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

1.1 Product identifier

Trade name/designation	Ammonia
Art-Nr(n).	0100-0107, 70010
Substance name	ammonia, anhydrous
INDEX No.	007-001-00-5
EC No.	231-635-3
REACH No.	01-2119488876-14
CAS No.	7664-41-7

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

Sector of uses [SU]
SU0 Other
SU1 Agriculture, forestry, fishery
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
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

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
PROC8b Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
PROC9 Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
PROC13 Treatment of articles by dipping and pouring
PROC15 Use as laboratory reagent
PROC20 Use of functional fluids in small devices

Environmental release categories [ERC]
ERC2 Formulation into mixture
ERC4 Industrial use of processing aids in processes and products, not becoming part of articles
ERC5 Use at industrial site leading to inclusion into/onto article
ERC6a Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b Industrial use of reactive processing aids
ERC7 Use of functional fluid at industrial site
ERC8b Widespread use of reactive processing aid (no inclusion into or onto article, indoor)
ERC8e Widespread use of reactive processing aid (no inclusion into or onto article, outdoor)
ERC9a Widespread use of functional fluid (indoor)
ERC9b Widespread use of functional fluid (outdoor)

Product Categories [PC]
PC1 Adhesives, sealants
PC9a Coatings and paints, thinners, paint removers
PC12 Fertilizers
PC14 Metal surface treatment products
PC15 Non-metal-surface treatment products
PC16 Heat transfer fluids
PC18 Ink and toners
PC19 Intermediate (precursor)
PC20 Processing aids such as pH-regulators, flocculants, precipitants, neutralization agents
PC21 Laboratory chemicals
PC26 Paper and board treatment products
PC29 Pharmaceuticals
PC30 Photo-chemicals
PC34 Textile dyes, and impregnating products
PC35 Washing and cleaning products
PC37 Water treatment chemicals
PC39 Cosmetics, personal care products
PC40 Extraction agents

1.3 Details of the supplier of the safety data sheet

Supplier
GHC Gerling, Holz & Co. Handels GmbH
Ruhrstraße 113
D-22761 Hamburg
Telephone +49 40 853 123 0
E-mail hamburg@ghc.de
Website www.ghc.com

Department responsible for information:
GHC Gerling, Holz & Co. Handels GmbH
Telephone +49 40 853 123 0

E-mail (competent person):
msds@ghc.de

* 1.4 Emergency telephone number

EN: Poison Information Center Mainz +49 6131 19240

* SECTION 2: Hazards identification

* 2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 [CLP]	Classification procedure
Flam. Gas 2, H221	
Press. Gas (Liq.), H280	
Acute Tox. 3, H331	
Skin Corr. 1B, H314	
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]**

Hazard pictograms

GHS05 GHS06 GHS09

Signal word
Danger

Hazard statements
H221 Flammable gas.
H280 Contains gas under pressure; may explode if heated.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.
H410 Very toxic to aquatic life with long lasting effects.

* **Precautionary statements**
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 and eye protection/face protection.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P310 Immediately call a POISON CENTER/doctor.
P403 Store in a well-ventilated place.
P405 Store locked up.

Supplemental hazard information
EUH071 Corrosive to the respiratory tract.

* **2.3 Other hazards**

* **Adverse human health effects and symptoms**
Contact with liquid may cause cold burns/frostbite.

* **Other adverse effects**
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

* **Results of PBT and vPvB assessment**
The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

* SECTION 3: Composition / information on ingredients

* **3.1 Substances**

Substance name	ammonia, anhydrous
INDEX No.	007-001-00-5
EC No.	231-635-3
REACH No.	01-2119488876-14
CAS No.	7664-41-7
ATE	ATE(inhalation gas): 9850 mg/m³

Additional information
Content: > 99 %

3.2 Mixtures

not applicable

* SECTION 4: First aid measures

* 4.1 Description of first aid measures

* **General information**
Remove contaminated, saturated clothing immediately.
First aider: Pay attention to self-protection!
Call a physician immediately.

* **Following inhalation**
Remove casualty to fresh air and keep warm and at rest.
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).
In case of respiratory standstill give artificial respiration by respiratory bag (Ambu bag) or respirator. Obtain medical assistance.

* **Following skin contact**
In case of skin contact rinse with warm water.
In case of frostbite, wash with plenty of water; do not remove clothing.
In case of frostbite rinse with lukewarm (not hot) water for at least 15 minutes. Do not remove clothing frozen to the skin.
Thaw with lukewarm water. Apply a sterile dressing. Obtain medical assistance.

After eye contact
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical assistance.

Following ingestion
Ingestion is not considered a potential route of exposure.

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

* **Symptoms**
Dyspnoea
Asthmatic complaints
Cough
Nausea

Effects
Pulmonary oedema
Pneumonia

* 4.3 Indication of any immediate medical attention and special treatment needed

* **Notes for the doctor**
Treat symptomatically.
Pulmonary oedema prophylaxis.
To supervise the blood circulation.

* SECTION 5: Firefighting measures

* 5.1 Extinguishing media

* **Suitable extinguishing media**
Extinguishing powder
Foam
Water spray jet

* **Unsuitable extinguishing media**
Carbon dioxide (CO_2)
Full water jet

* 5.2 Special hazards arising from the substance or mixture

* **Hazardous combustion products**
In case of fire formation of dangerous gases possible.
Nitrogen oxides (NOx)

* 5.3 Advice for firefighters

* **Special protective equipment for firefighters**
Wear a self-contained breathing apparatus and chemical protective clothing.

* **Additional information**
If possible, shut off gas valves and move containers to a safe location.
Use water spray jet to protect personnel and to cool endangered containers.
Exposure to fire may cause rupture / explosion of the containers.
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
Dispose of fire residues and contaminated extinguishing water in accordance with local, official regulations.

* SECTION 6: Accidental release measures

* 6.1 Personal precautions, protective equipment and emergency procedures

* **For non-emergency personnel**
Use personal protection equipment.
Leave the danger area.
Keep people away and stay on the upwind side.

* **For emergency responders**
Personal protection by wearing close-fitting protective clothing and breathing apparatus.
Eliminate all ignition sources if safe to do so.
Remove persons to safety.

* 6.2 Environmental precautions

If possible, stop flow of product.
Do not allow to enter into soil/subsoil.
Do not allow to enter into surface water or drains.

* 6.3 Methods and material for containment and cleaning up

* **For containment**
If necessary, secure leaky pressure receptacles using a salvage container.
Prevent the liquid from spreading over a wide area (set up barriers, cover sewage systems).
Limit expansion of the gas (water spray jet).

* **For cleaning up**
Leave to vapourize.
Provide adequate ventilation.

* 6.4 Reference to other sections

Disposal: see section 13
Personal protection equipment: see section 8

* SECTION 7: Handling and storage

* 7.1 Precautions for safe handling

* **Protective measures**
Use only in well-ventilated areas.
Transfer and handle product only in closed systems.
Usual measures for fire prevention.
Containers' temperature should 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.
Take precautionary measures against static discharges. Ground barrels and installations. Use only antistatically equipped (spark-free) tools.
Use explosion-proof machinery, apparatus, ventilation facilities, tools etc.
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 backflow into the container.
Entering 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.

* **Advices on general occupational hygiene**
When using do not eat, drink, smoke, sniff.
Wash hands before breaks and after work.
Remove contaminated clothing and protective equipment before entering eating areas.

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

* **Requirements for storage rooms and vessels**
All regulations and local requirements for the storage of containers have to be respected.
Keep container tightly closed and in a well-ventilated place.
Containers' temperature should not be increased above 50 °C.
Prevent cylinders from falling over.
Only use containers specifically approved for the substance/product.
Information on suitable materials for receptacles and valves see ISO 11114.

Storage class
2A Gases (except aerosol dispensers and lighters)

* **Materials to avoid**
Do not store together with explosives.
Do not store together with flammable liquids.
Do not store together with flammable solids.
Do not store together with pyrophoric and self-heating substances.
Do not store together with oxidizing liquids or oxidizing solids.
Do not store together with toxic liquids or toxic solids.
Do not store together with infectious substances.
Do not store together with radioactive material.
Do not store together with food or feed.

7.3 Specific end use(s)

Recommendation
Exposure scenarios (ES) see annex to this safety data sheet.

* SECTION 8: Exposure controls/personal protection

* **8.1 Control parameters**

* **Occupational exposure limit values**

CAS No.	EC No.	Substance name	occupational exposure limit value
7664-41-7	231-635-3	Ammonia, anhydrous	20 [ml/m³(ppm)] 14 [mg/m³] Short-term(ml/m³) 50 (1) Short-term(mg/m³) 36 (1) (1) 15 minutes reference period (IE)

* **DNEL worker**

CAS No.	Substance name	DNEL value	DNEL type	Remark
7664-41-7	ammonia, anhydrous	6.8 mg/kg bw/day	long-term dermal (systemic)	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	6.8 mg/kg bw/day	acute dermal, short-term (systemic)	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	14 mg/m³	long-term inhalative (local)	
7664-41-7	ammonia, anhydrous	36 mg/m³	acute inhalative (local)	
7664-41-7	ammonia, anhydrous	47.6 mg/m³	acute inhalative (systemic)	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	47.6 mg/m³	long-term inhalative (systemic)	Assessment factor 10, repeated dose toxicity.

* **DNEL Consumer**

CAS No.	Substance name	DNEL value	DNEL type	Remark
7664-41-7	ammonia, anhydrous	2.8 mg/m³	long-term inhalative (local)	Assessment factor 5

CAS No.	Substance name	DNEL value	DNEL type	Remark
7664-41-7	ammonia, anhydrous	6.8 mg/kg bw/day	acute – oral, systemic effects	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	6.8 mg/kg bw/day	Long-term – oral, systemic effects	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	7.2 mg/m³	acute inhalative (local)	Assessment factor 5
7664-41-7	ammonia, anhydrous	23.8 mg/m³	acute inhalative (systemic)	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	23.8 mg/m³	long-term inhalative (systemic)	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	6.8 mg/kg bw/day	long-term dermal (systemic)	Assessment factor 10, repeated dose toxicity.
7664-41-7	ammonia, anhydrous	6.8 mg/kg bw/day	acute dermal, short-term (systemic)	Assessment factor 10, repeated dose toxicity.

* **PNEC**

CAS No.	Substance name	PNEC Value	PNEC type	Remark
7664-41-7	ammonia, anhydrous	0.001 mg/L	aquatic, marine water	Assessment factor 10, assessment factor.
7664-41-7	ammonia, anhydrous	0.001 mg/L	aquatic, freshwater	Assessment factor 10, assessment factor.
7664-41-7	ammonia, anhydrous	0.008 mg/L	aquatic, intermittent release	
7664-41-7	ammonia, anhydrous	0.022 mg/kg soil dw	soil	Assessment factor 10

* **8.2 Exposure controls**

Appropriate engineering controls

Technical measures to prevent exposure
Transfer and handle only in enclosed systems.

* **Personal protection equipment**

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

* **Hand protection**
Safety gloves according to EN 374:
Glove material specification [make/type, thickness, permeation time/life]: IIR, >= 0,5 mm, >= 480 min

Body protection:
Safety shoes with steel toecap.
Body covering work clothing or chemical resistant suit at increased risk.

* **Respiratory protection**
Keep self contained breathing apparatus readily available for emergency use.
Suitable respiratory protection apparatus:
Respiratory protection complying with EN 136.
Short term: filter apparatus, filter K
At concentrations above the range of application of filter units, with oxygen contents below 17 vol.-% or in unclear conditions, a self-contained breathing apparatus must be used.

* **Thermal hazards**
Use cold-resistant protective equipment.

* **Environmental exposure controls**

* **Remark**
Prevent release to the environment.

* SECTION 9: Physical and chemical properties

* 9.1 Information on basic physical and chemical properties

Physical state
Gaseous / liquefied under pressure.

Colour
colourless
clear

Odour
stinging

Safety relevant basis data

	Value	Method	Source, Remark
Odour threshold:			5 ppm
Melting point/freezing point			not applicable
Boiling point or initial boiling point and boiling range	-33.4 °C pressure 1013 hPa		
flammability			inflammable
Lower and upper explosion limit	Upper explosion limit 32.5 Vol-%		
Lower and upper explosion limit	Lower explosion limit 14 Vol-%		
Flash point			not applicable
Auto-ignition temperature	630 °C		
Decomposition temperature			not determined
pH			not applicable
Viscosity			not applicable
Solubility(ies)	Water solubility 531 g/L (20°C)		
Partition coefficient n-octanol/water (log value)			not determined
Vapour pressure	8573.7 hPa (20°C)		
Density and/or relative density			not applicable
Relative vapour density	0.6 (20°C)		Air = 1.
particle characteristics			not applicable

* 9.2 Other information

*** Information with regard to physical hazard classes**

*** Gases under pressure**

Safety characteristics

	Value	Method, Result	Source, Remark
Critical temperature	132.4 °C		

* SECTION 10: Stability and reactivity

* 10.1 Reactivity

Formation of explosive gas mixtures in contact with air.

* 10.2 Chemical stability

The substance is chemically stable under recommended conditions of storage, use and temperature.

* 10.3 Possibility of hazardous reactions

Nitrogen oxides (NOx)
May react violently with oxidants.
Reactions with acids.
Reactions with numerous chemical compounds.

* 10.4 Conditions to avoid

Heat sources / heat - risk of bursting.
Ignition sources, open flames, glowing metal surfaces, etc.

* 10.5 Incompatible materials

Chlorine
Copper, brass and other copper alloys

10.6 Hazardous decomposition products

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

* SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

*** Acute toxicity**

*** Animal data**

	Effective dose	Method,Evaluation	Source, Remark
Acute oral toxicity			Study technically not feasible.
Acute dermal toxicity			Study technically not feasible.
Acute inhalation toxicity	CAS No.7664-41-7 ammonia, anhydrous Acute inhalation toxicity (gas) LC50: 9850 mg/m³ Species Rat Exposure time 1 h		

*** Assessment/classification**
Toxic if inhaled.

*** Skin corrosion/irritation**

Animal data

Result / Evaluation	Method	Source, Remark
Corrosive. Species Rabbit	OECD 404	Aqueous solution.

*** Assessment/classification**
Causes severe burns.

*** Serious eye damage/irritation**

Animal data

Result / Evaluation	Method	Source, Remark
Risk of serious damage to eyes.		experiences

*** Assessment/classification**
Causes serious eye damage.

*** Sensitisation to the respiratory tract**

*** Other information**
No data available

* **Skin sensitisation**

* **Other information**
Study technically not feasible.

* **Germ cell mutagenicity**

	Value	Method	Result / Evaluation	Remark
In vitro mutagenicity/genotoxicity		OECD 471	negative	
In vivo mutagenicity/genotoxicity	Species Mouse	OECD 474	negative	Analogous to a similar product.

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

* **Carcinogenicity**

Animal data

	Value	Method	Result / Evaluation	Remark
Carcinogenicity	oral NOAEL(C): 67 mg/kg Species Rat	OECD 453		Analogous to a similar product.

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

* **Reproductive toxicity**

Animal data

	Value	Method	Result / Evaluation	Remark
Reproductive toxicity	oral NOAEL(C): 387 mg/kg	OECD 422		Analogous to a similar product.

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

* **STOT-single exposure**

* **STOT SE 1 and 2**

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

* **STOT-repeated exposure**

* **Animal data**

	Effective dose	Method	Specific effects:	Organs affected:	Source, Remark
Inhalative specific target organ toxicity (repeated exposure)	LOEL(C): 150 ppm Species Rat Exposure duration 75 d				

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

* **Aspiration hazard**

* **Remark**
Study technically not feasible.

11.2 Information on other hazards

No data available

* SECTION 12: Ecological information

* 12.1 Toxicity

* Aquatic toxicity

	Effective dose	Method,Evaluation	Source, Remark
Acute (short-term) fish toxicity	LC50: 0.083 mg/L Species Oncorhynchus gorbuscha Test duration 96 h		Analogous to a similar product.
Chronic (long-term) fish toxicity	not determined		
Acute (short-term) toxicity to crustacea	EC50 101 mg/L Species Daphnia magna (Big water flea) Test duration 48 h		
Chronic (long-term) toxicity to aquatic invertebrate	not determined		
Acute (short-term) toxicity to algae and cyanobacteria	EC50 2700 mg/L Species Chlorella vulgaris Test duration 18 d		Analogous to a similar product.
Chronic (long-term) toxicity to aquatic algae and cyanobacteria	not determined		
Toxicity to other aquatic plants/organisms	not determined		
Toxicity to microorganisms	not determined		

* 12.2 Persistence and degradability

*** Assessment/classification**
Readily biodegradable (according to OECD criteria).

* 12.3 Bioaccumulative potential

*** Assessment/classification**
Study scientifically not necessary.

* 12.4 Mobility in soil

	Value	Distribution	Transport type	Method	Remark
Half-life time in soil	100000			KOC value	

* 12.5 Results of PBT and vPvB assessment

The substance/mixture does not contain components meeting the PBT/vPvB criteria of the Reach Regulation, Annex XIII, at levels of 0.1% or higher.

* 12.6 Endocrine disrupting properties

	Effective dose	Method,Evaluation	Source, Remark
Endocrine disrupting properties			See section 2.3

12.7 Other adverse effects

Additional ecotoxicological information

Additional information
Product is not allowed to be discharged into aquatic environment.

* SECTION 13: Disposal considerations

* 13.1 Waste treatment methods

Waste codes/waste designations according to EWC/AVV

Waste code product	Waste name
160504 *	gases in pressure containers (including halons) containing hazardous substances

* **Appropriate disposal / Product**
Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.
Disposal according to local regulations.
Prevent release to the environment. No disposal via the sewage.

Appropriate disposal / Package
Transportable pressure equipment (empty, residual pressure): Return to supplier / manufacturer.

* SECTION 14: Transport information

	Land transport (ADR/RID)	Sea transport (IMDG)	Air transport (ICAO-TI / IATA-DGR)
14.1 UN number or ID number	UN 1005	UN 1005	UN 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	ENVIRONMENTALLY HAZARDOUS	ENVIRONMENTALLY HAZARDOUS Marine pollutant	ENVIRONMENTALLY HAZARDOUS

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 Maritime transport in bulk according to IMO instruments

No carriage in bulk.

Land transport (ADR/RID)

UN number or ID number	UN 1005
UN proper shipping name	AMMONIA, ANHYDROUS
Transport hazard class(es)	2.3 (8)
Hazard label(s)	2.3+8
Classification code	2TC
Packing group	-
Environmental hazards	ENVIRONMENTALLY HAZARDOUS
Limited quantity (LQ)	0
Special provisions	23, 379
Tunnel restriction code	C/D

*** Sea transport (IMDG)**

UN number or ID number	UN 1005
UN proper shipping name	AMMONIA, ANHYDROUS
Transport hazard class(es)	2.3 (8)
Packing group	-
Environmental hazards	ENVIRONMENTALLY HAZARDOUS
Limited quantity (LQ)	0
Marine pollutant	Yes.

EmS	F-C, S-U

*** Air transport (ICAO-TI / IATA-DGR)**

UN number or ID number	UN 1005
UN proper shipping name	Ammonia, anhydrous
Transport hazard class(es)	2.3 (8)
Packing group	-
Environmental hazards	ENVIRONMENTALLY HAZARDOUS

* SECTION 15: Regulatory information

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

*** EU legislation**

*** Restrictions of occupation**
Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.
Observe restrictions to employment for juvenils according to the 'juvenile work protection guideline' (94/33/EC).

*** Other regulations (EU)**

*** To follow:**
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.
National and local regulations concerning chemicals shall be observed.

15.2 Chemical Safety Assessment

*** National regulations**

For this substance a chemical safety assessment has been carried out.

* SECTION 16: Other information

Key literature references and sources for data
Information from our suppliers and data from the "GESTIS Substances Database" and the "Registered Substances" database of the European Chemicals Agency (ECHA) were used to create this safety data sheet.

*** Additional information**
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.

Relevant H- and EUH-phrases (Number and full text)

H221	Flammable gas.
H280	Contains gas under pressure; may explode if heated.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

Indication of changes
* Data changed compared with the previous version

Exposure Scenarios

Section 1 — Title

Short title of the exposure scenario : ammonia, anhydrous - Distribution, Formulation

Identified use name : Industrial distribution.
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
Local freshwater dilution factor10
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:
Treatment effectiveness 99,9 %

Exposure Scenarios

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. Liquefied gas.
Amounts used	:	Maximum daily site tonnage 3.000.000 kg
Frequency and duration of use	:	Unless otherwise stated Use duration (h/d): > 4
Area of use:	:	Indoor, Outdoor
Ventilation control measures	:	Contributing Scenario: **PROC02, PROC03, PROC08b, PROC15** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC05, PROC08a, PROC09** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC01** 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. Treatment effectiveness > 90 % See Section 8 of the safety data sheet (personal protective equipment).
Respiratory protection	:	Contributing Scenario: **PROC02, PROC03, PROC08b, PROC15** In case of inadequate ventilation wear respiratory protection:, Treatment effectiveness > 95 % Contributing Scenario: **PROC05, PROC08a, PROC09** < 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.

Exposure Scenarios

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

Exposure Scenarios

Category		
Market sector by type of chemical product	:	PC01 - Adhesives, sealants PC09a - Coatings and paints, thinners, paint removers PC12 - Fertilizers PC16 - Heat transfer fluids PC18 - Ink and toners PC19 - Intermediate PC20 - Products such as ph-regulators, flocculants, precipitants, neutralization 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

Exposure Scenarios

Section 1 — Title

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

Identified use name : Industrial Use for flue gas NOx and SOx reduction.
Industrial USE as reactive agent/processing aid and for general chemical applications.
Industrial USE as heat transfer fluid.
Industrial USE as chemical/process nutrient.
Industrial USE for surface/article treatment.
Industrial USE to manufacture specialist chemical/other products.
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
Local freshwater dilution factor10
Local marine water dilution factor 10

Emission days (days/year) 330

Release fraction to air from process (initial release prior **ERC04:** 95 %
ERC05: 50 %

Exposure Scenarios

to RMM)		**ERC06b:** 0,1 % **ERC07:** 5 %
Release fraction to wastewater from process (initial release prior to RMM)		**ERC04:** 100 % **ERC05:** 50 % **ERC06b:** 5 % **ERC07:** 5 %
Risk management measures - Water	:	Waste water treatment: 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. Liquefied gas.
Frequency and duration of use	:	Unless otherwise stated Use duration (h/d): > 4
Area of use:	:	Indoor, Outdoor
Ventilation control measures	:	Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC05, PROC09, PROC13** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC01** 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. Treatment effectiveness > 90 % See Section 8 of the safety data sheet (personal protective equipment).
Respiratory protection	:	Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b** In case of inadequate ventilation wear respiratory protection:, Treatment effectiveness > 95 % Contributing Scenario: **PROC05, PROC09, PROC13**

Exposure Scenarios

	< 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

Exposure Scenarios

		(charging/discharging) from/to vessels/large containers at dedicated facilities PROC09 - Transfer of substance or preparation into small containers (dedicated filling line, including weighing) 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 ERC05 - Industrial use resulting in inclusion into or onto a matrix ERC06b - Industrial use of reactive processing aids ERC07 - Industrial use of substances in closed systems
Market sector by type of chemical product	:	PC01 - Adhesives, sealants PC09a - Coatings and paints, thinners, paint removers PC14 - Metal surface treatment products, including galvanic and electroplating products PC15 - Non-metal surface treatment products PC16 - Heat transfer fluids PC20 - Products such as ph-regulators, flocculants, precipitants, neutralization agents 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
Sector of end use	:	SU04 - Manufacture of food products SU05 - Manufacture of textiles, leather, fur SU06a - Manufacture of wood and wood products SU06b - Manufacture of pulp, paper and paper products SU08 - Manufacture of bulk, large scale chemicals (including petroleum products) SU09 - Manufacture of fine chemicals 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 SU23 - Electricity, steam, gas water supply and sewage treatment SU 0: Other: NACE B - Mining and quarrying SU 0: Other: NACE C - Manufacturing SU 0: Other: NACE C28.2 - Manufacture of other general-purpose machinery

Exposure Scenarios

Section 1 — Title

Short title of the exposure scenario : 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
Local freshwater dilution factor10
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:
Treatment effectiveness 99,9 %

Exposure Scenarios

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. Liquefied gas.
Frequency and duration of use	:	Unless otherwise stated Use duration (h/d): > 4
Area of use:	:	Indoor, Outdoor
Ventilation control measures	:	Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC05, PROC09** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC01** 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. Treatment effectiveness > 90 % See Section 8 of the safety data sheet (personal protective equipment).
Respiratory protection	:	Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15** In case of inadequate ventilation wear respiratory protection:, Treatment effectiveness > 95 % Contributing Scenario: **PROC05, PROC09** < 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.

Exposure Scenarios

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)

Exposure Scenarios

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

Exposure Scenarios

Section 1 — Title

Short title of the exposure scenario : 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

Exposure Scenarios

use		Use duration (h/d): > 4
Area of use:	:	Indoor, Outdoor
Ventilation control measures	:	Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15, PROC20** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC05, PROC08a, PROC09, PROC13** Local exhaust ventilation should be provided. Treatment effectiveness > 90 % Contributing Scenario: **PROC01** 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. Treatment effectiveness > 90 % See Section 8 of the safety data sheet (personal protective equipment).
Respiratory protection	:	Contributing Scenario: **PROC02, PROC03, PROC04, PROC08b, PROC15, PROC20** In case of inadequate ventilation wear respiratory protection:, Treatment effectiveness > 95 % Contributing Scenario: **PROC05, PROC08a, 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: : 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. 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.

Exposure Scenarios

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) 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) PROC13 - Treatment of articles by dipping and pouring PROC15 - Use a laboratory reagent 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 ERC08e - Wide dispersive outdoor use of reactive substances in open systems ERC09a - Wide dispersive indoor use of substances in closed systems ERC09b - Wide dispersive outdoor use of substances in closed systems
Market sector by type of chemical product	:	PC09a - Coatings and paints, thinners, paint removers PC12 - Fertilizers PC14 - Metal surface treatment products, including galvanic and electroplating products PC15 - Non-metal surface treatment products PC16 - Heat transfer fluids PC19 - Intermediate PC20 - Products such as ph-regulators, flocculants, precipitants, neutralization agents PC21 - Laboratory chemicals 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 PC40 - Extraction agents
Sector of end use	:	SU01 - Agriculture, forestry, fishery SU04 - Manufacture of food products

Exposure Scenarios

	SU05 - Manufacture of textiles, leather, fur SU06a - Manufacture of wood and wood products SU06b - Manufacture of pulp, paper and paper products SU09 - Manufacture of fine chemicals 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 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 SU 0: Other: NACE B - Mining and quarrying SU 0: Other: NACE C - Manufacturing SU 0: Other: NACE C28.2 - Manufacture of other general-purpose machinery