

**TETRACHLOROETHYLENE****Code : 14852****Responsible for distribution:**

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**In case of emergency:**

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Antipoison Center - Brussels :  
TEL: 070/245.245

The Netherlands:  
National Poisoning Information Center - Bilthoven :  
TEL: 030/274.88.88

**1. Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

- \* Chemical description : Tetrachloroethylene , Perchloroethylene , PER.
- Type of product : Pure product .
- \* Reach registration number : 01-2119475329-28

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

- \* Identified use(s) : See table on the front page of the annex.
- \* Use(s) advised against : This product is not recommended for any industrial, professional or consumer use other than identified in table on the front page of the annex.

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

Company identification : See heading of Material Safety Data Sheet.

**1.4. Emergency telephone number**

Emergency phone number : See heading of Material Safety Data Sheet.

**2. Hazards identification****2.1. Classification of the substance or mixture****Classification according to Directive 67/548/EEC or 1999/45/EC**

- \* Irritant (Xi; R38)
- Carcinogenic (Carc. Cat.3; R40)
- Sensitizing (Xi; R43)
- Dangerous for the environment (N; R51/53)
- Other (R67)

**Classification according to Regulation (EC) No 1272/2008**

- \* Skin irritation - Category 2 - Warning (Skin Irrit. 2; H315)
- Skin sensitisation - Category 1 - Warning (Skin Sens. 1; H317)
- Specific Target Organ Toxicity - Single exposure - Narcotic effects - Category 3 - Warning (STOT SE 3; H336)
- Carcinogenicity - Category 2 - Warning (Carc. 2; H351)
- Hazardous to the aquatic environment - Chronic hazard - Category 2 (Aquatic Chronic 2; H411)

**2.2. Label elements****Label in accordance with Regulation (EC) No 1272/2008**

- \* Dangerous ingredient(s) : Tetrachloroethylene
- \* Hazard pictogram(s)



- \* Signal word : Warning

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**2. Hazards identification (continued)**

- \* • Hazard statements : H315 - Causes skin irritation. H317 - May cause an allergic skin reaction. H336 - May cause drowsiness or dizziness. H351 - Suspected of causing cancer. H411 - Toxic to aquatic life with long lasting effects.
- \* • Precautionary statements
- \* - Prevention : P202 - Do not handle until all safety precautions have been read and understood. P273 - Avoid release to the environment. P281 - Use personal protective equipment as required.
- \* - Response : P302+P352 - IF ON SKIN : Wash with plenty of soap and water. P304+P340 - IF INHALED : Remove to fresh air and keep at rest in a position comfortable for breathing. P308+P313 - If exposed or concerned : get medical advice. P391 - Collect spillage.
- \* - Storage : P405 - Store locked up.
- \* - Disposal considerations : P501 - Dispose of this material and its container to hazardous or special waste collection point.

**2.3. Other hazards**

- \* Physical/chemical hazards : The substance decomposes by heating above 150 °C and under influence of UV-rays in formation of toxic and corrosive vapours.
- \* Hazards for the health : A health dangerous concentration in the air will very quickly be reached by evaporation of this substance at app. 20°C; even faster by spraying.
- \* Hazards for the environment : Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
This product is no substance or contains no PBT or vPvB (in accordance with Annex XIII).
- \* Hazards for the safety : Without stabiliser this product readily decomposes forming acidic substances, especially hydrogen chloride..

**3. Composition/information on ingredients**

**3.1. Substances**

Name component(s)	Weight %	CAS nr	EINECS nr	Index nr	Reach nr	CLASSIFICATION
* Tetrachloroethylene	: > 99 %	127-18-4	204-825-9	602-028-00-4	01-2119475329-28	Carc. Cat. 3; R40 R67 Xi; R38 R43 N; R51-53 ----- Skin Irrit. 2; H315 Skin Sens. 1; H317 STOT SE 3; H336 Carc. 2; H351 Aquatic Chronic 2; H411

\* The full text of the R-phrases and (EU)H-statements is in section 16.

**4. First aid measures**

**4.1. Description of first aid measures**

- General : CALL A PHYSICIAN IN ALL CIRCUMSTANCES.  
Never give anything by mouth to an unconscious person.
- First Aid Measures

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**4. First aid measures (continued)**

- \* - Inhalation : Remove victim into fresh air.  
Allow the affected person to rest.  
If not breathing, give artificial respiration.  
Take the patient IMMEDIATELY to the hospital.
- \* - Skin Contact : Remove contaminated clothing.  
Rinse skin immediately with plenty of water. ( at least 20') (shower if necessary).  
Consult a doctor.
- Eye Contact : Rinse immediately thoroughly and long (at least 15 min.) with plenty of water.  
Remove contact lenses.  
Consult eye doctor.
- Ingestion : DO NOT INDUCE VOMITING. Rinse mouth with water.  
Seek medical attention IMMEDIATELY or take to hospital.

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

- \* See section 11.

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

- \* For specialist advice doctors should contact the NVCI or the Belgian Poison center.

**5. Firefighting measures**

**5.1. Extinguishing media**

Extinguishing Media

- \* - Suitable : Extinguishing powder , Foam , Carbon dioxide (CO2) , Water spray , Water .
- \* - Insuitable : None .

**5.2. Special hazards arising from the substance or mixture**

Special Exposure Hazards : Fire may liberate toxic (Chlorine, Fosgene, ...) and corrosive (Hydrochloric acid, ...) vapours.

**5.3. Advice for firefighters**

- \* Special Protective Equipment for Firefighters : Use self-contained breathing apparatus and wear protective clothes when in close proximity to fire.
- Special Procedures : Apply water spray or fog to cool nearby equipment. Avoid fire-fighting water to enter environment.

**6. Accidental release measures**

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

Personal Precautions : Evacuate all personnel immediately and ventilate area.  
Avoid breathing vapour and contact with skin, eyes and clothing.  
Wear recommended personal protective equipment. (See section 8)

**6.2. Environmental precautions**

Environmental Precautions : Shut off leaks if without risks.  
Dike in the spilled product as much as possible with inert material.  
Prevent entry of product in public water, sewers or soil.  
Notify authorities if product enters sewers or public waters.

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

- \* Methods for Cleaning Up : Collect the spillage in closable, suitable disposal containers.  
Clean up any spills as soon as possible, using an inert absorbent material.  
Eventual remaining residues may be washed down with a soap solution.  
Collect rinsing water.

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**6. Accidental release measures (continued)**

**6.4. Reference to other sections**

- \* For personal protection, see section 8.  
For the removal of the waste product, see section 13.

**7. Handling and storage**

**7.1. Precautions for safe handling**

- \* Handling : SKIN ABSORPTION ! STRONG HYGIENE !  
Avoid breathing vapour and contact with skin, eyes and clothing. Wear recommended personal protective equipment. (See section 8)  
When using, do not eat, drink or smoke.  
Emergency eye wash fountains and showers should be available in the immediate vicinity of any potential exposure.

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

- \* Storage : Keep only in the original, safely locked container in a well ventilated, cool and dark place.  
All dangerous products should be placed on a drip tray or should be barreled.  
Keep away from : Light metals , Zinc .
- \* Packaging Material : Stainless steel , Glass .
- \* Insuitable Packaging Material : Several metals ( Alkali- and earthalkali-metals , Aluminium , Zinc , ... ), Some synthetics .

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

- \* For identified uses, see subsection 1.2 and/or exposure scenarios.

**8. Exposure controls/personal protection**

**8.1. Control parameters**

- \* Occupational Exposure Limits : Tetrachloroethylene : Limit value (BE) : 25 ppm (172 mg/m<sup>3</sup>) (2011)  
Tetrachloroethylene : Short time value (BE) : 100 ppm (695 mg/m<sup>3</sup>) (2011)
- \* Biological limit values : They will be included when available.
- \* DNELs :
  - Tetrachloroethylene : Worker, acute - local effects, inhalation : 275 mg/m<sup>3</sup>
  - Tetrachloroethylene : Worker, acute - systemic effects, inhalation : 275 mg/m<sup>3</sup>
  - Tetrachloroethylene : Worker, long-term - local effects, inhalation : 275 mg/m<sup>3</sup>
  - Tetrachloroethylene : Worker, long-term - systemic effects, inhalation : 138 mg/m<sup>3</sup>
  - Tetrachloroethylene : Worker, long-term - systemic effects, dermal : 39,4 mg/kg
  - Tetrachloroethylene : Consumer, acute - local effects, inhalation : 138 mg/m<sup>3</sup>
  - Tetrachloroethylene : Consumer, acute - systemic effects, inhalation : 138 mg/m<sup>3</sup>
  - Tetrachloroethylene : Consumer, long-term - systemic effects, inhalation : 34,5 mg/m<sup>3</sup>
  - Tetrachloroethylene : Consumer, long-term - systemic effects, dermal : 23 mg/kg
  - Tetrachloroethylene : Consumer, long-term - systemic effects, oral : 1,3 mg/kg
- \* PNECs :
  - Tetrachloroethylene : Fresh water : 0,051 mg/l
  - Tetrachloroethylene : Marine water : 0,0051 mg/l
  - Tetrachloroethylene : Fresh water sediment : 0,903 mg/kg
  - Tetrachloroethylene : Marine water sediment : 0,0903 mg/kg
  - Tetrachloroethylene : Soil : 0,01 mg/kg
  - Tetrachloroethylene : Intermittent release : 0,0364 mg/l
  - Tetrachloroethylene : Sewage treatment plant : 11,2 mg/l

**8.2. Exposure controls**

**TETRACHLOROETHYLENE****Code : 14852****8. Exposure controls/personal protection (continued)**

- \* Engineering Measures : Ventilation ( Through the floor ), Local exhaust .
- Personal Protection Equipment
- \* - Respiratory protection : CE-approved mask for organic vapours and solvents (type A, brown).
- Skin protection : Suitable protective clothing .
- \* - Hand protection : Suitable material for safety gloves (EN 374):  
PVC , Neoprene , Nitril rubber .
- Eye/Face protection : Closed safety glasses or face shield.
- \* Environmental exposure controls : See sections 6, 7, 12 en 13.

**9. Physical and chemical properties****9.1. Information on basic physical and chemical properties**

- Physical State (20°C) : Liquid .
- Form/Colour : Clear , Colourless .
- \* Odour : Ether-like odour .
- \* Odour threshold : 1,28 mg/m<sup>3</sup>
- pH value : Not applicable.
- \* Melting/Freezing point : -22 °C
- Boiling Point/Range (1013 hPa) : 121 °C
- Flash point : Not applicable.
- \* Fire hazard : Not applicable.
- \* Evaporation rate : No data available.
- Explosion limits in air : Not applicable.
- \* Vapour pressure (20°C) : 1,87 kPa
- Relative vapour density (air=1) : 5,7
- Relative density of saturated vapour/air mixture (air=1) : 1,09
- Relative density (water=1) : 1,6
- Solubility in water (20°C) : 0,02 g/100 ml
- \* Soluble in : Organic solvents , Fats .
- \* Log P Octanol/Water (20°C) : 2,53
- Auto-ignition temperature : Not applicable.
- \* Minimum ignition energy : No data available.
- Decomposition temperature : > 140 °C
- \* Viscosity (20°C) : 0,8 - 0,9 mPa.s ( Dynamic )
- \* Explosive properties : No chemical groups associated with explosive properties .
- \* Oxidizing properties : No chemical groups associated with oxidizing properties .

**9.2. Other information**

- \* Surface tension (20°C) : 31,74 mN/m
- Specific leading : 5,6\*10E10 pS/m
- % Volatiles (by weight) : > 99

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**10. Stability and reactivity**

**10.1. Reactivity**

- \* Reactivity : Reacts violently with: Alkali- and earthalkali-metals , Finely divided metals , Zinc .

**10.2. Chemical stability**

- \* Stability : Stable at normal circumstances (+ Stabilizer ).

**10.3. Possibility of hazardous reactions**

- \* Hazardous reactions : Without stabiliser this product readily decomposes forming acidic substances, especially hydrogen chloride..  
Vapour-air mixture may form phosgene when exposed to UV-radiation.  
Reacts violently with: Strong oxidizing agents , Several metals => May cause fire and explosion!

**10.4. Conditions to avoid**

- \* Conditions to avoid : High temperatures , Direct sunlight (UV).

**10.5. Incompatible materials**

- \* Materials to avoid : Alkali- and earthalkali-metals , Light metals , Zinc .

**10.6. Hazardous decomposition products**

- \* Hazardous Decomposition Products : Hydrochloric acid , Phosgene , Chlorine , Carbon monoxide .

**11. Toxicological information**

**11.1. Information on toxicological effects**

Acute toxicity

- \* - Inhalation : Irritating to respiratory system.  
Inhalation of high concentrations may cause lung oedema.  
The product may cause central nervous system depression and may affect kidneys and liver, resulting in function disturbances.  
Exposure to high concentrations may cause lowering of consciousness.  
Symptoms include: Loss of coordination , Confusion , Dizziness , Drowsiness , Unconsciousness .  
• Tetrachloroethylene : LC50 (Rat, inhalation, 4 h) : 3005-3835 mg/kg
- \* - Skin contact : Irritating to skin.  
Symptoms include: Redness , Pain , See "Inhalation" .  
• Tetrachloroethylene : LD50 (Rabbit, dermal) : 6384 mg/kg
- \* - Eye contact : May be irritating to eyes.  
Symptoms include: Redness , Pain .
- \* - Ingestion : Strongly irritating to mouth, throat and digestive system.  
Symptoms include: Burning feeling , See "Inhalation" .  
• Tetrachloroethylene : LD50 (Rat, oral) : 2629-3835 mg/kg
- \* Skin corrosion/irritation : Rabbit : Irritant .
- \* Serious eye damage/irritation : May be irritating to eyes.
- \* Aspiration hazard : After swallowing, some drops of liquid can enter the lungs (aspiration), which may cause pneumonia.
- \* Respiratory or skin sensitisation : Skin contact may cause an eczema-like skin disorder on the basis of an allergic reaction.  
Inhalation of vapour may cause asthma.
- \* Carcinogenicity : Suspected of causing cancer.  
IARC: Group 2B (possibly carcinogenic to humans).
- \* Mutagenicity : Not listed as mutagenic .

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- \* Reproductive toxicity : Not listed for reproductive toxicity .  
The Netherlands : Perchlorethylene is included in the SZW-list .
- \* Specific target organ toxicity - single exposure : To human : Vapours may cause drowsiness and dizziness.
- \* Specific target organ toxicity - repeated exposure : To human : Listed not for organ toxicity .  
For animals : Product may affect kidney and liver, resulting in organ damages.

**12. Ecological information****12.1. Toxicity**

- \* Ecotoxicity : • Tetrachloroethylene : EC50 (Daphnia magna, 48 h) : 8,5 mg/l  
• Tetrachloroethylene : LC50 (Fish, 96 h) : 5 mg/l (Oncorhynchus mykiss)

**12.2. Persistence and degradability****12.3. Bioaccumulative potential**

- \* Bioaccumulation : • Tetrachloroethylene : Bioaccumulation : No bioaccumulation .

**12.4. Mobility in soil**

- \* Mobility : • Tetrachloroethylene : Mobility : Not soluble in water .

**12.5. Results of PBT and vPvB assessment**

- \* Evaluation : • Tetrachloroethylene : PBT/vPvB : No

**12.6. Other adverse effects**

- WGK class (DE) : 3 ( Serious water pollutant ).
- Water damaging (NL) : 1
- Decontamination exertion (NL) : A ( Contains Black list substance ).
- \* Photochemical ozone creation potential : No data available.
- \* Ozone depletion potential : No data available.
- \* Endocrine disrupting potential : No data available.
- \* Global warming potential : No data available.

**13. Disposal considerations****13.1. Waste treatment methods**

- Waste from residues/Unused products : The product has to be destroyed according to national or local legislation, by a company specialised in handling hazardous waste products.
- \* European list of waste products : XXXXXX - European waste product code. This code is assigned on the basis of the most current applications and can not be representative for pollutions which are arisen at the effective use of the product. The producer of the waste has to evaluate its process himself and has to grant the appropriate waste coding. See Decision 2001/118/EC.
- Removal contaminated packaging : Packing is to be used exclusively for the packing of this product.  
After use, empty and close the packing very carefully.  
In case of returned packing, the empty packing can be offered back to the supplier.

**14. Transport information****14.1. UN number**

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**14. Transport information (continued)**

UN Number : 1897

**14.2. UN proper shipping name**

- \* ADR Name : UN 1897 Tetrachloroethylene, 6.1, III, (E)
- \* ADN Name : UN 1897 Tetrachloroethylene , 6.1, III
- IMDG Name : UN 1897 Tetrachloroethylene , 6.1, III, MARINE POLLUTANT

**14.3. Transport hazard classe(s)**

Class : 6.1

**14.4. Packing group**

Packaging Group : III

**14.5. Environmental hazards**

- \* Environmentally hazard : Yes
- Marine pollutant : Yes

**14.6. Special precautions for user**

Danger number : 60  
 Hazard Label(s) : 6.1  
 EmS-N° : F-A , S-A

**14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code**

- \* Type ship : No data available.
- \* Pollution category : No data available.

**15. Regulatory information**

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

Inventories : Australian inventory (AICS): Listed in inventory.  
 Canadian inventory (DSL): Listed in inventory.  
 Chinese inventory (IECS): Listed in inventory.  
 European inventory (EINECS): Listed in inventory.  
 Japanese inventory (ENCS): Listed in inventory.  
 Korean inventory (KECI): Listed in inventory.  
 Philippine inventory (PICCS): Listed in inventory.  
 Inventory of the United States (TSCA): Listed in inventory.

NFPA n° : 2-0-0

- \* Relevant EU Rule(s) : Directive 92/85/EEC of the Council of 19 October 1992 on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding  
 Directive 96/82/EC of the Council of 9 December 1996 on the control of major-accident hazards involving dangerous substances  
 Directive 98/24/EC of the Council of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work  
 Directive 1999/13/EC of the Council of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations  
 Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work  
 Directive 2004/42/CE of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC



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**15. Regulatory information (continued)**

Decision 2001/118/EC of the Commission of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes  
 Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006  
 Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (Reach)

**15.2. Chemical Safety Assessment**

- \* A chemical safety assessment has been carried out for the substance(s) that make up this material or for the material itself.

**16. Other information**

- \* This safety data sheet has been drawn up in accordance with Regulation (EU) No 453/2010. This safety data sheet is exclusively made for industrial/professional use.
  - \* Has changed compared to previous revision.
- \* Changes : General revision .
- \* Sources of used key data : The information contained herein is based on the present state of our knowledge ( Producer(s) , Chemical cards , ...).  
 See also on the webaddress:  
<http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
- \* R-phrases(s) : R38 - Irritating to skin.  
 R40 - Limited evidence of a carcinogenic effect.  
 R43 - May cause sensitization by skin contact.  
 R51/53 - Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.  
 R67 - Vapours may cause drowsiness and dizziness.
- \* (EU)H-statement(s) : H315 - Causes skin irritation.  
 H317 - May cause an allergic skin reaction.  
 H336 - May cause drowsiness or dizziness.  
 H351 - Suspected of causing cancer.  
 H411 - Toxic to aquatic life with long lasting effects.
- \* List of abbreviations and acronyms : ADN (Accord européen relatif au transport international des marchandises Dangereuses par voie de Navigation interieur) : European agreement concerning the international carriage of dangerous goods by inland waterways  
 ADR (Accord européen relatif au transport international des marchandises Dangereuses par Route) : European agreement concerning the international carriage of dangerous goods by road  
 Black list : List I of Directive 76/464/EEC contains substances which belong to families and groups of substances, selected mainly on the basis of their toxicity, persistence and bioaccumulation, with the exception of those which are biologically harmless  
 CO : Carbon monoxide  
 DNEL (Derived No Effect Level) : an estimated safe exposure level  
 EmS (Emergency Schedule) : the first code refers to the relevant fire schedule and the second code refers to the relevant spillage schedule  
 IARC (International Agency for Research on Cancer)  
 IMDG (International Maritime Dangerous Goods code)  
 NFPA (National Fire Protection Association) or fire diamant  
 NVCI : National Poisoning Information Center  
 PBT : persistent, bioaccumulative and toxic

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PNEC (Predicted No Effect Concentration) : concentration below which exposure to a substance is not expected to cause adverse effects

REACH : Registration, Evaluation, Authorisation and restriction of Chemicals

SZW-list : Non-limitative list of reproduction toxic substances to which the additional registration obligation applies as referred to in Article 4.2a, second paragraph of the Working conditions decree

vPvB : very persistent and very bioaccumulative

WGK (Wassergefährdungsklasse) : a German classification of substances that indicate the environmental hazard for surface water

This information is to our knowledge correct and complete on the date of issue of this safety data sheet. The information only concerns the product and does not give any guarantee for the quality and the completeness of the properties of the product, or in case of mixing or using in any other process. It remains the responsibility of the user to assure himself that the information is suitable and complete concerning the special use he makes of the product.

BRENNTAG denies all responsibility for loss or damage resulting from the use of these data.

**End of document**

*SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006*

**Perchloroethylene**

Version 1.2

Print Date 18.02.2013

Revision Date 18.02.2013

No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Manufacture of substance	3	NA	NA	1, 2, 3, 4, 8a, 8b, 15	1	NA	ES5203
2	Use as an intermediate	3	NA	NA	1, 2, 3, 8a, 8b, 15	6a	NA	ES5205
3	Distribution of substance	3	NA	NA	2, 3, 8a, 8b, 9, 15	2	NA	ES5216
4	Use in dry cleaning	3	NA	NA	2, 4, 6, 8a, 8b	4	NA	ES5225
5	Use in dry cleaning	22	NA	NA	2, 4, 8a, 8b	8a, 8d	NA	ES5234
6	Use in surface cleaning	3	NA	NA	2, 3, 8a, 8b, 13	4	NA	ES5240
7	Use in heat transfer and hydraulic fluids	3	NA	NA	1, 3, 8a	7	NA	ES5242

**SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006**

**Perchloroethylene**

Version 1.2

Print Date 18.02.2013

Revision Date 18.02.2013

**1. Short title of Exposure Scenario 1: Manufacture of substance**

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	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 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 PROC15: Use as laboratory reagent
Environmental Release Categories	ERC1: Manufacture of substances
Activity	Manufacture of substance or use as process chemical or extracting agent. Includes recycling/recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities.

**2.1 Contributing scenario controlling environmental exposure for: ERC1**

Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	287
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Treat air emission to provide the required removal efficiency of (%): (Efficiency: 99,9 %)
	Soil	Do not apply industrial sludge to natural soils.
	Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Domestic sewage treatment plant
	Degradation efficiency	92,6 %
	Percentage removed from waste water	92,6 %
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste gas treatment by thermal oxidation.
	Disposal methods	Dispose of waste or used sacks/containers according to local regulations.
Conditions and measures related to external recovery of waste	Recovery Methods	External recovery and recycling of waste should comply with applicable local and/or national regulations.

**2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4,**

**SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006**

**Perchloroethylene**

Version 1.2

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**PROC8a, PROC8b, PROC15**

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	1 hours/day(PROC8b)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Other operational conditions affecting workers exposure	Outdoor(PROC4)	
Technical conditions and measures to control dispersion from source towards the worker	General exposures Use in contained batch processes with sample collection	Provide extract ventilation to points where emissions occur.(PROC3)
	Process sampling	Use a sampling system designed to control exposure.(PROC3)
	Bulk transfers internal	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Drum and small package filling Automated process with (semi) closed systems	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance.(PROC8a)
	Bulk transfers (open systems)	Ensure material transfers are under containment or extract ventilation.(PROC8b)

**3. Exposure estimation and reference to its source**

**Environment**

Used ECETOC TRA model.

**Workers**

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

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.

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Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.  
For scaling see: <http://www.ecetoc.org/tra>  
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Assumes a good basic standard of occupational hygiene is implemented.

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**1. Short title of Exposure Scenario 2: Use as an intermediate**

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	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) 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 PROC15: Use as laboratory reagent
Environmental Release Categories	ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

**2.1 Contributing scenario controlling environmental exposure for: ERC6a**

Amount used	Amounts used in the EU (tonnes/year)	9907 ton(s)/year
	Fraction of EU tonnage used in region:	1
	Fraction used at the main local source.	0,25
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	1 .10 <sup>-4</sup>
	Emission or Release Factor: Water	5 .10 <sup>-4</sup>
	Emission or Release Factor: Soil	1 .10 <sup>-4</sup>
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Treat air emission to provide the required removal efficiency of (%): (Efficiency: 99,9 %)
	Water	Prevent discharge of undissolved substance to or recover from onsite wastewater.
	Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Domestic sewage treatment plant
	Degradation efficiency	92,6 %
	Percentage removed	92,6 %

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	from waste water	
	Sludge Treatment	Do not use sludge as fertiliser
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste gas treatment by thermal oxidation.
	Disposal methods	Dispose of waste or used sacks/containers according to local regulations.
Conditions and measures related to external recovery of waste	Recovery Methods	Storage of finished products in closed containers., Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.

**2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15**

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	1 hours/day(PROC8b)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	General exposures Use in contained batch processes with sample collection	Provide extract ventilation to points where emissions occur.(PROC3)
	Process sampling	Use a sampling system designed to control exposure.(PROC3)
	Bulk transfers internal	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Drum and small package filling Automated process with (semi) closed systems	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance.(PROC8a)
	Bulk transfers (open systems)	Ensure material transfers are under containment or extract ventilation.(PROC8b)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	

**3. Exposure estimation and reference to its source**

**Environment**



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Used ECETOC TRA model.

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6a	---	Fresh water	PEC	0,0153mg/L	0,3
ERC6a	---	Marine water	PEC	0,0015mg/L	0,3
ERC6a	---	Fresh water sediment	PEC	0,271mg/kg dwt	0,3
ERC6a	---	Marine sediment	PEC	0,0271mg/kg dwt	0,3
ERC6a	---	Agricultural soil	PEC	0,0030mg/kg dwt	0,297
ERC6a	---	Sewage treatment plant (STP)	PEC	0,153mg/L	0,0137

**Workers**

ECETOC TRA model v2

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	---	worker inhalation, long term - systemic	0,1mg/m <sup>3</sup>	0
PROC1	---	Worker - dermal, long-term - systemic	0,3mg/kg/day	0,01
PROC2	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC2	---	Worker - dermal, long-term - systemic	1,4mg/kg/day	0,03
PROC3	with local exhaust ventilation	worker inhalation, long term - systemic	17,3mg/m <sup>3</sup>	0,13
PROC3	Without local exhaust ventilation	worker inhalation, long term - systemic	34,5mg/m <sup>3</sup>	0,25
PROC3	---	Worker - dermal, long-term - systemic	0,3mg/kg/day	0,01
PROC8a	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC8a	---	Worker - dermal, long-term - systemic	13,7mg/kg/day	0,35
PROC8b	with local exhaust ventilation, 8 hours/day	worker inhalation, long term - systemic	10,4mg/m <sup>3</sup>	0,08
PROC8b	Without local exhaust ventilation, during 15 mins - 1 hour	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC8b	---	Worker - dermal, long-	6,9mg/kg/day	0,17

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		term - systemic		
PROC15	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC15	---	Worker - dermal, long-term - systemic	0,3mg/kg/day	0,01

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

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.  
 Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
 Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.  
 For scaling see: <http://www.ecetoc.org/tra>  
 Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Assumes a good basic standard of occupational hygiene is implemented.

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**1. Short title of Exposure Scenario 3: Distribution of substance**

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) 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) PROC15: Use as laboratory reagent
Environmental Release Categories	ERC2: Formulation of preparations

**2.1 Contributing scenario controlling environmental exposure for: ERC2**

Amount used	Amounts used in the EU (tonnes/year)	32000 ton(s)/year
	Fraction of EU tonnage used in region:	1
	Fraction used at the main local source.	0,002
	Maximum daily site tonnage (kg/day):	210 kg/day
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	1 .10 <sup>-4</sup>
	Emission or Release Factor: Water	1 .10 <sup>-5</sup>
	Emission or Release Factor: Soil	1 .10 <sup>-5</sup>
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Prevent discharge of undissolved substance to or recover from onsite wastewater.
		Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Domestic sewage treatment plant

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	Degradation efficiency	92,6 %
	Percentage removed from waste water	92,6 %
	Sludge Treatment	Do not use sludge as fertiliser
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Dispose of waste or used sacks/containers according to local regulations.
Conditions and measures related to external recovery of waste	Recovery Methods	Storage of finished products in closed containers., Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.

**2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC9, PROC15**

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	1 hours/day(PROC8b)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Bulk transfers Dedicated facility	Avoid carrying out operation for more than 1 hour.(PROC8b)
	Drum/batch transfers Dedicated facility	Avoid carrying out operation for more than 1 hour.(PROC8b)
	Drum and small package filling Dedicated facility	Ensure material transfers are under containment or extract ventilation.(PROC9)
	Process sampling (closed systems)	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance.(PROC8a)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	

**3. Exposure estimation and reference to its source**

**Environment**

Used ECETOC TRA model.

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
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ERC2	---	Fresh water	PEC	0,0194µg/L	0,00038
ERC2	---	Marine water	PEC	0,0020µg/L	0,000398
ERC2	---	Fresh water sediment	PEC	0,343µg/kg dwt	0,00038
ERC2	---	Marine sediment	PEC	0,036µg/kg dwt	0,000398
ERC2	---	Agricultural soil	PEC	0,169µg/kg dwt	0,0169
ERC2	---	Sewage treatment plant (STP)	PEC	0,0791µg/L	0,000007

ESVOC spERC 1.1b.v1 has been used to evaluate the exposure for the environment

**Workers**

ECETOC TRA model v2

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	---	worker inhalation, long term - systemic	69,08mg/m <sup>3</sup>	0,5
PROC2	---	Worker - dermal, long-term - systemic	1,37mg/kg/day	0,03
PROC3	---	worker inhalation, long term - systemic	120,9mg/m <sup>3</sup>	0,88
PROC3	---	Worker - dermal, long-term - systemic	0,34mg/kg/day	0,01
PROC8a	---	worker inhalation, long term - systemic	69,08mg/m <sup>3</sup>	0,50
PROC8a	---	Worker - dermal, long-term - systemic	13,71mg/kg/day	0,35
PROC8b	---	worker inhalation, long term - systemic	69,08mg/m <sup>3</sup>	0,5
PROC8b	---	Worker - dermal, long-term - systemic	6,86mg/kg/day	0,17
PROC9	---	worker inhalation, long term - systemic	34,54mg/m <sup>3</sup>	0,25
PROC9	---	Worker - dermal, long-term - systemic	6,86mg/kg/day	0,17
PROC15	---	worker inhalation, long term - systemic	69,08mg/m <sup>3</sup>	0,5
PROC15	---	Worker - dermal, long-term - systemic	0,34mg/kg/day	0,01

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

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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.  
Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).  
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.  
For scaling see: <http://www.ecetoc.org/tra>  
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Assumes a good basic standard of occupational hygiene is implemented.

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**1. Short title of Exposure Scenario 4: Use in dry cleaning**

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC6: Calendaring operations 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
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

**2.1 Contributing scenario controlling environmental exposure for: ERC4**

Amount used	Amounts used in the EU (tonnes/year)	2140 ton(s)/year
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,01
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Treat air emission to provide the required removal efficiency of (%): (Efficiency: 99,9 %)
	Air	Activated carbon filter to reduce emissions to air
	Water	Water treatment with air stripping
	Soil	Do not apply industrial sludge to natural soils.
	Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Domestic sewage treatment plant
	Degradation efficiency	92,6 %
	Percentage removed from waste water	92,6 %
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Dispose of waste or used sacks/containers according to local regulations.
Conditions and measures related to external recovery of waste	Recovery Methods	Storage of finished products in closed containers., Incinerate, absorb, or adsorb vapours stripped from

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solution whenever necessary.

**2.2 Contributing scenario controlling worker exposure for: PROC2, PROC4, PROC6, PROC8a, PROC8b**

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	1 hours/day(PROC8b)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Material transfers Manual	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC4)
	Finishing operations Treatment by heating	Provide extract ventilation to points where emissions occur.(PROC6)
	Material transfers Drum/batch transfers with local exhaust ventilation	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Material transfers Drum/batch transfers	Avoid carrying out operation for more than 1 hour.(PROC8b)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance.(PROC8a)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	

**3. Exposure estimation and reference to its source**

**Environment**

Used ECETOC TRA model.

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	---	Fresh water	PEC	0,0393µg/L	0,00077
ERC4	---	Marine water	PEC	0,0040µg/L	0,000788
ERC4	---	Fresh water sediment	PEC	0,695µg/kg dwt	0,000769
ERC4	---	Marine sediment	PEC	0,0712µg/kg dwt	0,000788
ERC4	---	Agricultural soil	PEC	3,760µg/kg dwt	0,376



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ERC4	---	Sewage treatment plant (STP)	PEC	0,278µg/L	0,000025
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**Workers**

ECETOC TRA model v2

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC2	---	Worker - dermal, long-term - systemic	1,4mg/kg/day	0,03
PROC4	---	worker inhalation, long term - systemic	96,7mg/m <sup>3</sup>	0,7
PROC4	---	Worker - dermal, long-term - systemic	6,9mg/kg/day	0,17
PROC6	---	worker inhalation, long term - systemic	34,5mg/m <sup>3</sup>	0,25
PROC6	---	Worker - dermal, long-term - systemic	0,3mg/kg/day	0,01
PROC8a	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC8a	---	Worker - dermal, long-term - systemic	13,7mg/kg/day	0,35
PROC8b	with local exhaust ventilation, 8 hours/day	worker inhalation, long term - systemic	10,4mg/m <sup>3</sup>	0,08
PROC8b	Without local exhaust ventilation, during 15 mins - 1 hour	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC8b	---	Worker - dermal, long-term - systemic	6,9mg/kg/day	0,17

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

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.  
 Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
 Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.  
 For scaling see: <http://www.ecetoc.org/tra>  
 Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

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Assumes a good basic standard of occupational hygiene is implemented.

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**1. Short title of Exposure Scenario 5: Use in dry cleaning**

Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises 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
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems

**2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8d**

Amount used	Amounts used in the EU (tonnes/year)	12408 ton(s)/year
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,000017
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Prevent leaks and prevent soil / water pollution caused by leaks.	
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Domestic sewage treatment plant
	Degradation efficiency	92,6 %
	Percentage removed from waste water	92,6 %
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Dispose of waste or used sacks/containers according to local regulations.
Conditions and measures related to external recovery of waste	Recovery Methods	Storage of finished products in closed containers., Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.

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**2.2 Contributing scenario controlling worker exposure for: PROC2, PROC4, PROC8a, PROC8b**

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	1 hours/day(PROC4, PROC8b)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	General exposures Use in contained batch processes Application of cleaning products in closed systems	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC2)
	Material transfers Manual	Avoid carrying out operation for more than 1 hour.(PROC4)
	Material transfers Drum/batch transfers with local exhaust ventilation	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Material transfers Drum/batch transfers	Avoid carrying out operation for more than 1 hour.(PROC8b)
	Material transfers Drum/batch transfers (closed systems)	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC2)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance. provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC8a)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	
Conditions and measures related to personal protection, hygiene and health evaluation	Equipment cleaning and maintenance	Wear suitable gloves tested to EN374.(PROC8a)

**3. Exposure estimation and reference to its source**

**Environment**

Used ECETOC TRA model.

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
PA100585_001		18/27			EN

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ERC8a	---	Fresh water	PEC	0,0142µg/L	0,000279
ERC8a	---	Marine water	PEC	0,0015µg/L	0,000298
ERC8a	---	Fresh water sediment	PEC	0,252µg/kg dwt	0,000279
ERC8a	---	Marine sediment	PEC	0,0269µg/kg dwt	0,000298
ERC8a	---	Agricultural soil	PEC	0,0568µg/kg dwt	0,00568
ERC8a	---	Sewage treatment plant (STP)	PEC	0,0278µg/L	0,000002

**Workers**

ECETOC TRA model v2

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	---	worker inhalation, long term - systemic	96,7mg/m <sup>3</sup>	0,7
PROC2	---	Worker - dermal, long-term - systemic	1,4mg/kg/day	0,03
PROC4	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC4	---	Worker - dermal, long-term - systemic	6,9mg/kg/day	0,17
PROC8a	---	worker inhalation, long term - systemic	96,7mg/m <sup>3</sup>	0,7
PROC8a	---	Worker - dermal, long-term - systemic	2,7mg/kg/day	0,07
PROC8b	with local exhaust ventilation, 8 hours/day	worker inhalation, long term - systemic	34,5mg/m <sup>3</sup>	0,25
PROC8b	Without local exhaust ventilation, during 15 mins - 1 hour	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,50
PROC8b	---	Worker - dermal, long-term - systemic	6,9mg/kg/day	0,17

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

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.  
 Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
 Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

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For scaling see: <http://www.ecetoc.org/tra>

Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Assumes a good basic standard of occupational hygiene is implemented.

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**1. Short title of Exposure Scenario 6: Use in surface cleaning**

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) 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 PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

**2.1 Contributing scenario controlling environmental exposure for: ERC4**

Amount used	Amounts used in the EU (tonnes/year)	8445 ton(s)/year
	Fraction of EU tonnage used in region:	0,1
	Fraction used at the main local source.	0,00048
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Activated carbon filter to reduce emissions to air Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Domestic sewage treatment plant
	Degradation efficiency	92,6 %
	Percentage removed from waste water	92,6 %
Conditions and measures related to external recovery of waste	Recovery Methods	Storage of finished products in closed containers., Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.

**2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC8a, PROC8b, PROC13**

Product characteristics	Concentration of the	Covers percentage substance in the product up to
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	Substance in Mixture/Article	100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	1 hours/day(PROC8b, PROC13)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	General exposures Use in contained batch processes Application of cleaning products in closed systems with local exhaust ventilation	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)
	Material transfers Manual	Avoid carrying out operation for more than 1 hour.(PROC13)
	Material transfers Manual with local exhaust ventilation	Provide extract ventilation to points where emissions occur.(PROC13)
	Material transfers Drum/batch transfers with local exhaust ventilation	Ensure material transfers are under containment or extract ventilation.(PROC8b)
	Material transfers Drum/batch transfers	Avoid carrying out operation for more than 1 hour.(PROC8b)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance.(PROC8a)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	

**3. Exposure estimation and reference to its source**

**Environment**

Used ECETOC TRA model.

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	---	Fresh water	PEC	0,0118µg/L	0,000232
ERC4	---	Marine water	PEC	0,0013µg/L	0,000251
ERC4	---	Fresh water	PEC	0,209µg/kg	0,000232



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		sediment		dwt	
ERC4	---	Marine sediment	PEC	0,0226µg/kg dwt	0,000251
ERC4	---	Agricultural soil	PEC	0,462µg/kg dwt	0,0462
ERC4	---	Sewage treatment plant (STP)	PEC	0,0037µg/L	0,000000

**Workers**

ECETOC TRA model v2

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC2	---	Worker - dermal, long-term - systemic	1,4mg/kg/day	0,03
PROC3	---	worker inhalation, long term - systemic	120,9mg/m <sup>3</sup>	0,88
PROC3	---	Worker - dermal, long-term - systemic	0,3mg/kg/day	0,01
PROC8a	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC8a	---	Worker - dermal, long-term - systemic	13,7mg/kg/day	0,35
PROC8b	with local exhaust ventilation, 8 hours/day	worker inhalation, long term - systemic	10,4mg/m <sup>3</sup>	0,08
PROC8b	Without local exhaust ventilation, during 15 mins - 1 hour	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,5
PROC8b	---	Worker - dermal, long-term - systemic	6,9mg/kg/day	0,17
PROC13	Without local exhaust ventilation, during 15 mins - 1 hour	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,50
PROC13	with local exhaust ventilation, 8 hours/day	worker inhalation, long term - systemic	34,5mg/m <sup>3</sup>	0,25
PROC13	---	Worker - dermal, long-term - systemic	13,7mg/kg/day	0,35

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may

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be necessary to define appropriate site-specific risk management measures.  
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.  
For scaling see: <http://www.ecetoc.org/tra>  
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Assumes a good basic standard of occupational hygiene is implemented.

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**1. Short title of Exposure Scenario 7: Use in heat transfer and hydraulic fluids**

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC3: Use in closed batch process (synthesis or formulation) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
Environmental Release Categories	ERC7: Industrial use of substances in closed systems

**2.1 Contributing scenario controlling environmental exposure for: ERC7**

Amount used	Amounts used in the EU (tonnes/year)	20 ton(s)/year
	Fraction of EU tonnage used in region:	1
	Fraction used at the main local source.	0,01
Frequency and duration of use	Continuous exposure	20 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Treat air emission to provide a typical removal efficiency of (%): (Efficiency: 99,9 %)
	Air	Activated carbon filter to reduce emissions to air
	Water	No release to water or STP
	Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.	
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Dispose of waste or used sacks/containers according to local regulations.
	Recovery Methods	Storage of finished products in closed containers., Incinerate, absorb, or adsorb vapours stripped from solution whenever necessary.

**2.2 Contributing scenario controlling worker exposure for: PROC1, PROC3, PROC8a**

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 % (unless stated differently).
	Physical Form (at time of use)	liquid
	Vapour pressure	0,5 - 10 kPa
Frequency and duration of use	Frequency of use	8 hours/day

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	Frequency of use	1 hours/day(PROC3)
Human factors not influenced by risk management	Assumes activities are at ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	General exposures (closed systems)	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC1)
	Material transfers Use in contained batch processes	Drain down and flush system prior to equipment opening or maintenance.(PROC3)
	cleaning (closed systems)	provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)
	Material transfers	Avoid carrying out operation for more than 1 hour. provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).(PROC3)
	Equipment cleaning and maintenance	Drain down system prior to equipment break-in or maintenance.(PROC8a)
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent /minimise exposures and to report any skin problems that may develop.	

**3. Exposure estimation and reference to its source**

**Environment**

Used ECETOC TRA model.

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC7	---	Fresh water	PEC	0,0115µg/L	0,000225
ERC7	---	Marine water	PEC	0,0012µg/L	0,000243
ERC7	---	Fresh water sediment	PEC	0,203µg/kg dwt	0,000225
ERC7	---	Marine sediment	PEC	0,022µg/kg dwt	0,000243
ERC7	---	Agricultural soil	PEC	0,0033µg/kg dwt	0,000330
ERC7	---	Sewage treatment plant (STP)	PEC	0,0000µg/L	0,000000

**Workers**

ECETOC TRA model v2

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	---	worker inhalation, long term - systemic	0,1mg/m <sup>3</sup>	0,00
PROC1	---	Worker - dermal, long-	0,3mg/kg/day	0,01

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		term - systemic		
PROC3	Indoor use., Without local exhaust ventilation, during 15 mins - 1 hour	worker inhalation, long term - systemic	34,5mg/m <sup>3</sup>	0,25
PROC3	Outdoor use., 8 hours/day	worker inhalation, long term - systemic	120,9mg/m <sup>3</sup>	0,88
PROC3	Outdoor use., during 15 mins - 1 hour	worker inhalation, long term - systemic	24,2mg/m <sup>3</sup>	0,18
PROC3	---	Worker - dermal, long-term - systemic	0,3mg/kg/day	0,01
PROC8a	---	worker inhalation, long term - systemic	69,1mg/m <sup>3</sup>	0,50
PROC8a	---	Worker - dermal, long-term - systemic	13,7mg/kg/day	0,35

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

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.  
 Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.  
 Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.  
 For scaling see: <http://www.ecetoc.org/tra>  
 Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

**Additional good practice advice beyond the REACH Chemical Safety Assessment**

Assumes a good basic standard of occupational hygiene is implemented.

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ISO 9001	Yes	Yes
ISO 14001	Yes	Yes
ISO 22000	Yes	Yes
FSSC 22000	Yes	Yes
GMP+ -feed	Yes	Yes
OHSAS18001	-	Yes
ESAD	Yes	Yes
other	-	AEO