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

### 1.1. Product identifier

| | |
|---|---|
| **Name of product** | Ammonia<br>Art-Nr(n).: 0100-0107, 70010 |
| **Name of substance** | ammonia, anhydrous |
| **Index No** | 007-001-00-5 |
| **EC No** | 231-635-3 |
| **REACH registration number** | 01-2119488876-14 |
| **CAS No** | 7664-41-7 |

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

**Identified uses**

**Sector of uses [SU]**
SU1 - Agriculture, forestry, fishery
SU10 - Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU11 - Manufacture of rubber products
SU12 - Manufacture of plastics products, including compounding and conversion
SU13 - Manufacture of other non-metallic mineral products, e.g. plasters, cement
SU15 - Manufacture of fabricated metal products, except machinery and equipment
SU16 - Manufacture of computer, electronic and optical products, electrical equipment
SU17 - General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment
SU23 - Electricity, steam, gas water supply and sewage treatment
SU24 - Scientific research and development
SU0 - Other
SU4 - Manufacture of food products
SU5 - Manufacture of textiles, leather, fur
SU6a - Manufacture of wood and wood products
SU6b - Manufacture of pulp, paper and paper products
SU8 - Manufacture of bulk, large scale chemicals (including petroleum products)
SU9 - Manufacture of fine chemicals

! **Product categories [PC]**
PC1 - Adhesives, sealants
PC12 - Fertilizers
PC14 - Metal surface treatment products, including galvanic and electroplating products
PC15 - Non-metal-surface treatment products
PC16 - Heat transfer fluids
PC18 - Ink and toners
PC19 - Intermediates
PC20 - Products such as ph-regulators, flocculants, precipitants, neutralisation agents
PC21 - Laboratory chemicals
PC26 - Paper and board dye, finishing and impregnation products: including bleaches and other processing aids
PC29 - Pharmaceuticals
PC30 - photo-chemicals
PC34 - Textile dyes, finishing and impregnating products; including bleaches and other processing aids
PC35 - Washing and cleaning products (including solvent based products)
PC37 - Water treatment chemicals
PC39 - Cosmetics, personal care products
PC40 - Extraction agents
PC9a - Coatings and paints, thinners, paint removers

**Process categories [PROC]**
PROC1 - Use in closed process, no likelihood of exposure
PROC2 - Use in closed, continuous process with occasional controlled exposure
PROC3 - Use in closed batch process (synthesis or formulation)
PROC4 - Use in batch and other process (synthesis) where opportunity for exposure arises

PROC5 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC8a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC9 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC13 - Treatment of articles by dipping and pouring
PROC8b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC15 - Use as laboratory reagent
PROC20 - Heat and pressure transfer fluids in dispersive, professional use but closed systems

**Environmental release categories [ERC]**
ERC7 - Industrial use of substances in closed systems
ERC8b - Wide dispersive indoor use of reactive substances in open systems
ERC8e - Wide dispersive outdoor use of reactive substances in open systems
ERC9a - Wide dispersive indoor use of substances in closed systems
ERC9b - Wide dispersive outdoor use of substances in closed systems
ERC2 - Formulation of preparations (mixtures)
ERC4 - Industrial use of processing aids in processes and products, not becoming part of articles
ERC5 - Industrial use resulting in inclusion into or onto a matrix
ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b - Industrial use of reactive processing aids

**Remark**
Restricted to professional users.

**Recommended intended purpose(s)**
Surface hardening.
Refrigerant (R-717).
Basic substance.

### 1.3. Details of the supplier of the safety data sheet

**Manufacturer/distributor**
GHC Gerling, Holz & Co. Handels GmbH
Ruhrstraße 113, D-22761 Hamburg
Phone +49 40 853 123-0, Fax +49 40 853 123-66
E-Mail hamburg@ghc.de
Internet www.ghc.com

**Advice**
GHC Gerling, Holz & Co. Handels GmbH
Phone +49 40 853 123-0
Fax +49 40 853 123-66
E-mail (competent person):
msds@ghc.de

### 1.4. Emergency telephone number

**Emergency advice**
Medizinische Notfallauskunft bei Vergiftungen:
Giftinformationszentrum Mainz - 24 h
Phone +49 6131 19240

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

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

| Hazard classes and Hazard categories | Hazard Statements | Classification procedure |
|---|---|---|
| **Flam. Gas 2** | **H221** | |
| **Liquef. Gas** | **H280** | |
| **Acute Tox. 3** | **H331** | |
| **Skin Corr. 1B** | **H314** | |
| **Eye Dam. 1** | | |
| **Aquatic Acute 1** | **H400** | |
| **Aquatic Chronic 2** | **H411** | |

**Hazard statements for physical hazards**
**H221** **Flammable gas.**
**H280** **Contains gas under pressure; may explode if heated.**

**Hazard statements for health hazards**
**H314** **Causes severe skin burns and eye damage.**
**H331** **Toxic if inhaled.**

**Hazard statements for environmental hazards**
**H400** **Very toxic to aquatic life.**
**H411** **Toxic to aquatic life with long lasting effects.**

**2.2. Label elements**
**Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]**

**GHS05** **GHS06** **GHS09**

**Signal word**
**Danger**

**Hazard statements for physical hazards**
**H221** **Flammable gas.**
**H280** **Contains gas under pressure; may explode if heated.**

**Hazard statements for health hazards**
**H314** **Causes severe skin burns and eye damage.**
**H331** **Toxic if inhaled.**

**Hazard statements for environmental hazards**
**H400** **Very toxic to aquatic life.**
**H411** **Toxic to aquatic life with long lasting effects.**

**Precautionary Statements**

**Prevention**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260 Do not breathe gas/vapours.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

**Response**
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P315 Get immediate medical advice/attention.

**Storage**
P403 Store in a well-ventilated place.
P405 Store locked up.

**Hazardous ingredients for labeling**
ammonia, anhydrous

**Supplemental Hazard information (EU)**

**Health properties**
Corrosive to the respiratory tract.

**2.3. Other hazards**
**Information pertaining to special dangers for human and environment**
Can form explosive mixture with air.
Contact with liquid may cause cold burns/frostbite.

**Results of PBT and vPvB assessment**
This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

## SECTION 3: Composition/ information on ingredients

**3.1. Substances**
**Description**
Content: > 99 %

**CAS No 7664-41-7** **ammonia, anhydrous**
EC No 231-635-3
Index No 007-001-00-5
REACH registration number 01-2119488876-14

**3.2. Mixtures**
not applicable

## ! SECTION 4: First aid measures

**4.1. Description of first aid measures**
**General information**
Remove contaminated soaked clothing immediately.
Adhere to personal protective measures when giving first aid.
Seek medical treatment immediately.

**In case of inhalation**
Remove the casualty into fresh air and keep him immobile.
In case of breathing difficulties give oxygen.
In the event of pulmonary irritation treat initially with corticoid spray, e.g. Ventolair- or Pulmicort- metered-dose aerosol (Ventolair and Pulmicort are registrated trademarks).
No mouth-to-mouth resuscitation by first aid.
In case of respiratory standstill give artifical respiration by respiratory bag (Ambu bag) or respirator. Send for a doctor.

**In case of skin contact**
In case of contact with skin wash off immediately with plenty of water.
In case of frostbite rinse with plenty of water. Don`t remove clothing.
In case of frostbite spray with lukewarm (not hot) water for at least 15 minutes. Do not remove clothing frozen to the skin. Thaw it with lukewarm water. Apply a sterile dressing. Obtain medical assistance.

! **In case of eye contact**
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**In case of ingestion**
Ingestion is not considered a potential route of exposure.

**4.2. Most important symptoms and effects, both acute and delayed**
**Physician's information / possible symptoms**
Respiratory tract irritation
Coughing
Shortness of breath
Asthmatic complaints
Nausea
Tears.
Contact with liquid may cause cold burns/frostbite.

**Physician's information / possible dangers**
Risk of pulmonary oedema
Risk of pneumonia

**4.3. Indication of any immediate medical attention and special treatment needed**
**Treatment (Advice to doctor)**
Treat symptoms.
Pulmonary oedema prophylaxis.
Symptoms may not occur until several hours.

## ! SECTION 5: Firefighting measures

**5.1. Extinguishing media**
! **Suitable extinguishing media**
Dry powder
Carbon dioxide
Water spray jet

**Unsuitable extinguishing media**
Full water jet

**5.2. Special hazards arising from the substance or mixture**
In case of fire formation of dangerous gases possible.
Formation of explosive gas mixtures in air.
In the event of fire the following can be released:
Nitrogen oxides (NOx)

**5.3. Advice for firefighters**
**Special protective equipment for fire-fighters**
Use breathing apparatus with independent air supply ( isolated ).
Wear full protective clothing.

! **Additional information**
Cool endangered containers with water spray jet.
Exposure to fire may cause containers to rupture / explode.
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur.
Extinguish any other fire.
Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.
Collect contaminated firefighting water separately, must not be discharged into the drains.

## ! SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel**

Evacuate area.
Keep people away and stay on the upwind side.
Keep away sources of ignition.

! **For emergency responders**

Remove persons to safety.
Keep area evacuated and free from ignition sources until any spilled liquid has evaporated. (Ground free from frost).
Personal protection by wearing close-fitting protective clothing and breathing apparatus.

### 6.2. Environmental precautions

Collect contaminated water / firefighting water separately.
If possible, stop flow of product.
Do not discharge into the drains/surface waters/groundwater.
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.
If necessary, secure leaky pressure receptacles in a salvage packaging.
Suppress gases/vapours/mists with water spray jet
Do not discharge into the subsoil/soil.

### 6.3. Methods and material for containment and cleaning up

Ensure adequate air ventilation.
Allow to vaporise.
Flush away residues with water.

**Additional Information**

No water on the leaks.

### 6.4. Reference to other sections

Safe handling: see section 7
Disposal: see section 13
Personal protection equipment: see section 8

## ! SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

**Advice on safe handling**

Care for thoroughly room ventilation, if necessary use in well ventilated area with local exhaust ventilation at workplace.
Transfer and handle only in enclosed systems.
Containers' temperature may not be increased above 50 °C.
The working pressure in the receptacle must not exceed the saturation vapour pressure of the pure product resulting at a temperature of 50 °C.
Prevent cylinders from falling over.
Avoid release to the environment.
Ensure valve protection device is correctly fitted.
Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
Open valve slowly to avoid pressure shock.
Do not allow backfeed into the container.
Suck back of water into the container must be prevented.
No water to valves, flanges and other fittings.
Purging of pipes and valves with inert gases - to avoid: water, solvents.

**General protective measures**

Do not inhale vapours.
Do not inhale gases.

! **Hygiene measures**
At work do not eat, drink and smoke.
Wash hands before breaks and after work.

! **Advice on protection against fire and explosion**
Vapours can form an explosive mixture with air.
Because of risk of explosion avoid vapours getting into cellar, sewage system and holes.
Take precautionary measures against static discharges.
Pay attention to general rules of internal fire prevention.
Use explosion-proof equipment / fittings and non-sparking tools.

**7.2. Conditions for safe storage, including any incompatibilities**

! **Requirements for storage rooms and vessels**
Keep in closed original container.
Only use containers that are approved specifically for the substance/product.
Suitable materials: Normalised carbon steel, tempered alloy steel, aluminium alloys, austenitic stainless steels.
Valve: Suitable materials: Carbon steels, aluminium alloys, austenitic stainless steels.
Other material details see ISO 11114.
All regulations and local requirements for the storage of containers have to be respected.
Unsuitable materials: Brass, copper alloys.

**Advice on storage compatibility**
Do not store with acids.
Do not store together with spontaneously flammable materials.
Do not store together with combustible liquids or combustible solids.
Do not store together with animal feedstuffs.
Do not store together with explosives.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with toxic liquids or toxic solids.
Do not store together with food.
Do not store together with oxidizing liquids or oxidizing solids.

! **Further information on storage conditions**
Ensure valve protection device is correctly fitted.
Store only in original container at temperature of 50°C maximum (=122°F).
Keep container tightly closed and store at cool and aired place.
Keep locked up.
Protect from heat and direct solar radiation.

**7.3. Specific end use(s)**

! **Recommendation(s) for intended use**
See section 1.2
Exposure scenarios (ES) see annex to this safety data sheet.

## ! SECTION 8: Exposure controls/personal protection

**8.1. Control parameters**
**Ingredients with occupational exposure limits to be monitored**

| CAS No | Name | Code | [mg/m3] | [ppm] | Remark |
|---|---|---|---|---|---|
| 7664-41-7 | Ammonia, anhydrous | WEL, 8 hours | 18 | 25 | EH40/2005 |
| | | Short-term | 25 | 35 | |

**Indicative occupational exposure limit values (91/322/EEC, 2000/39/EC, 2004/37/EC, 2006/15/EC or 2009/161/EU)**

| CAS No | Name | Code | [mg/m3] | [ppm] | Remark |
|---|---|---|---|---|---|
| 7664-41-7 | ammonia, anhydrous | 8 hours | 14 | 20 | |
| | | Short-term | 36 | 50 | |

**DNEL-/PNEC-values**
**DNEL worker**

| CAS No | Substance name | Value | Code | Remark |
|---|---|---|---|---|
| 7664-41-7 | ammonia, anhydrous | 6,8 mg/kg bw/day | DNEL acute dermal, short-term (systemic) | Assessment factor 10 |
| | | 47,6 mg/m3 | DNEL long-term inhalative (systemic) | Assessment factor 10 |
| | | 6,8 mg/kg bw/day | DNEL long-term dermal (systemic) | Assessment factor 10 |
| | | 47,6 mg/m3 | DNEL acute inhalative (systemic) | Assessment factor 10 |
| | | 36 mg/m3 | DNEL acute inhalative (local) | |
| | | 14 mg/m3 | DNEL long-term inhalative (local) | |

**DNEL Consumer**

| CAS No | Substance name | Value | Code | Remark |
|---|---|---|---|---|
| 7664-41-7 | ammonia, anhydrous | 7,2 mg/m3 | DNEL acute inhalative (local) | Assessment factor 5 |
| | | 23,8 mg/m3 | DNEL acute inhalative (systemic) | Assessment factor 10 |
| | | 68 mg/kg bw/day | DNEL long-term dermal (systemic) | Assessment factor 10 |
| | | 68 mg/kg bw/day | DNEL acute dermal, short-term (systemic) | Assessment factor 10 |
| | | 2,8 mg/m3 | DNEL long-term inhalative (local) | Assessment factor 5 |
| | | 23,8 mg/m3 | DNEL long-term inhalative (systemic) | Assessment factor 10 |
| | | 6,8 mg/kg bw/day | DNEL short-term oral (acute) | Assessment factor 10 |
| | | 6,8 mg/kg bw/day | DNEL long-term oral (repeated) | Assessment factor 10 |

**PNEC**

| CAS No | Substance name | Value | Code | Remark |
|---|---|---|---|---|
| 7664-41-7 | ammonia, anhydrous | 0,001 mg/l | PNEC aquatic, freshwater | Assessment factor 20, Extrapolation |
| | | 0,007 mg/l | PNEC aquatic, intermittent release | Extrapolation |
| | | 0,001 mg/l | PNEC aquatic, marine water | Assessment factor 20, Extrapolation |

### 8.2. Exposure controls

! **Respiratory protection**
Short term: filter apparatus, filter K
Keep self contained breathing apparatus readily available for emergency use.
Respiratory protection complying with EN 136.

! **Hand protection**
Safety gloves according to EN 374.
Glove material specification [make/type, thickness, permeation time/life]: NBR; 0,4 mm; >= 30 min
Glove material specification [make/type, thickness, permeation time/life]: CR; 0,5 mm; >= 30 min
Glove material specification [make/type, thickness, permeation time/life]: IIR, >= 0,7 mm, > 480 min
Glove material specification [make/type, thickness, permeation time/life]: FKM, >= 0,7 mm, > 480 min

! **Eye protection**
Protective goggles according to EN 166, in case of increased risk add protective face shield.

**Other protection measures**
Safety shoes with steel toe.
Body covering work clothing, or chemical resistant suit at increased risk.

**Appropriate engineering controls**
Transfer and handle only in enclosed systems.

## ! SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

| Appearance | Colour | Odour |
|---|---|---|
| Gaseous / liquefied under pressure. | colourless, clear | pungent |

**Odour threshold**
5 ppm

**Important health, safety and environmental information**

| | Value | Temperature | at | Method | Remark |
|---|---|---|---|---|---|
| **pH value** | not applicable | | | | |
| **boiling point** | -33,4 °C | | 1013 hPa | | |
| **melting point** | -77,7 °C | | | | |
| **Flash point** | not applicable | | | | |
| **Vapourisation rate** | not determined | | | | |
| **Flammable (solid)** | not applicable | | | | |
| **Flammability (gas)** | inflammable | | | | |
| **Ignition temperature** | 651 °C | | | DIN 51794 | |
| **Self ignition temperature** | no | | | | |
| **Lower explosion limit** | 14 Vol-% | | | | |

| | Value | Temperature | at | Method | Remark |
|---|---|---|---|---|---|
| **Upper explosion limit** | 32,5 Vol-% | | | | |
| **Vapour pressure** | 8574 hPa | 20 °C | | | |
| **Relative density** | 0,7714 kg/m3 | 0 °C | 1013 mbar | | |
| **Vapour density** | 0,6 | 20 °C | | | Air = 1. |
| **Solubility in water** | 541 g/l | 20 °C | | | |
| **Solubility/other** | not determined | | | | |
| **Partition coefficient n-octanol/water (log P O/W)** | not determined | | | | |
| **Decomposition temperature** | not determined | | | | |
| **Viscosity** | not applicable | | | | |

**Oxidising properties**
no

**Explosive properties**
no

**9.2. Other information**
No information available.

## ! SECTION 10: Stability and reactivity

**10.1. Reactivity**
See section "Possibility of hazardous reactions".

**10.2. Chemical stability**
Stable under recommended conditions of use and storage (see section 7).

**10.3. Possibility of hazardous reactions**
May react violently with oxidants.
Reactions with acids.
Reactions with halogenated compounds.
Addition of water leads to increase in temperature.
Corrodes copper and its alloys.

**10.4. Conditions to avoid**
Formation of explosive gas/air mixtures.
Heat sources / heat - risk of bursting.
Sources of ignition.
Avoid contact with open flames, glowing metal surfaces, etc..

### 10.5. Incompatible materials

! **Substances to avoid**

Chlorine
Sulphur dioxide (SO2)
Sulphur
hydrogen sulphide (H2S)
Nitrogen oxides (NOx)
hydrogen peroxide
Copper, brass and other copper alloys.
Acids.
Oxidants.

### 10.6. Hazardous decomposition products

When handled and stored appropriately, no dangerous decomposition products are known.

## ! SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

**Acute toxicity/Irritation/Sensitization**

| | Value/Validation | Species | Method | Remark |
|---|---|---|---|---|
| **LD50 acute oral** | 350 mg/kg | rat (male) | OECD 401 | Aqueous solution. |
| **LD50 acute dermal** | Study scientifically not necessary. | | | |
| **LC50 acute inhalation** | 9850 mg/m3 (1 h) | rat (male) | | |
| **Skin irritation** | corrosive | rabbit | OECD 404 | An aqueous solution was tested. |
| **Eye irritation** | risk of strong eye injuries | | | |
| **Skin sensitization** | Study scientifically not necessary. | | | |
| **Sensitization respiratory system** | Study scientifically not necessary. | | | |

**Subacute Toxicity - Carcinogenicity**

| | Value | Species | Method | Validation |
|---|---|---|---|---|
| **Subchronic Toxicity** | NOAEC 35 mg/m3 (50 d)<br>Inhalation | Rat | | |
| **Mutagenicity** | | | OECD 471 / $74 | No experimental information on genotoxicity in vitro and in vivo available. |

| | Value | Species | Method | Validation |
|---|---|---|---|---|
| **Reproduction-Toxicity** | NOAEL 408 mg/kg | Rat | OECD TG 422 | Indications of toxic effects are available from reproduction studies in animals. |
| **Carcinogenicity** | NOAEL 67 mg/kg (2 a)<br>Oral. | Rat | OECD 453 | No indications of carcinogenic effects are available from long-term trials. |

**Specific target organ toxicity (single exposure)**
Substance or mixture is not classified in GHS-criteria as specific target organ toxic with single exposure.

**Specific target organ toxicity (repeated exposure)**
Substance or mixture is not classified in GHS-criteria as specific target organ toxic with repeated exposure.

**Aspiration hazard**
not applicable

! **Experiences made from practice**
Corrosive effect on skin and eyes.
May cause frostbite.
Irritates respiratory tract.

## ! SECTION 12: Ecological information

### 12.1. Toxicity

**Ecotoxicological effects**

| | Value | Species | Method | Validation |
|---|---|---|---|---|
| **Fish** | LC50 0,068 mg/l (96 h) | Oncorhynchus mykiss | | |
| **Daphnia** | EC50 101 mg/l (48 h) | Daphnia magna | | |
| **Algae** | EC50 2700 mg/l (18 d) | Chlorella vulgaris | | |

### 12.2. Persistence and degradability

| | Elimination rate | Method of analysis | Method | Validation |
|---|---|---|---|---|
| **Biological degradability** | The product is biodegradable. | | | |

### 12.3. Bioaccumulative potential
Does not bioaccumulate.
Because of the n-octanol/water distribution coefficient (log K o/w) accumulation in organisms is not expected.

### 12.4. Mobility in soil
High mobility

### 12.5. Results of PBT and vPvB assessment
This substance does not meet the PBT/vPvB criteria of REACH, annex XIII.

### 12.6. Other adverse effects
**General regulation**
Avoid release to the environment.
Product is not allowed to be discharged into aquatic environment.

## SECTION 13: Disposal considerations

**13.1. Waste treatment methods**

| Waste code No. | Name of waste |
|---|---|
| 16 05 04* | gases in pressure containers (including halons) containing hazardous substances |

Wastes marked with an asterisk are considered to be hazardous waste pursuant to Directive 2008/98/EC on hazardous waste.

**Recommendations for the product**
Dispose of as hazardous waste.
Return to manufacturer.

**Recommendations for packaging**
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

**General information**
Operators of stationary equipment shall be responsible for putting in place arrangements for the proper recovery.

## SECTION 14: Transport information

| | ADR/RID | IMDG | IATA-DGR |
|---|---|---|---|
| **14.1. UN number** | 1005 | 1005 | 1005 |
| **14.2. UN proper shipping name** | AMMONIA, ANHYDROUS | AMMONIA, ANHYDROUS | Ammonia, anhydrous |
| **14.3. Transport hazard class(es)** | 2.3 (8) | 2.3 (8) | 2.3 (8) |
| **14.4. Packing group** | - | - | - |
| **14.5. Environmental hazards** | Yes | Yes | Yes |

**14.6. Special precautions for user**
The protective measures listed in Sections 6, 7 and 8 of the Safety Data Sheet have to be considered.

**14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**
not applicable
No transport as bulk according IBC - Code.

**Land and inland navigation transport ADR/RID**
Hazard label(s) 2.3+8
tunnel restriction code C/D
Classification code 2TC

**Marine transport IMDG**
MARINE POLLUTANT
Ems: F-C, S-U

**Air transport ICAO/IATA-DGR**
FORBIDDEN

## SECTION 15: Regulatory information

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

**Other regulations (EU)**

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Annex XVII No 40.
Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.

### 15.2. Chemical Safety Assessment

For this substance a chemical safety assessment has been carried out.
Exposure scenarios (ES) see annex to this safety data sheet.

## SECTION 16: Other information

**Recommended uses and restrictions**

National and local regulations concerning chemicals shall be observed.

**Further information**

All declarations of safety-data-sheet refer to pure substance.
The information contained herein is based on the state of our knowledge. It characterizes the product with regard to the appropriate safety precautions. It does not represent a guarantee of the properties of the product.

Indication of changes: "!" = Data changed compared with the previous version. Previous version: 16.1

**Sources of key data used**

For the preparation of this safety data sheet, information from our suppliers as well as data from the "database of registered substances" of the European Chemicals Agency (ECHA) were used.

# Appendix exposure scenarios
# Exposure Scenario 1

## Section 1 — Title

| | | |
|---|---|---|
| **Short title of the exposure scenario** | : | Yara - ammonia, anhydrous - Distribution, Formulation |
| **Identified use name** | : | Industrial distribution.<br>Industrial USE to formulate chemical product mixtures. |
| **Substance supplied to that use in form of** | : | As such |

**List of use descriptors**

| | | |
|---|---|---|
| **Process Category** | : | PROC01, PROC02, PROC03, PROC05, PROC08a, PROC08b, PROC09, PROC15 |
| **Environmental Release Category** | : | ERC02 |
| **Market sector by type of chemical product** | : | PC01, PC09a, PC12, PC16, PC18, PC19, PC20, PC21, PC26, PC29, PC30, PC34, PC35, PC37, PC39, PC40 |
| **Subsequent service life relevant for that use** | : | No. |

| | | |
|---|---|---|
| **Number of the ES** | : | 02686-1/2013-11-18 |

## Section 2 — Exposure controls

**Contributing exposure scenario controlling environmental exposure for:**

| | | |
|---|---|---|
| **Product Characteristics** | : | Refrigerated liquefied gas |
| **Concentration of substance in mixture or article** | : | <= 100 % |
| **Amounts used** | : | Annual site tonnage 1000000 |
| **Environmental factors not influenced by risk management** | : | Flow rate of receiving surface water (m3/d): 20.000<br>Local freshwater dilution factor10<br>Local marine water dilution factor 10 |
| **Emission days (days/year)** | | 330 |
| **Release fraction to air from process (initial release prior to RMM)** | | **ERC02:** 2,5 % |
| **Release fraction to wastewater from process (initial release prior to RMM)** | | **ERC02:** 2 % |
| **Risk management measures - Water** | : | Waste water treatment:<br>Treatment effectiveness 99,9 % |

| | | |
|---|---|---|
| **Conditions and measures related to municipal sewage treatment plant** | : | Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. |
| **Suitable waste treatment** | : | Biological nitrogen elimination |

**Contributing exposure scenario controlling worker exposure for:**

| | | |
|---|---|---|
| **Product Characteristics** | : | Gas. |
| **Concentration of substance in mixture or article** | : | <= 100 % |
| **Physical state** | : | Gas.<br>Liquefied gas. |
| **Amounts used** | : | Maximum daily site tonnage 3.000.000 kg |
| **Frequency and duration of use** | : | Unless otherwise stated<br>Use duration (h/d): > 4 |
| **Area of use:** | : | Indoor, Outdoor |
| **Ventilation control measures** | : | Contributing Scenario: **PROC02, PROC03, PROC08b, PROC15**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC05, PROC08a, PROC09**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC01**<br>No special ventilation requirements. |

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

| | | |
|---|---|---|
| **Personal protection** | : | Causes severe skin burns and eye damage., Wear protective gloves/clothing and eye/face protection.<br>Treatment effectiveness > 90 %<br>See Section 8 of the safety data sheet (personal protective equipment). |
| **Respiratory protection** | : | Contributing Scenario: **PROC02, PROC03, PROC08b, PROC15**<br>In case of inadequate ventilation wear respiratory protection:,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC05, PROC08a, PROC09**<br>< 4 hours:, In case of inadequate ventilation wear respiratory protection., > 4 hours:, Wear appropriate respiratory protection.,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC01**<br>No personal respiratory protective equipment normally required. |

## Section 3 — Exposure estimation and reference to its source

**Website:** : Environment:, EUSES v2.1, http://ihcp.jrc.ec.europa.eu/our_activities/public-health/risk_assessment_of_Biocides/euses
Workers:, ECETOC TRA v2.0 Worker, http://www.ecetoc.org/

**Exposure estimation and reference to its source - Environment:**

**Exposure assessment (environment):** : Used EUSES model.

**Exposure estimation** : See Section 8 in SDS, PNEC.
Predicted exposures are not expected to exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

**Exposure estimation and reference to its source - Workers:**

**Exposure assessment (human):** : Used ECETOC TRA model.

**Exposure estimation** : See Section 8 in SDS, DNEL.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

## Section 4 — Guidance to Downstream User to evaluate if he works inside the boundaries set by the ES

**Environment** : 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, EUSES v2.1

**Health** : Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures., For scaling, see, ECETOC TRA.

## Abbreviations and acronyms

**Process Category** : PROC01 - Use in closed process, no likelihood of exposure
PROC02 - Use in closed, continuous process with occasional controlled exposure
PROC03 - Use in closed batch process (synthesis or formulation)
PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15 - Use a laboratory reagent

**Environmental Release** : ERC02 - Formulation of preparations

| | | |
|---|---|---|
| **Category** | | |
| **Market sector by type of chemical product** | : | PC01 - Adhesives, sealants<br>PC09a - Coatings and paints, thinners, paint removers<br>PC12 - Fertilizers<br>PC16 - Heat transfer fluids<br>PC18 - Ink and toners<br>PC19 - Intermediate<br>PC20 - Products such as ph-regulators, flocculants, precipitants, neutralization agents<br>PC21 - Laboratory chemicals<br>PC26 - Paper and board dye, finishing and impregnation products: including bleaches and other processing aids<br>PC29 - Pharmaceuticals<br>PC30 - Photo-chemicals<br>PC34 - Textile dyes, finishing and impregnating products; including bleaches and other processing aids<br>PC35 - Washing and cleaning products (including solvent based products)<br>PC37 - Water treatment chemicals<br>PC39 - Cosmetics, personal care products<br>PC40 - Extraction agents |

# Appendix exposure scenarios
# Exposure Scenario 2

## Section 1 — Title

| | | |
|---|---|---|
| **Short title of the exposure scenario** | : | Yara - ammonia, anhydrous - Industrial |
| **Identified use name** | : | Industrial Use for flue gas NOx and SOx reduction.<br>Industrial USE as reactive agent/processing aid and for general chemical applications.<br>Industrial USE as heat transfer fluid.<br>Industrial USE as chemical/process nutrient.<br>Industrial USE for surface/article treatment.<br>Industrial USE to manufacture specialist chemical/other products.<br>Industrial USE as part of specialist chemicals/other products . |
| **Substance supplied to that use in form of** | : | As such |

**List of use descriptors**

| | | |
|---|---|---|
| **Process Category** | : | PROC01, PROC02, PROC03, PROC04, PROC05, PROC08b, PROC09, PROC13 |
| **Environmental Release Category** | : | ERC04, ERC05, ERC06b, ERC07 |
| **Market sector by type of chemical product** | : | PC01, PC09a, PC14, PC15, PC16, PC20, PC26, PC29, PC30, PC34, PC35, PC37, PC39, PC40 |
| **Sector of end use** | : | SU04, SU05, SU06a, SU06b, SU08, SU09, SU11, SU12, SU13, SU15, SU16, SU23, SU 0: Other: NACE B, SU 0: Other: NACE C, SU 0: Other: NACE C28.2 |
| **Subsequent service life relevant for that use** | : | No. |

| | | |
|---|---|---|
| **Number of the ES** | : | 02687-1/2013-11-20 |

## Section 2 — Exposure controls

**Contributing exposure scenario controlling environmental exposure for:**

| | | |
|---|---|---|
| **Product Characteristics** | : | Refrigerated liquefied gas |
| **Concentration of substance in mixture or article** | : | <= 100 % |
| **Amounts used** | : | Annual site tonnage 25000 |
| **Environmental factors not influenced by risk management** | : | Flow rate of receiving surface water (m3/d): 20.000<br>Local freshwater dilution factor10<br>Local marine water dilution factor 10 |
| **Emission days (days/year)** | | 330 |
| **Release fraction to air from process (initial release prior** | | **ERC04:** 95 %<br>**ERC05:** 50 % |

| | | |
|---|---|---|
| **to RMM)** | | **ERC06b:** 0,1 %<br>**ERC07:** 5 % |
| **Release fraction to wastewater from process (initial release prior to RMM)** | | **ERC04:** 100 %<br>**ERC05:** 50 %<br>**ERC06b:** 5 %<br>**ERC07:** 5 % |
| **Risk management measures - Water** | : | Waste water treatment:<br>Treatment effectiveness 99,9 % |
| **Conditions and measures related to municipal sewage treatment plant** | : | Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. |
| **Suitable waste treatment** | : | Biological nitrogen elimination |

**Contributing exposure scenario controlling worker exposure for:**

| | | |
|---|---|---|
| **Product Characteristics** | : | Gas. |
| **Concentration of substance in mixture or article** | : | <= 100 % |
| **Physical state** | : | Gas.<br>Liquefied gas. |
| **Frequency and duration of use** | : | Unless otherwise stated<br>Use duration (h/d): > 4 |
| **Area of use:** | : | Indoor, Outdoor |
| **Ventilation control measures** | : | Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC05, PROC09, PROC13**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC01**<br>No special ventilation requirements. |

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

| | | |
|---|---|---|
| **Personal protection** | : | Causes severe skin burns and eye damage., Wear protective gloves/clothing and eye/face protection.<br>Treatment effectiveness > 90 %<br>See Section 8 of the safety data sheet (personal protective equipment). |
| **Respiratory protection** | : | Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b**<br>In case of inadequate ventilation wear respiratory protection:,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC05, PROC09, PROC13** |

< 4 hours:, In case of inadequate ventilation wear respiratory protection., > 4 hours:, Wear appropriate respiratory protection., Treatment effectiveness > 95 %

Contributing Scenario: **PROC01**
No personal respiratory protective equipment normally required.

## Section 3 — Exposure estimation and reference to its source

**Website:** : Environment:, EUSES v2.1, http://ihcp.jrc.ec.europa.eu/our_activities/public-health/risk_assessment_of_Biocides/euses
Workers:, ECETOC TRA v2.0 Worker, http://www.ecetoc.org/

**Exposure estimation and reference to its source - Environment:**

**Exposure assessment (environment):** : Used EUSES model.

**Exposure estimation** : See Section 8 in SDS, PNEC.
Predicted exposures are not expected to exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

**Exposure estimation and reference to its source - Workers:**

**Exposure assessment (human):** : Used ECETOC TRA model.

**Exposure estimation** : See Section 8 in SDS, DNEL.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

## Section 4 — Guidance to Downstream User to evaluate if he works inside the boundaries set by the ES

**Environment** : 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, EUSES v2.1

**Health** : Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures., For scaling, see, ECETOC TRA.

## Abbreviations and acronyms

**Process Category** : PROC01 - Use in closed process, no likelihood of exposure
PROC02 - Use in closed, continuous process with occasional controlled exposure
PROC03 - Use in closed batch process (synthesis or formulation)
PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC08b - Transfer of substance or preparation

| | | |
|---|---|---|
| | | (charging/discharging) from/to vessels/large containers at dedicated facilities<br>PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)<br>PROC13 - Treatment of articles by dipping and pouring |
| **Environmental Release Category** | : | ERC04 - Industrial use of processing aids in processes and products, not becoming part of articles<br>ERC05 - Industrial use resulting in inclusion into or onto a matrix<br>ERC06b - Industrial use of reactive processing aids<br>ERC07 - Industrial use of substances in closed systems |
| **Market sector by type of chemical product** | : | PC01 - Adhesives, sealants<br>PC09a - Coatings and paints, thinners, paint removers<br>PC14 - Metal surface treatment products, including galvanic and electroplating products<br>PC15 - Non-metal surface treatment products<br>PC16 - Heat transfer fluids<br>PC20 - Products such as ph-regulators, flocculants, precipitants, neutralization agents<br>PC26 - Paper and board dye, finishing and impregnation products: including bleaches and other processing aids<br>PC29 - Pharmaceuticals<br>PC30 - Photo-chemicals<br>PC34 - Textile dyes, finishing and impregnating products; including bleaches and other processing aids<br>PC35 - Washing and cleaning products (including solvent based products)<br>PC37 - Water treatment chemicals<br>PC39 - Cosmetics, personal care products<br>PC40 - Extraction agents |
| **Sector of end use** | : | SU04 - Manufacture of food products<br>SU05 - Manufacture of textiles, leather, fur<br>SU06a - Manufacture of wood and wood products<br>SU06b - Manufacture of pulp, paper and paper products<br>SU08 - Manufacture of bulk, large scale chemicals (including petroleum products)<br>SU09 - Manufacture of fine chemicals<br>SU11 - Manufacture of rubber products<br>SU12 - Manufacture of plastics products, including compounding and conversion<br>SU13 - Manufacture of other non-metallic mineral products, e.g. plasters, cement<br>SU15 - Manufacture of fabricated metal products, except machinery and equipment<br>SU16 - Manufacture of computer, electronic and optical products, electrical equipment<br>SU23 - Electricity, steam, gas water supply and sewage treatment<br>SU 0: Other: NACE B - Mining and quarrying<br>SU 0: Other: NACE C - Manufacturing<br>SU 0: Other: NACE C28.2 - Manufacture of other general-purpose machinery |

# Appendix exposure scenarios
# Exposure Scenario 3

## Section 1 — Title

| | | |
|---|---|---|
| **Short title of the exposure scenario** | : | Yara - ammonia, anhydrous - Industrial, Use as an intermediate |
| **Identified use name** | : | Industrial USE as chemical intermediate. |
| **Substance supplied to that use in form of** | : | As such |

**List of use descriptors**

| | | |
|---|---|---|
| **Process Category** | : | PROC01, PROC02, PROC03, PROC04, PROC05, PROC08b, PROC09, PROC15 |
| **Environmental Release Category** | : | ERC06a |
| **Market sector by type of chemical product** | : | PC19 |
| **Sector of end use** | : | SU01, SU05, SU08, SU09, SU12, SU24, SU 0: Other: NACE C21 |
| **Subsequent service life relevant for that use** | : | No. |

| | | |
|---|---|---|
| **Number of the ES** | : | 02719-1/2013-11-25 |

## Section 2 — Exposure controls

**Contributing exposure scenario controlling environmental exposure for:**

| | | |
|---|---|---|
| **Product Characteristics** | : | Refrigerated liquefied gas |
| **Concentration of substance in mixture or article** | : | <= 100 % |
| **Amounts used** | : | Annual site tonnage 800000 |
| **Environmental factors not influenced by risk management** | : | Flow rate of receiving surface water (m3/d): 20.000<br>Local freshwater dilution factor10<br>Local marine water dilution factor 10 |
| **Emission days (days/year)** | | 330 |
| **Release fraction to air from process (initial release prior to RMM)** | | **ERC06a:** 5 % |
| **Release fraction to wastewater from process (initial release prior to RMM)** | | **ERC06a:** 2 % |
| **Risk management measures - Water** | : | Waste water treatment:<br>Treatment effectiveness 99,9 % |

| | | |
|---|---|---|
| **Conditions and measures related to municipal sewage treatment plant** | : | Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments. |
| **Suitable waste treatment** | : | Biological nitrogen elimination |

**Contributing exposure scenario controlling worker exposure for:**

| | | |
|---|---|---|
| **Product Characteristics** | : | Gas. |
| **Concentration of substance in mixture or article** | : | <= 100 % |
| **Physical state** | : | Gas.<br>Liquefied gas. |
| **Frequency and duration of use** | : | Unless otherwise stated<br>Use duration (h/d): > 4 |
| **Area of use:** | : | Indoor, Outdoor |
| **Ventilation control measures** | : | Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC05, PROC09**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC01**<br>No special ventilation requirements. |

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

| | | |
|---|---|---|
| **Personal protection** | : | Causes severe skin burns and eye damage., Wear protective gloves/clothing and eye/face protection.<br>Treatment effectiveness > 90 %<br>See Section 8 of the safety data sheet (personal protective equipment). |
| **Respiratory protection** | : | Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15**<br>In case of inadequate ventilation wear respiratory protection:,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC05, PROC09**<br>< 4 hours:, In case of inadequate ventilation wear respiratory protection., > 4 hours:, Wear appropriate respiratory protection.,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC01**<br>No personal respiratory protective equipment normally required. |

## Section 3 — Exposure estimation and reference to its source

**Website:** : Environment:, EUSES v2.1, http://ihcp.jrc.ec.europa.eu/our_activities/public-health/risk_assessment_of_Biocides/euses
Workers:, ECETOC TRA v2.0 Worker, http://www.ecetoc.org/

**Exposure estimation and reference to its source - Environment:**

**Exposure assessment (environment):** : Used EUSES model.

**Exposure estimation** : See Section 8 in SDS, PNEC.
Predicted exposures are not expected to exceed the PNEC when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

**Exposure estimation and reference to its source - Workers:**

**Exposure assessment (human):** : Used ECETOC TRA model.

**Exposure estimation** : See Section 8 in SDS, DNEL.
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

## Section 4 — Guidance to Downstream User to evaluate if he works inside the boundaries set by the ES

**Environment** : 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, EUSES v2.1

**Health** : Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures., For scaling, see, ECETOC TRA.

## Abbreviations and acronyms

**Process Category** : PROC01 - Use in closed process, no likelihood of exposure
PROC02 - Use in closed, continuous process with occasional controlled exposure
PROC03 - Use in closed batch process (synthesis or formulation)
PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises
PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)
PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC15 - Use a laboratory reagent

**Environmental Release Category** : ERC06a - Industrial use resulting in manufacture of another substance (use of intermediates)

| | | |
|---|---|---|
| **Market sector by type of chemical product** | : | PC19 - Intermediate |
| **Sector of end use** | : | SU01 - Agriculture, forestry, fishery<br>SU05 - Manufacture of textiles, leather, fur<br>SU08 - Manufacture of bulk, large scale chemicals (including petroleum products)<br>SU09 - Manufacture of fine chemicals<br>SU12 - Manufacture of plastics products, including compounding and conversion<br>SU24 - Scientific research and development<br>SU 0: Other: NACE C21 - Manufacture of basic pharmaceutical products and pharmaceutical preparations |

# Appendix exposure scenarios
# Exposure Scenario 4

## Section 1 — Title

**Short title of the exposure scenario** : Yara - ammonia, anhydrous - Professional, Industrial

**Identified use name** : Professional formulation of mixtures.
Professional USE as chemical/process nutrient.
Professional USE as reactive agent/processing aid and for general chemical applications.
Professional USE as a laboratory/research chemical.
Professional USE as heat transfer fluid.
Professional USE for surface/article treatment.
Professional USE as part of specialist chemicals/other products.
Professional USE as photochemical.

**Substance supplied to that use in form of** : As such

**List of use descriptors**

**Process Category** : PROC01, PROC02, PROC03, PROC04, PROC05, PROC08a, PROC08b, PROC09, PROC13, PROC15, PROC20

**Environmental Release Category** : ERC08b, ERC08e, ERC09a, ERC09b

**Market sector by type of chemical product** : PC09a, PC12, PC14, PC15, PC16, PC19, PC20, PC21, PC29, PC30, PC34, PC35, PC37, PC40

**Sector of end use** : SU01, SU04, SU05, SU06a, SU06b, SU09, SU10, SU11, SU12, SU15, SU16, SU17, SU23, SU24, SU 0: Other: NACE B, SU 0: Other: NACE C, SU 0: Other: NACE C28.2

**Subsequent service life relevant for that use** : No.

**Number of the ES** : 02688-1/2013-11-20

## Section 2 — Exposure controls

**Contributing exposure scenario controlling environmental exposure for: All**
Contains substances occurring naturally in surface waters., No exposure assessment presented for the environment., Not applicable for wide dispersive uses

**Contributing exposure scenario controlling worker exposure for:**

**Product Characteristics** : Gas.

**Concentration of substance in mixture or article** : <= 100 %

**Physical state** : Gas.
Liquefied gas.

**Frequency and duration of** : Unless otherwise stated

| | | |
|---|---|---|
| **use** | | Use duration (h/d): > 4 |
| **area of use** | : | Indoor, Outdoor |
| **Ventilation control measures** | : | Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15, PROC20**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC05, PROC08a, PROC09, PROC13**<br>Local exhaust ventilation should be provided.<br>Treatment effectiveness > 90 %<br><br>Contributing Scenario: **PROC01**<br>No special ventilation requirements. |
| **Conditions and measures related to personal protection, hygiene and health evaluation** | | |
| **Personal protection** | : | Causes severe skin burns and eye damage., Wear protective gloves/clothing and eye/face protection.<br>Treatment effectiveness > 90 %<br>See Section 8 of the safety data sheet (personal protective equipment). |
| **Respiratory protection** | : | Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15, PROC20**<br>In case of inadequate ventilation wear respiratory protection:,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC05, PROC08a, PROC09, PROC13**<br>< 4 hours:, In case of inadequate ventilation wear respiratory protection., > 4 hours:, Wear appropriate respiratory protection.,<br>Treatment effectiveness > 95 %<br><br>Contributing Scenario: **PROC01**<br>No personal respiratory protective equipment normally required. |

## Section 3 — Exposure estimation and reference to its source

| | | |
|---|---|---|
| **Website:** | : | Workers:, ECETOC TRA v2.0 Worker, http://www.ecetoc.org/ |

| | | |
|---|---|---|
| **Exposure estimation and reference to its source - Workers:** | | |
| **Exposure assessment (human):** | : | Used ECETOC TRA model. |
| **Exposure estimation** | : | See Section 8 in SDS, DNEL.<br>Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. |

## Section 4 — Guidance to Downstream User to evaluate if he works inside the boundaries set by the ES

| | | |
|---|---|---|
| **Environment** | : | Not applicable. |

| | | |
|---|---|---|
| **Health** | : | Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures., For scaling, see, ECETOC TRA. |

## Abbreviations and acronyms

| | | |
|---|---|---|
| **Process Category** | : | PROC01 - Use in closed process, no likelihood of exposure<br>PROC02 - Use in closed, continuous process with occasional controlled exposure<br>PROC03 - Use in closed batch process (synthesis or formulation)<br>PROC04 - Use in batch and other process (synthesis) where opportunity for exposure arises<br>PROC05 - Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)<br>PROC08a - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities<br>PROC08b - Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities<br>PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing)<br>PROC13 - Treatment of articles by dipping and pouring<br>PROC15 - Use a laboratory reagent<br>PROC20 - Heat and pressure transfer fluids in dispersive use but closed systems |
| **Environmental Release Category** | : | ERC08b - Wide dispersive indoor use of reactive substances in open systems<br>ERC08e - Wide dispersive outdoor use of reactive substances in open systems<br>ERC09a - Wide dispersive indoor use of substances in closed systems<br>ERC09b - Wide dispersive outdoor use of substances in closed systems |
| **Market sector by type of chemical product** | : | PC09a - Coatings and paints, thinners, paint removers<br>PC12 - Fertilizers<br>PC14 - Metal surface treatment products, including galvanic and electroplating products<br>PC15 - Non-metal surface treatment products<br>PC16 - Heat transfer fluids<br>PC19 - Intermediate<br>PC20 - Products such as ph-regulators, flocculants, precipitants, neutralization agents<br>PC21 - Laboratory chemicals<br>PC29 - Pharmaceuticals<br>PC30 - Photo-chemicals<br>PC34 - Textile dyes, finishing and impregnating products; including bleaches and other processing aids<br>PC35 - Washing and cleaning products (including solvent based products)<br>PC37 - Water treatment chemicals<br>PC40 - Extraction agents |
| **Sector of end use** | : | SU01 - Agriculture, forestry, fishery<br>SU04 - Manufacture of food products |

| | |
|---|---|
| | SU05 - Manufacture of textiles, leather, fur<br>SU06a - Manufacture of wood and wood products<br>SU06b - Manufacture of pulp, paper and paper products<br>SU09 - Manufacture of fine chemicals<br>SU10 - Formulation [mixing] of preparations and/or re-packaging (excluding alloys)<br>SU11 - Manufacture of rubber products<br>SU12 - Manufacture of plastics products, including compounding and conversion<br>SU15 - Manufacture of fabricated metal products, except machinery and equipment<br>SU16 - Manufacture of computer, electronic and optical products, electrical equipment<br>SU17 - General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment<br>SU23 - Electricity, steam, gas water supply and sewage treatment<br>SU24 - Scientific research and development<br>SU 0: Other: NACE B - Mining and quarrying<br>SU 0: Other: NACE C - Manufacturing<br>SU 0: Other: NACE C28.2 - Manufacture of other general-purpose machinery |