

**SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE**

1.- IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY:

1.1. Product identifier: VeryOne® Cetane Improver

Product identifier provided in the registration: **2-Ethylhexyl Nitrate**
REACH Registration number: **01-2119539586-27-0000**

1.2. Relevant identified uses of the substance: The product is used to raise the cetane number of diesel fuels

1.3. Details of the supplier of the safety data sheet

Supplier

VERYONE - SORGUES site –1928, avenue d'Avignon – CS 90109 SORGUES
84275 VEDENE CEDEX
Tel : + 33(0)4.90.33.62.00
Fax : + 33(0)4.90.39.52.64
E-mail : fds@veryone.com

1.4. Emergency phone number

Official advisory body UK : National Poisons Information: +44 870 600 6266
EURENCO/VERYONE (SORGUES plant) : +33(0)4.90.33.62.00

2.- HAZARDS IDENTIFICATION :

2.1. Classification of the substance

➤ **Classification according to Regulation (EC) N° 1272/2008 (CLP regulation)**

• Hazard statements for human health

Acute toxicity, category 4, H302
Acute toxicity, category 4, H312
Acute toxicity, category 4, H332

• Hazard statements for environmental effects

Chronic hazard for aquatic environment, category 2, H411

• Supplemental hazard information

EUH066 et EUH044

**SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE****2.2. Label elements according to Regulation (EC) N° 1272/2008**

- Signal Word: Warning
- Hazard Statement:
 - H302: Harmful if swallowed
 - H312: Harmful in contact with skin
 - H332: Harmful if inhaled
 - H411: Toxic to aquatic life with long lasting effects
 - EUH066: Repeated exposure may cause skin dryness or cracking
 - EUH044: Risk of explosion if heated under confinement
- Precautionary Statement:
 - P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
 - P273: Avoid release to the environment.
 - P280: Wear protective gloves/protective clothing/eye protection/face protection.
 - P304 + P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 - P312: Call a POISON CENTER or doctor/physician if you feel unwell.
 - P501: Dispose of contents/container by incineration in a specialized site.

2.3. Other hazards

- Classified Marine pollutant.
- Substance not classified PBT/vPvB

3. - COMPOSITION/INFORMATION ON INGREDIENTS :**3.1. Substance**

Chemical name of the substance: 2-ETHYLHEXYL NITRATE

Synonym(s):

CAS Name: Nitric acid, 2-ethylhexyl ester (2-EHN)

Other Name: 3-Nitroxymethyl-heptane

N° CAS: 27247-96-7

N° EC: 248-363-6

Chemical formula: C₈ H₁₇ N O₃

M.W. : 175,23

**SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE**

3.2. Mixture

Not applicable.

4. – FIRST AID MEASURES:**4.1. Description of first aid measures****Inhalation:**

If the person is affected by inhaled vapours or combustion products, remove the person to fresh air at once.

Provide respiratory support as needed.

Get medical attention immediately.

Skin contact:

Immediately decontaminate contact area.

Ensure shoes and clothing are free from material before reuse - discard if necessary.

Get medical attention immediately, if irritation continues.

Wash immediately contaminated parts with large amounts of water and soap at least 15 minutes.

Eye contact:

Immediately decontaminate eyes with plenty of water.

Get medical attention immediately, if irritation continues.

Ingestion:

DO NOT induce vomiting, as aspiration of liquid product into the lungs can cause chemical pneumonitis.

Get medical attention immediately.

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

Symptoms of vasodilation may be present following organic nitrate over exposure.

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

Notes to Physicians: Treat as organic nitrate poisoning.

5. – FIREFIGHTING MEASURES:**5.1. Extinguishing media**

Suitable extinguishing media:

SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

For large fire: Water spray, foam (resistant to alcohol preference).

For small fire: Water spray foam, powder or CO₂.

Do not use water jet.

Specific method(s): Flood adjacent containers with water to keep cool.

Special fire fighting procedures:

Removal of radiant heat from nearby fire is vital.

Radiant heat from surrounding fires can heat up tanks containing 2-EHN, and in theory start a bulk liquid phase decomposition with potential catastrophic effects. A credible scenario is that when a storage tank is involved in a fire, the upper tank surfaces in contact with the vapour will rapidly reach the auto-ignition temperature (130°C) of 2-EHN. This will lead to an air-vapour explosion in the headspace of the tank, which could become projectiles if its roof is not frangible. The hazard is well recognised for kerosene and gas-oil storage tanks where the auto-ignition temperatures are of the order of 250°C, more than 100°C higher than 2-EHN.

Apply deluge water onto tank walls to keep the product cool.

2-EHN is thermally unstable - when heated above 100°C, it may undergo a self-accelerating exothermic decomposition. Cool containers exposed to flames with flooding quantities of water until well after the fire is out.

Be aware of the danger of a container bursting under pressure followed by combustion of vapours. Fight any fire from a safe distance or protected locations. Do not approach containers suspected to be hot.

if tank, rail car or tank truck is involved in fire, ISOLATE the container and evacuate personnel to ensure safety.

Drums and IBC's should be immediately cooled by spraying firewater from a fixed deluge. Sealed drums of 2-EHN in an intense fire will rupture after a short period of exposure (practical tests and theoretical examples indicate a time to rupture of 10 to 20 minutes, depending on conditions). Bursting drums will give rise to projectiles/flying fragments and fireball formation, which will add to the severity of the incident.

5.2. Special hazards arising from the substance

Specific fire hazard(s):

Thermally unstable (refer to section 10).

Combustion products include nitrogen oxides, carbon monoxide and carbon dioxide.

Vapours are heavier than air and may travel a considerable distance to a source of ignition and flash back.

Vapour-air mixtures are explosive above flash point.

5.3. Advice for firefighters

Any self-contained breathing apparatus and appropriate protective clothing.

Exhaust gases from fire or products of decomposition are toxic (they contain oxides of nitrogen and combustion products). Therefore, fire fighters must be protected by wearing self contained breathing apparatus.

Wear chemical protective clothing; however, such clothing may provide little or no thermal protection.

Fire fighter's protective clothing will only provide limited chemical protection.

6. – ACCIDENTAL RELEASE MEASURES:

SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

6.1. Personal precautions, protective equipment and emergency procedures

Do not breathe fumes, vapours, gas.
Avoid contact with skin, eyes, or clothing.
All non-essential personnel should evacuate the affected area.
Shut off ignition sources.
Use water spray to reduce vapours.
No smoking, flames or flares in hazard area.
Isolate hazard area and restrict entry.

6.2. Environmental precautions

Prevent contamination of soil and water.

6.3. Methods and material for containment and cleaning up

- RECOVERY:

Recover spilled material with an absorbent (earth, sand,...) and place in a labelled container for later disposal. For large spill, dike spilled area for later disposal.

- DISPOSAL:

Incinerate in an authorized area.

6.4. Reference to other sections

See section 8 and section 13 for more informations.

7. – HANDLING AND STORAGE:

7.1. Precautions for safe handling

Prevent heating above 100 °C due to severe risk of pressure rise and explosion (refer to section 10).

Maximal recommended handling temperature : 60 °C. (refer to section 10).

7.2. Conditions for safe storage, including any incompatibilities

Store in a ventilated area in tightly closed containers equipped with means of preventing the product from reaching 100 °C (Refer to section 10).

Maximal recommended storage temperature: 40 °C. (refer to section 10).

Packaging / tank material:

Mild steel. Stainless steel. Aluminium. PTFE. Perfluoro elastomers.

Unsuitable packaging materials:

Natural or butyl rubbers.

SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

7.3. Specific end uses

Uses of this substance are identified in section 1.2.

8. – EXPOSURE CONTROLS / PERSONAL PROTECTION:

8.1. Control parameter(s)

DNEL/PNEC:

Workers :

DNEL(long term / dermal / systemic effects) : 1 mg/kg/day

DNEL(long term / inhalation / systemic effects): 0.35 mg/m³

DNEL(long term / dermal / local effects): 44 µg/cm²/d

General population :

DNEL(long term / dermal / systemic effects) : 0.52 mg/kg/day

DNEL(long term / inhalation / systemic effects): 87 µg/m³

DNEL(long term / oral / systemic effects) : 25 µg/kg/day

DNEL(long term / dermal / local effects): 22 µg/cm²/d

PNEC aqua – freshwater : 0.8 µg/l

PNEC aqua – marine water : 0.08 µg/l

PNEC sediment : 0.74 µg/kg

PNEC soil : 0.191 µg/kg

8.2. Exposure controls

Personal protective equipment:

- Respiratory protection:
Gas-mask with organic vapour-canister in case of lack of air-purifying system.
- Hand protection:
Neoprene solvent proof protective gloves.
- Skin and body protection:
Appropriate clothing and boots.
- Eye protection:
Safety goggles.

Hygiene measure(s): (refer to section 6)

Do not eat, drink, or smoke during work.

Do not breathe vapours.

Avoid contact with skin and eyes.

Wash one's hand before breaks and at the end of day's work.

Take a shower at the end of working.

Clean protective equipment and working clothes.

Further information(s): DECONTAMINATION DEVICE

Shower, eye-wash fountain close by.

SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE

Cleaning point (with soap) close by.

Environmental exposure controls

A summary of the risk management measures that adequately control exposure of the environment to the substance shall be given for the exposure scenarios set out in the annex to the safety data sheet.

9. – PHYSICAL AND CHEMICAL PROPERTIES:**9.1 Information on physical properties and chemical properties**

Physical state / Form	: Liquid (20 °C). Slightly viscous liquid
Colour	: Clear colorless to pale yellow
Odour	: Pungent, fatty, fruity ester odor
Melting point/range	: < - 50 °C
Flash point	: 81 °C (closed cup) (Method : NF T60-103)
Auto-ignition temperature	: 215 °C (Progressive heating)
Decomposition temperature	: 130 °C
Cinematic viscosity	: 1.8 cSt (20 °C)
Flammability (solid, gas)	: Lower flammable limit: 0,25 %
Explosive properties	: Non-explosive
Enthalpy of combustion	: 29855 J/g
Vapour pressure	: 27 Pa (20 °C) ; 4,0 - 5,3 Pa (10 °C) ; 40 - 53 Pa (40 °C)
Relative density	: 0.96 g/ml (20 °C)
Water solubility	: 12,6 mg/l (20 °C)
Solvent solubility	: Soluble in hydrocarbons, methanol and chlorinated solvents
Partition coefficient n-octanol/water	: logPow = 5,24

9.2. Other information:

Non-corrosive to steel and aluminium.

10.- STABILITY AND REACTIVITY :**10.1. Reactivity**

Thermal decomposition at 130 °C (refer to section 9).

10.2. Chemical stability

SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

Chemically stable under normal storage (<100°C recommended; 60°C in handling and 40°C in storage) (refer to section 7).

10.3. Possibility of hazardous reactions

Temperatures above 100°C may cause self-accelerating exothermic decomposition which causes a rapid rise in temperature and pressure. JD90119 burning of the product, exhaust toxic fumes).

Thermal-ignition critical temperatures (T_c) and reaction times (t) at T_c + 1°C:

- Cylindrical metallic drum diameter 400 mm : T_c = 93 °C ; t = 27 hours.
- Cylindrical metallic container diameter 2 m : T_c = 65 °C ; t = 6 days.
- Cylindrical metallic container diameter 10 m : T_c = 38 °C ; t = 30,5 days.

Self-accelerating decomposition temperature (SADT):

50 kg package: 95 °C ; not insulated inox container (25 m³): 88 °C.

10.4. Condition(s) to avoid:

Avoid all contact with sources of heat, flames, sparks or any other source of ignition.

Vapours may be explosive.

Avoid overheating of containers. Containers may violently rupture in heat of fire.

Incompatibilities with strong oxidizing agents and reducing agent, acids and strong bases, amines and phosphorus, combustible materials and natural or synthetic rubber.

10.5. Incompatible materials

Strong oxidizing agents and reducing agent, acids and strong bases, amines and phosphorus, combustible materials and natural or synthetic rubber.

10.6. Hazardous decomposition products

Combustion or thermal decomposition products may include carbon monoxide, carbon dioxide, various hydrocarbon fragments and nitrogen oxides.

11. - TOXICOLOGICAL INFORMATION:

11.1. Information of toxicological effects

11.1.1. Substance information

➤ **Acute toxicity:**



SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

- Inhalation :
LCLo/inhalation/rat > 4.6 mg/L air – Non-conclusive data
- Contact avec la peau :
LDLo/cutanée/lapin > 4.8 g/kg
- Ingestion :
LD50/orale/rat > 9.6 g/kg
- Human data:
Effects in worker have been reported, including dizziness and headaches. These effects are explained by the vasodilatory properties of 2-Ethylhexyl Nitrate.
- Conclusion on acute toxicity:
No oral and skin toxicity. The inhalation route is inconclusive. However and according to observations from the worker, the classification (worst case) and Acute Toxicity Category 4 is applicable.
- **Skin corrosion/irritation:**
Non irritant (Tested on rabbits: according to OECD Guideline 404 (Acute Dermal Irritation / Corrosion))
- **Serious eye damage/eye irritation:**
Slightly irritating (Tested *in vitro* according to OECD 437)
- **Respiratory or skin sensitization:**
No respiratory sensitiser and skin (6 studies available)
- **Germ Cell mutagenicity:**
Non genotoxic according to OECD Guideline 476 and OECD Guideline 473
- **Carcinogenicity:**
Missing data.
Non carcinogenic according substance properties and read-across with the 2-Ethylhexanol.
- **Reproductive toxicity:**
Non-toxic to reproduction (Screening test according to “OECD Guideline 421 (Reproduction / Developmental Toxicity Screening Test”)
NOAEL = 20 mg/kg bw/day
NOAEL = 100 mg/kg bw/day
- **Toxicity specific target organ:**
Given the available data, the classification criteria are not met
- **Aspiration hazard:**
Given the available data, the classification criteria are not met
- **Effects on chronic exposure to short and long term:**

SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE

Probably similar of Nitric Esters (Nitroglycerin and ethylene glycol dinitrate). Vasodilator. With prolonged exposure, can cause headaches, nausea, lower blood pressure (human observation).

➤ **Specific effects:**

Poisoning may affect the blood and cardiovascular system. Alcohol may increase toxic effects (Human and Animal observation).

11.1.2. Information on the mixture

Not applicable.

11.1.3. Information on likely routes of exposure

The routes of likely exposures under normal use of the product are by inhalation, skin and ingestion contact.

11.1.4. Symptoms related to the physical, chemical and toxicological characteristics

See section 4.2.

11.1.5. Delayed, immediate and chronic effects of short or long term exposure

See section 4.2.

11.1.6. Interaction effects

No data available.

11.1.7. Absence of specific data

Not applicable.

12. - ECOLOGICAL INFORMATION:

12.1. Toxicity

- Toxicity to fish:

LC50 (Danio rerio, 96 hours) = 1.88 mg/L

NOEC = 1.42 mg/L

- Acute toxicity for daphnia:

EC50 (Daphnia magna, 48 hours): above the solubility limit

Non-conclusive data

- Algae growth inhibition:

ErC50 (Pseudokirchnerella subcapitata, 72 hours) < 0.8 mg/L

EyC50 (Pseudokirchnerella subcapitata, 72 hours) < 0.8 mg/L

12.2. Persistence and degradability

Half-life at pH 7 at 25°C: about 7 days; at 50°C: about 24 hours (Hydrolysis test in terms of pH).
Not readily biodegradable (0% degradation after 28 days) according to OECD Guideline 310.

SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

12.3. Bioaccumulative potential

No data available. Not potentially bioaccumulable
BCF = 1332 with log Kow = 5.24 (according to BCFBAF v.3.00)

12.4. Mobility in soil

Coefficient of adsorption/desorption Log Koc = 3.75 → Koc = 5 623 L/kg (OECD 121: HPLC method). Significant potential for adsorption in soils.

Very slightly soluble in water: 12.6 mg/l at 20°C. May emulsify with water.
May form a film on water surface causing impaired oxygen transfer.

12.5. Results of PBT and vPvB assessment

Persistent, not Bioaccumulative (< 2000 according to BCF) and not toxic
Conclusion: Not classified PBT/vPvB

12.6. Other adverse effects

No data available.

13. - DISPOSAL CONSIDERATIONS:

13.1. Waste treatment methods

Waste / unused products:

Recover and recycle the product if possible.
Incinerate with a combustible solvent in an authorized area.

Contaminated packaging:

- Bottles and drums:

Empty completely the container and wash it with an appropriate solvent.
Recycle or incinerate in an authorized area.

- Containers and tanks:

Wash with an appropriate solvent, then with steam and water.
Destroy the solvent and wastewaters in the same way as the product in an authorized area.
Do not release into the environment.

14. – TRANSPORT INFORMATION:

14.1. UN Number

UN N° 3082

14.2. UN proper shipping name

SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2-ETHYLHEXYL NITRATE)

14.3. Transport hazard class(es)

Class 9

14.4. Packing group

Packing group III

Packing instructions (by land): P001 with special provision PP1 - IBC03 - LP01 - R001

Packing instructions (by sea): P001 with special provision PP1 - LP01 - IBC 03

FS : F-A , S-F

Tunnel code : (-)

14.5. Environmental hazards

By land (ADR-RID) :

Environmentally hazardous substance

By sea (IMDG) :

Environmentally hazardous substance

Polluant marin : oui

By air (IATA) :

Environmentally hazardous substance

14.6. Special precautions for user

Do not discharge on the ground.

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

Not relevant.

15. – REGULATORY INFORMATION :

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

MSDS established according to Regulation (EU) N°2015/830 of the Commission on 28 May 2015 amending Regulation (EC) 1907/2006 of the European Parliament and the Council concerning the Registration, Evaluation and Authorisation of Chemicals, and Restrictions of Chemicals (REACH) replaces Annex II of REACH « **REQUIREMENTS FOR THE COMPILATION OF SAFETY DATA SHEETS** ».

Mandatory labeling of dangerous substances according to CLP Regulation (EC) N°.1272/2008 of the European Parliament and the Council of 16 December 2008 on Classification, Labeling and packaging of substances and mixtures (Auto-Classification): Concerned.

15.2. Chemical safety assessment

**SAFETY DATA SHEET
2-ETHYLHEXYL NITRATE**

A chemical safety assessment has been carried out by the supplier (Eurenco/VeryOne) as the « Lead Registrant » in the SIEF.

16. – OTHER INFORMATION:

Changes in all sections of the MSDS following submission of the registration dossier with a CSA/CSR and the creation of the new format (Regulation (EC) N° 453/2010) for MSDS with all sub-topics.

Abbreviations and acronyms:

ADR - RID: European Agreement concerning the International Carriage of Dangerous Goods by Road – International Rule for Transport of Dangerous Substances by Railway
BCF: BioConcentration Factor
BW: Body Weight
CSA/CSR: Chemical Safety Assessment / Chemical Safety Report
DNEL: Derived No Effect Level
SIEF: Substance Information Exchange Forum
IATA: International Air Transport Association
IMDG: International Maritime code for Dangerous Goods
LC50: Median lethal concentration
LCLo: Lowest Lethal Concentration
LD50: Median Lethal Dose
NOAEL: No Observed Adverse Effect Level
NOEC: No Observed Effect Concentration
OECD: Organisation for Economic Co-operation and Development
PBT/vPvB: Persistent Bioaccumulable Toxic / Very Persistent very Bioaccumulable
PNEC: Predicted No Effect Concentration
PTFE: PolyTétraFluorEthylène

Key literature references and sources for data:

Registration dossier REACH (data of Annex VII to XI and CSA/CSR) with Eurenco/VeryOne as Lead Registrant.
ATC Document n° 76. Best Practices MANUAL. 2-Ethylhexyl nitrate (2EHN). August 2004.
High Production Volume (HPV) Challenge program. “Final submission for Nitric Acid, 2-Ethylhexyl Ester”. October 2006.
IUCALID Dataset of 2-ethylhexyl nitrate. February 2000.

Warning:



SAFETY DATA SHEET 2-ETHYLHEXYL NITRATE

The information it contains is based on our current state of knowledge about the product at the date indicated and is given in good faith.

We want to draw the user's attention to the risks of using the product for purposes other than the original purpose for which it is intended.

It is a responsibility incumbent upon the user to:

- develop safety measures for all situations in which the product is used, in particular in light of the data given in the present data sheet.
- make known to all product users and handlers the appropriate safety data and warnings concerning the risks mentioned in any documentation pertaining to the use of the product.

This information should in no case whatsoever be considered as exhaustive, and does not release the user from any other obligations stemming from any regulations other than those mentioned especially from those governing his own field of business, as concerns the possession or handling of the product, for which the addressee is solely responsible.

Eurenco/VeryOne technical services are at the users' disposal for any assistance on the subject, whenever possible, and within the limits of their expertise.

Historic :

- First edition date : 22-10-2012
- Previous revision date : 02-07-2018
- Review date : 25-11-2020
- Version : 21
- Review section(s) N° : 1.3 ; 4 ; 5.3 ; 12.6



**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 1**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

1. Exposure scenario n° 1	
Synthesis, use and formulation under industrial processes	
Use descriptors related to the life cycle stage	SU3 PROC1/2/3 ERC1
Name of contributing environmental scenario (1) and corresponding ERC	1. Manufacture of substances (ERC1)
List of names of contributing worker scenarios (2) and corresponding PROC	1. Use in closed process, no likelihood of exposure (PROC1) 2. Use in closed, continuous process with occasional controlled exposure (PROC2) 3. Use in closed batch process (synthesis or formulation) (PROC3)
2.1 Contributing scenario (1) controlling environmental exposure	
Manufacture of substances (ERC1)	
Product characteristic	Liquid
Frequency and duration of use	329 days/year
Technical conditions and measures at process level (source) to prevent release	Procedural and/or control technologies are required to minimize emissions and the resulting exposure during cleaning and maintenance procedures
Conditions and measures related to external treatment of waste for disposal	Recycle product or dispose properly. Can be incinerated according to local regulations
2.2 Contributing scenario (2) controlling worker exposure	
PROC1/2/3	
Product characteristic	
Product related conditions, e.g. the concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure:	Liquid
Frequency and duration of use/exposure	
Duration per task/activity (e.g. hours per shift) and frequency (e.g. single events or repeated) of exposure	PROC 1&2 : Less than 1 hour(s) per day PROC 3 : Less than 1/2 hour(s) per day
Human factors not influenced by risk management	
Particular conditions of use, e.g. body parts potentially exposed as a result of the nature of the activity :	PROC 1&3 : Exposed skin surface (cm ²) : 240 (one hand, face side only) PROC 2 : Exposed skin surface (cm ²) : 480 (two hands, face side only)
Other given operational conditions affecting workers exposure	
Other given operational conditions: e.g. technology or process techniques determining the initial release of substance from process into workers environment; room volume, whether the work is carried out outdoors/indoors, process conditions related to temperature and pressure:	Indoors or outdoors



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Technical conditions and measures at process level (source) to prevent release																					
Process design aiming to prevent releases and hence exposure of workers; this in particular includes conditions ensuring rigorous containment; performance of containment to be specified (e.g. by quantification of residual losses or exposure)	Closed system																				
Technical conditions and measures to control dispersion from source towards the worker																					
Engineering controls, e.g. exhaust ventilation, general ventilation; specify effectiveness of measure :	Indoors or outdoors : PROC 2&3 : Local exhaust ventilation																				
Organisational measures to prevent /limit releases, dispersion and exposure																					
Specific organisational measures or measures needed to support the functioning of particular technical measures (e.g. training and supervision). Those measures need to be reported in particular for demonstrating strictly controlled conditions :	Not applicable																				
Conditions and measures related to personal protection, hygiene and health evaluation																					
Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the Personal Protection Equipment (where relevant) and advise how long the protective equipment can be used before replacement:	PROC 1 : Protective gloves Efficiency : 90%																				
3 Exposure information and reference to its source																					
Information for contributing scenario 1																					
The local PECs are calculated manually, mainly based on site specific information																					
	<table border="1"> <thead> <tr> <th></th> <th>Exposure estimation</th> <th>PNEC</th> <th>Ratio</th> </tr> </thead> <tbody> <tr> <td>Fresh water</td> <td>0,652 µg/l</td> <td>0,8 µg/l</td> <td>0.815</td> </tr> <tr> <td>Marine water</td> <td>0,0652 µg/l</td> <td>0,08 µg/l</td> <td>0.815</td> </tr> <tr> <td>Sediment (freshwater)</td> <td>No data available</td> <td>0,00074 mg/kg dwt</td> <td></td> </tr> <tr> <td>Soil.</td> <td>Negligible.</td> <td>0,000191 mg/kg dwt</td> <td></td> </tr> </tbody> </table>		Exposure estimation	PNEC	Ratio	Fresh water	0,652 µg/l	0,8 µg/l	0.815	Marine water	0,0652 µg/l	0,08 µg/l	0.815	Sediment (freshwater)	No data available	0,00074 mg/kg dwt		Soil.	Negligible.	0,000191 mg/kg dwt	
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Information for contributing scenario 2																					
Workers exposure estimation has been calculated using ECETOC Tra																					

**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 1**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

Workers exposure	Exposure estimation	DNEL	Ratio
Long-term - local effects, dermal	PROC1 : 8,58 µg/cm ² /d PROC2 : 17,1 µg/cm ² /d PROC3 : 8,58 µg/cm ² /d	44 µg/cm ² /d	PROC1 : 0.195 PROC2 : 0.389 PROC3 : 0.195
Long-term - systemic effects, dermal	PROC1 : 0,0343 mg/kg bw/day PROC2 : 0,137 mg/kg bw/day PROC3 : 0,0343 mg/kg bw/day	1 mg/kg bodyweight/day	PROC1 : 0.0343 PROC2 : 0.137 PROC3 : 0.0343
Long-term - systemic effects, inhalation	PROC1 : 0,0146 mg/m ³ < 1h/day PROC2 : 0,146 mg/m ³ < 1h/day PROC3 : 0,438 mg/m ³ < 1/2h/day	0,35 mg/m ³	PROC1 : 0.0417 PROC2 : 0.417 PROC3 : 0.625 (<1/2h/day & RCR/2)
Combined routes			PROC1 : 0.076 PROC2 : 0.554 PROC3 : 0.659

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

No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

5 Additional good practice advice beyond the REACH CSA

Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets. Such as:

- Containment as appropriate;
- Minimise number of staff exposed;
- Segregation of the emitting process;
- Effective contaminant extraction;
- Good standard of general ventilation;
- Minimisation of manual phases;
- Avoidance of contact with contaminated tools and objects;
- Regular cleaning of equipment and work area;
- Management/supervision in place to check that RMMs in place are being used correctly and OCs followed;
- Training staff on good practice;
- Good standard of personal hygiene



**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 3**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

1. Exposure scenario n° 2	
Formulation of preparations (mixtures)	
Use descriptors related to the life cycle stage	SU3 (SU8/9/10) PROC4/5/8a/8b/9/15/16 ERC1/2/7 PC13/19
Name of contributing environmental scenario (1) and corresponding ERC	1. Manufacture of substances (ERC1) 2. Formulation of preparations (ERC2) 3. Industrial use of substances in closed systems (ERC7)
List of names of contributing worker scenarios (2) and corresponding PROC	1. Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4) 2. Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC5) 3. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC8a) 4. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC8b) 5. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9) 6. Use as laboratory reagent (PROC15) 7. Using material as fuel sources, limited exposure to unburned product to be expected (PROC16)
2.1 Contributing scenario (1) controlling environmental exposure	
Manufacture of substances (ERC1) Formulation of preparations (ERC2) Industrial use of substances in closed systems (ERC7)	
Product characteristic	Liquid
Frequency and duration of use	292 days/year
Technical conditions and measures at process level (source) to prevent release	Procedural and/or control technologies are required to minimize emissions and the resulting exposure during cleaning and maintenance procedures
Conditions and measures related to external treatment of waste for disposal	Recycle product or dispose properly. Can be incinerated according to local regulations
2.2 Contributing scenario (2) controlling worker exposure	
PROC4/5/8a/8b/9/15/16	
Product characteristic	
Product related conditions, e.g. the concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure:	Liquid

**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 3**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

Frequency and duration of use/exposure				
Duration per task/activity (e.g. hours per shift) and frequency (e.g. single events or repeated) of exposure		More than 4 hours per day Except : PROC8b : 0.25 - 1 hours per day PROC15 : 1-4 hours per day		
Other given operational conditions affecting workers exposure				
Other given operational conditions: e.g. technology or process techniques determining the initial release of substance from process into workers environment; room volume, whether the work is carried out outdoors/indoors, process conditions related to temperature and pressure:		Indoors and Outside		
Process design aiming to prevent releases and hence exposure of workers; this in particular includes conditions ensuring rigorous containment; performance of containment to be specified (e.g. by quantification of residual losses or exposure)		Retention		
Technical conditions and measures to control dispersion from source towards the worker				
Engineering controls, e.g. exhaust ventilation, general ventilation; specify effectiveness of measure :		Local exhaust ventilation Efficiency : 90% PROC8b : No specific measures are necessary.		
Organisational measures to prevent /limit releases, dispersion and exposure				
Specific organisational measures or measures needed to support the functioning of particular technical measures (e.g. training and supervision). Those measures need to be reported in particular for demonstrating strictly controlled conditions (to justify exposure based waiving) :		Not applicable		
Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the PPE (where relevant) and advise how long the protective equipment can be used before replacement (if relevant) :		Protective gloves : PROC4&9 : Efficiency 80% PROC8b : Efficiency : 95% Breathing apparatus : PROC4,5 & 9 : Efficiency : 95% PROC8a & 8b : Efficiency : 98% PROC15&16 : Efficiency : 90%		
3. Exposure information and reference to its source				
Information for contributing scenario 1				
Environmental exposure has been calculated using EUSES				
		Exposure estimation	PNEC	Ratio
	Fresh water	Negligible.	0,8 µg/l	
	Marine water	Negligible.	0,08 µg/l	
	Sediment (freshwater)	Negligible.	0,00074 mg/kg dwt	
	Soil.	Negligible.	0,000191 mg/kg dwt	



**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 3**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

Information for contributing scenario 2				
Workers exposure estimation has been calculated using Ecetoc TRA (2010), with other exposure determinant (gloves and respiratory protection apparatus)				
	Workers exposure	Exposure estimation	DNEL	Ratio
	Long-term - local effects, dermal	PROC4 : 17,1 µg/cm ² /d PROC5 : 8,58 µg/cm ² /d PROC8a : 8,56 µg/cm ² /d PROC8b : 4,29 µg/cm ² /d (0.25-1 Hours) PROC9 : 17,1 µg/cm ² /d PROC15 : 8,58 µg/cm ² /d (1-4 Hours) PROC16 : 8,58 mg/cm ² /day	44 µg/cm ² /d	PROC4 : 0.39 PROC5 : 0.19 PROC8a : 0.19 PROC8b : 0.10 PROC9 : 0.39 PROC15 : 0.19 PROC16 : 0.19
	Long-term - systemic effects, dermal	PROC4 : 0,137 mg/kg bw/day PROC5 : 0,0686 mg/kg bw/day PROC8a : 0,137 mg/kg bw/day PROC8b : 0,343 mg/kg bw/day (0.25-1 Hours) PROC9 : 0,137 mg/kg bw/day PROC15 : 0,0343 mg/kg bw/day (1-4 Hours) PROC16 : 0,0343 mg/kg bw/day	1 mg/kg bodyweight/day	PROC4 : 0.137 PROC5 : 0.068 PROC8a : 0.137 PROC8b : 0.343 PROC9 : 0.137 PROC15 : 0.034 PROC16 : 0.034
	Long-term - systemic effects, inhalation	PROC4 : 0,182 mg/m ³ PROC5 : 0,182 mg/m ³ PROC8a : 0,146 mg/m ³ PROC8b : 0,146 mg/m ³ (0.25-1 Hours) PROC9 : 0,182 mg/m ³ PROC15 : 0,219 mg/m ³ (1-4 Hours) PROC16 : 0,073 mg/m ³	0,35 mg/m ³	PROC4 : 0.52 PROC5 : 0.52 PROC8a : 0.42 PROC8b : 0.42 PROC9 : 0.52 PROC15 : 0.62 PROC16 : 0.21
4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES				
No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers. To establish other combinations, use the {0} tool Ecetoc TRA				
5. Additional good practice advice beyond the REACH CSA				
Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets. Such as:				
<ul style="list-style-type: none"> - Containment as appropriate; - Minimise number of staff exposed; - Segregation of the emitting process; - Effective contaminant extraction; - Good standard of general ventilation; - Minimisation of manual phases; - Avoidance of contact with contaminated tools and objects; - Regular cleaning of equipment and work area; - Management/supervision in place to check that RMMs in place are being used correctly and OCs followed; - Training staff on good practice; - Good standard of personal hygiene 				



**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 3**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

1. Exposure scenario n° 3

Use or formulation of 2-EHN under specific non-closed professional processes

Sector of end use : all

Environmental Release Category : ERC 1 / ERC 2 / ERC 7

Process category : PROC 4/5 / PROC 8a / PROC 8b / PROC 9 / PROC 15 / PROC 16 - professional

It should be noted that ES 3 has not been assessed. Indeed, the professional formulations generally include less than the cut-off level for taking into account 2-EHN according to REACH regulation, Article 14. This cut-off is evaluated as 0.1 %.



**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 4**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

1. Exposure scenario n° 4	
Consumer use	
Use descriptors related to the life cycle stage	SU21 PC13 ERC8a/8b/8d/8e/9a/9b
Name of contributing environmental scenario (1) and corresponding ERC	2. Wide dispersive outdoor use of processing aids in open systems (ERC8d) 3. Wide dispersive indoor use of reactive substances in open systems (ERC8b) 4. Wide dispersive indoor use of processing aids in open systems (ERC8a) 5. Wide dispersive outdoor use of reactive substances in open systems (ERC8e) 6. Wide dispersive indoor use of substances in closed systems (ERC9a) 7. Wide dispersive outdoor use of substances in closed systems (ERC9b)
List of names of contributing consumer scenarios (2) and corresponding PC and sub-product categories if applicable	4. Fuels (PC13)
2.1 Contributing scenario (1) controlling environmental exposure	
Product characteristic	Liquid, <= 25 % substance in the product
Frequency and duration of use	36 days/year
Conditions and measures related to external treatment of waste for disposal	Recycle product or dispose properly., Can be incinerated according to local regulations
2.2 Contributing scenario (2) consumer end-use	
PC13	
Product characteristic	
Product related conditions, e.g. the concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure:	Liquid, <= 25 % substance in the product
Amounts used	
Amounts used per event	14 g/task
Frequency and duration of use/exposure	
Duration of exposure per event and frequency of events; please note: Tier 1 exposure assessment usually refers to external event exposure, without taking into account the duration and frequency of the event (see Guidance Chapter R.15)	Consumer use : <= 20 seconds / use <= 3 time per month Exposure estimation : Inhalation : <= 30 minutes / year In contact with skin : <= 30 seconds /operation



**Annex to the extended Safety Data Sheet (eSDS)
2-ETHYLHEXYL NITRATE – Exposure scenario 4**

Explanation of acronyms : SU: Sector of use / PROC: Process category / ERC: Environmental release category / PC: Product category

Human factors not influenced by risk management																
Particular conditions of use, e.g. body parts potentially exposed; population potentially exposed (adults, children)	Body weight : ≥ 60 kg Respiration volume ≤ 33 m ³ /24h Exposed skin surface (cm ²) : 480 (two hands, face side only)															
Conditions and measures related to information and behavioral advice to consumers																
Safety advice to be communicated to consumers in order to control exposure, e.g. technical instruction, behavioral advice	Keep out of reach of children. In case of contact with eyes or skin, rinse immediately with plenty of water.															
Conditions and measures related to personal protection, hygiene and health evaluation																
Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the PPE (where relevant) and advise how long the protective equipment can be used before replacement (if relevant) :	Dermal protection (Neoprene)															
3. Exposure information and reference to its source																
Information for contributing scenario 1																
Environmental exposure has been calculated using EUSES 2.0.3																
	<table border="1"> <thead> <tr> <th></th> <th>Exposure estimation</th> <th>PNEC</th> </tr> </thead> <tbody> <tr> <td>Fresh water</td> <td>Negligible.</td> <td>0,8 µg/l</td> </tr> <tr> <td>Marine water</td> <td>Negligible.</td> <td>0,08 µg/l</td> </tr> <tr> <td>Sediment (freshwater)</td> <td>Negligible.</td> <td>0,00074 mg/kg dwt</td> </tr> <tr> <td>Soil.</td> <td>Negligible.</td> <td>0,000191 mg/kg dwt</td> </tr> </tbody> </table>		Exposure estimation	PNEC	Fresh water	Negligible.	0,8 µg/l	Marine water	Negligible.	0,08 µg/l	Sediment (freshwater)	Negligible.	0,00074 mg/kg dwt	Soil.	Negligible.	0,000191 mg/kg dwt
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Information for contributing scenario 2																
Consumers exposure estimation has been calculated using ConsExpo																
	<table border="1"> <thead> <tr> <th>Users exposure – medium term</th> <th>Exposure estimation – medium term</th> <th>DNEL – medium term</th> <th>Ratio</th> </tr> </thead> <tbody> <tr> <td>Inhalation</td> <td>19 µg/kg bw/j</td> <td>50 µg/kg bw/j</td> <td>0.38</td> </tr> <tr> <td>Dermal</td> <td>57 µg/kg bw/j</td> <td>1 mg/kg bw/j</td> <td>0.057</td> </tr> </tbody> </table>	Users exposure – medium term	Exposure estimation – medium term	DNEL – medium term	Ratio	Inhalation	19 µg/kg bw/j	50 µg/kg bw/j	0.38	Dermal	57 µg/kg bw/j	1 mg/kg bw/j	0.057			
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No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for consumers																