

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Ammonia

Version	Revision Date:	Date of last issue: -
1.0	29.07.2026	Date of first issue: 29.07.2026

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

1.1 Product identifier

Trade name	:	Anhydrous Ammonia, Anhydrous Ammonia Novo
UK-REACH Registration Number	:	01-2119488876-14-0249
Index-No.	:	007-001-00-5
EC-No.	:	231-635-3

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

Use of the Substance/Mixture	:	Use as an intermediate, Processing aid, Additive, Use in laboratories, Water treatment chemical, Treatment of gas (NO _x and SO _x reduction), Heat transfer fluids
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1.3 Details of the supplier of the safety data sheet

Supplier	:	AGF Nitrogen Ammonia Distribution B.V. Wolgaweg 31, 3198 LR Europoort Rotterdam The Netherlands https://documentation.agf-nitrogen.nl/
E-mail address	:	info.aad@agf-nitrogen.nl

1.4 Emergency telephone number

0870 600 6266 National Poisons Information Service, UK (24h)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Flammable gases, Category 2	H221: Flammable gas.
Gases under pressure, Liquefied gas	H280: Contains gas under pressure; may explode if heated.
Acute toxicity, Category 3	H331: Toxic if inhaled.
Skin corrosion, Sub-category 1B	H314: Causes severe skin burns and eye damage.

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Serious eye damage, Category 1	H318: Causes serious eye damage.
Short-term (acute) aquatic hazard, Category 1	H400: Very toxic to aquatic life.
Long-term (chronic) aquatic hazard, Category 2	H411: Toxic to aquatic life with long lasting effects.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Hazard pictograms	:	
Signal word	:	Danger
Hazard statements	:	H221 H280 H314 H331 H410 H411 Flammable gas. Contains gas under pressure; may explode if heated. Causes severe skin burns and eye damage. Toxic if inhaled. Very toxic to aquatic life with long lasting effects. Toxic to aquatic life with long lasting effects.
Precautionary statements	:	Prevention: P210 P260 P273 P280 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not breathe gas. Avoid release to the environment. Wear protective gloves/ protective clothing/ eye protection/ face protection. Response: P303 + P361 + P353 P304 + P340 + P310 P305 + P351 + P338 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Storage: P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

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2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: This substance/mixture does not contain components considered to have endocrine disrupting properties for environment according to UK REACH Article 57(f) at levels of 0.1% or higher.

Toxicological information: This substance/mixture does not contain components considered to have endocrine disrupting properties for human health according to UK REACH Article 57(f), at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Index-No. : 007-001-00-5
EC-No. : 231-635-3

Components

Chemical name	CAS-No. EC-No.	Concentration (% w/w)
ammonia, anhydrous	7664-41-7 231-635-3	>= 90 - <= 100

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Immediate medical attention is required.
Remove from exposure.

Protection of first-aiders : First Aid responders should pay attention to self-protection
and use the recommended protective clothing

If inhaled : Move to fresh air.
Victim to lie down in the recovery position, cover and keep him warm.
Oxygen or artificial respiration if needed.
Seek medical advice immediately.

In case of skin contact : Wash off immediately with plenty of water for at least 15 minutes.
Take off contaminated clothing and shoes immediately.
If clothing already frozen and stuck to the skin:

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Wash frost-bitten areas with plenty of lukewarm water.
Immediate medical attention is required.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
If easy to do, remove contact lens, if worn.
Immediate medical attention is required.

If swallowed : Rinse mouth with water.
Never give anything by mouth to an unconscious person.
Do NOT induce vomiting.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Symptoms of poisoning may not appear for several hours.
Keep under medical supervision for at least 48 hours.

Skin contact may provoke the following symptoms:
Frostbite

Inhalation may provoke the following symptoms:
Risk of delayed pulmonary oedema.

Risks : Causes serious eye damage.
Toxic if inhaled.
Causes severe burns.

Causes serious eye damage.
Toxic if inhaled.
Causes severe burns.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Treat frost-bitten areas as needed.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Carbon dioxide (CO₂)
Dry chemical
Water spray
Foam

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting : Vapours may form explosive mixtures with air.
Incomplete combustion may produce:
Nitrogen oxides (NO_x)

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5.3 Advice for firefighters

- Special protective equipment for firefighters : Personal protection through wearing a tightly closed chemical protection suit and a self-contained breathing apparatus.
- Further information : Cool containers/tanks with water spray.
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Container may explode if heated.
-

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Personal precautions : Evacuate personnel to safe areas.
Avoid inhalation of vapour or mist.
Wear personal protective equipment.
Ensure adequate ventilation.
Suppress (knock down) gases/vapours/mists with water spray.

6.2 Environmental precautions

- Environmental precautions : Prevent further leakage or spillage if safe to do so.
Prevent product from entering environment and drains.
Do not flush into surface water or sanitary sewer system.
Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and material for containment and cleaning up

- Methods for cleaning up : Attempt to stop leakage without personal risk.
Ensure adequate ventilation.
- Clean-up methods - small spillage
Dilute with water.
- Clean-up methods - large spillage
Suitable material for dilution or neutralization
Mono ammonium phosphate
- Large spills should be collected mechanically (remove by pumping) for disposal.
Keep in suitable, closed containers for disposal.
Dispose of as hazardous waste in compliance with local and national regulations.
Suppress (knock down) gases/vapours/mists with water spray.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

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SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling : Keep container tightly closed.
Ensure adequate ventilation.
Handle with care.
Ensure that eyewash stations and safety showers are close to the workstation location.

Wash hands before breaks and immediately after handling the product.
Keep away from food, drink and animal feedingstuffs.
Take off contaminated clothing and wash before reuse.
Avoid inhalation, ingestion and contact with skin and eyes.

Advice on protection against fire and explosion : Keep away from sources of ignition - No smoking. To avoid ignition of vapours by static electricity discharge, all metal parts of the equipment must be grounded. Use explosion-proof equipment. The product is flammable but not readily ignited.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep containers tightly closed in a dry, cool and well-ventilated place. Keep locked up or in an area accessible only to qualified or authorised persons. Suitable materials for containers: Stainless steel

Advice on common storage : Keep away from food, drink and animal feedingstuffs.
Do not store together with oxidizing and self-igniting products.
Do not store near acids.

7.3 Specific end use(s)

Specific use(s) : Not applicable

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
ammonia, anhydrous	7664-41-7	TWA	25 ppm 18 mg/m ³	GB EH40
		STEL	35 ppm 25 mg/m ³	GB EH40
		STEL	50 ppm 36 mg/m ³	2000/39/EC
Further information: Indicative				

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		TWA	20 ppm 14 mg/m ³	2000/39/EC
Further information: Indicative				

Derived No Effect Level (DNEL)

Substance name	End Use	Exposure routes	Potential health effects	Value
ammonia, anhydrous	Workers	Inhalation	Long-term systemic effects	47.6 mg/m ³
	Workers	Inhalation	Acute systemic effects	47.6 mg/m ³
	Workers	Inhalation	Long-term local effects	14 mg/m ³
	Workers	Inhalation	Acute local effects	36 mg/m ³
	Workers	Skin contact	Long-term systemic effects	6.8 mg/kg bw/day
	Workers	Skin contact	Acute systemic effects	6.8 mg/kg bw/day
	Consumers	Inhalation	Long-term systemic effects	23.8 mg/m ³
	Consumers	Inhalation	Acute systemic effects	23.8 mg/m ³
	Consumers	Inhalation	Long-term local effects	2.8 mg/m ³
	Consumers	Inhalation	Acute local effects	7.2 mg/m ³
	Consumers	Skin contact	Long-term systemic effects	6.8 mg/kg bw/day
	Consumers	Skin contact	Acute systemic effects	6.8 mg/kg bw/day
	Consumers	Ingestion	Long-term systemic effects	6.8 mg/kg bw/day
	Consumers	Ingestion	Acute systemic effects	6.8 mg/kg bw/day

Predicted No Effect Concentration (PNEC)

Substance name	Environmental Compartment	Value
ammonia, anhydrous	Fresh water	0.00135 mg/l
	Intermittent use/release	0.0083 mg/l
	Marine water	0.00135 mg/l
	Soil	0.0221 mg/kg dry weight (d.w.)

8.2 Exposure controls

Engineering measures

Avoid inhalation of vapour or mist.
Provide adequate ventilation.

Personal protective equipment

Eye/face protection : Safety goggles
Face-shield
(EN 166)

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Hand protection	
Material	: Viton®
Break through time	: 480 min
Glove thickness	: 0.7 mm
Material	: butyl-rubber
Break through time	: 480 min
Glove thickness	: 0.7 mm
Remarks	: The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact). Protective gloves against cold
Skin and body protection	: Chemical resistant apron Butylrubber apron Wear butylrubber boots.
Respiratory protection	: In the case of vapour formation use a respirator with an approved filter. (K or ABEK-filter) Prolonged exposure: Self-contained breathing apparatus (EN 133)
Protective measures	: Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	: Liquefied gas
Colour	: colourless
Odour	: pungent
Odour Threshold	: 5 - 25 ppm
pH	: Not applicable (gaseous)
Melting point	: -77.7 °C (1,013 hPa)

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Boiling point	: -33.4 °C (1,013 hPa)
Flash point	: Not applicable, (inorganic)
Evaporation rate	: No data available
Flammability	: Flammable.
Upper explosion limit / Upper flammability limit	: 26 %(V)
Lower explosion limit / Lower flammability limit	: 16 %(V)
Vapour pressure	: 861 kPa (20 °C)
Relative vapour density	: 0.59 (Air = 1.0)
Density	: 0.689 g/cm ³ (-33 °C, 1,013 hPa)
Solubility(ies)	
Water solubility	: 510 - 531 g/l (20 °C)
Solubility in other solvents	: Alcohol, Ether, Chloroform
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity	
Viscosity, dynamic	: 0.255 mPa.s (-33 °C)
Viscosity, kinematic	: No data available
Explosive properties	: Not explosive
Oxidizing properties	: The substance or mixture is not classified as oxidizing.

9.2 Other information

Molecular weight	: 17.03 g/mol
Self-ignition	: 651 °C

SECTION 10: Stability and reactivity

10.1 Reactivity

Stable under recommended storage conditions.

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10.2 Chemical stability

No decomposition if stored and applied as directed.

10.3 Possibility of hazardous reactions

Hazardous reactions : Vapours may form explosive mixtures with air.
Corrosive in contact with metals
Reacts violently with:
Strong acids
Nitrogen oxides (NO_x)

10.4 Conditions to avoid

Conditions to avoid : Keep away from heat and sources of ignition.

10.5 Incompatible materials

Materials to avoid : Copper
Strong acids
Lead
Mercury
Silver
Zinc
gold
Hypochlorites

10.6 Hazardous decomposition products

Hydrogen
Nitrogen oxides (NO_x)

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Toxic if inhaled.

Product:

Acute oral toxicity : Remarks: study scientifically unjustified
(gaseous)
(corrosive)

Acute inhalation toxicity : LC50 (Rat, male): 9,850 mg/m³
Exposure time: 1 h
Test atmosphere: gas

LC50 (Rat, female): 13,770 mg/m³
Exposure time: 1 h
Test atmosphere: gas

Acute dermal toxicity : Remarks: study scientifically unjustified
(corrosive)

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Skin corrosion/irritation

Causes severe burns.

Product:

Remarks : study scientifically unjustified
(corrosive)

Serious eye damage/eye irritation

Causes serious eye damage.

Product:

Remarks : study scientifically unjustified
(corrosive)

Respiratory or skin sensitisation

Skin sensitisation

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

Respiratory sensitisation

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

Product:

Remarks : study scientifically unjustified
(corrosive)

Germ cell mutagenicity

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

Product:

Genotoxicity in vitro : Test Type: Ames test
Method: OECD Test Guideline 471
Result: negative
Remarks: In vitro tests did not show mutagenic effects

Genotoxicity in vivo : Test Type: In vivo micronucleus test
Species: Mouse (male)
Method: OECD Test Guideline 474
Result: No adverse effects
Test substance: ammonium chloride
Remarks: Read-across (Analogy)
In vivo tests did not show mutagenic effects

Carcinogenicity

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

Product:

Species : Rat, male and female
Application Route : Oral
Activity duration : 104 Weeks
NOAEL : 350 mg/kg bw/day

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Method : OECD Test Guideline 453
Test substance : Ammonium sulphate
Remarks : Read-across (Analogy)
Animal testing did not show any carcinogenic effects.

Reproductive toxicity

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

STOT - single exposure

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

STOT - repeated exposure

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

Repeated dose toxicity

Product:

Species : Rat, male and female
NOAEL : 68 mg/kg bw/day
Application Route : Oral
Exposure time : 35 d
Method : OECD Test Guideline 422
Test substance : Diammonium phosphate
Target Organs : Kidney, Liver
Remarks : Read-across (Analogy)

Species : Rat, male
NOEC : 35 mg/m³
Application Route : Inhalation
Exposure time : 50 d

Aspiration toxicity

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

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish : LC50 (pink salmon (*Oncorhynchus gorbusha*)): 0.083 mg/l
Exposure time: 96 h
Test Type: Short term
Test substance: Ammonium sulphate
Remarks: Read-across (Analogy)
Fresh water

Toxicity to daphnia and other : LC50 (*Daphnia magna* (Water flea)): 101 mg/l
aquatic invertebrates : Exposure time: 48 h
Test Type: Short term
Method: ASTM E 729-80
Remarks: Fresh water

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EC50 (Acacia sinensis): 10 mg/l
Exposure time: 48 h
Remarks: Marine water

Toxicity to algae/aquatic plants : EC50 (Chlorella vulgaris (Fresh water algae)): 3,283.2 mg/l
Exposure time: 18 d
Test substance: Ammonium sulphate
Method: OECD Test Guideline 201
Remarks: Read-across (Analogy)
Fresh water

NOEC (Zostera marina (seagrass)): 0.153 mg/l
Remarks: Marine water

Toxicity to fish (Chronic toxicity) : NOEC: 0.0135 mg/l
Exposure time: 73 d
Species: Oncorhynchus mykiss (rainbow trout)
Test substance: ammonium chloride
Method: OECD Test Guideline 210
Remarks: Read-across (Analogy)
Fresh water

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 0.961 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)
Test substance: ammonium chloride
Method: EPA OPPTS 850.1300
Remarks: Read-across (Analogy)
Fresh water

Ecotoxicology Assessment

Acute aquatic toxicity : Very toxic to aquatic life.

Chronic aquatic toxicity : Toxic to aquatic life with long lasting effects.

Components:

ammonia, anhydrous:

M-Factor (Acute aquatic toxicity) : 1

12.2 Persistence and degradability

Product:

Biodegradability : Result: Readily biodegradable.
Remarks: Freshwater
Soil

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12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Does not bioaccumulate.

12.4 Mobility in soil

Product:

Mobility : Remarks: After release, adsorbs onto soil.

Distribution among environmental compartments : Adsorption/Soil
log Koc: 5
Remarks: Adsorbs on soil.

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

Product:

Endocrine disrupting potential : This substance/mixture does not contain components considered to have endocrine disrupting properties for environment according to UK REACH Article 57(f) at levels of 0.1% or higher.

Additional ecological information : Very toxic to aquatic life.
Toxic to aquatic life with long lasting effects.
In the aqueous environment, ammonia is present predominantly as ammonium ion (NH₄⁺) or as ammonia (NH₃); the relative proportions are dependent on pH. Toxicity to aquatic organisms is attributed to un-ionised ammonia (NH₃).
Do not allow product to reach ground water, water bodies or sewage system.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Dispose of as hazardous waste in compliance with local and national regulations.
Do not dispose of together with household waste.
Do not allow product to reach ground water, water bodies or sewage system.

European waste code:

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06 02 03* (ammonium hydroxide)

Contaminated packaging : Empty remaining contents.
Dispose of contents/ container to an approved waste disposal plant.

SECTION 14: Transport information

14.1 UN number

ADR	: UN 1005
RID	: UN 1005
IMDG	: UN 1005

14.2 UN proper shipping name

ADR	: AMMONIA, ANHYDROUS
RID	: AMMONIA, ANHYDROUS
IMDG	: AMMONIA, ANHYDROUS

14.3 Transport hazard class(es)

	Class	Subsidiary risks
ADR	: 2	2.3, 8
RID	: 2	2.3, 8, (13)
IMDG	: 2.3	8

14.4 Packing group

ADR	
Packing group	: Not assigned by regulation
Classification Code	: 2TC
Hazard Identification Number	: 268
Labels	: 2.3 (8)
Tunnel restriction code	: (C/D)

RID	
Packing group	: Not assigned by regulation
Classification Code	: 2TC
Hazard Identification Number	: 268
Labels	: 2.3 (8, (13))

IMDG	
Packing group	: Not assigned by regulation
Labels	: 2.3 (8)
EmS Code	: F-C, S-U

14.5 Environmental hazards

ADR	
Environmentally hazardous	: yes

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RID

Environmentally hazardous : yes

IMDG

Marine pollutant : yes

14.6 Special precautions for user

Remarks : SDS: No specific instructions needed.

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

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

Remarks	: Not applicable
	Bulk shipping (gas):, ammonia, anhydrous
Ship type	: 2P/2G

SECTION 15: Regulatory information

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

Relevant EU provisions transposed through retained EU law

UK REACH Candidate list of substances of very high concern (SVHC) for Authorisation : Not applicable

The Persistent Organic Pollutants Regulations (retained Regulation (EU) 2019/1021 as amended for Great Britain)

Regulation (EU) No 2024/590 on substances that deplete the ozone layer : Not applicable

UK REACH List of substances subject to authorisation (Annex XIV) : Not applicable

Control of Major Accident Hazards Regulations 2015 (COMAH)	H2	ACUTE TOXIC
	P2	FLAMMABLE GASES
	18	Liquefied flammable gases (including LPG) and natural gas
	E1	ENVIRONMENTAL HAZARDS
	35	Anhydrous Ammonia

Other regulations:

Take note of The Management of Health and Safety at Work Regulations 1999 (requirements

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relating to protection of young people at work contained in Regulation 19) and of Directive 94/33/EC on the protection of young people at work.

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of other abbreviations

2000/39/EC	:	Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values
GB EH40	:	UK. EH40 WEL - Workplace Exposure Limits
2000/39/EC / TWA	:	Limit Value - eight hours
2000/39/EC / STEL	:	Short term exposure limit
GB EH40 / TWA	:	Long-term exposure limit (8-hour TWA reference period)
GB EH40 / STEL	:	Short-term exposure limit (15-minute reference period)

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonised System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organisation for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN

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- United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

Training advice : Provide adequate information, instruction and training for operators.
Regular trainings of all employees which are involved in the transport of dangerous goods (according to chapter 1.3 ADR).

Other information :
Sources of key data used to compile the Safety Data Sheet : Chemical Safety Report, Anhydrous Ammonia. FARM REACH Consortium, 2023

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. However we do not assume any warranty and liability whatsoever for the accuracy and completeness of such information.

We herewith also do not make any representation or warranty of merchantability of our products or their fitness for a particular purpose.

It is the customer's responsibility to inspect and test our products in order to satisfy itself as to the suitability of the products for the customer's particular purpose. The customer is responsible for the appropriate, safe and legal use, processing and handling of our products.

The information contained herein relates exclusively to our products when not used in conjunction with any third party materials. No liability can be accepted especially in respect of the use of our products in conjunction with other material or substance.

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Annex: Exposure Scenarios

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Number	Title
ES1	Formulation or re-packing , Formulation & (re)packing of substances and mixtures; Adhesives, sealants (PC1); Coatings and paints, thinners, paint removers (PC9a); Fertilizers (PC12); Heat transfer fluids (PC16); Ink and toners (PC18); Intermediate (PC19); Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20); Laboratory chemicals (PC21); Paper and board treatment products (PC26); Pharmaceuticals (PC29); Photo-chemicals (PC30); Textile dyes and impregnating products (PC34); Washing and cleaning products (PC35); Water treatment chemicals (PC37); Cosmetics, personal care products (PC39); Extraction agents (PC40)
ES2	Use at industrial sites , Use as an intermediate; Intermediate (PC19)
ES3	Use at industrial sites , Use in functional fluids; Heat transfer fluids (PC16)
ES4	Use at industrial sites , Processing aid; Air care products (PC3); Metal surface treatment products (PC14); Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20); Laboratory chemicals (PC21); Pharmaceuticals (PC29); Extraction agents (PC40)
ES5	Widespread use by professional workers , Use in functional fluids; Heat transfer fluids (PC16)

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ES1: Formulation & (re)packing of substances and mixtures

1.1. Title section

Structured Short Title	: Formulation or re-packing, Formulation & (re)packing of substances and mixtures; Adhesives, sealants (PC1).; Coatings and paints, thinners, paint removers (PC9a).; Fertilizers (PC12).; Heat transfer fluids (PC16).; Ink and toners (PC18).; Intermediate (PC19).; Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20).; Laboratory chemicals (PC21).; Paper and board treatment products (PC26).; Pharmaceuticals (PC29).; Photo-chemicals (PC30).; Textile dyes and impregnating products (PC34).; Washing and cleaning products (PC35).; Water treatment chemicals (PC37).; Cosmetics, personal care products (PC39).; Extraction agents (PC40).
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Environment		
CS1	Formulation & (re)packing of substances and mixtures	ERC2, spERC -2 – NH4
Worker		
CS2	Use in closed process, no likelihood of exposure	PROC1
CS3	Use in closed, continuous process with occasional controlled exposure	PROC2
CS4	Use in closed batch process (synthesis or formulation)	PROC3
CS5	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	PROC8b
CS6	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC9
CS7	Use as laboratory reagent	PROC15

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Formulation into mixture (ERC2) / spERC -2 – NH4 ()

Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 3830000 tonnes/year
Daily amount per site	: 7276 tonnes/day
Emission days	: 100

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Conditions and measures related to sewage treatment plant	
STP type	: Municipal Sewage Treatment Plant
Additional information on STP	: Biological elimination
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2,000 m ³ /d
Other conditions affecting environmental exposure	
Receiving surface water flow	: 18,000 m ³ /d
Local freshwater dilution factor	: 10

1.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

1.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas

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Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

1.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation)
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

1.2.5. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	

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Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 95 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

1.2.6. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	

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Indoor or outdoor use	:	Indoor use
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1.2.7. Control of worker exposure: Use as laboratory reagent Use as laboratory reagent (PROC15)

Product (article) characteristics
Covers percentage substance in the product up to 100 %.
Physical form of product : Liquefied gas
Amount used, frequency and duration of use (or from service life)
Duration : Covers daily exposures up to 8 hours
Technical and organisational conditions and measures
Local exhaust ventilation Inhalation - minimum efficiency of 90 %
Provide a basic standard of general ventilation (1 to 3 air changes per hour).
Conditions and measures related to personal protection, hygiene and health evaluation
Use eye protection according to EN 166.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor use

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Formulation into mixture (ERC2) / spERC -2 – NH4 ()

Release route	Release rate	Release estimation method
Air	0.003 %	spERC -2 – NH4
Water	0 %	spERC -2 – NH4
Soil	0 %	spERC -2 – NH4

Compartment	Exposure level	RCR
Freshwater	0.178 µg/L (EUSES v2.1)	0.132
Marine water	0.018 µg/L (EUSES v2.1)	0.013
Agricultural soil	0.313 µg/kg dry weight (EUSES v2.1)	0.014

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1.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	0.0071 mg/m ³ (EASY TRA v5.2.0)	< 0.01	
dermal	systemic	long-term	0.0343 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		< 0.01	

1.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	17.74 mg/m ³ (EASY TRA v5.2.0)	0.373	
dermal	systemic	long-term	1.371 mg/kg bw/day (EASY TRA v5.2.0)	0.202	
combined routes	systemic	long-term		0.574	

1.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	35.48 mg/m ³ (EASY TRA v5.2.0)	0.745	
dermal	systemic	long-term	0.686 mg/kg bw/day (EASY TRA v5.2.0)	0.101	
combined routes	systemic	long-term		0.846	

1.3.5. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	5.322 mg/m ³ (EASY TRA	0.112	

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dermal	systemic	long-term	0.137 mg/kg bw/day (EASY TRA v5.2.0)	0.02	
combined routes	systemic	long-term		0.132	

1.3.6. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	14.19 mg/m ³ (EASY TRA v5.2.0)	0.298	
dermal	systemic	long-term	0.137 mg/kg bw/day (EASY TRA v5.2.0)	0.02	
combined routes	systemic	long-term		0.319	

1.3.7. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		0.08	

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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ES2: Use as an intermediate

2.1. Title section

Structured Short Title	: Use at industrial sites, Use as an intermediate; Intermediate (PC19).
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Environment		
CS1	Use as an intermediate	ERC6a, spERC -6a – NH4
Worker		
CS2	Use in closed process, no likelihood of exposure	PROC1
CS3	Use in closed, continuous process with occasional controlled exposure	PROC2
CS4	Use in closed batch process (synthesis or formulation)	PROC3
CS5	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	PROC8b
CS6	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC9
CS7	Use as laboratory reagent	PROC15

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Use of intermediate (ERC6a) / spERC -6a – NH4 ()

Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 3830000 tonnes/year
Daily amount per site	: 900 tonnes/day
Emission days	: 100
Conditions and measures related to sewage treatment plant	
STP type	: Municipal Sewage Treatment Plant
Additional information on STP	: Biological elimination
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2,000 m ³ /d

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Other conditions affecting environmental exposure	
Receiving surface water flow	: 18,000 m ³ /d
Local freshwater dilution factor	: 10

2.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

2.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	

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Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

2.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation)
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

2.2.5. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	

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Duration	: Covers exposure up to 4 hrs
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	
Inhalation - minimum efficiency of 90 %	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use

2.2.6. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers exposure up to 4 hrs
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	
Inhalation - minimum efficiency of 90 %	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use

2.2.7. Control of worker exposure: Use as laboratory reagent Use as laboratory reagent (PROC15)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas

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Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection Inhalation - minimum efficiency of 90 %	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.	
Dermal - minimum efficiency of 90 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Use of intermediate (ERC6a) / spERC -6a – NH4 ()

Release route	Release rate	Release estimation method
Water	0 %	spERC -6a – NH4
Air	0.005 %	spERC -6a – NH4
Soil	0 %	spERC -6a – NH4

Compartment	Exposure level	RCR
Freshwater	0.219 µg/L (EUSES v2.1)	0.162
Marine water	0.022 µg/L (EUSES v2.1)	0.016
Agricultural soil	0.204 µg/kg dry weight (EUSES v2.1)	< 0.01

2.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	0.0071 mg/m ³ (EASY TRA	< 0.01	

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dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		< 0.01	

2.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	17.74 mg/m ³ (EASY TRA v5.2.0)	0.373	
dermal	systemic	long-term	1.371 mg/kg bw/day (EASY TRA v5.2.0)	0.202	
combined routes	systemic	long-term		0.574	

2.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.069 mg/kg bw/day (EASY TRA v5.2.0)	0.01	
combined routes	systemic	long-term		0.085	

2.3.5. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	4.471 mg/m ³ (EASY TRA v5.2.0)	0.094	
dermal	systemic	long-term	1.646 mg/kg bw/day (EASY TRA v5.2.0)	0.242	
combined routes	systemic	long-term		0.336	

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2.3.6. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	5.961 mg/m ³ (EASY TRA v5.2.0)	0.125	
dermal	systemic	long-term	0.823 mg/kg bw/day (EASY TRA v5.2.0)	0.121	
combined routes	systemic	long-term		0.246	

2.3.7. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		0.08	

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

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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ES3: Use in functional fluids, Industrial

3.1. Title section

Structured Short Title	: Use at industrial sites, Use in functional fluids; Heat transfer fluids (PC16).
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Environment		
CS1	Use in functional fluids, Industrial	ERC7, spERC-7 – NH4
Worker		
CS2	Use in closed process, no likelihood of exposure	PROC1
CS3	Use in closed, continuous process with occasional controlled exposure	PROC2
CS4	Use in closed batch process (synthesis or formulation)	PROC3
CS5	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	PROC8b
CS6	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC9
CS7	Use as laboratory reagent	PROC15

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Use of functional fluid at industrial site (ERC7) / spERC -7 – NH4 ()

Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 355000 tonnes/year
Daily amount per site	: 41.6 tonnes/day
Emission days	: 100
Conditions and measures related to sewage treatment plant	
STP type	: Municipal Sewage Treatment Plant
Additional information on STP	: Biological elimination
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2,000 m ³ /d

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Other conditions affecting environmental exposure

Receiving surface water flow : 18,000 m³/d

Local freshwater dilution factor : 10

3.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product : Liquefied gas

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

Duration : Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Provide a basic standard of general ventilation (1 to 3 air changes per hour).

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

Use eye protection according to EN 166.

Other conditions affecting workers exposure

Indoor or outdoor use : Indoor use

3.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product : Liquefied gas

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

Duration : Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Provide a basic standard of general ventilation (1 to 3 air changes per hour).

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Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

3.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation)
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

3.2.5. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities
Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	

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Duration	: Covers use up to 4 hrs
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	
Dermal - minimum efficiency of 90 %	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use

3.2.6. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers use up to 4 hrs
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	
Dermal - minimum efficiency of 90 %	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use

3.2.7. Control of worker exposure: Use as laboratory reagent Use as laboratory reagent (PROC15)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas

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Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Use of functional fluid at industrial site (ERC7) / spERC -7 – NH4 ()

Release route	Release rate	Release estimation method
Water	0 %	spERC -7 – NH4
Air	0.005 %	spERC -7 – NH4
Soil	0 %	spERC -7 – NH4

Compartment	Exposure level	RCR
Freshwater	0.03 µg/L (EUSES v2.1)	0.02
Marine water	0.003 µg/L (EUSES v2.1)	< 0.01
Agricultural soil	0.169 µg/kg dry weight (EUSES v2.1)	< 0.01

3.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	0.0071 mg/m ³ (EASY TRA v5.2.0)	< 0.01	

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dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		< 0.01	

3.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	17.74 mg/m ³ (EASY TRA v5.2.0)	0.373	
dermal	systemic	long-term	1.371 mg/kg bw/day (EASY TRA v5.2.0)	0.202	
combined routes	systemic	long-term		0.574	

3.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.069 mg/kg bw/day (EASY TRA v5.2.0)	0.01	
combined routes	systemic	long-term		0.085	

3.3.5. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	4.471 mg/m ³ (EASY TRA v5.2.0)	0.094	
dermal	systemic	long-term	1.646 mg/kg bw/day (EASY TRA v5.2.0)	0.242	
combined routes	systemic	long-term		0.336	

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3.3.6. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	5.961 mg/m ³ (EASY TRA v5.2.0)	0.125	
dermal	systemic	long-term	0.823 mg/kg bw/day (EASY TRA v5.2.0)	0.121	
combined routes	systemic	long-term		0.246	

3.3.7. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		0.08	

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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ES4: Processing aid, an auxiliary agent in different processes, Industrial

4.1. Title section

Structured Short Title	: Use at industrial sites, Processing aid; Air care products (PC3).; Metal surface treatment products (PC14).; Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents (PC20).; Laboratory chemicals (PC21).; Pharmaceuticals (PC29).; Extraction agents (PC40).
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Environment		
CS1	Processing aid, an auxiliary agent in different processes	ERC6b, spERC -6b – NH4
Worker		
CS2	Use in closed process, no likelihood of exposure	PROC1
CS3	Use in closed, continuous process with occasional controlled exposure	PROC2
CS4	Use in closed batch process (synthesis or formulation)	PROC3
CS5	Use in batch and other process (synthesis) where opportunity for exposure arises	PROC4
CS6	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	PROC8b
CS7	Use as laboratory reagent	PROC15

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Use of reactive processing aid at industrial site (no inclusion into or onto article) (ERC6b) / spERC -6b – NH4 ()

Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 355000 tonnes/year
Daily amount per site	: 41 tonnes/day
Emission days	: 100
Conditions and measures related to sewage treatment plant	
STP type	: Municipal Sewage Treatment Plant

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Additional information on STP	: Biological elimination
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil
STP effluent	: 2,000 m ³ /d
Other conditions affecting environmental exposure	
Receiving surface water flow	: 18,000 m ³ /d
Local freshwater dilution factor	: 10

4.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

4.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	

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Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

4.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation)
Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Dermal - minimum efficiency of 90 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

4.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises

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Chemical production where opportunity for exposure arises (PROC4)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

4.2.6. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers use up to 4 hrs
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection Inhalation - minimum efficiency of 90 %	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	

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Other conditions affecting workers exposure

Indoor or outdoor use : Outdoor use

4.2.7. Control of worker exposure: Use as laboratory reagent Use as laboratory reagent (PROC15)

Product (article) characteristics

Covers percentage substance in the product up to 100 %.

Physical form of product : Liquefied gas

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

Duration : Covers daily exposures up to 8 hours

Technical and organisational conditions and measures

Local exhaust ventilation
Inhalation - minimum efficiency of 90 %

Provide a basic standard of general ventilation (1 to 3 air changes per hour).

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Dermal - minimum efficiency of 90 %
Use eye protection according to EN 166.

Other conditions affecting workers exposure

Indoor or outdoor use : Indoor use

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Use of reactive processing aid at industrial site (no inclusion into or onto article) (ERC6b) / spERC -6b – NH4 ()

Release route	Release rate	Release estimation method
Water	0 %	spERC -6b – NH4
Air	0.001 %	spERC -6b – NH4
Soil	0 %	spERC -6b – NH4

Compartment	Exposure level	RCR
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Freshwater	0.03 µg/L (EUSES v2.1)	0.02
Marine water	0.003 µg/L (EUSES v2.1)	< 0.01
Agricultural soil	0.168 µg/kg dry weight (EUSES v2.1)	< 0.01

4.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	0.0071 mg/m ³ (EASY TRA v5.2.0)	< 0.01	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		< 0.01	

4.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	1.774 mg/m ³ (EASY TRA v5.2.0)	0.037	
dermal	systemic	long-term	0.137 mg/kg bw/day (EASY TRA v5.2.0)	0.02	
combined routes	systemic	long-term		0.057	

4.3.4. Worker exposure: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition (PROC3)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.069 mg/kg bw/day (EASY TRA v5.2.0)	0.01	
combined routes	systemic	long-term		0.085	

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4.3.5. Worker exposure: Chemical production where opportunity for exposure arises (PROC4)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	7.096 mg/m ³ (EASY TRA v5.2.0)	0.149	
dermal	systemic	long-term	0.137 mg/kg bw/day (EASY TRA v5.2.0)	0.020	
combined routes	systemic	long-term		0.169	

4.3.6. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	4.471 mg/m ³ (EASY TRA v5.2.0)	0.094	
dermal	systemic	long-term	1.646 mg/kg bw/day (EASY TRA v5.2.0)	0.242	
combined routes	systemic	long-term		0.336	

4.3.7. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		0.08	

4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.

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ES5: Use in functional fluids, Professional

5.1. Title section

Structured Short Title	: Widespread use by professional workers, Use in functional fluids; Heat transfer fluids (PC16).
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Environment		
CS1	Use in functional fluids, Professional	ERC9a, ERC9b
Worker		
CS2	Use in closed process, no likelihood of exposure	PROC1
CS3	Use in closed, continuous process with occasional controlled exposure	PROC2
CS4	Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	PROC8b
CS5	Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC9
CS6	Use as laboratory reagent	PROC15
CS7	Heat and pressure transfer fluids in dispersive, professional use but closed systems	PROC20

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Widespread use of functional fluid (indoor) (ERC9a) / Widespread use of functional fluid (outdoor) (ERC9b)

Amount used, frequency and duration of use (or from service life)	
Annual amount per site	: 25000 tonnes/year
Daily amount per site	: 243 kg/day
Emission days	: 365
Conditions and measures related to sewage treatment plant	
STP type	: Municipal Sewage Treatment Plant
Additional information on STP	: Biological elimination
STP sludge treatment	: Controlled application of sewage sludge to agricultural soil

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STP effluent	: 2,000 m ³ /d
Other conditions affecting environmental exposure	
Receiving surface water flow	: 18,000 m ³ /d
Local freshwater dilution factor	: 10

5.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure
Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

5.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure
Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	

SAFETY DATA SHEET

According to REACH Regulation (EC) No 1907/2006, as amended by
UK REACH Regulations SI 2019/758



Ammonia

Version
1.0

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Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

5.2.4. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities

Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 95 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

5.2.5. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)

Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	

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Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers use up to 4 hrs
Conditions and measures related to personal protection, hygiene and health evaluation	
Respiratory protection	
Inhalation - minimum efficiency of 90 %	
Wear suitable gloves tested to EN374.	
Dermal - minimum efficiency of 80 %	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Outdoor use

5.2.6. Control of worker exposure: Use as laboratory reagent Use as laboratory reagent (PROC15)

Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation	
Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

5.2.7. Control of worker exposure: Heat and pressure transfer fluids in dispersive, professional use but closed systems Use of functional fluids in small devices (PROC20)

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Product (article) characteristics	
Covers percentage substance in the product up to 100 %.	
Physical form of product	: Liquefied gas
Amount used, frequency and duration of use (or from service life)	
Duration	: Covers daily exposures up to 8 hours
Technical and organisational conditions and measures	
Local exhaust ventilation Inhalation - minimum efficiency of 90 %	
Provide a basic standard of general ventilation (1 to 3 air changes per hour).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Use eye protection according to EN 166.	
Other conditions affecting workers exposure	
Indoor or outdoor use	: Indoor use

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Widespread use of functional fluid (indoor) (ERC9a) / Widespread use of functional fluid (outdoor) (ERC9b)

Release route	Release rate	Release estimation method
Water	0 %	Environmental Release Category (ERC)
Air	5 %	Environmental Release Category (ERC)
Soil	0 %	Environmental Release Category (ERC)

Compartment	Exposure level	RCR
Freshwater	0.0056 µg/L (EUSES v2.1)	< 0.01
Marine water	0.0005 µg/L (EUSES v2.1)	< 0.01
Agricultural soil	0.168 µg/kg dry weight (EUSES v2.1)	< 0.01

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5.3.2. Worker exposure: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions (PROC1)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	0.071 mg/m ³ (EASY TRA v5.2.0)	< 0.01	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	< 0.01	
combined routes	systemic	long-term		< 0.01	

5.3.3. Worker exposure: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions (PROC2)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	0.137 mg/kg bw/day (EASY TRA v5.2.0)	0.02	
combined routes	systemic	long-term		0.095	

5.3.4. Worker exposure: Transfer of substance or mixture (charging/discharging) at dedicated facilities (PROC8b)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	8.87 mg/m ³ (EASY TRA v5.2.0)	0.186	
dermal	systemic	long-term	0.686 mg/kg bw/day (EASY TRA v5.2.0)	0.101	
combined routes	systemic	long-term		0.287	

5.3.5. Worker exposure: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	7.451 mg/m ³ (EASY TRA v5.2.0)	0.157	

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dermal	systemic	long-term	0.823 mg/kg bw/day (EASY TRA v5.2.0)	0.121	
combined routes	systemic	long-term		0.278	

5.3.6. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	8.279 mg/m ³ (EASY TRA v5.2.0)	0.174	
dermal	systemic	long-term	0.034 mg/kg bw/day (EASY TRA v5.2.0)	0.01	
combined routes	systemic	long-term		0.179	

5.3.7. Worker exposure: Use of functional fluids in small devices (PROC20)

Exposure route	Health effect	Exposure indicator	Exposure level	RCR	Remarks
inhalative	systemic	long-term	3.548 mg/m ³ (EASY TRA v5.2.0)	0.075	
dermal	systemic	long-term	1.714 mg/kg bw/day (EASY TRA v5.2.0)	0.252	
combined routes	systemic	long-term		0.327	

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

The safety data sheet at hand provides the user with risk management measures and operational conditions which enables him to work safely with the substance / mixture. If other risk management measures / operational conditions are adopted, the user has to ensure, that the risks are managed to at least equivalent levels.