification	: SOL Nederland B.V. Swaardvenstraat 11, 5048 AV, Tilburg - Nederland T +31.(0)13.462.57.80 www.solnederland.nl msds@sol.it
------------------------	---

1.4. Emergency telephone number

Emergency telephone number	: Nationaal Vergiftigingen Informatie Centrum (NVIC): www.vergiftigingen.nl / 030-274 88 88 Let op : Uitsluitend bereikbaar voor professionele hulpverleners bij acute vergiftiging.
----------------------------	--

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Physical hazards	Oxidising Gases, Category 1	H270
	Gases under pressure : Refrigerated liquefied gas	H281
Health hazards	Specific target organ toxicity – Single exposure, Category 3, Narcosis	H336

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Reference number: 093B

2.2. Label elements

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

Hazard pictograms (CLP)



Signal word (CLP)

: Danger

Hazard statements (CLP)

: H270 - May cause or intensify fire; oxidiser.
H281 - Contains refrigerated gas; may cause cryogenic burns or injury.
H336 - May cause drowsiness or dizziness.

Precautionary statements (CLP)

- Prevention

: P220 - Keep away from combustible materials.
P260 - Do not breathe gas, vapours.
P244 - Keep valves and fittings free from oil and grease.
P282 - Wear cold insulating gloves and either face shield or eye protection.
- 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.
P336+P315 - Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.
P370+P376 - In case of fire: Stop leak if safe to do so.
- Storage : P403 - Store in a well-ventilated place.
Supplemental information : Do not inhale product on purpose because of the risk of asphyxiation.

2.3. Other hazards

None.

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	%	Product identifier	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Nitrous oxide (refrigerated)	100	CAS-No.: 10024-97-2 EC-No.: 233-032-0 EC Index-No.: --- REACH registration No: 01-2119970538-25-0011 (SOL SPA) / 01-2119970538-25-0012 (SOL NEDERLAND B.V.)	Ox. Gas 1, H270 Press. Gas (Ref. Liq.), H281 STOT SE 3, H336

Name	Product identifier	Specific concentration limits
Nitrous oxide (refrigerated)	CAS-No.: 10024-97-2 EC-No.: 233-032-0 EC Index-No.: --- REACH registration No: 01-2119970538-25-0011 (SOL SPA) / 01-2119970538-25-0012 (SOL NEDERLAND B.V.)	(20 ≤ C < 100) STOT SE 3, H336

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

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- | | |
|----------------|---|
| - Inhalation | : Remove victim to uncontaminated area. |
| - Skin contact | : In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Obtain medical assistance. |
| - Eye contact | : Immediately flush eyes thoroughly with water for at least 15 minutes. |
| - Ingestion | : Ingestion is not considered a potential route of exposure. |

4.2. Most important symptoms and effects, both acute and delayed

In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.
 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. |
| - Unsuitable extinguishing media | : Do not use water jet to extinguish. |

5.2. Special hazards arising from the substance or mixture

- | | |
|-------------------------------|---|
| Specific hazards | : Supports combustion.
Exposure to fire may cause containers to rupture/explode. |
| Hazardous combustion products | : Nitric oxide/nitrogen dioxide. |

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.
If leaking do not spray water onto container. Water surrounding area (from protected position) to contain 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. |

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Reference number: 093B

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.
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.
Eliminate ignition sources.
Use protective clothing.
Ensure adequate air ventilation.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
Act in accordance with local emergency plan.
Stay upwind.

6.2. Environmental precautions

Try to stop release.
Liquid spillages can cause embrittlement of structural materials.

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

: Use only lubricants and sealings approved for the specific gas service.
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.
Keep equipment free from oil and grease. For more guidance, refer to the EIGA Doc. 33 - Cleaning of Equipment for Oxygen Service downloadable at <http://www.eiga.eu>.
Use no oil or grease.
Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
Avoid suck back of water, acid and alkalis.
Do not breathe gas.
Avoid release of product into work area.
For more guidance on safe use, refer to the EIGA Doc.176 "Safe practices for storage and handling of Nitrous oxide", downloadable at <http://www.eiga.org> and consult your supplier.
Temperatures above 150°C (300°F) shall be avoided by all practical means, to reduce the likelihood of an explosive decomposition of the nitrous oxide.
Clean all surfaces in direct contact with nitrous oxide as for oxygen service.
Nitrous oxide transfer pumps shall be provided with an interlock to prevent dry running.
Use self-limiting heating devices. Direct contact electric immersion heaters are not allowed.

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

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.
- Segregate from flammable gases and other flammable materials in store.
- 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

Nitrous oxide (refrigerated) (10024-97-2)	
DNEL: Derived no effect level (Workers)	
Long-term - systemic effects, inhalation	183 mg/m ³

PNEC (Predicted No-Effect Concentration)

: None established.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

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

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

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 goggles and a face shield when transfilling or breaking transfer connections.
 Standard EN 166 - Personal eye-protection - specifications.
 - Skin protection : Wear working gloves when handling gas containers.
 Standard EN 388 - Protective gloves against mechanical risks, performance level 1 or higher.
 Wear cold insulating gloves when transfilling or breaking transfer connections.
 Standard EN 511 - Cold insulating gloves.
 - Other : Consider the use of flame resistant safety clothing.
 Standard EN ISO 14116 - Limited flame spread materials.
 Wear safety shoes while handling containers.
 Standard EN ISO 20345 - Personal protective equipment - Safety footwear.
 - Respiratory protection : Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known.
 Use gas filters with full face mask, where exposure limits may be exceeded for a short-term period, e.g. connecting or disconnecting containers.
 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.
 Gas filters do not protect against oxygen deficiency.
 Standard EN 14387 - Gas filter(s), combined filter(s) and standard EN136, full face masks .
 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 liquid.
Odour	: Sweetish. Poor warning properties at high concentrations. Odour threshold is subjective and inadequate to warn of overexposure.
Melting point / Freezing point	: -90.81 °C -90.81 °C
Boiling point	: -88.5 °C
Flammability	: Non flammable.
Lower explosion limit	: Not available
Upper explosion limit	: Not available
Flash point	: Not applicable for gases and gas mixtures.
Auto-ignition temperature	: Non flammable.
Decomposition temperature	: Not applicable.
pH	: Not applicable for gases and gas mixtures.
Viscosity, kinematic	: No reliable data available.
Water solubility [20°C]	: 1500 mg/l
Partition coefficient n-octanol/water (Log Kow)	: Not applicable for gas mixtures.
Vapour pressure [20°C]	: 50.8 bar(a)
Vapour pressure [50°C]	: Not applicable.
Density and/or relative density	: Not applicable.

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

Relative vapour density (air=1) : 1.5
 Particle characteristics : Not applicable.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosive properties : Not applicable.
 Explosion limits : Non flammable.
 Oxidising properties : Oxidiser.
 - Coefficient of oxygen equivalency (Ci) : 0.6
 Critical temperature [°C] : 36.4 °C

9.2.2. Other safety characteristics

Molar mass : 44 g/mol
 Evaporation rate : Not applicable for gases and gas mixtures.
 Gas group : Press. Gas (Ref. Liq.).
 Other data : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

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.
 At temperatures over 575°C and at atmospheric pressure, nitrous oxide decomposes into nitrogen and oxygen.
 In the presence of catalysts (e.g. halogen products, mercury, nickel, platinum) the rate of decomposition increases and decomposition can occur at even lower temperatures.
 Nitrous oxide dissociation is irreversible and exothermic, leading to a considerable rise in pressure.

10.3. Possibility of hazardous reactions

Violently oxidises organic material.
 May react violently with reducing agents.

10.4. Conditions to avoid

Avoid moisture in installation systems.

10.5. Incompatible materials

May react violently with combustible materials.
 May react violently with reducing agents.
 Keep equipment free from oil and grease. For more guidance, refer to the EIGA Doc. 33 - Cleaning of Equipment for Oxygen Service downloadable at <http://www.eiga.eu>.
 For additional information on compatibility refer to ISO 11114.
 Materials such as carbon steel, low alloy carbon steel and plastic become brittle at low temperatures and are subject to failure. Use appropriate materials compatible with the cryogenic conditions present in refrigerated liquefied gas systems.

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 : Inhalation causes narcotic effects.

LC50 Inhalation - Rat [ppm]	500000 ppm/4h
-----------------------------	---------------

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

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	: No known effects from this product.
STOT-single exposure	: May cause drowsiness or dizziness.
STOT-repeated exposure	: At low concentrations: Neurologic effect. Hemotoxic effect.
Target organ(s)	: Erythrocytes. Kidneys. liver. Central nervous system.
Aspiration hazard	: Not applicable for gases and gas mixtures.

11.2. Information on other hazards

No additional information available

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	: Not applicable for inorganic products. Study scientifically unjustified.
------------	---

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

Assessment	:
------------	---

12.7. Other adverse effects

Other adverse effects	: Can cause frost damage to vegetation.
Effect on the ozone layer	: None.
Global warming potential [CO2=1]	: 298
Effect on global warming	: Contains greenhouse gas(es). When discharged in large quantities may contribute to the greenhouse effect.

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Contact supplier if guidance is required.
 May be vented to atmosphere in a well ventilated place.
 Discharge to atmosphere in large quantities should be avoided.
 Do not discharge into any place where its accumulation could be dangerous.
 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.
 : 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.

: 2201

14.2. UN proper shipping name

Transport by road/rail (ADR/RID)

: NITROUS OXIDE, REFRIGERATED LIQUID

Transport by air (ICAO-TI / IATA-DGR)

: Nitrous oxide, refrigerated liquid

Transport by sea (IMDG)

: NITROUS OXIDE, REFRIGERATED LIQUID

14.3. Transport hazard class(es)

Labelling



2.2 : Non-flammable, non-toxic gases.

5.1 : Oxidizing substances.

Transport by road/rail (ADR/RID)

Class

: 2

Classification code

: 30

Hazard identification number

: 225

Tunnel Restriction

: C/E - Tank carriage: Passage forbidden through tunnels of category C, D and E. Other carriage: Passage forbidden through tunnels of category E

Transport by sea (IMDG)

Class / Div. (Sub. risk(s))

: 2.2 (5.1)

Emergency Schedule (EmS) - Fire

: F-C

Emergency Schedule (EmS) - Spillage

: S-W

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.

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
 Reference number: 093B

14.6. Special precautions for user

Packing Instruction(s)

Transport by road/rail (ADR/RID) : P203.

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : Forbidden.

Cargo Aircraft only : Forbidden.

Transport by sea (IMDG) : P203.

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 : None.

Other information, restriction and prohibition : Ensure all national/local regulations are observed.

regulations : Not listed on the PIC list (Regulation EU 649/2012).

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

National regulations

ABM category : B(4) - low hazard for aquatic organisms.

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.

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Reference number: 093B

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.
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.

Training advice

: None.

Full text of H- and EUH-statements	
H270	May cause or intensify fire; oxidiser.
H281	Contains refrigerated gas; may cause cryogenic burns or injury.
H336	May cause drowsiness or dizziness.
Ox. Gas 1	Oxidising Gases, Category 1
Press. Gas (Ref. Liq.)	Gases under pressure : Refrigerated liquefied gas
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis

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.

Safety Data Sheet

Nitrous oxide (refrigerated)

according to the REACH Regulation (EC) 1907/2006 amended by Regulation (EU) 2020/878
Reference number: 093B

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
Feedstock in chemical processes	EIGA093-1	Industrial uses, closed contained conditions	13
Formulation of mixtures in pressure receptacles	EIGA093-1	Industrial uses, closed contained conditions	13
Transfilling in pressure receptacles	EIGA093-1	Industrial uses, closed contained conditions	13
Calibration of analysis equipment	EIGA093-1	Industrial uses, closed contained conditions	13
Refilling of refrigeration equipment	EIGA093-1	Industrial uses, closed contained conditions	13
Electronic component manufacture	EIGA093-1	Industrial uses, closed contained conditions	13
Pressure gas in airbag inflators	EIGA093-1	Industrial uses, closed contained conditions	13
Aerosol propellant.	EIGA093-2	Professional uses in open conditions.	19

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

1. EIGA093-1: Industrial uses, closed contained conditions

1.1. Title section

Industrial uses, closed contained conditions

ES Ref.: EIGA093-1

Revision date: 1/31/2017

Processes, tasks, activities covered

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

Environment

CS1

Use descriptors

Worker

CS2

CS3

CS4

CS5

Use descriptors

Assessment method

 MEASE
 EUSES v2.1

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental 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, frequency and duration of use (or from service life)

Annual site tonnage:

250

Emission Days (days/year)

365

Technical and organisational conditions and measures

Soil emission controls are not applicable as there is no direct release to soil. No additional requirement

Ensure operatives are trained to minimise releases

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

Conditions and measures related to sewage treatment plant

Wastewater emission controls are not applicable as there is no direct release to wastewater

Conditions and measures related to treatment of waste (including article waste)

See section 13 of the SDS. No additional information

Other conditions affecting environmental exposure

No additional information

1.2.2. Control of worker exposure:

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.

Duration of task

 ≤ 8 h/day

Exposure duration

Occasional exposure, e.g. during maintenance and sampling, connecting/ disconnecting containers .

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

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

Conditions and measures related to personal protection, hygiene and health evaluation

Personal protection measures have to be applied in case of potential exposure only.

See section 8 of the SDS.

Other conditions affecting workers exposure

Indoor use

1.2.3. Control of worker exposure:

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.

Duration of task

 ≤ 8 h/day

Exposure duration

Occasional exposure, e.g. during maintenance and sampling, connecting/ disconnecting containers .

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

Personal protection measures have to be applied in case of potential exposure only.

See section 8 of the SDS.

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

Other conditions affecting workers exposure

Indoor use

1.2.4. Control of worker 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 and level of containment/automation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential.	
Duration of task	≤ 8 h/day
Exposure duration	Occasional exposure, e.g. during maintenance and sampling, connecting/ disconnecting containers .
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

Personal protection measures have to be applied in case of potential exposure only.	
See section 8 of the SDS.	

Other conditions affecting workers exposure

Indoor use

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

1.2.5. Control of worker 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 and level of containment/automation (as reflected in the technical conditions) is the main determinant of the process-intrinsic emission potential.	
Duration of task	≤ 8 h/day
Exposure duration	Occasional exposure, e.g. during maintenance and sampling, connecting/ disconnecting containers .
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	
Personal protection measures have to be applied in case of potential exposure only.	
See section 8 of the SDS.	

Other conditions affecting workers exposure	
Indoor use	

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure:

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:

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	0.018 mg/m ³	Indoor use, General ventilation, Without LEV, MEASE	0

1.3.3. Worker exposure:

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	14.937 mg/m ³	Indoor use, General ventilation, Without LEV, MEASE	0.082

1.3.4. Worker exposure:

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	37.342 mg/m ³	Indoor use, General ventilation, Without LEV, MEASE	0.204

1.3.5. Worker exposure:

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Inhalation - Long-term - systemic effects	74.683 mg/m ³	Indoor use, General ventilation, Without LEV, MEASE	0.408

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 : MEASE model available at: http://www.ebrc.de/industrial-chemicals-reach/projects-and-references/mease.php
-------------------	--

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

2. EIGA093-2: Professional uses in open conditions.

2.1. Title section

Professional uses in open conditions.

ES Ref.: EIGA093-2

Revision date: 1/31/2017

Processes, tasks, activities covered

Professional uses of a processing aid in non-industrial settings.

Environment

Use descriptors

CS1

Worker

Use descriptors

CS2

Assessment method

 ConsExpo
 EUSES v2.1

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure:

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, frequency and duration of use (or from service life)

No additional information

Technical and organisational conditions and measures

Ensure operatives are trained to minimise exposure

Conditions and measures related to sewage treatment plant

No additional information

Conditions and measures related to treatment of waste (including article waste)

See section 13 of the SDS. No additional information

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

Other conditions affecting environmental exposure

No additional information

2.2.2. Control of worker 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

Maximum daily site tonnage	0.5
Duration of task	≤ 8 h/day
Exposure duration	Individual events, not totalling more than 1hour, per working day.

Technical and organisational conditions and measures

General ventilation	
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

See section 8 of the SDS. Personal protection measures have to be applied in case of potential exposure only.

Other conditions affecting workers exposure

Indoor use

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure:

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.

2.3.2. Worker exposure:

Route of exposure and type of effects	Exposure estimate	Assessment conditions	RCR
Acute - Local - Inhalation	158 mg/m ³	Indoor use, General ventilation, Without LEV, ConsExpo	

Exposure scenario

Nitrous oxide (refrigerated)

Annex to the safety data sheet

Reference number: 093B

CAS-No.: 10024-97-2 Product form: Substance Physical state: Gas

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

2.4.1. Environment

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

2.4.2. 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 : ConsExpo model available at: http://www.rivm.nl/en/Topics/Topics/C/ConsExpo/Spray_model
-------------------	--

End of document