



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

Nitrous oxide

Issue Date: 16.01.2013 Version: 2.2 SDS No.: 000010021720
 Last revised date: 13.01.2022 1/66

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

1.1 Product identifier

Product name: Nitrous oxide
Trade name: Gasart 368 Stickoxydul med.

Additional identification

Chemical name: Dinitrogen oxide
Chemical formula: N2O
INDEX No. -
CAS-No. 10024-97-2
EC No. 233-032-0
REACH Registration No. 01-2119970538-25

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.
 Aerosol propellant. Calibration gas for analytical equipment Electronic industry Formulation of mixtures with gas in pressure receptacles.
 Refrigerant. Use as pressure gas in airbags Using gas as feedstock in chemical processes. Exempt from registration requirements. Use of gas to manufacture pharmaceutical products.
 Medical applications.

Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier
 Linde Gas GmbH Telephone: +43 50 4273
 Carl-von-Linde-Platz 1
 A-4651 Stadl-Paura

E-mail: office@at.linde-gas.com

1.4 Emergency telephone number: Emergency number UMC0: +49 89 220 61012 (German), +44 1865 407333 (English)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

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

Physical Hazards

Oxidizing gases Category 1 H270: May cause or intensify fire; oxidizer.



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

Health Hazards

Specific Target Organ Toxicity - Single Exposure Category 3 H336: May cause drowsiness or dizziness.

2.2 Label Elements

Contains: Dinitrogen oxide



Signal Word: Danger

Hazard Statement(s): H270: May cause or intensify fire; oxidizer.
 H280: Contains gas under pressure; may explode if heated.
 H336: May cause drowsiness or dizziness.

Precautionary Statements

General None.

Prevention: P220: Keep away from clothing and other combustible materials.
 P244: Keep valves and fittings free from oil and grease.
 P260: Do not breathe gas/vapors.

Response: P304+P340+P315: IF INHALED: Remove person to fresh air and keep comfortable for breathing. 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.

Disposal None.

2.3 Other hazards Contact with evaporating liquid may cause frostbite or freezing of skin.



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SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name: Dinitrogen oxide
INDEX No.: -
CAS-No.: 10024-97-2
EC No.: 233-032-0
REACH Registration No.: 01-2119970538-25
Purity: 100%
 The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.
Trade name: Gasart 368 Stickoxydul med.

| Chemical name | Chemical formula | Concentration | CAS-No. | REACH Registration No. | M-Factor: | Notes |
|------------------|------------------|---------------|------------|------------------------|-----------|-------|
| Dinitrogen oxide | N2O | 100% | 10024-97-2 | 01-2119970538-25 | - | # |

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

This substance has workplace exposure limit(s).

PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

SECTION 4: First aid measures

General: Move the exposed person to fresh air at once. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: Move the exposed person to fresh air at once. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact: Contact with evaporating liquid may cause frostbite or freezing of skin.

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



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4.2 Most important symptoms and effects, both acute and delayed: Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Treatment: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

SECTION 5: Firefighting measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media: Water Spray or Fog. Dry powder. Foam. Carbon Dioxide.

Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance or mixture: Supports combustion.

Hazardous Combustion Products: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Nitrogen monoxide ; Nitrogen dioxide

5.3 Advice for firefighters

Special fire fighting procedures: In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.



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SECTION 6: Accidental release measures

- | | |
|--|---|
| 6.1 Personal precautions, protective equipment and emergency procedures: | Evacuate area. In case of leakage, eliminate all ignition sources. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor the concentration of the released product. |
| 6.2 Environmental Precautions: | Prevent further leakage or spillage if safe to do so. |
| 6.3 Methods and material for containment and cleaning up: | Provide adequate ventilation. |
| 6.4 Reference to other sections: | Refer to sections 8 and 13. |



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SECTION 7: Handling and storage:

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

7.2 Conditions for safe storage, including any incompatibilities: Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material. Avoid asphalted locations for storage, transfer and use (ignition risk if spilt). Segregate from flammable gases and other flammable materials being stored.

7.3 Specific end use(s): None.



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SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

| Chemical name | Type | Exposure Limit Values | Source |
|------------------|----------|----------------------------------|--|
| Dinitrogen oxide | MAK STEL | 400 ppm 720 mg/m ³ | Austria. MAK List, OEL Ordinance (GKV), BGBl. II, no. 184/2001, as amended (04 2021) |
| | MAK | 100 ppm 180 mg/m ³ | Austria. MAK List, OEL Ordinance (GKV), BGBl. II, no. 184/2001, as amended (04 2021) |

DNEL-Values

| Critical component | Type | Value | Remarks |
|--------------------|---|-----------------------|---------|
| Dinitrogen oxide | Workers - Inhalation, Systemic, long-term | 183 mg/m ³ | - |

8.2 Exposure controls

Appropriate engineering controls:

Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Gas detectors should be used when quantities of oxidizing gases may be released. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product. Heat and impact sensitive - impact or heating can cause decomposition.

Individual protection measures, such as personal protective equipment

General information:

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

Eye/face protection:

Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.

Skin protection

Hand Protection:

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



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| | |
|---|--|
| Body protection: | No special precautions. |
| Other: | Wear safety shoes while handling containers Guideline: ISO 20345 Personal protective equipment - Safety footwear. |
| Respiratory Protection: | Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances. When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used. The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. Self-contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres Guideline: EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking. |
| Thermal hazards: | No precautionary measures are necessary. |
| Hygiene measures: | Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product. |
| Environmental exposure controls: | For waste disposal, see section 13 of the SDS. |

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

| | |
|-----------------------------|--|
| Physical state: | Gas |
| Form: | Liquefied gas |
| Color: | Colorless |
| Odor: | Slightly sweetish odor |
| Odor Threshold: | Odor threshold is subjective and is inadequate to warn of over exposure. |
| pH: | Not applicable. |
| Melting Point: | -90,81 °C Other, Key study |
| Boiling Point: | -88,5 °C (1.013 hPa) Experimental result, Key study |
| Sublimation Point: | Not applicable. |
| Critical Temp. (°C): | 36,4 °C |
| Flash Point: | Not applicable to gases and gas mixtures. |



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| | |
|--|--|
| Evaporation Rate: | Not applicable to gases and gas mixtures. |
| Flammability (solid, gas): | This product is not flammable. |
| Flammability Limit - Upper (%): | Not applicable. |
| Flammability Limit - Lower (%): | Not applicable. |
| Vapor pressure: | 5.719,51 kPa (25 °C) |
| Vapor density (air=1): | 1,53 AIR=1 |
| Relative density: | 1,226 (-89 °C) |
| Solubility(ies) | |
| Solubility in Water: | 1,5 g/l (15 °C) |
| Partition coefficient (n-octanol/water): | 0,36 |
| Autoignition Temperature: | Not applicable. |
| Decomposition Temperature: | 575 °C |
| Viscosity | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |
| Explosive properties: | Not applicable. |
| Oxidizing properties: | Oxidizing |
| 9.2 Other information: | Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level. |
| Molecular weight: | 44,01 g/mol (N2O) |

SECTION 10: Stability and reactivity

| | |
|--|--|
| 10.1 Reactivity: | No reactivity hazard other than the effects described in sub-section below. |
| 10.2 Chemical Stability: | Stable under normal conditions. At temperatures above 575°C and at atmospheric pressure, nitrous oxide decomposes into nitrogen and oxygen. Pressurised nitrous oxide can also decompose at temperatures equal to or greater than 300°C. |
| 10.3 Possibility of hazardous reactions: | Violently oxidises organic material. May react violently with combustible materials. May react violently with reducing agents. |
| 10.4 Conditions to avoid: | Heat. |
| 10.5 Incompatible Materials: | May react violently with combustible materials. May react violently with reducing agents. Combustible materials Catalyst. Reducing agents. Organic material. For material compatibility see latest version of ISO-11114. |



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10.6 Hazardous Decomposition Products: Thermal decomposition yields toxic products which can be corrosive in the presence of moisture. Under normal conditions of storage and use, hazardous decomposition products should not be produced. If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Nitrogen Oxides

SECTION 11: Toxicological information

General information: None.

Information on likely routes of exposure

Inhalation: Reduced fertility in healthcare personnel has been reported where they have been repeatedly exposed to levels of nitrous oxide above the specified occupational exposure limits in inadequately ventilated rooms. There is no documented evidence to confirm or exclude the existence of any causal connection between these cases and exposure to nitrous oxide. The substance may have effects on the bone marrow and peripheral nervous system.

11.1 Information on toxicological effects

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

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

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

Dinitrogen oxide LC 50 (Mouse, 4 h): > 500000 ppm Remarks: Gas Experimental result, Key study

Repeated dose toxicity
Dinitrogen oxide NOAEL (Mouse(Female, Male), Inhalation, 14 Weeks): 50.000 ppm(m) Inhalation Experimental result, Key study

Skin Corrosion/Irritation Product Based on available data, the classification criteria are not met.

Serious Eye Damage/Eye Irritation Product Based on available data, the classification criteria are not met.



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Respiratory or Skin Sensitization

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

Germ Cell Mutagenicity

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

Carcinogenicity

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

Reproductive toxicity

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

Specific Target Organ Toxicity - Single Exposure

Product May cause drowsiness or dizziness.

Specific Target Organ Toxicity - Repeated Exposure

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

Aspiration Hazard

Product Not applicable to gases and gas mixtures..

SECTION 12: Ecological information

General information: Not applicable

12.1 Toxicity

Acute toxicity

Product No ecological damage caused by this product.

12.2 Persistence and Degradability

Product Not applicable to gases and gas mixtures..

12.3 Bioaccumulative potential

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

12.4 Mobility in soil

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

12.5 Results of PBT and vPvB assessment

Product Not classified as PBT or vPvB.



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12.6 Other adverse effects:

Global Warming Potential

Global warming potential: 298
 Contains greenhouse gas(es). When discharged in large quantities may contribute to the greenhouse effect.

Dinitrogen oxide

EU. Non-Fluorinated Substance GWPs (Annex IV), Regulation 517/2014/EU on fluorinated greenhouse gases
 - Global warming potential: 298

SECTION 13: Disposal considerations

13.1 Waste treatment methods

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

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

European Waste Codes

Container: 16 05 04*: Gases in pressure containers (including halons) containing dangerous substances.

SECTION 14: Transport information

ADR

| | |
|------------------------------------|----------------|
| 14.1 UN Number: | UN 1070 |
| 14.2 UN Proper Shipping Name: | NITROUS OXIDE |
| 14.3 Transport Hazard Class(es) | |
| Class: | 2 |
| Label(s): | 2.2, 5.1 |
| Hazard No. (ADR): | 25 |
| Tunnel restriction code: | (C/E) |
| 14.4 Packing Group: | - |
| 14.5 Environmental hazards: | Not applicable |
| 14.6 Special precautions for user: | - |



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RID

| | |
|------------------------------------|----------------|
| 14.1 UN Number: | UN 1070 |
| 14.2 UN Proper Shipping Name | NITROUS OXIDE |
| 14.3 Transport Hazard Class(es) | |
| Class: | 2 |
| Label(s): | 2.2, 5.1 |
| 14.4 Packing Group: | - |
| 14.5 Environmental hazards: | Not applicable |
| 14.6 Special precautions for user: | - |

IMDG

| | |
|------------------------------------|----------------|
| 14.1 UN Number: | UN 1070 |
| 14.2 UN Proper Shipping Name: | NITROUS OXIDE |
| 14.3 Transport Hazard Class(es) | |
| Class: | 2.2 |
| Label(s): | 2.2, 5.1 |
| EmS No.: | F-C, S-W |
| 14.4 Packing Group: | - |
| 14.5 Environmental hazards: | Not applicable |
| 14.6 Special precautions for user: | - |

IATA

| | |
|------------------------------------|----------------|
| 14.1 UN Number: | UN 1070 |
| 14.2 Proper Shipping Name: | Nitrous oxide |
| 14.3 Transport Hazard Class(es): | |
| Class: | 2.2 |
| Label(s): | 2.2, 5.1 |
| 14.4 Packing Group: | - |
| 14.5 Environmental hazards: | Not applicable |
| 14.6 Special precautions for user: | - |
| Other information | |
| Passenger and cargo aircraft: | Allowed. |
| Cargo aircraft only: | Allowed. |

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: Not applicable

Additional identification: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.



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SECTION 15: Regulatory information

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

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, as amended.:

| Classification | Lower-tier Requirements | Upper-tier Requirements |
|---------------------|-------------------------|-------------------------|
| P4. Oxidizing gases | 50 t | 200 t |

National Regulations

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work Directive 89/686/EEC on personal protective equipment Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
 This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2 Chemical safety assessment: Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information: Not relevant.



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Key literature references and sources for data:

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
 Agency for Toxic Substances and Diseases Registry (ATSDR) (<http://www.atsdr.cdc.gov/>).
 European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
 European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
 European Industrial Gases Association (EIGA) Doc. 169 "Classification and Labelling guide", as amended.
 International Programme on Chemical Safety (<http://www.inchem.org/>)
 ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
 Matheson Gas Data Book, 7th Edition.
 National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
 The ESIS (European chemical Substances Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>).
 The European Chemical Industry Council (CEFIC) ERICards.
 United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>)
 Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
 Substance specific information from suppliers.
 Details given in this document are believed to be correct at the time of publication.

Wording of the H-statements in section 2 and 3

| | |
|------|---|
| H270 | May cause or intensify fire; oxidizer. |
| H280 | Contains gas under pressure; may explode if heated. |
| H336 | May cause drowsiness or dizziness. |

Training information: Users of breathing apparatus must be trained. Ensure operators understand the hazards.

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

Ox. Gas 1, H270
 Press. Gas Liq. Gas, H280
 STOT SE 3, H336



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

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



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Annex to the extended Safety Data Sheet (eSDS)

Content

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| Exposure Scenario 1) | Industrial use, Formulation & (re)packing of substances and mixtures |
| Exposure Scenario 2) | Industrial use, Laboratory activities |
| Exposure Scenario 3) | Industrial use, Manufacture of computer, electronic and optical products, electrical equipment |
| Exposure Scenario 4) | Industrial use, Manufacture of fine chemicals |
| Exposure Scenario 5) | Industrial use, Refrigerant. |
| Exposure Scenario 6) | Industrial use, Use as pressure gas in airbags |
| Exposure Scenario 7) | Professional use, Aerosol propellant. |

Exposure Scenario 1)

Exposure Scenario worker

1. Industrial use, Formulation & (re)packing of substances and mixtures

| | |
|--------------------------|--|
| List of use descriptors | |
| Sector(s) of use | |
| Product categories [PC]: | |

| | |
|---|---|
| Name of contributing environmental scenario and corresponding ERC | <u>Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.:</u> ERC2: Formulation into mixture |
|---|---|

| | |
|------------------------|---|
| Contributing Scenarios | <u>Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.:</u> PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|------------------------|---|

2.1. Contributing exposure scenario controlling environmental exposure for: Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.



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Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|------------------------------|---------------------------|
| Physical form of the product | See section 9 of the SDS. |
|------------------------------|---------------------------|

| | |
|----------------------|---------------------|
| Viscosity: | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |

Amounts used

| | |
|-----------------------|---------------|
| Regional use tonnage: | 500 tonnes/yr |
|-----------------------|---------------|

Frequency and duration of use

| | |
|---------------------|-------------------|
| Batch process: | 220 Emission days |
| Continuous process: | not relevant |

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|---|
| | | Air | Soil | Water | |
| Intermittent release | 220 | 0,5 % | - | - | 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. |

| | |
|---------------------------------------|--|
| Other relevant operational conditions | Release to air from process: 11,4 kg/day |
|---------------------------------------|--|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release



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See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|-----------|--|
| Air | Handle substance within a closed system. Effectiveness: 99,5 %. |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

| | |
|----------------------------------|--|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:



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| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.

| | |
|---------------------|--|
| Process Categories: | PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|---------------------|--|

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used

| | |
|-----------------------|--|
| Daily amount per site | 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. |
|-----------------------|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|---------------------------|---------------|-------------------|---------------|
| Hours per shift | < 8 h | 220 days per year | PROC1, PROC8b |
| Occasional exposure, e.g. | | | |



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| | | | |
|--|--|--|--|
| during maintenance and sampling, connecting/disconnecting containers . | | | |
|--|--|--|--|

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|---|
| Indoor use | | | 5 | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Transfer of substance or mixture (charging and discharging) at dedicated facilities |
| Outdoor use | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---|-----------------|--------------|---------------|--|
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |
| Provide a good standard of controlled ventilation (5 to 10 | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |



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| | | | | |
|---------------------------|--|--|--|---|
| air changes per hour). | | | | |
| Local exhaust ventilation | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. 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.

3. Exposure estimation

Environment:
 Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.:
 ERC2:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|-----|-----|--------|---------|
|-------------|-----|-----|--------|---------|



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| | | | | |
|-----|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |
|-----|---------------------------|-----|------------|--|

Health:

Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.:

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|-----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 1283,7125 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------------|--------------------|--------------------|-----|-----------------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC8b:



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| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|-----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 1283,7125 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-----------------------------|--------------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, systemic | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

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

Check that RMMs and OCs are as described above or of equivalent efficiency 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>

Exposure Scenario 2)



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Exposure Scenario worker

1. Industrial use, Laboratory activities

| | |
|--------------------------|---|
| List of use descriptors | |
| Sector(s) of use | SU24: Scientific research and development |
| Product categories [PC]: | PC21: Laboratory chemicals |

| | |
|---|---|
| Name of contributing environmental scenario and corresponding ERC | <u>Using gas alone or in mixtures for the calibration of analysis equipment.:</u> ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) |
|---|---|

| | |
|------------------------|--|
| Contributing Scenarios | <u>Using gas alone or in mixtures for the calibration of analysis equipment.:</u> PROC15: Use as laboratory reagent |
|------------------------|--|

2.1. Contributing exposure scenario controlling environmental exposure for: Using gas alone or in mixtures for the calibration of analysis equipment.

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
| Physical form of the product | See section 9 of the SDS. |
| Viscosity: | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |

Amounts used

| | |
|-----------------------|--------------|
| Regional use tonnage: | 20 tonnes/yr |
|-----------------------|--------------|

Frequency and duration of use

| | |
|---------------------|-------------------|
| Batch process: | 220 Emission days |
| Continuous process: | not relevant |



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Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|---|
| | | Air | Soil | Water | |
| Intermittent release | 220 | 20 % | - | - | 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. |

Other relevant operational conditions

Release to air from process: 18,2 kg/day

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|-----------|--|
| Air | Handle substance within a closed system. Effectiveness: 80 %. |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |

Organisational measures to prevent/limit release from site:

none



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Conditions and measures related to sewage treatment plant

| | |
|----------------------------------|--|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Using gas alone or in mixtures for the calibration of analysis equipment.

Process Categories: PROC15: Use as laboratory reagent

Product characteristics

Concentration of the substance in a mixture: Covers percentage substance in the product up to 100 %.



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| | |
|-------------------------------|---------------------------|
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used

| | |
|-----------------------|--|
| Daily amount per site | 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. |
|-----------------------|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|---|---------------|-------------------|---------|
| Hours per shift | < 8 h | 220 days per year | PROC15 |
| Occasional exposure, e.g. during maintenance and sampling, connecting/ disconnecting containers . | 1 h | h/day | PROC15 |

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|---------------------------|
| Indoor use | | | 5 | Use as laboratory reagent |
| Outdoor use | | | | Use as laboratory reagent |

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet



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Technical conditions and measures to control dispersion from source towards the worker

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---|-----------------|--------------|---------------|---------------------------|
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Use as laboratory reagent |
| Local exhaust ventilation | | | | Use as laboratory reagent |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. 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.

3. Exposure estimation



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Environment:

Using gas alone or in mixtures for the calibration of analysis equipment.:

ERC8a:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |

Health:

Using gas alone or in mixtures for the calibration of analysis equipment.:

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 256,7425 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------------|--------------------|--------------------|-----|-----------------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 256,7425 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-------------------|--------------------|----------------|-----|--------|---------|
| | | | | | |



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| | | | | | |
|-----------------------------|----------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |
|-----------------------------|----------------|----------------------|-----|-----------------------------|-----------------------|

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, systemic | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

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

Check that RMMs and OCs are as described above or of equivalent efficiency 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>

Exposure Scenario 3)

Exposure Scenario worker

1. Industrial use, Manufacture of computer, electronic and optical products, electrical equipment

| List of use descriptors | |
|--------------------------|--|
| Sector(s) of use | SU16: Manufacture of computer, electronic and optical products, electrical equipment |
| Product categories [PC]: | PC33: Semiconductors |



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| | |
|---|--|
| Name of contributing environmental scenario and corresponding ERC | Use for electronic component manufacture.: ERC6a: Use of intermediate |
|---|--|

| | |
|------------------------|---|
| Contributing Scenarios | Use for electronic component manufacture.: PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |
|------------------------|---|

2.1. Contributing exposure scenario controlling environmental exposure for: Use for electronic component manufacture.

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|------------------------------|---------------------------|
| Physical form of the product | See section 9 of the SDS. |
|------------------------------|---------------------------|

| | |
|----------------------|---------------------|
| Viscosity: | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |

Amounts used

| | |
|-----------------------|---------------|
| Regional use tonnage: | 250 tonnes/yr |
|-----------------------|---------------|

Frequency and duration of use

| | |
|---------------------|-------------------|
| Batch process: | 365 Emission days |
| Continuous process: | not relevant |

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|--|
| | | Air | Soil | Water | |
| Intermittent release | 365 | 0,5 % | - | - | The exposure of aquatic, terrestrial, sediment and |



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| | | | |
|--|--|--|--|
| | | | sewage treatment microorganisms is considered to be negligible because the substance partitions primarily to air when released to the environment. |
|--|--|--|--|

| | |
|---------------------------------------|--|
| Other relevant operational conditions | Release to air from process: 3,42 kg/day |
|---------------------------------------|--|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|-----------|--|
| Air | Handle substance within a closed system. Effectiveness: 99,5 %. |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

| | |
|----------------------------------|--|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |



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Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Use for electronic component manufacture.

| | |
|---------------------|---|
| Process Categories: | PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |
|---------------------|---|

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used

| | |
|-----------------------|---|
| Daily amount per site | The actual tonnage handled per shift is not considered to influence the |
|-----------------------|---|



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| | |
|--|--|
| | 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. |
|--|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|--|---------------|-------------------|---------|
| Hours per shift | < 8 h | 220 days per year | PROC1 |
| Occasional exposure, e.g. during maintenance and sampling, connecting/disconnecting containers . | | | |

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|--|
| Indoor use | | | 5 | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |
| Outdoor use | | | | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

| inhalation | dermal exposure | eye exposure | oral exposure | Remarks |
|------------|-----------------|--------------|---------------|---------|
|------------|-----------------|--------------|---------------|---------|



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| | | | | |
|---|--|--|--|--|
| exposure | | | | |
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. 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.

3. Exposure estimation

Environment:
 Use for electronic component manufacture.:
 ERC6a:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|-----|-----|--------|---------|
|-------------|-----|-----|--------|---------|



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| | | | | |
|-----|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |
|-----|---------------------------|-----|------------|--|

Health:

Use for electronic component manufacture.:

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------------|--------------------|--------------------|-----|-----------------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-----------------------------|--------------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1:



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| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, systemic | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

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

Check that RMMs and OCs are as described above or of equivalent efficiency 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>

Exposure Scenario 4)

Exposure Scenario worker

1. Industrial use, Manufacture of fine chemicals

| List of use descriptors | |
|--------------------------|------------------------------------|
| Sector(s) of use | SU9: Manufacture of fine chemicals |
| Product categories [PC]: | PC21: Laboratory chemicals |

| | |
|---|---|
| Name of contributing environmental scenario and corresponding ERC | <u>Using gas as feedstock in chemical processes.:</u> ERC6a: Use of intermediate |
|---|---|

| | |
|------------------------|---|
| Contributing Scenarios | <u>Using gas as feedstock in chemical processes.:</u> |
|------------------------|---|



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| | |
|--|--|
| | PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|--|--|

2.1. Contributing exposure scenario controlling environmental exposure for: Using gas as feedstock in chemical processes.

Product characteristics

| | |
|---|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|---|---|

| | |
|-------------------------------------|---------------------------|
| Physical form of the product | See section 9 of the SDS. |
|-------------------------------------|---------------------------|

| | |
|-----------------------------|---------------------|
| Viscosity: | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |

Amounts used

| | |
|------------------------------|---------------|
| Regional use tonnage: | 250 tonnes/yr |
|------------------------------|---------------|

Frequency and duration of use

| | |
|----------------------------|-------------------|
| Batch process: | 365 Emission days |
| Continuous process: | not relevant |

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|--|
| | | Air | Soil | Water | |
| Intermittent release | 365 | 0,5 % | - | - | The exposure of aquatic, terrestrial, sediment and sewage treatment microorganisms is considered |



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| | | | | | |
|--|--|--|--|--|--|
| | | | | | to be negligible because the substance partitions primarily to air when released to the environment. |
|--|--|--|--|--|--|

| | |
|---------------------------------------|--|
| Other relevant operational conditions | Release to air from process: 3,42 kg/day |
|---------------------------------------|--|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|-----------|--|
| Air | Handle substance within a closed system. Effectiveness: 99,5 %. |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

| | |
|----------------------------------|--|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |

Conditions and measures related to external treatment of waste for disposal



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Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Using gas as feedstock in chemical processes.

| | |
|---------------------|--|
| Process Categories: | PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|---------------------|--|

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used

| | |
|-----------------------|---|
| Daily amount per site | The actual tonnage handled per shift is not considered to influence the |
|-----------------------|---|



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| | |
|--|--|
| | 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. |
|--|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|--|---------------|-------------------|---------------|
| Hours per shift | < 8 h | 220 days per year | PROC1, PROC8b |
| Occasional exposure, e.g. during maintenance and sampling, connecting/disconnecting containers . | | | |

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|---|
| Indoor use | | | 5 | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions, Transfer of substance or mixture (charging and discharging) at dedicated facilities |
| Outdoor use | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

| inhalation | dermal exposure | eye exposure | oral exposure | Remarks |
|------------|-----------------|--------------|---------------|---------|
|------------|-----------------|--------------|---------------|---------|



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| | | | | |
|---|--|--|--|--|
| exposure | | | | |
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |
| Local exhaust ventilation | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. Drain down and flush system prior to equipment
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break-in or maintenance. Apply a good standard of general or controlled ventilation when maintenance activities are carried out.

3. Exposure estimation

Environment:

Using gas as feedstock in chemical processes.:

ERC6a:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |

Health:

Using gas as feedstock in chemical processes.:

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|-----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 1283,7125 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------------|--------------------|--------------------|-----|-----------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, | Dermal exposure is considered to be not |



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| | | | | | |
|--|--|--|--|-------|-----------|
| | | | | MEASE | relevant. |
|--|--|--|--|-------|-----------|

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|-----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 1283,7125 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-----------------------------|--------------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, systemic | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1, PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, | Worst case assumption |



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| | | | | | |
|--|--|--|--|-------|--|
| | | | | MEASE | |
|--|--|--|--|-------|--|

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

Check that RMMs and OCs are as described above or of equivalent efficiency 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>

Exposure Scenario 5)

Exposure Scenario worker

1.Industrial use, Refrigerant.

| | |
|--------------------------|----------------------------|
| List of use descriptors | |
| Sector(s) of use | |
| Product categories [PC]: | PC16: Heat transfer fluids |

| | |
|---|---|
| Name of contributing environmental scenario and corresponding ERC | <u>Refilling of refrigeration equipment:</u> ERC9a: Widespread use of functional fluid (indoor) ERC9b: Widespread use of functional fluid (outdoor) |
|---|---|

| | |
|------------------------|---|
| Contributing Scenarios | <u>Refilling of refrigeration equipment:</u> PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|------------------------|---|

2.1.Contributing exposure scenario controlling environmental exposure for: Refilling of refrigeration equipment

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|------------------------------|---------------------------|
| Physical form of the product | See section 9 of the SDS. |
|------------------------------|---------------------------|

| | |
|----------------------|---------------------|
| Viscosity: | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |



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Amounts used

| | |
|-----------------------|--------------|
| Regional use tonnage: | 20 tonnes/yr |
|-----------------------|--------------|

Frequency and duration of use

| | |
|---------------------|-------------------|
| Batch process: | 365 Emission days |
| Continuous process: | not relevant |

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|---|
| | | Air | Soil | Water | |
| Intermittent release | 365 | 10 % | - | - | 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. |

| | |
|---------------------------------------|---|
| Other relevant operational conditions | Release to air from process: 100 kg/day |
|---------------------------------------|---|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|-------|--|
| Air | Handle substance within a closed system. Effectiveness: 90 %. |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct |



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| | |
|-----------|------------------------|
| | release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

| | |
|----------------------------------|--|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases



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2.2. Contributing exposure scenario controlling worker exposure for: Refilling of refrigeration equipment

| | |
|---------------------|---|
| Process Categories: | PROC8b: Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|---------------------|---|

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|-------------------------------|---------------------------|
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used

| | |
|-----------------------|--|
| Daily amount per site | 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. |
|-----------------------|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|--|---------------|-------------------|---------|
| Hours per shift | < 8 h | 220 days per year | PROC8b |
| Occasional exposure, e.g. during maintenance and sampling, connecting/disconnecting containers . | | | |

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|---|
| Indoor use | | | 5 | Transfer of substance or mixture (charging and discharging) at dedicated facilities |



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| | | | | |
|-------------|--|--|--|---|
| Outdoor use | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |
|-------------|--|--|--|---|

| | |
|---|-----------------------------|
| Other relevant operational conditions: | . See section 8 of the SDS. |
|---|-----------------------------|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

| |
|--|
| See section 8 of the safety data sheet |
|--|

Technical conditions and measures to control dispersion from source towards the worker

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---|-----------------|--------------|---------------|---|
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |
| Local exhaust ventilation | | | | Transfer of substance or mixture (charging and discharging) at dedicated facilities |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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



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| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. 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.

3. Exposure estimation

Environment:

Refilling of refrigeration equipment:
ERC9a, ERC9b:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |

Health:

Refilling of refrigeration equipment:
PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|-----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 1283,7125 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-------------------|--------------------|----------------|-----|--------|---------|
| | | | | | |



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| | | | | | |
|------------------------------------|----------------|--------------------|--|-----------------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |
|------------------------------------|----------------|--------------------|--|-----------------------------|---|

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|-----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 1283,7125 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-----------------------------|--------------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, systemic | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC8b:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

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

Check that RMMs and OCs are as described above or of equivalent efficiency Guidance is based on assumed operating



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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>

Exposure Scenario 6)

Exposure Scenario worker

1. Industrial use, Use as pressure gas in airbags

List of use descriptors

| | |
|------------------|------------|
| Sector(s) of use | SU0: Other |
|------------------|------------|

| | |
|--------------------------|------------|
| Product categories [PC]: | PC0: Other |
|--------------------------|------------|

| | |
|---|---|
| Name of contributing environmental scenario and corresponding ERC | <p><u>Use as pressure gas in airbags:</u> ERC6b: Use of reactive processing aid at industrial site (no inclusion into or onto article)</p> |
|---|---|

| | |
|------------------------|--|
| Contributing Scenarios | <p><u>Use as pressure gas in airbags:</u> PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions</p> |
|------------------------|--|

2.1. Contributing exposure scenario controlling environmental exposure for: Use as pressure gas in airbags

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|------------------------------|---------------------------|
| Physical form of the product | See section 9 of the SDS. |
|------------------------------|---------------------------|

Viscosity:

| | |
|----------------------|--------------------|
| Kinematic viscosity: | No data available. |
|----------------------|--------------------|

| | |
|--------------------|---------------------|
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |
|--------------------|---------------------|

Amounts used

| | |
|-----------------------|---------------|
| Regional use tonnage: | 180 tonnes/yr |
|-----------------------|---------------|



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Frequency and duration of use

| | |
|---------------------|-------------------|
| Batch process: | 365 Emission days |
| Continuous process: | not relevant |

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|---|
| | | Air | Soil | Water | |
| Intermittent release | 365 | 15 % | - | - | 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. |

| | |
|---------------------------------------|--|
| Other relevant operational conditions | Release to air from process: 74 kg/day |
|---------------------------------------|--|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|-----------|--|
| Air | Handle substance within a closed system. Effectiveness: 85 %. |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |



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Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

| | |
|----------------------------------|--|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Use as pressure gas in airbags

| | |
|---------------------|---|
| Process Categories: | PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |
|---------------------|---|



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Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used

| | |
|-----------------------|--|
| Daily amount per site | 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. |
|-----------------------|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|--|---------------|-------------------|---------|
| Hours per shift | < 8 h | 220 days per year | PROC1 |
| Occasional exposure, e.g. during maintenance and sampling, connecting/disconnecting containers . | | | |

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|--|
| Indoor use | | | 5 | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |

Other relevant operational conditions: . See section 8 of the SDS.



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Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---|-----------------|--------------|---------------|--|
| Provide a good standard of controlled ventilation (5 to 10 air changes per hour). | | | | Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. Drain down and flush system prior to equipment



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

3. Exposure estimation

Environment:

Use as pressure gas in airbags:

ERC6b:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |

Health:

Use as pressure gas in airbags:

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|--------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------------|--------------------|--------------------|-----|-----------------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|--------------------------|-----|-----------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 0,5135 mg/m ³ | < 1 | ECETOC TRA worker v3, | none |



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| | | | | | |
|--|--|--|--|-------|--|
| | | | | MEASE | |
|--|--|--|--|-------|--|

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-----------------------------|--------------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, systemic | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC1:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

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

Check that RMMs and OCs are as described above or of equivalent efficiency 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>

Exposure Scenario 7)

Exposure Scenario worker

1. Professional use, Aerosol propellant.



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| | |
|--------------------------|------------|
| List of use descriptors | |
| Sector(s) of use | SU0: Other |
| Product categories [PC]: | PC0: Other |

| | |
|---|--|
| Name of contributing environmental scenario and corresponding ERC | Use as a propellant in household consumer aerosol products.: ERC2: Formulation into mixture |
|---|--|

| | |
|------------------------|--|
| Contributing Scenarios | Use as a propellant in household consumer aerosol products.: PC0: Other |
|------------------------|--|

2.1. Contributing exposure scenario controlling environmental exposure for: Use as a propellant in household consumer aerosol products.

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|------------------------------|---------------------------|
| Physical form of the product | See section 9 of the SDS. |
|------------------------------|---------------------------|

| | |
|----------------------|---------------------|
| Viscosity: | |
| Kinematic viscosity: | No data available. |
| Dynamic viscosity: | 0,014 mPa.s (25 °C) |

Amounts used

| | |
|-----------------------|--------------|
| Regional use tonnage: | 20 tonnes/yr |
|-----------------------|--------------|

Frequency and duration of use

| | |
|---------------------|-------------------|
| Batch process: | 365 Emission days |
| Continuous process: | not relevant |

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure



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| type | Emission days | Emission factors | | | Remarks |
|----------------------|---------------|------------------|------|-------|---|
| | | Air | Soil | Water | |
| Intermittent release | 365 | 100 % | - | - | 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. |

| | |
|--|--|
| Other relevant operational conditions | Release to air from process: 54,8 kg/day |
|--|--|

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet (Environmental exposure controls).

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

| | |
|------------------|--|
| Air | not relevant |
| Soil | Soil emission controls are not applicable as there is no direct release to soil. |
| Water | Wastewater emission controls are not applicable as there is no direct release to wastewater. |
| Sediment: | not relevant |
| Remarks: | not relevant |

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

| | |
|------------------------------------|------------------------|
| type: | Sewage treatment plant |
| Discharge rate: | not relevant |
| Treatment effectiveness: | not relevant |
| Sludge treatment technique: | not relevant |



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| | |
|----------------------------------|--|
| Measures to limit air emissions: | not relevant |
| Remarks: | Not applicable as there is no release to wastewater. |

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

| Suitable waste treatment | Treatment effectiveness | Remarks |
|---------------------------|-------------------------|---|
| See section 13 of the SDS | | External treatment and disposal of waste should comply with applicable local and/or national regulations. |

Conditions and measures related to external recovery of waste

Fraction of used amount transferred to external waste treatment:

| Suitable recovery operations: | Treatment effectiveness | Remarks |
|-------------------------------|-------------------------|---|
| See section 13 of the SDS | | External recovery and recycling of waste should comply with applicable local and/or national regulations. |

Additional good practice advice beyond the REACH Chemical Safety Report

Use appropriate abatement systems to ensure that the emission levels defined by local regulations are not exceeded.
 Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Use as a propellant in household consumer aerosol products.

| | |
|---------------------|------------|
| Process Categories: | PC0: Other |
|---------------------|------------|

Product characteristics

| | |
|--|---|
| Concentration of the substance in a mixture: | Covers percentage substance in the product up to 100 %. |
|--|---|

| | |
|-------------------------------|---------------------------|
| Physical form of the product: | See section 9 of the SDS. |
| Vapour pressure: | 5719,51 kPa |
| Process temperature: | 25 °C |
| Remarks | not relevant |

Amounts used



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| | |
|-----------------------|--|
| Daily amount per site | 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. |
|-----------------------|--|

Frequency and duration of use

| | Use duration: | Frequency of use: | Remarks |
|--|---------------|-------------------|---------|
| Hours per shift | < 8 h | 220 days per year | PROC15 |
| Occasional exposure, e.g. during maintenance and sampling, connecting/disconnecting containers . | 1 h | h/day | PROC15 |

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

| Area of use | Room size: | Temperature: | Ventilation rate | Remarks |
|-------------|------------|--------------|------------------|---------------------------|
| Indoor use | | | 10 | Use as laboratory reagent |

Other relevant operational conditions: . See section 8 of the SDS.

Risk management measures (RMM)

Technical conditions and measures at process level (source) to prevent release

See section 8 of the safety data sheet

Technical conditions and measures to control dispersion from source towards the worker

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|--|-----------------|--------------|---------------|---------------------------|
| Provide a good standard of controlled ventilation (5 to 10 air changes per | | | | Use as laboratory reagent |



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| | | | | |
|---------------------------|--|--|--|---------------------------|
| hour). | | | | |
| Local exhaust ventilation | | | | Use as laboratory reagent |

Organisational measures to prevent/limit releases, dispersion and exposure

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|---|
| | | | | See section 7 of the SDS. |
| | | | | Ensure operatives are trained to minimise exposures. |
| | | | | 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

| inhalation exposure | dermal exposure | eye exposure | oral exposure | Remarks |
|---------------------|-----------------|--------------|---------------|--|
| | | | | See section 8 of the safety data sheet (Personal protection equipment) |

Additional good practice advice beyond the REACH Chemical Safety Report

See section 7 of the SDS. Handle product within a closed system. 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.

3. Exposure estimation

Environment:
 Use as a propellant in household consumer aerosol products.:
 ERC2:

| Compartment | PEC | RCR | Method | Remarks |
|-------------|---------------------------|-----|------------|--|
| Air | 0,00196 mg/m ³ | < 1 | EUSES v2.1 | Not regarded as dangerous for the environment. |



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Health:

Use as a propellant in household consumer aerosol products.:

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---------------------------------------|--------------------|----------------|-----|-----------------------------|---|
| dermal, short-term, systemic, (acute) | Closed systems | mg/kg bw/day | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|---|--------------------|----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, systemic, (acute) | Closed systems | 256,7425 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------------|--------------------|--------------------|-----|-----------------------------|---|
| dermal, short-term, local, (acute) | Closed systems | mg/cm ² | | ECETOC TRA worker v3, MEASE | Dermal exposure is considered to be not relevant. |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--|--------------------|----------------------------|-----|-----------------------------|---------|
| inhalative, short-term, local, (acute) | Closed systems | 256,7425 mg/m ³ | < 1 | ECETOC TRA worker v3, MEASE | none |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|-----------------------------|--------------------|----------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, systemic | Closed systems | 21,4286 mg/kg bw/day | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------|--------------------|----------------|------|------------|-----------------------|
| inhalative, long-term, | Closed | 158 | 0,86 | ECETOC TRA | Worst case assumption |



SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended

Nitrous oxide

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| | | | | | |
|----------|---------|-------------------|--|---------------------|--|
| systemic | systems | mg/m ³ | | worker v3, MEASE | |
|----------|---------|-------------------|--|---------------------|--|

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|--------------------------|--------------------|--------------------------|-----|-----------------------------|-----------------------|
| dermal, long-term, local | Closed systems | 1,000 mg/cm ² | < 1 | ECETOC TRA worker v3, MEASE | Worst case assumption |

PROC15:

| Route of Exposure | Specific condition | Exposure level | RCR | Method | Remarks |
|------------------------------|--------------------|-----------------------|------|-----------------------------|-----------------------|
| inhalative, long-term, local | Closed systems | 158 mg/m ³ | 0,86 | ECETOC TRA worker v3, MEASE | Worst case assumption |

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

Check that RMMs and OCs are as described above or of equivalent efficiency 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>