SAFETY DATA SHEET

Ethane

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

1.1 Product identifier

Product name: Ethane

Trade name: Ethane 2.5 Chemical, Ethane 3.5, Ethane 4.5 Scientific

Additional identification

Chemical name:	Ethane
Chemical formula:	C2H6
INDEX No.	601-002-00-X
CAS-No.	74-84-0
EC No.	200-814-8
REACH Registration No.	01-2119486765-21

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. Refrigerant. Transfilling gas or liquid, Using gas alone or in mixtures for the calibration of analysis equipment. Using gas as feedstock in chemical processes. Using gas for metal treatment. Formulation of mixtures with gas in pressure receptacles.

Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier

Linde Gas UAB
Didlaukio g. 69
LT-08300 Vilnius, Lietuva

Telephone: + 370 52787788

E-mail: sds.ren@linde.com

1.4 Emergency telephone number: Poisons Control and Information Bureau,tel. +370 52 36 20 52

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

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

Physical Hazards

Flammable gas	Category 1	H220: Extremely flammable gas.

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

2.2 Label Elements

Signal Word: Danger

Hazard Statement(s):
H220: Extremely flammable gas.
H280: Contains gas under pressure; may explode if heated.

Precautionary Statements

General None.

Prevention: P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response: P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381: In case of leakage, eliminate all ignition sources.

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.

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Ethane
INDEX No.:	601-002-00-X
CAS-No.:	74-84-0
EC No.:	200-814-8
REACH Registration No.:	01-2119486765-21
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:	Ethane 2.5 Chemical, Ethane 3.5, Ethane 4.5 Scientific

Chemical name	Chemical formula	Concentration	CAS-No.	REACH Registration No.	M-Factor:	Notes
Ethane	C2H6	100%	74-84-0	01-2119486765-21	-	

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: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. 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: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. 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. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Get medical attention.
Ingestion:	Ingestion is not considered a potential route of exposure.
4.2 Most important symptoms and effects, both acute and delayed:	Respiratory arrest. 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:	Respiratory arrest. 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.
Unsuitable extinguishing media:	Carbon Dioxide.
5.2 Special hazards arising from the substance or mixture:	Incomplete combustion may form carbon monoxide

5.3 Advice for firefighters

Special fire fighting procedures:	In case of fire: Stop leak if safe to do so. Do not extinguish flames at leak because possibility of uncontrolled explosive reignition exists. 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.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:	Evacuate area. Provide adequate ventilation. Consider the risk of potentially explosive atmospheres . In case of leakage, eliminate all ignition sources. Monitor the concentration of the released product. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.
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. Eliminate sources of ignition.
6.4 Reference to other sections:	Refer to sections 8 and 13.

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. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Purge air from system before introducing gas. Containers, which contain or have contained flammable or explosive substances, must not be inerted with liquid carbon dioxide. Assess the risk of a potentially explosive atmosphere and the need for suitable equipment i.e. explosion-proof. Take precautionary measures against static discharges. Keep away from ignition sources (including static discharges). Provide electrical earthing of equipment and electrical equipment usable in explosive atmospheres. Use non-sparking tools. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Ensure the complete system has been (or is regularly) checked for leaks before use. 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: All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere. Segregate from oxidant gases and other oxidants being stored. 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.

7.3 Specific end use(s): None.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

8.2 Exposure controls

Appropriate engineering controls: Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Provide adequate general and local exhaust ventilation. Keep concentrations well below lower explosion limits. Gas detectors should be used when quantities of flammable gases or vapours may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Product to be handled in a closed system. Only use permanent leak tight installations (e.g. welded pipes). Take precautionary measures against static discharges.

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. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Do not eat, drink or smoke when using the product.

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
Body protection:	Wear fire resistant or flame retardant clothing. Guideline: ISO/TR 2801:2007 Clothing for protection against heat and flame -- General recommendations for selection, care and use of protective clothing.
Other:	Wear safety shoes while handling containers Guideline: ISO 20345 Personal protective equipment - Safety footwear.
Respiratory Protection:	Not required.
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:	Odorless
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
pH:	Not applicable.
Melting Point:	-182,79 °C Experimental result, Key study
Boiling Point:	-88,6 °C (101,325 kPa) Experimental result, Key study
Sublimation Point:	Not applicable.
Critical Temp. (°C):	32,0 °C
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	Flammable Gas
Flammability Limit - Upper (%):	12,5 %(V) Experimental result, Key study

Flammability Limit - Lower (%):	2,4 %(V)
Vapor pressure:	4.194,11388 kPa (25 °C)
Vapor density (air=1):	1,04 AIR=1
Relative density:	0,446 (0 °C)
Solubility(ies)	
Solubility in Water:	61 mg/l
Partition coefficient (n-octanol/water):	1,81
Autoignition Temperature:	460 °C Experimental result, Key study
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0,063 mPa.s (-78,5 °C)
Explosive properties:	Not applicable.
Oxidizing properties:	Not applicable.

9.2 Other information: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Molecular weight:	30,08 g/mol (C2H6)
Minimum ignition energy:	0,24 mJ

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.
10.3 Possibility of hazardous reactions:	Can form a potentially explosive atmosphere in air. May react violently with oxidants.
10.4 Conditions to avoid:	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
10.5 Incompatible Materials:	Air and oxidizers. For material compatibility see latest version of ISO-11114.
10.6 Hazardous Decomposition Products:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

General information: None.

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.

Ethane: LC 50 (Rat, 10 min): > 800000 ppm Remarks: Inhalation Experimental result, Key study

Repeated dose toxicity
Ethane: NOAEL (Rat(Female, Male), Inhalation, >= 28 d): 4.000 ppm(m) Inhalation Experimental result, Key study
NOAEC (Rat, Inhalation): 19678 mg/m³

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.

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.

In vitro
Ethane: Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Negative.

In vivo
Ethane — Drosophila Sex-Linked Recessive Lethal Assay (SLRL) test: Negative.

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

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

12.1 Toxicity

Acute toxicity
Product — No ecological damage caused by this product.

Acute toxicity - Fish
Ethane — LC 50 (Various, 96 h): 147,54 mg/l (QSAR) Remarks: QSAR QSAR, Key study

Acute toxicity - Aquatic Invertebrates
Ethane — LC 50 (Daphnid, 48 h): 16,33 mg/l (QSAR) Remarks: QSAR QSAR, Key study

Toxicity to microorganisms
Ethane — EC50 (Alga, 96 h): 16,5 mg/l

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.

12.6 Other adverse effects:

Global Warming Potential

Global warming potential: 6
Contains greenhouse gas(es). When discharged in large quantities may contribute to the greenhouse effect.

Ethane: EU. Non-Fluorinated Substance GWPs (Annex IV), Regulation 517/2014/EU on fluorinated greenhouse gases
- Global warming potential: 6

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Do not discharge into any place where its accumulation could be dangerous. Consult supplier for specific recommendations. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor.

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 1035
14.2 UN Proper Shipping Name:	ETHANE
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.1
Hazard No. (ADR):	23
Tunnel restriction code:	(B/D)
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

RID

14.1 UN Number:	UN 1035
14.2 UN Proper Shipping Name	ETHANE
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.1
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IMDG

14.1 UN Number:	UN 1035
14.2 UN Proper Shipping Name:	ETHANE
14.3 Transport Hazard Class(es)	
Class:	2.1
Label(s):	2.1
EmS No.:	F-D, S-U
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IATA

14.1 UN Number:	UN 1035
14.2 Proper Shipping Name:	Ethane
14.3 Transport Hazard Class(es):	
Class:	2.1
Label(s):	2.1
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–
Other information	
Passenger and cargo aircraft:	Forbidden.
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.

SECTION 15: Regulatory information

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

EU Regulations

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

Classification	Lower-tier Requirements	Upper-tier Requirements
P2: Flammable gases, Category 1 or 2	10 t	50 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 Directive 2014/34/EU on equipment and protective

systems intended for use in potentially explosive atmospheres (ATEX) 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.

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 5 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

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.

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

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

Flam. Gas 1, H220

Press. Gas Liq. Gas, H280

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. Ensure equipment is adequately earthed. 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.

Last revised date: 14.07.2020

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.

Annex to the extended Safety Data Sheet (eSDS)

Content

Exposure Scenario 1.

Exposure Scenario worker

1.Industrial use, Formulation of mixtures with gas in pressure receptacles, Transfilling gas or liquid.

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

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

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

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:	0,063 mPa.s

Amounts used

Annual amount per site	The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release

Frequency and duration of use

Batch process:	260 Emission days
Continuous process:	260 Emission days

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant

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: 98 %.
Soil	not relevant

Water	not relevant
Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	not relevant
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	Wastewater emission controls are not applicable as there is no direct 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

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 % (unless stated differently).

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	4194,1 kPa
Process temperature:	Approximate 21 °C
Remarks	not relevant

Amounts used

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
Covers daily exposures up to 8 hours		5 days per week	PROC1, PROC8b

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

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 basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Provide a basic standard of general ventilation (1 to 3 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 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
Air		< 1		Not classified as PBT or vPvB. As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

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
inhalation exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

PROC1, PROC8b:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
dermal exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-

					related (worker/consumer) exposure assessment and risk characterization was performed.

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.

Exposure Scenario worker

1.Industrial use, Using gas for metal treatment.

List of use descriptors	
Sector(s) of use	SU15: Manufacture of fabricated metal products, except machinery and equipment
Product categories [PC]:	PC14: Metal surface treatment products

Name of contributing environmental scenario and corresponding ERC	Using gas for metal treatment.: ERC4: Use of non-reactive processing aid at industrial site (no inclusion into or onto article)

Contributing Scenarios	Using gas for metal treatment.: PROC22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature

2.1.Contributing exposure scenario controlling environmental exposure for: Using gas for metal treatment.

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:	0,063 mPa.s

Amounts used

Annual amount per site	The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release

Frequency and duration of use

Batch process:	260 Emission days
Continuous process:	260 Emission days

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant

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: 98 %.
Soil	not relevant
Water	not relevant
Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant	
type:	not relevant
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	Wastewater emission controls are not applicable as there is no direct 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

Ensure operatives are trained to minimise releases

2.2. Contributing exposure scenario controlling worker exposure for: Using gas for metal treatment.

Process Categories:	PROC22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature

Product characteristics

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

	stated differently).

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	4194,1 kPa
Process temperature:	Approximate 21 °C
Remarks	not relevant

Amounts used

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
Covers daily exposures up to 8 hours		5 days per week	PROC22

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

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 basic standard of general ventilation (1 to 3				Manufacturing and processing of minerals and/or metals at

air changes per hour).				substantially elevated temperature
Local exhaust ventilation				Manufacturing and processing of minerals and/or metals at substantially elevated temperature

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

3. Exposure estimation

Environment:
Using gas for metal treatment.:
ERC4:

Compartment	PEC	RCR	Method	Remarks

Air		< 1		Not classified as PBT or vPvB. As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

Health:
Using gas for metal treatment.:
PROC22:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
inhalation exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

PROC22:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
dermal exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

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, Using gas as feedstock in chemical processes.

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	Using gas as feedstock in chemical processes.: ERC6a: Use of intermediate

Contributing Scenarios	Using gas as feedstock in chemical processes.: 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:	0,063 mPa.s

Amounts used

Annual amount per site	The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release

Frequency and duration of use

Batch process:	260 Emission days
Continuous process:	260 Emission days

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant

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: 98 %.
Soil	not relevant
Water	not relevant
Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:
none

Conditions and measures related to sewage treatment plant	
type:	not relevant
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	Wastewater emission controls are not applicable as there is no direct 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

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 % (unless stated differently).

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	4194,1 kPa
Process temperature:	Approximate 21 °C
Remarks	not relevant

Amounts used

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
Covers daily exposures up to 8 hours		5 days per week	PROC1, PROC8b

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

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 basic standard of general ventilation (1 to 3 air changes per hour).				Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
Provide a basic standard of general ventilation (1 to 3 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 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		< 1		Not classified as PBT or vPvB. As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was

				performed.

Health:
Using gas as feedstock in chemical processes.:
PROC1, PROC8b:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
inhalation exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

PROC1, PROC8b:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
dermal exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

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.Professional use, Using gas alone or in mixtures for the calibration of analysis equipment.

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

Name of contributing environmental scenario	Using gas alone or in mixtures for the calibration of analysis

and corresponding ERC	equipment.: ERC8a: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)

Contributing Scenarios	Using gas alone or in mixtures for the calibration of analysis equipment.: 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:	0,063 mPa.s

Amounts used

Annual amount per site	The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release

Frequency and duration of use

Batch process:	260 Emission days
Continuous process:	260 Emission days

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant

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: 98 %.
Soil	not relevant
Water	not relevant
Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant

type:	not relevant
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	Wastewater emission controls are not applicable as there is no direct 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

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 % (unless stated differently).

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	4194,1 kPa
Process temperature:	Approximate 21 °C
Remarks	not relevant

Amounts used

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
Covers daily exposures up to 8 hours		5 days per week	PROC15

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

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

3. Exposure estimation

Environment:
Using gas alone or in mixtures for the calibration of analysis equipment.:
ERC8a:

Compartment	PEC	RCR	Method	Remarks
Air		< 1		Not classified as PBT or vPvB. As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

Health:
Using gas alone or in mixtures for the calibration of analysis equipment.:
PROC15:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
inhalation exposure	Indoor use		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

PROC15:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks

dermal exposure	Indoor use		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

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.Professional use, Refilling of refrigeration equipment

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

Name of contributing environmental scenario and corresponding ERC	Refilling of refrigeration equipment: ERC9a: Widespread use of functional fluid (indoor) ERC9b: Widespread use of functional fluid (outdoor)

Contributing Scenarios	Refilling of refrigeration equipment: PROC8a: Transfer of substance or mixture (charging and discharging) at non-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:	0,063 mPa.s

Amounts used

Annual amount per site	The actual tonnage handled per site is not considered to influence the immissions as such for this scenario as there is practically no release

Frequency and duration of use

Batch process:	260 Emission days
Continuous process:	260 Emission days

Environment factors not influenced by risk management

Other given operational conditions affecting environmental exposure

Other relevant operational conditions	not relevant

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: 98 %.
Soil	not relevant
Water	not relevant
Sediment:	not relevant
Remarks:	not relevant

Organisational measures to prevent/limit release from site:

none

Conditions and measures related to sewage treatment plant	
type:	not relevant
Discharge rate:	not relevant
Treatment effectiveness:	not relevant
Sludge treatment technique:	not relevant
Measures to limit air emissions:	not relevant
Remarks:	Wastewater emission controls are not applicable as there is no direct 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

Ensure operatives are trained to minimise releases

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

Process Categories:	PROC8a: Transfer of substance or mixture (charging and discharging) at non-dedicated facilities

Product characteristics

Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 % (unless stated differently).

Physical form of the product:	See section 9 of the SDS.
Vapour pressure:	4194,1 kPa
Process temperature:	Approximate 21 °C
Remarks	not relevant

Amounts used

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
Covers daily exposures up to 8 hours		5 days per week	PROC8a

Human factors not influenced by risk management

This information is not available.

Other given operational conditions affecting workers exposure

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 basic				Transfer of substance or

standard of general ventilation (1 to 3 air changes per hour).				mixture (charging and discharging) at non-dedicated facilities
Local exhaust ventilation				Transfer of substance or mixture (charging and discharging) at non-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 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		< 1		Not classified as PBT or vPvB. As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

Health:
Refilling of refrigeration equipment:
PROC8a:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
inhalation exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

PROC8a:

Route of Exposure	Specific condition	Exposure level	RCR	Method	Remarks
dermal exposure	Indoor/Outdoor use.		< 1		As no toxicological hazard was identified no human-related (worker/consumer) exposure assessment and risk characterization was performed.

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

SAFETY DATA SHEET

Ethane

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