

Material Safety Data Sheet

According to Regulation (EC) n. 1907/2006 and subsequent amendments thereto



FUEL OIL

Q8 Quaser s.r.l.

SECTION 1 IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/ UNDERTAKING

1.1 Product identifier

Product name	FUEL OL
Synonym	FUEL OIL (all types)
CAS Number	68476-33-5
CE Number	270-675-6
Index number	649-024-00-9
Registration number	01-2119474894-22-XXXX
Unique Formula Identifier (UFI) n.a.	

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

Relevant identified uses: Industrial uses

Identified uses in the chemical safety report: generic list of applications

Life cycle:

Manufacture: Manufacture of substance

Formulation or re-packing: Formulation & (re)packing of substances and mixtures

Uses at industrial sites: use of substance as an intermediate, use in fuel

Widespread uses by professional workers: Use in fuel

See the annex (Exposure scenarios) for the complete list of uses for which an exposure scenario is provided.

Uses advised against: The Professional Uses of HFO substances in coatings and road and construction applications are advised against.

Reason why uses advised against: A qualitative assessment of the hazards and potential exposure of HFO substances concluded that the uses advised against cannot be considered safe due to their hazard classification for CMR properties. Therefore, for reasons of protection of human health, these uses are no longer supported in the registration dossier.

1.3 Details of the safety data sheet supplier

<i>Company name:</i>	Q8 Quaser s.r.l.
<i>Address:</i>	Via dell'Oceano Indiano, 13
<i>City / Nation:</i>	00144 – Roma (Italia)
<i>Telephone:</i>	+39 06-520881
<i>Competent Technician E-mail:</i>	schede@q8.it

1.4 Emergency number

For Appropriate National Emergency Information Services see the following link:

<https://echa.europa.eu/it/support/helpdesks>

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SECTION 2 HAZARD IDENTIFICATION

Physico-chemical hazards:	Non-hazardous substance according to the criteria for classification of Annex I to Part 2 of Regulation 1272/2008;
Human health hazard:	The substance is harmful by inhalation, and prolonged exposure through inhalation can cause serious damage to health. May cause skin dryness or cracking in the case of repeated exposure. May cause cancer. Suspected of damaging the fetus;
Environmental hazard:	The substance is highly toxic to aquatic life with long-term effects in the aquatic environment.

2.1 Classification of the substance or mixture

Acute Tox. 4:	H332
Carc. 1B	H350
Repr. 2	H361d
STOT RE 2	H373 (blood, thymus, liver)
Aquatic Acute 1	H400 (M factor = 1)
Aquatic Chronic 1	H410 (M factor = 1)

Full text of hazard statements see section 16.

Note: classification of the substance has been performed considering the following: Viscosity > 20,5 mm²/s at 40 °C.

2.2 Label elements



Signal Word: **Danger**

Hazard Statements

H332:	Harmful if inhaled
H350:	May cause cancer
H361d:	Suspected of damaging the unborn child
H373:	May cause damage to organs through prolonged or repeated exposure (blood, thymus, liver)
H410:	Very toxic to aquatic life with long lasting effects
EUH066	Repeated exposure may cause skin dryness or cracking

Precautionary Statements

Prevention	
P201:	Obtain special instructions before use

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P260:	Do not breathe dust/fume/gas/mist/vapours/spray
P273:	Avoid release to the environment
P280:	Wear protective gloves/protective clothing/eye protection/face protection/hearing protection
Response	
P301+310:	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Disposal	
P501:	Dispose of contents/container in accordance with local/regional/national/international regulation

Other information none

Authorization Number: n.a.

2.3 Other hazards

There is a risk of thermal burns in case of direct contact with skin or eyes, because normally the product is stored or handled at high temperature. A potential risk may be the development of hydrogen sulfide (poison gas) when the product is stored or handled at elevated temperatures.

Any substance, in case of accidents involving pipelines under pressure or otherwise, may be accidentally injected into the skin, even without external damage. In this case it is necessary to conduct as soon as the injured to hospital for treatment. The product does not meet the PBT or vPvB classification criteria set out in Annex XIII to REACH.

The substance is not a substance identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 (3) or Commission Regulation (EU) 2018/605. See also sections 9 to 12.

SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Component	Identifier	Concentration	Classification accordig to Reg. (CE) 1272/2008
UVCB SUBSTANCE: FUEL OIL, RESIDUAL <i>("The liquid product from various refinery streams, usually residues. The composition is complex and varies with the source of the crude oil")</i>	CAS Number: 68476-33-5 EINECS Number: 270-675-6 INDEX Number: 649-024-00-9 Registration Number: 01-2119474894-22-XXXX	100 %	Acute Tox. 4: H332 Carc. 1B: H350 Repr. 2: H361d STOT RE 2: H373 Aquatic Acute 1: H400 Aquatic Chronic 1: H410

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SECTION 4 FIRST AID MEASURES

4.1 Description of first aid measures

- Eye contact:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so Continue rinsing. Irrigate exposed eyes with 0.9% normal saline if available or water for at least 15 minutes. Irrigate before and after removing the lenses to prevent a carry-over of the substances to the shielded area of the lens. Seek medical attention if skin irritation, swelling or redness develops and persists. In case of eye contact with hot product, flood with water to dissipate heat. Immediately obtain specialist medical assessment and treatment for the casualty.
- Skin contact:** Remove contaminated clothing, contaminated footwear and dispose of safely. Wash area with soap and water for 10 to 15 minutes. If irritation, blurred vision or swelling occurs and persists, obtain medical advice from a specialist. For minor thermal burns, cool the burn. Hold the burned area under cold running water for at least five minutes, or until the pain subsides. Body hypothermia must be avoided. Do not put ice on the burn. DO NOT attempt to remove portions of clothing glued to burnt skin but cut round them. When using high-pressure equipment, injection of product can occur. If high-pressure injuries occur, immediately seek professional medical attention. Do not wait for symptoms to develop.
- Swallowing:** Do not induce vomiting as there is high risk of aspiration. Do not give anything by mouth to an unconscious person. If vomiting occurs, the head should be kept low so that the vomit does not enter the lungs (aspiration)
- Inhalation:** If breathing is difficult, remove victim to fresh air. Monitor for respiratory distress, administer oxygen and assist ventilation as required. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible). Check vital signs regularly and act accordingly. If there is any suspicion of inhalation of H₂S (hydrogen sulphide) rescuers must wear breathing apparatus, belt and safety rope, and follow rescue procedures.

4.2 Most important symptoms and effects, both acute and delayed

- Skin contact symptoms:** may cause slight skin irritation. Exposure to the hot product can cause thermal burns
- Eye contact symptoms:** may cause mild reversible eye irritation. Exposure to hot fumes can cause severe and severe irritation of the eyes and mucous membranes.
- Inhalation symptoms of vapours:** irritation of the irritation of the nose and respiratory tract.
- Exposure to hot fumes can cause:** eye irritation, nose irritation, throat irritation, respiratory tract irritation, headache, nausea, nervousness.
- Ingestion:** few or no symptoms expected. If any, nausea and diarrhoea might occur.

4.3 Indication of any immediate medical attention and special treatment needed

Seek medical attention in all cases of serious burns.

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SECTION 5 FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media: Small fires: Sand or earth, carbon dioxide, foam (trained personnel only), dry chemical powder. Large fires: foam (trained personnel only), water fog (trained personnel only). Other inert gases (subject to regulations).

Unsuitable extinguishing media: Do not use direct water jets on the burning product, they could cause splattering and spread the fire. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

5.2 Special hazards arising from the substance or mixture

Incomplete combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including CO (carbon monoxide), H₂S (hydrogen sulphide), SO_x (sulfur oxides), H₂SO₄ and other unidentified organic and inorganic compounds.

5.3 Advice for firefighters

In case of a large fire or in confined or poorly ventilated spaces, wear full fire resistant protective clothing and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel

Stop or contain leak at the source, if safe to do so. Avoid direct contact with released material. Stay upwind. In case of large spillages, alert occupants in downwind areas. Keep non-involved personnel away from the area of spillage. Alert emergency personnel. Except in case of small spillages, the feasibility of any actions should always be assessed and advised, if possible, by a trained, competent person in charge of managing the emergency. Eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares). In those cases when the presence of dangerous amounts of H₂S in the leaked/spilled product is suspected or proved, additional or special actions may be warranted, including access restrictions, use of special protection equipment, procedures and personnel training).

6.1.2 For emergency personnel

Small spillages: normal antistatic working clothes are usually adequate. Large spillages: full body suit of chemically resistant and antistatic material. If necessary heat resistant and insulated. Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons. Gloves made of PVA are not water-resistant, and are not suitable for emergency use. If contact with hot product is possible or anticipated, gloves should be heat-resistant and thermally insulated. Work helmet. Antistatic non-skid safety shoes or boots. Chemical resistant goggles and /or face shield, if splashes or contact with eyes is possible or anticipated. Respiratory protection: a half or full-face respirator with filter(s) for organic vapours and when applicable for H₂S) or a Self Contained Breathing Apparatus (SCBA) can be used according to the extent of spill and predictable amount of exposure. If the situation cannot be completely assessed, or if an oxygen deficiency is possible, only SCBA's should be used. Concentration of H₂S in tank headspaces may reach hazardous values, especially in case of prolonged storage. This situation is especially relevant for those operations which involve direct exposure to the vapours in the tank.

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6.2 Environmental precautions

Prevent product from entering sewers, rivers or other bodies of water

6.3 Methods and material for containment and cleaning up

Soil: If necessary dike the product with dry earth, sand or similar non-combustible materials. Let hot product cool down naturally. Large spillages may be cautiously covered with foam, if available, to limit fire risk. Do not use direct jets. When inside buildings or confined spaces, ensure adequate ventilation. Absorb spilled product with suitable non-combustible materials. If it is necessary to store any contaminated materials for safe disposal, only suitable containers (airtight, labelled, sealed, waterproof, earthed and bonded) should be used. In case of soil contamination, remove contaminated soil and treat in accordance with local regulations

Water: Product less dense than water. In case of small spillages in closed waters (i.e. ports) contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents. If possible, large spillages in open waters should be contained with floating barriers or other mechanical means. If this not possible, control the spreading of the spillage, and collect the product by skimming or other suitable mechanical means. The use of dispersants should be advised by an expert, and, if required, approved by local authorities. Product which is denser than water will sink to the bottom, and usually no intervention will be feasible. If possible, collect the product and contaminated materials with mechanical means, and store/dispose of according to relevant regulations. In special situations (to be assessed on case-by case basis, according to expert judgement and local conditions), excavations of trenches on the bottom to collect the product, or burying the product with sand may be a feasible option.

Recommended measures are based on the most likely spillage scenarios for this material; however, local conditions (wind, air temperature, wave/current direction and speed) may significantly influence the choice of appropriate actions.

6.4 Reference to other sections

For more information regarding protective equipment and operational conditions see Exposure scenarios.

SECTION 7 HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures (containment and preventive measures)

Obtain special instructions before use. Ensure that all relevant regulations regarding handling and storage facilities of flammable products are followed. Take precautionary measures against static electricity. Ground/bond containers, tanks and transfer/receiving equipment. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Where applicable, implement the provisions on the prevention of fire and explosive atmospheres. Keep away from heat/sparks/open flames/hot surfaces. Do not smoke. Product may release Hydrogen Sulphide: a specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances

Use only outdoors or in a well-ventilated area. Use adequate personal protective equipment as needed. Do not use compressed air for filling, discharging, or handling operations. Prevent the risk of slipping. For more information regarding protective equipment and operational conditions see Exposure scenarios. Avoid release to the environment.

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7.1.2 Advice on general occupational hygiene

Do not breathe vapour/mist/aerosol. Avoid contact with skin. Keep away from food and beverages. Do not eat, drink or smoke when using this product. Wash the hands thoroughly after handling. Do not reuse contaminated clothing. Contaminated materials should not be allowed to accumulate in the workplaces and should never be kept inside the pockets. Ensure that proper housekeeping measures are in place.

7.2 Conditions for safe storage, including any incompatibilities

Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation. Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills. Cleaning, inspection and maintenance of internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, H₂S (Hydrogen sulphide), and flammability. It is also advisable to check for the presence of polycyclic aromatic hydrocarbons.

Store separately from oxidising agents. Recommended materials for containers, or container linings use mild steel, stainless steel. For containers, or container linings use materials specifically approved for use with this product. Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Compatibility should be checked with the manufacturer. If the product is supplied in containers, keep only in the original container or in a suitable container for this kind of product. Store in a well-ventilated place. Keep containers tightly closed and properly labelled. Empty containers may contain combustible product residues. Do not weld, solder, drill, cut or incinerate empty containers, unless they have been properly cleaned.

7.3 Specific end uses

See attached Exposure scenarios.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Exposure limit values

Substance

ACGIH 2022 :

TLV®-TWA:

Low and mildly refined mineral oil: Exposure should be kept as low as possible.

Polycyclic aromatic hydrocarbons (Benzo[a]pyrene, Benzo[a]anthracene, Benzo[b]fluoranthene): Exposure should be kept as low as possible.

Hydrogen sulphide

ACGIH 2022

TLV®-TWA: 1 ppm (1,4 mg/m³)

TLV®-STEL: 5 ppm (7 mg/m³)

Dir 98/24/EC and further amendments

Hydrogen sulphide

8 hours: 7 mg/m³; 5 ppm

Short term: (4 hours): 14 mg/m³; 10 ppm

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Recommended Monitoring procedures: refer to Dir. 96/82/EC or Good industrial health practices in the work place.

Toxicological information DNEL: Hazard conclusions for workers

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	DNEL 0.18 mg/m ³	developmental toxicity/teratogenicity
Inhalation	Systemic effects - Acute	DNEL 4716.8mg/m ³	Acute oxicity (By inhalation)
Inhalation	Local effects - Long-term	no hazard identified	
Inhalation	Local effects - Acute	no hazard identified	
Dermal	Systemic effects - Long-term	DNEL 0.065mg/kg bw/day	developmental toxicity / teratogenicity (Dermal)
Dermal	Systemic effects - Acute	no hazard identified	
Dermal	Local effects - Long-term	high hazard (no threshold derived)	
Dermal	Local effects - Acute	no hazard identified	
Eyes	Local effects	no hazard identified	

Toxicological information - DNEL: Hazard conclusions for the general population

Route	Type of effect	Hazard conclusion	Most sensitive endpoint
Inhalation	Systemic effects - Long-term	hazard unknown but no further hazard information necessary as no exposure expected	repeated dose toxicity (By inhalation)
Inhalation	Systemic effects - Acute	hazard unknown but no further hazard information necessary as no exposure expected	neurotoxicity (By inhalation)
Inhalation	Local effects - Long-term	hazard unknown but no further hazard information necessary as no exposure expected	irritation (respiratory tract)
Inhalation	Local effects - Acute	hazard unknown but no further hazard information necessary as no exposure expected	irritation (respiratory tract)
Dermal	Systemic effects - Long-term	hazard unknown but no further hazard information necessary as no exposure expected	
Dermal	Systemic effects - Acute	hazard unknown but no further hazard information necessary as no exposure expected	
Dermal	Local effects - Long-term	hazard unknown but no further hazard information necessary as no exposure expected	
Dermal	Local effects - Acute	hazard unknown but no further hazard information necessary as no exposure expected	
Oral	Systemic effects - Long-term	DNEL 0.015mg/kg bw/day	repeated dose toxicity (Dermal)
Oral	Systemic effects - Acute	hazard unknown but no further hazard information necessary as no exposure expected	
Eyes	Local effects	no hazard identified	

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PNEC(S) (Predicted No Effect Concentration):

PNEC(S) Water, sediments, soil	
-	<p>Substance is a hydrocarbon UVCB: The "hydrocarbon block method" is used for environmental risk assessment (see REACH guidance, R7, app.13-1).</p> <p>A PNEC cannot be derived for UVCBs, therefore, the water, sediments and soil PNECs in relation to "hydrocarbon block" (library using a set of representative hydrocarbon structures with specific physical-chemical parameters (water solubility, vapour pressure, logKow, the melting point and boiling point) and environmental fate parameters: abiotic and biotic ½ life, bioconcentration factor), were derived statistical extrapolation methods HC5 by the Target Lipid Model (TLM) described by McCarthy et al. (1991).</p> <p>Following Final Decisions issued by ECHA, a review of the TLM has been conducted that led to a revised TLM-model and the new results are used in this dossier. For full details refer to the following Appendixes attached in IUCLID Section 13: PETRORISK ProductLibrary tab, PAH Phototoxicity, PNEC HC5, TLM Validation, PETROTOX Verification and NOS Heterocyclics.</p>

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Minimize exposure to fume/ mist/ vapours. Where hot product is handled in confined spaces, effective local ventilation must be provided. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulphide (H₂S) and flammability. Provide showers and eyewash fountains at the workplace.

8.2.2 Individual protection measures, such as personal protective equipment

(a) Eye/face protection:

In the absence of containment system, if splashing is likely, full head and face protection (protective shield and/or safety goggles (EN 166)) should be used.

(b) Skin protection:

i) Hand protection:

In the absence of containment systems and in case of possible contact with the skin, use gloves with hydrocarbon-resistant high cuffs, felt-lined, and insulated if necessary. Supposedly adequate materials: nitrile, PVC or PVA (polyvinyl alcohol) with an index of protection against chemical agents at least equal to 5 (breakthrough time > 240 minutes). Use gloves in accordance with the conditions and limits set by the manufacturer. In the case, refer to 374-1:2018. Gloves must be periodically inspected and changed in case of wear, perforations or contaminations.

ii) Other:

Wear protective clothing for operations with hot material: heat resistant coveralls (with trousers legs over boots and sleeves over cuffs of gloves), heat resistant heavy duty antiskid boots (e. g. leather) UNI EN 14605:2009. Resistant to chemicals. In case of contamination of the clothes, clean and replace them immediately.

(c) Respiratory protection:

Open or well-ventilated spaces: wear approved respiratory protection devices: full face masks equipped with type A filter cartridge (for organic vapors) (UNI EN14387: 2021)

In the absence of containment systems

- in case of suspected presence of hydrogen sulphide, wear full masks equipped with a type B filter/cartridge (gray for inorganic vapors, H₂S included) (UNI EN14387: 2021)

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- If exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBA's should be used (UNI EN 11719: 2018)

(d) Thermal hazards:

see point b



For more information regarding protective equipment and operational conditions see "Exposure Scenarios".

8.2.3 Environmental exposure controls

Avoid release to the environment. Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills . For more information see Exposure scenarios.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a) Physical state	Liquid viscous
b) Color	Black
c) Odor	Petroleum odor
d) Melting point/freezing point	< 30 °C (EN 3060, ASTM D97, Concawe, 1998)
e) Boiling point or initial point and boiling range	From 160 °C to >750 °C (CSR Concawe 2022)
f) Flammability	From 64 to 310°C (CONCAWE, 2010a)
g) Lower and upper explosion limit	Not applicable
h) Flash point	64-310°C (CONCAWE, 2010a)
i) Auto-ignition temperature	220 °C-550 °C (ASTM E 659, Concawe, 2010a)
j) Decomposition temperature	Not applicable
k) pH	Not applicable
l) Kinematic Viscosity	≥3 mm ² /s at 100° > 20.5 mm ² /s at 40°C
m) Solubility	Not applicable: substance is a hydrocarbon UVCB.
n) Partition coefficient: <i>n</i> -octanol/water (log value)	Not applicable: substance is a hydrocarbon UVCB.
o) Vapor pressure	From 0.02 to ,0.791 kPa at 120°C(MW from 330 to 500) From 0.063 to 0.861 kPa at 150°C (MW from 350 to 420) (ASTM D 2878 CSR Concawe 2022)
p) Density and/or relative density	From 840 to 1100 Kg/m ³ at 15°C (CSR Concawe 2022)
q) Relative vapor density	Not available
r) Particle characteristics	Not applicable

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9.2 Other information

9.2.1 Information with regard to physical hazard classes

The substance is not classified

9.2.2 Other safety characteristics

In case of accidents involving pipelines under pressure or otherwise, may be accidentally injected into the skin. The sample had a moderate potential to evoke photoirritation.

SECTION 10 STABILITY AND REACTIVITY

10.1 Reactivity

The substance does not present additional dangers of reactivity than those reported in the next subsections.

10.2 Chemical stability

This substance is stable in relation to its intrinsic properties.

10.3 Possibility of hazardous reactions

Contact with strong oxidizers (peroxides, chromates, etc.) may cause a fire hazard. A mixture with nitrates or other strong oxidisers (e.g. chlorates, perchlorates, liquid oxygen) may create an explosive mass. Sensitivity to heat, friction or shock cannot be assessed in advance.

10.4 Conditions to avoid

Store separately from oxidising agents. Keep away from heat/sparks/open flames/hot surfaces. Do not smoke. Avoid formation of electrostatic charges.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

The product does not decompose when used for its intended uses.

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SECTION 11 TOXICOLOGICAL INFORMATION

No in vivo experimental data were located on the absorption, distribution, metabolism or elimination of substances in the Heavy Fuel Oil category. Physicochemical considerations suggest that uptake across skin is possible but will be relatively low since only around 2% of the hydrocarbon blocks present have a log Pow <5. This is supported by results from animal acute dermal toxicity testing, where no mortality and only limited (gross) systemic changes were recorded. This indicates that uptake by undamaged skin was limited; or that the absorbed hydrocarbon components were of low inherent toxicity. It can be suggest that uptake across the lung is low because of results from a rat acute inhalation toxicity study (where no grossly observable systemic changes were found at necropsy) combined with the low water solubility of substances in the Heavy Fuel Oil category. With regard to uptake after ingestion, modelled information indicates that the majority of hydrocarbon substances present in Heavy Fuel Oil Components have a predicted log Pow of >5 suggesting that uptake by micellar solubilisation is possible.

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

a) Acute toxicity:

Acute Oral Toxicity:

The acute oral toxicity of Heavy Fuel Oil Components following gavage administration has been assessed in a number of GLP-compliant studies. All studies have shown signs of reversible intoxication and lethargy immediately after dosing, intestinal irritation and/or altered gut function (reduced stool production etc) with occasional changes in the gross appearance of liver, kidney, lung etc at necropsy. These results do not lead to any classification for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
RAT 4320 (female) 5270 (male) ORAL (gavage) OECD Guideline 401 (Acute Oral Toxicity)	DL50: 5270 (male) DL50: 4320 mg/kg (female)	key study, reliable with restriction CAS 64741-62-4	American Petroleum Institute (API) 1982

Acute Inhalation Toxicity:

To assess the acute toxicity by inhalation of products of the Heavy Fuel Oil category has a number of studies in rats (LD50 studies limit or multi group). The methods used are EPA OTS 798.1150. These findings support classification as Acute Tox. 4; H332 (Harmful if inhaled).

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	reference
RAT EPA OTS 798.1150 (Acute inhalation toxicity)	CL50 mg/L/4 h: 4,5 (female) CL50 mg/L/4 h: 4,1 (male)	key study (study of more relevance) CAS 64741-62-4	ARCO 1987 (Atlantic Richfield Company)

Acute Dermal Toxicity:

The acute dermal toxicity of samples belonging to the category of the Heavy Fuel Oil category has been evaluated in a series of studies conducted mainly in rabbits. These studies revealed a acute dermal LD50 greater than 2 g / kg, which does not involve any classification for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

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Method	Results	Remarks	Reference
RABBIT Guideline 434 (Acute Toxicity Dermal)	DL50>2000 mg/kg (male/female)	Key study, reliable with restriction CAS 64741-62-4	API (American Petroleum Institute) 1982

b) Skin corrosion/irritation:

The dermal irritation potential of Heavy Fuel Oil Components toward intact and abraded skin has been investigated in a large number of studies conducted mainly in rabbits. The conclusions of these studies indicate a potential to evoke no more than moderate skin irritation, with no evidence of injuries in depth (corrosion); therefore, no classification is required for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
RABBIT EU Method B.4 (Acute Toxicity: Dermal Irritation / Corrosion)	Primary irritation index: 2.6 very mild and well-defined erythema, edema variable	"Weight of evidence" study, reliable with restrictions CAS 68476-33-5	ARCO 1986 (Atlantic Richfield Company)

c) Serious eye damage/irritation:

The eye irritation potential of Heavy Fuel Oil Components toward eye has been investigated in a large number of studies conducted mainly in rabbits. None of the samples tested elicited more than transient, fully reversible eye irritation; therefore, no classification is required for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
RABBIT EU Method B.5 (Acute Toxicity: Eye Irritation / Corrosion)	Not irritating	Key study, reliable with restriction CAS 68476-33-5	API (American Petroleum Institute) 1980

d) Respiratory or skin sensitization

Respiratory system: This endpoint is not a REACH requirement and no data are available for this endpoint but these substances are not expected to cause respiratory sensitisation. No classification is required under the regulations on hazardous substances. The skin sensitisation potential of Heavy Fuel Oil Components has been investigated in a large number of studies (annex V method B.6 (skin sensitisation); Buehler method).

Results obtained from these studies indicate no obvious potential for the induction or elicitation of dermal sensitisation. Thus, no classification is required for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
GUINEA PIG Equivalent or similar to EU Method B.6 (Skin Sensitisation)	Not sensitising	"Weight of evidence" study, reliable with restriction CAS 68476-33-5	ARCO 1986 (Atlantic Richfield Company)

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e) Germ cell mutagenicity:

The mutagenicity potential of Heavy Fuel Oil Components has been investigated in a large number of in vivo and in vitro studies. The majority of the studies showed no consistent evidence of mutagenic activity, with no classification required for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
<i>In vitro</i> Ames Test <i>S. typhimurium</i> TA98	Positive (with or without activation) >10000 ug/plate	Key study, reliable with restrictions CAS 64741-62-4	American Petroleum Institute 1986
Micronucleus assay (chromosome aberration) MOUSE (CD-1) male/female Oral: garage 0. 188, 375, 750 or 1500 mg/kg/bw/d (nominal concentration) Equivalent or similar to EU B.12	Negative Test results: Genotoxicity: negative (male/female); Toxicity: no effect	Supporting study, reliable without restrictions CAS 64741-62-4	Przygoda, R.T.; McKee, R.H.; Amoroso, M.A. and Freeman, J.J. (1999)

f) Carcinogenicity:

Positive results obtained from several studies that, along with chemical (PAH) analysis, indicate that straight-run and cracked Heavy Fuel Oils Components are carcinogenic. Classification Carc. 1B; H350 (May cause cancer) is appropriate.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
MOUSE 50 µL (amount applied). Compound was applied dermally 2 times a week for the lifespan of the animal. No guidance available.	Strongly carcinogenic for the skin (LOAEC 1% increase of malignant tumors of the skin NOAEL 0.1%: modest increase in the incidence of benign skin tumors)	Key study, reliable with restriction CAS 64741-62-4	American Petroleum Institute 1989

g) Reproductive toxicity:

Effects on fertility

Overall, there were no adverse effects on reproductive parameters in either genders following repeated dermal application; therefore, no classification is required for this endpoint.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
RAT 0.1, 1, 10, 50, 250 mg/kg/bw/d Dermal application 6 h/d EPA OTS 798.4700	NOAEL 50 mg/kg systemic effects: decrease in body weight (male) NOAEL 250 mg/kg Reproductive toxicity (male): No adverse effects on reproductive organ weights, sperm parameters and fertility functional	Supporting study, reliable without restriction CAS 64741-62-4	ARCO (1992 af)

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Effects on fertility/ Developmental toxicity

Results of developmental toxicity testing indicate alterations in fetal and pup development, which sometimes occurred in the presence of maternal toxicity. Thus, classification of Heavy Fuel Components as Repr. 2; H361d (Suspected of damaging the unborn child) is considered appropriate.

The following is a summary of the most representative studies of the registration dossier.

Method	Results	Remarks	Reference
RAT 0, 0.05, 1, 10, 50, 2550 mg/kg mg/kg/bw/d Dermal application 6 h/gd	NOAEL 0.05 mg/kg Maternal toxicity, effects: Decrease in weight, effects on food consumption vaginal discharge NOAEL 0.05 mg/kg Developmental toxicity effects: Decreased gravid uterine weight, resorptions, reduced fetal weight.	Key study, reliable without restriction CAS 64741-62-4	Hoberman, A.M.; Christian, M.S.; Lovre, S.; Roth, R. and Koschier, F. 1995 EPA OTS 798.4900 (Prenatal Developmental Toxicity Study)
RAT 0, 50, 333, 1000 mg/kg mg/kg/bw/d Dermal application 6 h/d	NOAEL 333 mg/kg Maternal toxicity, effects: weight loss, increased length of gestation NOAEL 333 mg/kg Developmental toxicity effects: decrease of infant weight	Key study, reliable with restriction CAS 64741-45-3	ARCO (Atlantic Richfield Company) 1994

h) STOT-single exposure:

Non-lethal toxic effects observed after a single-event exposure

i) STOT-repeated exposure:

Oral

Justification: In accordance with column 2 of REACH Annex VIII (8.6.1) and Annex VIII (8.6.2), repeated dose testing should be by an appropriate route. Results are available from repeated dose dermal testing which meet this requirement. No oral exposure is anticipated making testing via this route unnecessary.

Dermic

The following effects were observed for cutaneous administration: changes in haematological and clinical chemistry parameters and organ weights were recorded after treatment with Heavy Fuel Oil Components. alterations in serum cholesterol and blood urea nitrogen were recorded following administration of higher dermal doses accompanied by red cell, platelet, liver and thymus effects at lower treatment levels. There is evidence to indicate that Heavy Fuel Oil Components have a potential to cause systemic alterations following repeated dermal exposure. Thus, classification STOT RE 2 H373: May cause damage to organs (blood, thymus, liver), through prolonged or repeated exposure) is appropriate.

The following is a summary of the most representative studies of the registration dossier.

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Method	Results	Remarks	Reference
RAT Pure product: 0, 1, 10, 50 mg/kg/bw/d Diluted in acetone: 0,01 1, 10, 50 mg/kg/bw/d Occlusive bandage 6 h/day for 5 days a week for 4 weeks.	NOAEL (systemic toxicity (applied neat)): 10 mg/kg bw/day (male) (Decreased body weight, decreased haematological parameters, clinical chemistry effects, organ weight changes) NOAEL (systemic toxicity (applied neat)): 1 mg/kg bw/day (female) (Increased serum potassium, increased relative liver weight) LOAEL (local effects (applied neat)): 1 mg/kg bw/day (male/female) (Sporadic very slight erythema, eschar and dry skin) NOAEL (systemic toxicity (applied in acetone)): 1 mg/kg bw/day (male) (Decreased haematological parameters, increase relative liver weight) NOAEL (systemic toxicity (applied in acetone)): 1 mg/kg bw/day (female) (Increased relative liver weight) LOAEL (local effects (applied in acetone)): 0.01 mg/kg bw/day (male/female) (Sporadic very slight erythema, eschar and dry skin)	Key study, reliable with restriction CAS 64741-62-4	ARCO 1993 (Atlantic Richfield Company)

Inhalation

Justification: In accordance with column 2 of REACH Annex VIII (8.6.1) and Annex VIII (8.6.2), repeated dose testing should be by an appropriate route. Results are available from repeated dose dermal testing which meet this requirement. The low vapour pressure of heavy fuel components makes testing via inhalation unnecessary.

j) Aspiration hazard:

Since the viscosity of the product is $> 20,5 \text{ mm}^2$ at $40 \text{ }^\circ\text{C}$, it is not classified as hazardous following aspiration.

11.2 Information on other hazards

11.2.1 Endocrine disrupting properties

The substance has no endocrine-disrupting properties.

11.2.2 Other information

The studies carried out so far have not shown neurotoxic or neuropathological effects.

SECTION 12 ECOLOGICAL INFORMATION

On the basis of ecological information below and on the basis of the criteria set by the regulation on hazardous substances, fuel oil is dangerous for the environment.

Classification: Aquatic Acute 1; H400 (Very toxic to aquatic life) and Aquatic Chronic 1: H410 (Very toxic to aquatic life with long lasting effects).

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12.1 Toxicity

The following is a summary of the most representative studies of the registration dossier.

Endpoint	Results	Remarks
Aquatic Toxicity		
Invertebrates Daphnia magna Short-term	EL50 48h: 0.22 mg/L	Key study
Invertebrates Daphnia magna Long-term	NOAEL: 0.27 mg/L	Key study
Algae Selenastrum capricornutum Growth Inhibition Test	ErL50/72h: 0.032 mg/L NOEL: < 0,05 mg/L	Key study
Fish Pimephales promelas Short-term	LL50/96h: 79 mg/L	Key study
Fish Long-term	NOEL: 0.1 mg/L	Key study
Activated sludge: (respiration inhibition test)	LL50:>1.000 mg/L NOEL: 14.91 mg/	Key study
Effects on terrestrial organisms		
Birds Anas platyrhynchos Long-term /oral/22 weeks	NOAEL: 20,000 mg/kg	Key study

12.2 Persistence and degradability

Abiotic degradation

- Hydrolysis:** the available data and available weight of evidence demonstrate that heavy fuel oils are resistant to hydrolysis because they lack a functional group that is hydrolytically reactive. Therefore, this fate process will not contribute to a measurable degradative loss of these substances from the environment.
- Phototransformation in air:** substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substance.
- Phototransformation in water/soil:** this substance contains hydrocarbon molecules that absorb UV light below 290 nm, a range of UV light that does not reach the earth's surface due to the stratospheric ozone layer. Therefore, this substance does not have the potential to undergo photolysis in water and soil, and this fate process will not contribute to a measurable degradative loss of this substance from the environment.

Biotic degradation

Biodegradation (water/sediments/soil): substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substance and are not appropriate for this complex substance.

12.3 Bioaccumulative potential

Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

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12.4 Mobility in soil

Absorption Koc: Substance is a hydrocarbon UVCB. Standard tests for this endpoint are intended for single substances and are not appropriate for this complex substance.

12.5 Results of PBT and vPvB assessment

The UVCB substance does not contain any PBT / vPvB constituents included in the SVHC Candidate List at concentrations above 0.1%. No other representative hydrocarbon structures were found to meet the PBT / vPvB (Evaluation of PBT for Petroleum Hydrocarbons criteria. "Concawe, 2019". In conclusion, the substance does not meet the PBT or vPvB classification criteria set out in Annex XIII of REACH.

12.6 Endocrine disrupting properties

The substance has no endocrine-disrupting properties.

12.7 Other adverse effects

This substance may contribute to ozone formation in the near surface atmosphere.

SECTION 13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Do not dispose the product, either new or used, by discharging into sewers, tunnels, lakes or water courses. Dispose of waste product or used containers according to local regulations. European Waste Catalogue code(s) (Decision 2001/118/CE): 13 07 01. These codes can be given only as a suggestion, according to the original composition of the product, and its intended (foreseeable) use(s). The final user has the responsibility for the attribution of the most suitable code, according to the actual use(s) of the material, contaminations or alterations. The product does not contain halogenated compounds. Disposal of emptied containers: do NOT dispose containers in the environment. Dispose used containers according to local regulations. Do not cut, weld, bore, burn or incinerate emptied containers, unless they have been cleaned and declared safe.

SECTION 14: TRANSPORT INFORMATION

Regulations applicable to road transport

ADR Agreement, Annexes A and B

Regulations applicable to rail transport

COTIF Convention, Appendix C, RID Regulation

Regulations applicable to inland waterway transport

ADN Agreement, Annex

Regulations applicable to maritime transport

IMDG Code

Regulations applicable to air transport

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FUEL OIL

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ICAO Technical Instructions
IATA DGR Manual

CASE A – PRODUCT CONSIGNED FOR CARRIAGE AT TEMPERATURE GREATER THAN ITS FLASH POINT:

14.1 UN number

UN 3256

14.2 UN proper shipping name

Italian: LIQUIDO TRASPORTATO A CALDO, INFIAMMABILE, N.A.S. (olio combustibile)

English: ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S.(heating oil)

14.3 Transport hazard class(es)

<i>Road transport (ADR):</i>	Class: 3 Subsidiary hazards: -
<i>Railway transport (RID):</i>	Class: 3 Subsidiary hazards: -
<i>Inland waterways transport (ADN):</i>	Class: 3 Subsidiary hazards: N1, N2, N3, CMR, F o S
<i>Sea transport (IMDG):</i>	Class: 3 Subsidiary hazards: -
<i>Air transport (IATA) [forbidden]:</i>	Class: 3 Subsidiary hazards: -

14.4 Packing group

PG: III

14.5 Environmental hazards

<i>Road transport (ADR):</i>	Environmentally hazardous
<i>Railway transport (RID):</i>	Environmentally hazardous
<i>Inland waterways transport (ADN):</i>	Environmentally hazardous
<i>Sea transport (IMDG):</i>	Marine Pollutant (MP)
<i>Air transport (IATA):</i>	Environmentally hazardous

14.6 Special precautions for user

Carriage, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.

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According to Regulation (EC) n. 1907/2006 and subsequent amendments thereto



FUEL OIL

Q8 Quaser s.r.l.

During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.

Road tanker/rail car loading: Ensure that the transfer of material takes place under conditions of containment or extraction ventilation.

Loading or unloading to and from boats/barges: Transfer through closed lines. Do not perform activities that involve the possibility of exposure for a period longer than 4 hours. Drain the transfer lines before decoupling. Keep drains in sealed containers awaiting the subsequent disposal or recycling.

General additional information

Mark and labeling: MODEL No. 3 HAZARD LABEL
+ ENVIRONMENTALLY HAZARDOUS SUBSTANCE MARK
(+ MARK FOR CARRIAGE AT ELEVATED TEMPERATURE if carriage temperature is at or above 100 °C)

Additional information on road transport (ADR)

Transport category according to ADR 1.1.3.6 3
Tunnel restriction code: (D/E)
Hazard Identification Number (tank): 30
High Consequence Dangerous Goods (HCDG): NO

Additional information on railway transport (RID)

Hazard Identification Number (tank): 30
High Consequence Dangerous Goods (HCDG): NO

Additional information on internal waterways transport (ADN)

Hazard Identification Number (tank): 30
High Consequence Dangerous Goods (HCDG): NO

Additional information on sea transport (IMDG)

Emergency Schedules EmS F-E, S-E

Additional information on air transport (IATA) [forbidden]

Emergency measures in case of aircraft accidents: ERG Code 3L

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

Not applicable (refer to Annex I of MARPOL Convention).

CASE B – PRODUCT CONSIGNED FOR CARRIAGE AT TEMPERATURE LOWER THAN ITS FLASH POINT BUT GREATER THAN 100°C:

14.1 UN number

UN 3257

14.2 UN proper shipping name

Italian: LIQUIDO TRASPORTATO A CALDO, N.A.S. (olio combustibile)
English: ELEVATED TEMPERATURE LIQUID, N.O.S.(heating oil)

Material Safety Data Sheet

According to Regulation (EC) n. 1907/2006 and subsequent amendments thereto



FUEL OIL

Q8 Quaser s.r.l.

14.3 Transport hazard class(es)

<i>Road transport (ADR):</i>	Class: 9	Subsidiary hazards:	-
<i>Railway transport (RID):</i>	Class: 9	Subsidiary hazards:	-
<i>Inland waterways transport (ADN):</i>	Class: 9	Subsidiary hazards:	N1, N2, N3, CMR, F o S
<i>Sea transport (IMDG):</i>	Class: 9	Subsidiary hazards:	-
<i>Air transport (IATA) [forbidden]:</i>	Class: 9	Subsidiary hazards:	-

14.4 Packing group

PG: III

14.5 Environmental hazards

<i>Road transport (ADR):</i>	Environmentally hazardous
<i>Railway transport (RID):</i>	Environmentally hazardous
<i>Inland waterways transport (ADN):</i>	Environmentally hazardous
<i>Sea transport (IMDG):</i>	Marine Pollutant (MP)
<i>Air transport (IATA) [forbidden]:</i>	Environmentally hazardous

14.6 Special precautions for user

Carriage, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.

During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.

Road tanker/rail car loading: Ensure that the transfer of material takes place under conditions of containment or extraction ventilation.

Loading or unloading to and from boats/barges: Transfer through closed lines. Do not perform activities that involve the possibility of exposure for a period longer than 4 hours. Drain the transfer lines before decoupling. Keep drains in sealed containers awaiting the subsequent disposal or recycling.

General additional information

Mark and labeling: MODEL No. 9 HAZARD LABEL
+ ENVIRONMENTALLY HAZARDOUS SUBSTANCE MARK
+ MARK FOR CARRIAGE AT ELEVATED TEMPERATURE

Additional information on road transport (ADR)

Transport category according to ADR 1.1.3.6 3
Tunnel restriction code: (D)

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Hazard Identification Number (tank): 99
High Consequence Dangerous Goods (HCDG): NO

Additional information on railway transport (RID)

Hazard Identification Number (tank): 99
High Consequence Dangerous Goods (HCDG): NO

Additional information on internal waterways transport (ADN)

Hazard Identification Number (tank): 99
High Consequence Dangerous Goods (HCDG): NO

Additional information on sea transport (IMDG)

Emergency Schedules: EmS F-A, S-P

Additional information on air transport (IATA) [forbidden]

Emergency measures in case of aircraft accidents: ERG Code 9L

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

Not applicable (refer to Annex I of MARPOL Convention).

CASE C – PRODUCT CONSIGNED FOR CARRIAGE AT TEMPERATURE LOWER THAN ITS FLASH POINT AND LOWER THAN 100°C:

14.1 UN number

UN 3082

14.2 UN proper shipping name

Italian: MATERIA PERICOLOSA PER L'AMBIENTE, LIQUIDA, N.A.S. (olio combustibile)
English: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(heating oil)

14.3 Transport hazard class(es)

<i>Road transport (ADR):</i>	Class: 9 Subsidiary hazards: -
<i>Railway transport (RID):</i>	Class: 9 Subsidiary hazards: -
<i>Inland waterways transport (ADN):</i>	Class: 9 Subsidiary hazards: N1, N2, CMR, F o S
<i>Sea transport (IMDG):</i>	Class: 9 Subsidiary hazards: -
<i>Air transport (IATA):</i>	Class: 9 Subsidiary hazards: -

14.4 Packing group

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According to Regulation (EC) n. 1907/2006 and subsequent amendments thereto



FUEL OIL

Q8 Quaser s.r.l.

PG: III

14.5 Environmental hazards

Road transport (ADR): Environmentally hazardous

Railway transport (RID): Environmentally hazardous

Inland waterways transport (ADN): Environmentally hazardous

Sea transport (IMDG): Marine Pollutant (MP)

Air transport (IATA): Environmentally hazardous

14.6 Special precautions for user

Carriage, including loading and unloading, must be performed by personnel who have received the necessary training required by the relevant modal regulations concerning the transport of dangerous goods.

During loading and unloading apply safety measures required by section 7.1 and individual protection measures required by section 8.2.2 of this SDS.

Road tanker/rail car loading: Ensure that the transfer of material takes place under conditions of containment or extraction ventilation.

Loading or unloading to and from boats/barges: Transfer through closed lines. Do not perform activities that involve the possibility of exposure for a period longer than 4 hours. Drain the transfer lines before decoupling. Keep drains in sealed containers awaiting the subsequent disposal or recycling.

General additional information

Mark and labeling:
(except packaging or carriage in exemption) MODEL No. 9 HAZARD LABEL + ENVIRONMENTALLY HAZARDOUS
SUBSTANCE MARK

Additional information on road transport (ADR)

Transport category according to ADR 1.1.3.6 3
Tunnel restriction code: (-)
Hazard Identification Number (tank): 90
High Consequence Dangerous Goods (HCDG): NO

Additional information on railway transport (RID)

Hazard Identification Number (tank): 90
High Consequence Dangerous Goods (HCDG): NO

Additional information on internal waterways transport (ADN)

Hazard Identification Number (tank): 90
High Consequence Dangerous Goods (HCDG): NO

Additional information on sea transport (IMDG)

Emergency Schedules: EmS F-A, S-F

Additional information on air transport (IATA)

Emergency measures in case of aircraft accidents: ERG Code 9L

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

Not applicable (refer to Annex I of MARPOL Convention).

SECTION 15 REGULATORY INFORMATION

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

- Title VII authorizations under the REACH Regulation (EC Reg. No. 1907/2006): This product is not subject to authorization
- Title VIII restrictions under the REACH Regulation (EC Reg. No. 1907/2006): restricted substances in Annex XVII, items 3 and 28.

Other UE:

- The substance is dangerous under the Seveso Regulation (Dir. 2012/18/UE):
Annex 1 part 1:
Category E1: Hazardous to the Aquatic Environment in Category Chronic 1
Annex 1 part 2:
Category 34: Petroleum products and alternative fuels
- Directive 98/24/EC (on the protection of the health and safety of workers from the risks related to chemical agents at work) : Hazardous chemical agent for Dir. 98/24/CE
- Directive 97/42/EC and 99/38/CE: Carcinogen agent

Dispose of waste in accordance with environmental legislation.

SECTION 16 OTHER INFORMATION

List of relevant H phrases:

H332:	Harmful if inhaled
H350:	May cause cancer
H361d:	Suspected of damaging the unborn child
H373:	May cause damage to organs through prolonged or repeated exposure
H400:	Very toxic to aquatic life
H410:	Very toxic to aquatic life with long lasting effects
EU H066	Repeated exposure may cause skin dryness or cracking

Advice on any training appropriate for workers:

Have been properly trained workers potentially exposed to this substance on the basis of the contents of this safety data sheet.

Key literature references and sources for data:

Material Safety Data Sheet

According to Regulation (EC) n. 1907/2006 and subsequent amendments thereto



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REACH dossier

CSR 2012, CSR 2019, CSR 2020, CSR 2021, CSR 2022

Legend to abbreviations and acronyms:

ACGIH	=	American Conference of Governmental Industrial Hygienists
CSR	=	Chemical Safety Report
DNEL	=	Derived No effect Level
DMEL	=	Derived Minimal Effect Level
EC50	=	Half maximal effective concentration
IC50	=	Half maximal inhibitory concentration
LC50	=	Lethal concentration, 50%
LD50	=	Median lethal dose
PNEC	=	Predicted No Effect Concentration
PBT	=	Persistent, Bioaccumulative and Toxic substance
CNS	=	Central nervous system
STOT	=	Specific Target Organ Toxicity
(STOT) RE	=	Repeated Exposure
(STOT) SE	=	Single Exposure
TLV®TWA	=	Threshold Limit Values – Time-Weighted Average
TLV®STEL	=	Threshold Limit Values – Short Term Exposure Limit
UVCB	=	Unknown or Variable Composition, Complex reaction products or Biological materials
vPvB	=	Very Persistent and Very Bioaccumulative

Revision Index:

<i>First issue date:</i>	01/12/2010
<i>Revision Number:</i>	01
<i>Revision Date:</i>	20/05/2016
<i>Grounds for review:</i>	Deletion of classification according to Directive 67/548/CEE and related references Addition of new precautionary statement P210 and P273 Deletion of Note H Section 8 updated Section 12 updated Section 14 updated Section 15, subsection 15.1 updated
Exposure scenarios updated	
Exposure scenario deleted:	Uses in Coatings
<i>Revision Number:</i>	02
<i>Revision Date:</i>	15/05/2017
<i>Grounds for review:</i>	Section 14.6, Case C (tunnel restriction)
<i>Revision Number:</i>	03
<i>Revision Date:</i>	27/10/2017

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<i>Grounds for review:</i>	Section 1.2 updated
<i>Revision Number:</i>	04
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<i>Grounds for review:</i>	Section 14 updated
<i>Revision Number:</i>	05
<i>Revision Date:</i>	29/07/2019
<i>Grounds for review:</i>	Section 1 updated
	Section 8 updated
	Section 11 updated
	Exposure scenarios updated
<i>Revision Number:</i>	06
<i>Revision Date:</i>	24/05/2021
<i>Grounds for review:</i>	Section 14 updated
<i>Revision Number:</i>	07
<i>Revision Date:</i>	31/01/2023
<i>Grounds for review:</i>	Update of sections 1, 2, 3, 4, 8, 9, 11, 12, 14, 15, 16 updated the format as the latest update Regulation CE n. 1907/2006 and f.a.

The information and recommendations are offered for the user's consideration and examination. It is the user's responsibility to satisfy itself that the product is suitable for the intended use. Uses not listed in this document are not recommended unless an assessment is completed.

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ANNEX - Exposure Scenarios Heavy Fuel Oil Components EC 270-675-6

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List of common uses of the mixture components for which were developed the exposure scenarios

Identified Use	Life cycle	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Specific Environmental Release Category (SpERC)
Exp.scenario 1 01 - Manufacture of substance Closed systems	Manufacture	n.a.	n.a.	1. 2. 3. 8a, 8b, 15. 28	1	ESVOC SpERC 1.1.v1
Exp.scenario 2 02 - Formulation & (re)packing of substances and mixtures Closed systems	Formulation	n.a.	n.a.	1. 2. 3. 8a, 8b, 15. 28	2	ESVOC SpERC 2.2.v1
Exp. scenario 3 01b - Use of substance as intermediate Closed systems	Industrial	8. 9	n.a.	1. 2. 3. 8a, 8b, 15. 28	6a	ESVOC SpERC 6.1a.v1
Exp. scenario 4 12a - Use in fuel: Industrial Closed systems	Industrial	n.a.	n.a.	1. 2. 8a, 8b, 16. 28	7	ESVOC SpERC 7.12a.v1
Exp.scenario 5 12b - Use in fuel: Professional Closed systems	Professional	n.a.	n.a.	1. 2. 8a, 8b, 16. 28	9a, 9b	ESVOC SpERC 9.12b.v1

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01 Manufacture of substance; Closed system

Section 1	
Title	
01 - Manufacture of substance; Closed systems	
Use Descriptor	
Sector(s) of Use	
Process Categories	1. 2. 3. 8a, 8b, 15. 28
Environmental Release Categories	1
Specific Environmental Release Category	ESVOC SpERC 1.1.v1
Processes, tasks, activities covered	
Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at Standard Temperature and Pressure With potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented
Contributing Scenarios	
Specific Risk Management Measures and Operating Conditions	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (aspiration hazard)	applicable if classified as H304. refer to section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.

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<p>CS1 General exposures; Closed systems (PROC_1)</p>	<p>Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 800.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Provide employee with skin care programmes.</p>
<p>CS2 General exposures; Closed systems (PROC_2)</p>	<p>Covers use up to 1.0 h/day Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Wear a full face respirator conforming to EN136. Assumes process temperature up to 800.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.</p>
<p>CS3 General exposures; Batch process; Closed systems (PROC_3)</p>	<p>Covers use up to 4.0 h/day Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.</p>
<p>CS4 Laboratory activities (PROC_15)</p>	<p>Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Put lids on containers immediately after use</p>
<p>CS5 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 4.0 h/day. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS6 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 4.0 h/day. Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS7 Marine vessel/barge; Off-shore; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 4.0 h/day. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a full face respirator conforming to EN136. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>

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<p>CS8 Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Ensure displaced vapours are vented to a safe location. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS9 Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Vapour recovery system Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS10 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS11 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Provide extract ventilation to material transfer points and other openings. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS12 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS13 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 4.0 h/day Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS14 Equipment cleaning and maintenance (PROC_8a, PROC_28)</p>	<p>Covers use up to 4.0 h/day Drain down and flush system prior to equipment break-in or maintenance. Wear a respirator conforming to EN140. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands. For further specification, refer to section 8 of the SDS. Covers use at ambient temperatures. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Clear spills immediately.</p>

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CS15 Storage (PROC_1)	Store substance within a closed system. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS16 Storage (PROC_2)	Provide extract ventilation to points where emissions occur. Store substance within a closed system. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is complex UVCB. Predominantly hydrophobic.	
Amounts used	
Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	6,6E+06
Fraction of Regional tonnage used locally	7.0E-01
Annual site tonnage (tonnes/year)	4,6E+06
Maximum daily site tonnage (kg/day)	1,5E+07
Frequency and duration of use	
Continuous release.	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	1,0E-05
Release fraction to wastewater from process (initial release prior to RMM)	2,5E-07
Release fraction to soil from process (initial release prior to RMM)	0,0001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion).	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant. no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	9,0E+01
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	89,9
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0,0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater.	

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Estimated substance removal from wastewater via domestic sewage treatment (%)	90,6
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	90,6
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1,6E+07
Assumed domestic sewage treatment plant flow (m3/d)	1,0E+04

Conditions and measures related to external treatment of waste for disposal

During manufacturing no waste of the substance is generated.

Conditions and measures related to external recovery of waste

During manufacturing no waste of the substance is generated.

Section 3 Exposure Estimation

3.1. Health

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

3.2. Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model.

Section 4 Guidance to check compliance with the Exposure Scenario

4.1. Health

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.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation.

CS1: General exposures; Closed systems RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.064 mg/m ³ (TRA Workers) RCR = 0.354	Final RCR = 0.354
Inhalation, systemic, acute	Vapour	0.255 mg/m ³ (TRA Workers) RCR = 5.41E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.354
Combined routes, systemic, acute			Final RCR < 0.01

CS2: General exposures; Closed systems RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.159 mg/m ³ (TRA Workers) RCR = 0.886	Final RCR = 0.886
Inhalation, systemic, acute	Vapour	3.189 mg/m ³ (TRA Workers) RCR = 6.76E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.886
Combined routes, systemic, acute			Final RCR < 0.01

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CS3: General exposures; batch process Closed systems RCR (PROC 3)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.145 mg/m ³ (TRA Workers) RCR = 0.806	Final RCR = 0.886
Inhalation, systemic, acute	Vapour	0.967 mg/m ³ (TRA Workers) RCR = 2.05E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.806
Combined routes, systemic, acute			Final RCR < 0.01

CS4: Laboratory activities RCR (PROC 15)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4E-3 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.022 Supportive exposure (not used for RC): 0.044 mg/m ³ (TRA Workers)	Final RCR = 0.244
	Vapour	0.04 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.222 Supportive exposure (not used for RC): 0.403 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.018 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 3.82E-6 Supportive exposure (not used for RC): 0.175 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.16 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 3.39E-5 Supportive exposure (not used for RC): 1.612 mg/m ³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.034 mg/kg bw/day (TRA Workers) RCR = 0.523	Final RCR = 0.523
Dermal, local, long term	Dermal	9.92E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, long-term			Final RCR = 0.768
Combined routes, systemic, acute			Final RCR < 0.01

CS5: Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.9E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.016 Supportive exposure (not used for RC): 0.037 mg/m ³ (TRA Workers)	Final RCR = 0.23

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	Vapour	0.039 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.214 Supportive exposure (not used for RC): 0.169 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.245 mg/m ³ (TRA Workers) RCR = 5.19E-5	Final RCR < 0.01
	Vapour	1.129 mg/m ³ (TRA Workers) RCR = 2.39E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.302
Combined routes, systemic, acute			Final RCR < 0.01

CS6: Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.9E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.016	Final RCR = 0.23
	Vapour	Supportive exposure (not used for RC): 0.367 mg/m ³ (TRA Workers) 0.039 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.214 Supportive exposure (not used for RC): 1.693 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.446 mg/m ³ (TRA Workers) RCR = 5.19E-4	Final RCR < 0.01
	Vapour	11.29 mg/m ³ (TRA Workers) RCR = 2.39E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.302
Combined routes, systemic, acute			Final RCR < 0.01

CS7: Marine vessel/barge; Off-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.2E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.012 Supportive exposure (not used for RC): 0.018 mg/m ³ (TRA Workers)	Final RCR = 0.708

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	Vapour	0.125 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.696 Supportive exposure (not used for RC): 0.085 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.122 mg/m ³ (TRA Workers) RCR = 2.59E-5	Final RCR < 0.01
	Vapour	0.564 mg/m ³ (TRA Workers) RCR = 1.2E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.78
Combined routes, systemic, acute			Final RCR < 0.01

CS8: Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.08E-3 mg/m ³ (Measured data: Concawe report 2/20)	Final RCR = 0.256
		RCR = 0.012 Supportive exposure (not used for RC): 0.039 mg/m ³ (TRA Workers)	
	Vapour	0.044 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.244 Supportive exposure (not used for RC): 0.102 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.259 mg/m ³ (TRA Workers) RCR = 5.49E-5	Final RCR < 0.01
	Vapour	0.679 mg/m ³ (TRA Workers) RCR = 1.44E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.328
Combined routes, systemic, acute			Final RCR < 0.01

CS9: Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.16E-3 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.023 Supportive exposure (not used for RC): 0.388 mg/m ³ (TRA Workers)	Final RCR = 0.512

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	Vapour	0.088 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.489 Supportive exposure (not used for RC): 1.018 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.587 mg/m ³ (TRA Workers) RCR = 5.49E-4	Final RCR < 0.01
	Vapour	6.786 mg/m ³ (TRA Workers) RCR = 1.44E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.584
Combined routes, systemic, acute			Final RCR < 0.01

CS10: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 8.33E-3	Final RCR = 0.469
		Supportive exposure (not used for RC): 0.038 mg/m ³ (TRA Workers)	
	Vapour	0.083 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.461 Supportive exposure (not used for RC): 0.142 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.25 mg/m ³ (TRA Workers) RCR = 5.31E-5	Final RCR < 0.01
	Vapour	0.944 mg/m ³ (TRA Workers) RCR = 2E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.541
Combined routes, systemic, acute			Final RCR < 0.01

CS11: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	8E-4 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 4.44E-3 Supportive exposure (not used for RC): 0.376 mg/m ³ (TRA Workers)	Final RCR = 0.235

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	Vapour	0.042 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.231 Supportive exposure (not used for RC): 1.416 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.504 mg/m ³ (TRA Workers) RCR = 5.31E-4	Final RCR < 0.01
	Vapour	9.438 mg/m ³ (TRA Workers) RCR = 2E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.307
Combined routes, systemic, acute			Final RCR < 0.01

CS12: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 8.33E-3 Supportive exposure (not used for RC): 0.376 mg/m ³ (TRA Workers)	Final RCR = 0.469
	Vapour	0.083 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.461 Supportive exposure (not used for RC): 1.416 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.504 mg/m ³ (TRA Workers) RCR = 5.31E-4	Final RCR < 0.01
	Vapour	9.438 mg/m ³ (TRA Workers) RCR = 2E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.541
Combined routes, systemic, acute			Final RCR < 0.01

CS13: Equipment cleaning and maintenance RCR (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.029 mg/m ³ (TRA Workers) RCR = 0.162	Final RCR = 0.224
	Vapour	0.011 mg/m ³ (TRA Workers) RCR = 0.062	

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Inhalation, systemic, acute	Aerosol	0.194 mg/m ³ (TRA Workers) RCR = 4.12E-5	Final RCR < 0.01
	Vapour	0.075 mg/m ³ (TRA Workers) RCR = 1.58E-5	
Dermal, systemic, long term	Dermal	0.03 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.462	Final RCR = 0.462
Combined routes, systemic, long-term			Final RCR = 0.686
Combined routes, systemic, acute			Final RCR < 0.01

CS14: Storage RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS15: Storage RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.081 mg/m ³ (TRA Workers) RCR = 0.448	Final RCR = 0.448
Inhalation, systemic, acute	Vapour	0.323 mg/m ³ (TRA Workers) RCR = 6.84E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.448
Combined routes, systemic, acute			Final RCR < 0.01

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCR _{air}	1,2E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCR _{water}	9,3E-01

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02 Formulation & (re)packing of substances and mixtures; Closed system

Section 1	
Title	
02 - Formulation & (re)packing of substances and mixtures; Closed systems	
Use Descriptor	
Sector(s) of Use	
Process Categories	1. 2. 3. 8a, 8b, 15. 28
Environmental Release Categories	2
Specific Environmental Release Category	ESVOC SpERC 2.2.v1
Processes, tasks, activities covered	
Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at Standard Temperature and Pressure With potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented
Contributing Scenarios	
Specific Risk Management Measures and Operating Conditions	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (aspiration hazard)	applicable if classified as H304. refer to section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
CS1 General exposures; Closed systems (PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.

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CS2 General exposures; Closed systems (PROC_2)	Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS3 General exposures; Batch process; Closed systems (PROC_3)	Covers use up to 4.0 h/day Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS4 Laboratory activities (PROC_15)	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Put lids on containers immediately after use
CS5 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 4.0 h/day Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS6 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 4.0 h/day Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS7 Marine vessel/barge; Off-shore; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 2.0 h/day Ensure displaced vapours are vented to a safe location. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.

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<p>CS8 Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Vapour recovery system Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS9 Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS10 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Provide extract ventilation to material transfer points and other openings. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS11 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>
<p>CS12 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)</p>	<p>Covers use up to 2.0 h/day Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.</p>

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CS13 Equipment cleaning and maintenance (PROC_8a, PROC_28)	<p>Covers use up to 4.0 h/day</p> <p>Drain down and flush system prior to equipment break-in or maintenance.</p> <p>Wear a respirator conforming to EN140.</p> <p>Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands. For further specification, refer to section 8 of the SDS.</p> <p>Covers use at ambient temperatures.</p> <p>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</p> <p>Wear suitable coveralls to prevent exposure to the skin.</p> <p>Provide employee with skin care programmes.</p> <p>Clear spills immediately.</p>
CS14 Storage (PROC_1)	<p>Store substance within a closed system.</p> <p>Assumes process temperature up to 90.0 °C</p> <p>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</p> <p>Provide employee with skin care programmes.</p>
CS15 Storage (PROC_2)	<p>Provide extract ventilation to points where emissions occur.</p> <p>Store substance within a closed system.</p> <p>Assumes process temperature up to 90.0 °C</p> <p>Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply.</p> <p>Provide employee with skin care programmes.</p>

Section 2.2 Control of environmental exposure

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	7,1E+06
Fraction of Regional tonnage used locally	4,2E-03
Annual site tonnage (tonnes/year)	3,0E+04
Maximum daily site tonnage (kg/day)	1,0E+05

Frequency and duration of use

Continuous release.

Emission days (days/year)	300
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Environmental factors not influenced by risk management

Local freshwater dilution factor	10
Local marine water dilution factor	100

Other given operational conditions affecting environmental exposure

Release fraction to air from process (after typical onsite RMMs, consistent with EU Solvent Emissions Directive requirements)	2,5E-04
Release fraction to wastewater from process (initial release prior to RMM)	8,0E-06
Release fraction to soil from process (initial release prior to RMM)	0,0001

Technical conditions and measures at process level (source) to prevent release

Common practices vary across sites thus conservative process release estimates used.

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil

Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion).

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Prevent discharge of undissolved substance to or recover from onsite wastewater.			
If discharging to domestic sewage treatment plant. no onsite wastewater treatment required			
Treat air emission to provide a typical removal efficiency of (%)			0,0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)			89,4
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)			0.0
Organisation measures to prevent/limit release from site			
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.			
Conditions and measures related to municipal sewage treatment plant			
Not applicable as there is no release to wastewater.			
Estimated substance removal from wastewater via domestic sewage treatment (%)			90,6
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)			90,6
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)			1,1E+5
Assumed domestic sewage treatment plant flow (m3/d)			2,0E+03
Conditions and measures related to external treatment of waste for disposal			
External treatment and disposal of waste should comply with applicable local and/or national regulations.			
Conditions and measures related to external recovery of waste			
External recovery and recycling of waste should comply with applicable local and/or national regulations.			
Section 3 Exposure Estimation			
3.1. Health			
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.			
3.2. Environment			
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model.			
Section 4 Guidance to check compliance with the Exposure Scenario			
4.1. Health			
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.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation.			
CS1: General exposures; Closed systems RCR (PROC 1)			
Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01
CS2: General exposures; Closed systems RCR (PROC 2)			

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Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.081 mg/m ³ (TRA Workers) RCR = 0.448	Final RCR = 0.448
Inhalation, systemic, acute	Vapour	0.323 mg/m ³ (TRA Workers) RCR = 6.84E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.448
Combined routes, systemic, acute			Final RCR < 0.01

CS3: General exposures; Batch process; Closed systems RCR (PROC 3)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.145 mg/m ³ (TRA Workers) RCR = 0.806	Final RCR = 0.806
Inhalation, systemic, acute	Vapour	0.967 mg/m ³ (TRA Workers) RCR = 2.05E-4	Final RCR < 0.01
Combined routes, systemic, long-			Final RCR = 0.806
Combined routes, systemic, acute			Final RCR < 0.01
Inhalation, systemic, long term	Vapour	0.145 mg/m ³ (TRA Workers) RCR = 0.806	Final RCR = 0.806

CS4: Laboratory activities RCR (PROC 15)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4E-3 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.022 Supportive exposure (not used for RC): 0.044 mg/m ³ (TRA Workers)	Final RCR = 0.244
	Vapour	0.04 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.222 Supportive exposure (not used for RC): 0.403 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.018 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 3.82E-6 Supportive exposure (not used for RC): 0.175 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.16 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 3.39E-5 Supportive exposure (not used for RC): 1.612 mg/m ³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.034 mg/kg bw/day (TRA Workers) RCR = 0.523	Final RCR = 0.523
Dermal, local, long term	Dermal	9.92E-3 mg/cm ² (TRA Workers)	

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Combined routes, systemic, long-term		Final RCR = 0.768
Combined routes, systemic, acute		Final RCR < 0.01

CS5: Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.9E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.016 Supportive exposure (not used for RC): 0.037 mg/m ³ (TRA Workers)	Final RCR = 0.23
	Vapour	0.039 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.214 Supportive exposure (not used for RC): 0.169 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.245 mg/m ³ (TRA Workers) RCR = 5.19E-5	Final RCR < 0.01
	Vapour	1.129 mg/m ³ (TRA Workers) RCR = 2.39E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.302
Combined routes, systemic, acute			Final RCR < 0.01

CS6: Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.9E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.016 Supportive exposure (not used for RC): 0.367 mg/m ³ (TRA Workers)	Final RCR = 0.23
	Vapour	0.039 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.214 Supportive exposure (not used for RC): 1.693 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.446 mg/m ³ (TRA Workers) RCR = 5.19E-4	Final RCR < 0.01
	Vapour	11.29 mg/m ³ (TRA Workers) RCR = 2.39E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072

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Combined routes, systemic, long-term			Final RCR = 0.302
Combined routes, systemic, acute			Final RCR < 0.01

CS7: Marine vessel/barge; Off-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.2E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.012 Supportive exposure (not used for RC): 0.018 mg/m ³ (TRA Workers)	Final RCR = 0.708
	Vapour	0.125 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.696 Supportive exposure (not used for RC): 0.085 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.122 mg/m ³ (TRA Workers) RCR = 2.59E-5	Final RCR < 0.01
	Vapour	0.564 mg/m ³ (TRA Workers) RCR = 1.2E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.78
Combined routes, systemic, acute			Final RCR < 0.01

CS8: Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.08E-3 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.012 Supportive exposure (not used for RC): 0.039 mg/m ³ (TRA Workers)	Final RCR = 0.256
	Vapour	0.044 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.244 Supportive exposure (not used for RC): 0.102 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.259 mg/m ³ (TRA Workers) RCR = 5.49E-5	Final RCR < 0.01
	Vapour	0.679 mg/m ³ (TRA Workers) RCR = 1.44E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072

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Combined routes, systemic, long-term			Final RCR = 0.328
Combined routes, systemic, acute			Final RCR < 0.01

CS9: Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.16E-3 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.023 Supportive exposure (not used for RC): 0.388 mg/m ³ (TRA Workers)	Final RCR = 0.512
	Vapour	0.088 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.489 Supportive exposure (not used for RC): 1.018 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.587 mg/m ³ (TRA Workers) RCR = 5.49E-4	Final RCR < 0.01
	Vapour	6.786 mg/m ³ (TRA Workers) RCR = 1.44E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.584
Combined routes, systemic, acute			Final RCR < 0.01

CS10: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 8.33E-3 Supportive exposure (not used for RC): 0.038 mg/m ³ (TRA Workers)	Final RCR = 0.469
	Vapour	0.083 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.461 Supportive exposure (not used for RC): 0.142 mg/m ³ (TRA Workers)	
Inhalation, systemic,	Aerosol	0.25 mg/m ³ (TRA Workers) RCR = 5.31E-5	Final RCR < 0.01
	Vapour	0.944 mg/m ³ (TRA Workers) RCR = 2E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072

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Combined routes, systemic, long-term			Final RCR = 0.541
Combined routes, systemic, acute			Final RCR < 0.01

CS11: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	8E-4 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 4.44E-3 Supportive exposure (not used for RC): 0.376 mg/m ³ (TRA Workers)	Final RCR = 0.235
	Vapour	0.042 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.231 Supportive exposure (not used for RC): 1.416 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.504 mg/m ³ (TRA Workers) RCR = 5.31E-4	Final RCR < 0.01
	Vapour	9.438 mg/m ³ (TRA Workers) RCR = 2E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.307
Combined routes, systemic, acute			Final RCR < 0.01

CS12: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 8.33E-3 Supportive exposure (not used for RC): 0.376 mg/m ³ (TRA Workers)	Final RCR = 0.469
	Vapour	0.083 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011)	
Inhalation, systemic, acute	Aerosol	2.504 mg/m ³ (TRA Workers) RCR = 5.31E-4	Final RCR < 0.01
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011)	Final RCR = 0.469
	Vapour	9.438 mg/m ³ (TRA Workers) RCR = 2E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072

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Combined routes, systemic, long-term			Final RCR = 0.541
Combined routes, systemic, acute			Final RCR < 0.01

CS13: Equipment cleaning and maintenance RCR (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.029 mg/m ³ (TRA Workers) RCR = 0.162	Final RCR = 0.224
	Vapour	0.011 mg/m ³ (TRA Workers) RCR = 0.062	
Inhalation, systemic, acute	Aerosol	0.194 mg/m ³ (TRA Workers) RCR = 4.12E-5	Final RCR < 0.01
	Vapour	0.075 mg/m ³ (TRA Workers) RCR = 1.58E-5	
Dermal, systemic, long term	Dermal	0.03 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.462	Final RCR = 0.462
Combined routes, systemic, long-term			Final RCR = 0.686
Combined routes, systemic, acute			Final RCR < 0.01

CS14: Storage RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS15: Storage RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.081 mg/m ³ (TRA Workers) RCR = 0.448	Final RCR = 0.448
Inhalation, systemic, acute	Vapour	0.323 mg/m ³ (TRA Workers) RCR = 6.84E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.448
Combined routes, systemic, acute			Final RCR < 0.01

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4.2. Environment	
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).	
Maximum Risk Characterisation Ratio for Air Emissions RCRair	9,5E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	8,8E-01

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01b Use as an intermediate; Closed system

Section 1	
Title	
01b - Use as an intermediate; Closed systems	
Use Descriptor	
Sector(s) of Use	8, 9
Process Categories	1, 2, 3, 8a, 8b, 15, 28
Environmental Release Categories	6a
Specific Environmental Release Category	ESVOC SpERC 6.1a.v1
Processes, tasks, activities covered	
Use of substance as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at Standard Temperature and Pressure With potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (aspiration hazard)	applicable if classified as H304. refer to section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
CS1 General exposures; Closed systems (PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.

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CS2 General exposures; Closed systems (PROC_2)	Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS3 General exposures; Batch process; Closed systems (PROC_3)	Covers use up to 4.0 h/day. Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS4 Laboratory activities (PROC_15)	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Put lids on containers immediately after use
CS5 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 4.0 h/day. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS6 Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 4.0 h/day. Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes Ensure no splashing occurs during transfer.
CS7 Marine vessel/barge; Off-shore; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 4.0 h/day Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a full face respirator conforming to EN136. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS8 Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 2.0 h/day Ensure displaced vapours are vented to a safe location. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS9 Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 2.0 h/day Vapour recovery system Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.

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CS10 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 2.0 h/day Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS11 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 2.0 h/day Ensure complete segregation with ventilation and filtration of recirculated air Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS12 Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; (PROC_8b)	Covers use up to 2.0 h/day. Ensure complete segregation with ventilation and filtration of recirculated air. Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors. Assumes process temperature up to 80.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS13 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Covers use up to 4.0 h/day Drain down and flush system prior to equipment break-in or maintenance. Wear a respirator conforming to EN140. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands. For further specification, refer to section 8 of the SDS. Covers use at ambient temperatures. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Clear spills immediately.
CS13 Storage (PROC_1)	Store substance within a closed system. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS14 Storage (PROC_2)	Provide extract ventilation to points where emissions occur. Store substance within a closed system. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.

Section 2.2 Control of environmental exposure

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	1,5E+06
Fraction of Regional tonnage used locally	1,0E-02
Annual site tonnage (tonnes/year)	1,5E+04
Maximum daily site tonnage (kg/day)	5,0E+04

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Frequency and duration of use	
Continuous release.	
Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	1,0E-04
Release fraction to wastewater from process (initial release prior to RMM)	1,0E-05
Release fraction to soil from process (initial release prior to RMM)	0,001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion).	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	80
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	89,6
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0,0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater.	
Estimated substance removal from wastewater via domestic sewage treatment (%)	90,6
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	90,6
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5,5E+04
Assumed domestic sewage treatment plant flow (m3/d)	2,0E+03
Conditions and measures related to external treatment of waste for disposal	
This substance is consumed during use and no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model.	
Section 4 Guidance to check compliance with the Exposure Scenario	
4.1. Health	

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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.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation.

CS1: General exposures; Closed systems RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS2: General exposures; Closed systems RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.081 mg/m ³ (TRA Workers) RCR = 0.448	Final RCR = 0.448
Inhalation, systemic, acute	Vapour	0.323 mg/m ³ (TRA Workers) RCR = 6.84E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.448
Combined routes, systemic, acute			Final RCR < 0.01

CS3: General exposures; Batch process; RCR Closed systems (PROC 3)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.145 mg/m ³ (TRA Workers) RCR = 0.806	Final RCR = 0.806
Inhalation, systemic, acute	Vapour	0.967 mg/m ³ (TRA Workers) RCR = 2.05E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.806
Combined routes, systemic, acute			Final RCR < 0.01

CS4: Laboratory activities RCR (PROC 15)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4E-3 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.022 Supportive exposure (not used for RC): 0.044 mg/m ³ (TRA Workers)	Final RCR = 0.244

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	Vapour	0.04 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.222 Supportive exposure (not used for RC): 0.403 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.018 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 3.82E-6 Supportive exposure (not used for RC): 0.175 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.16 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 3.39E-5 Supportive exposure (not used for RC): 1.612 mg/m ³ (TRA Workers)	
Dermal, systemic, long term	Dermal	0.034 mg/kg bw/day (TRA Workers) RCR = 0.523	Final RCR = 0.523
Dermal, local, long term	Dermal	9.92E-3 mg/cm ² (TRA Workers)	
Combined routes, systemic, long-term			Final RCR = 0.768
Combined routes, systemic, acute			Final RCR < 0.01

CS5: Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.9E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.016 Supportive exposure (not used for RC): 0.037 mg/m ³ (TRA Workers)	Final RCR = 0.23
	Vapour	0.039 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.214 Supportive exposure (not used for RC): 0.169 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.245 mg/m ³ (TRA Workers) RCR = 5.19E-5	Final RCR < 0.01
	Vapour	1.129 mg/m ³ (TRA Workers) RCR = 2.39E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.302
Combined routes, systemic, acute			Final RCR < 0.01

CS6: Marine vessel/barge; On-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
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Inhalation, systemic, long term	Aerosol	2.9E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.016 Supportive exposure (not used for RC): 0.367 mg/m ³ (TRA Workers)	Final RCR = 0.23
	Vapour	0.039 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.214 Supportive exposure (not used for RC): 1.693 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.446 mg/m ³ (TRA Workers) RCR = 5.19E-4	Final RCR < 0.01
	Vapour	11.29 mg/m ³ (TRA Workers) RCR = 2.39E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.302
Combined routes, systemic, acute			Final RCR < 0.01

CS7: Marine vessel/barge; Off-shore; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.2E-3 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.012 Supportive exposure (not used for RC): 0.018 mg/m ³ (TRA Workers)	Final RCR = 0.708
	Vapour	0.125 mg/m ³ (Measured data: Concawe report 1/15R and Concawe report 2/20) RCR = 0.696 Supportive exposure (not used for RC): 0.085 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.122 mg/m ³ (TRA Workers) RCR = 2.59E-5	Final RCR < 0.01
	Vapour	0.564 mg/m ³ (TRA Workers) RCR = 1.2E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.78
Combined routes, systemic, acute			Final RCR < 0.01

CS8: Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

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Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	2.08E-3 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.012 Supportive exposure (not used for RC): 0.039 mg/m ³ (TRA Workers)	Final RCR = 0.256
	Vapour	0.044 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.244 Supportive exposure (not used for RC): 0.102 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.259 mg/m ³ (TRA Workers) RCR = 5.49E-5	Final RCR < 0.01
	Vapour	0.679 mg/m ³ (TRA Workers) RCR = 1.44E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.328
Combined routes, systemic, acute			Final RCR < 0.01

CS9: Road tanker/rail car; Bottom loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	4.16E-3 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.023 Supportive exposure (not used for RC): 0.388 mg/m ³ (TRA Workers)	Final RCR = 0.512
	Vapour	0.088 mg/m ³ (Measured data: Concawe report 2/20) RCR = 0.489 Supportive exposure (not used for RC): 1.018 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.587 mg/m ³ (TRA Workers) RCR = 5.49E-4	Final RCR < 0.01
	Vapour	6.786 mg/m ³ (TRA Workers) RCR = 1.44E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.584
Combined routes, systemic, acute			Final RCR < 0.01

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CS10: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 8.33E-3 Supportive exposure (not used for RC): 0.038 mg/m ³ (TRA Workers)	Final RCR = 0.469
	Vapour	0.083 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.461 Supportive exposure (not used for RC): 0.142 mg/m ³ (TRA Workers)	
Inhalation, systemic,	Aerosol	0.25 mg/m ³ (TRA Workers) RCR = 5.31E-5	Final RCR < 0.01
	Vapour	0.944 mg/m ³ (TRA Workers) RCR = 2E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.541
Combined routes, systemic, acute			Final RCR < 0.01

CS11: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	8E-4 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 4.44E-3 Supportive exposure (not used for RC): 0.376 mg/m ³ (TRA Workers)	Final RCR = 0.235
	Vapour	0.042 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 0.231 Supportive exposure (not used for RC): 1.416 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	2.504 mg/m ³ (TRA Workers) RCR = 5.31E-4	Final RCR < 0.01
	Vapour	9.438 mg/m ³ (TRA Workers) RCR = 2E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.307
Combined routes, systemic, acute			Final RCR < 0.01

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CS12: Road tanker/rail car; Top loading; Bulk transfers; Loading and unloading; RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011) RCR = 8.33E-3 Supportive exposure (not used for RC): 0.376 mg/m ³ (TRA Workers)	Final RCR = 0.469
	Vapour	0.083 mg/m ³ (Measured data: Concawe report 2/20 and	
Inhalation, systemic, acute	Aerosol	2.504 mg/m ³ (TRA Workers) RCR = 5.31E-4	Final RCR < 0.01
Inhalation, systemic, long term	Aerosol	1.5E-3 mg/m ³ (Measured data: Concawe report 2/20 and Resecare 2011)	Final RCR = 0.469
	Vapour	9.438 mg/m ³ (TRA Workers) RCR = 2E-3	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.541
Combined routes, systemic, acute			Final RCR < 0.01

CS13: Equipment cleaning and maintenance RCR (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.029 mg/m ³ (TRA Workers) RCR = 0.162	Final RCR = 0.224
	Vapour	0.011 mg/m ³ (TRA Workers) RCR = 0.062	
Inhalation, systemic, acute	Aerosol	0.194 mg/m ³ (TRA Workers) RCR = 4.12E-5	Final RCR < 0.01
	Vapour	0.075 mg/m ³ (TRA Workers) RCR = 1.58E-5	
Dermal, systemic, long term	Dermal	0.03 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.462	Final RCR = 0.462
Combined routes, systemic, long-term			Final RCR = 0.686
Combined routes, systemic, acute			Final RCR < 0.01

CS14: Storage RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification

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Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS15: Storage RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.081 mg/m ³ (TRA Workers) RCR = 0.448	Final RCR = 0.448
Inhalation, systemic, acute	Vapour	0.323 mg/m ³ (TRA Workers) RCR = 6.84E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.448
Combined routes, systemic, acute			Final RCR < 0.01

4.2. Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

Maximum Risk Characterisation Ratio for Air Emissions RCRair	1,1E-01
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater	9,0E-01

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FUEL OIL

Q8 Quaser s.r.l.

12a Use in fuel; Industrial; Closed system

Section 1			
Title			
12a - Use in fuel; Industrial; Closed systems			
Use Descriptor			
Sector(s) of Use			
Process Categories	1, 2, 8a, 8b, 16, 28		
Environmental Release Categories	7		
Specific Environmental Release Category	ESVOC SpERC 7.12a.v1		
Processes, tasks, activities covered			
Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.			
Assessment Method			
See Section 3.			
Section 2 Operational conditions and risk management measures			
Section 2.1 Control of worker exposure			
Product characteristics			
Physical form of product	Liquid		
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at Standard Temperature and Pressure With potential for aerosol generation		
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently)		
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)		
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented		
Contributing Scenarios		Specific Risk Management Measures and Operating Conditions	
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.		
General measures (aspiration hazard)	applicable if classified as H304. refer to section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.		
CS1 General exposures; Closed systems (PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.		

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CS2 General exposures; Closed systems (PROC_2)	Provide extract ventilation to points where emissions occur. Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS3 Bulk transfers; Unloading; Closed systems (PROC_8b)	Covers use up to 4.0 h/day. Ensure material transfers are under containment or extract ventilation. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS4 Drum/batch transfers; Dedicated facility (PROC_8b)	Covers use up to 1.0 h/day. Ensure material transfers are under containment or extract ventilation. Assumes process temperature up to 60.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS5 Use of fuels; Closed systems (PROC_16)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Handle substance within a closed system. Assumes process temperature up to 90.0 °C. Operate activity away from sources of substance emission or release. Assumes large workrooms. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS6 Operation of solids filtering equipment (PROC_2)	Covers use up to 4.0 h/day. Provide a good standard of controlled ventilation (5 to 10 air changes per hour). Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS7 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Covers use up to 4.0 h/day. Drain down and flush system prior to equipment break-in or maintenance. Wear a respirator conforming to EN140. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands. For further specification, refer to section 8 of the SDS. Covers use at ambient temperatures. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Clear spills immediately.
CS8 Storage (PROC_1)	Store substance within a closed system. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS9 Storage (PROC_2)	Covers use up to 1.0 h/day. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Store substance within a closed system. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.

Section 2.2 Control of environmental exposure

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	5,6E+06
Fraction of Regional tonnage used locally	2,7E-01
Annual site tonnage (tonnes/year)	1,5E+06
Maximum daily site tonnage (kg/day)	5,0E+06

Frequency and duration of use

Continuous release.

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Emission days (days/year)	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from process (initial release prior to RMM)	5,0E-03
Release fraction to wastewater from process (initial release prior to RMM)	1,5E-07
Release fraction to soil from process (initial release prior to RMM)	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion).	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	9,5E+01
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	89,6
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0,0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater.	
94.4	90,6
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	90,6
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5,6E+06
Assumed domestic sewage treatment plant flow (m3/d)	2,0E+03
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model.	
Section 4 Guidance to check compliance with the Exposure Scenario	
4.1. Health	
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).	

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CS1: General exposures; Closed systems RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS2: General exposures; Closed systems RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.081 mg/m ³ (TRA Workers) RCR = 0.448	Final RCR = 0.448
Inhalation, systemic, acute	Vapour	0.323 mg/m ³ (TRA Workers) RCR = 6.84E-5	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.448
Combined routes, systemic, acute			Final RCR < 0.01

CS3: Bulk transfers; Unloading; Closed systems RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	3.7E-3 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.021 Supportive exposure (not used for RC): 0.037 mg/m ³ (TRA Workers)	Final RCR = 0.114
	Vapour	0.017 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.094 Supportive exposure (not used for RC): 0.169 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.025 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 5.19E-6 Supportive exposure (not used for RC): 0.245 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.113 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 2.39E-5 Supportive exposure (not used for RC): 1.129 mg/m ³ (TRA Workers)	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.187

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Combined routes, systemic, acute			Final RCR < 0.01
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CS4: Drum/batch transfers; Dedicated facility RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.019 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.103 Supportive exposure (not used for RC): 0.185 mg/m ³ (TRA Workers)	Final RCR = 0.372
	Vapour	0.049 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.269	
		Supportive exposure (not used for RC): 0.485 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.37 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 7.84E-5 Supportive exposure (not used for RC): 3.696 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.969 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 2.05E-4 Supportive exposure (not used for RC): 9.694 mg/m ³ (TRA Workers)	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.445
Combined routes, systemic, acute			Final RCR < 0.01

CS5: Use of fuels; Closed systems RCR (PROC 16)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.022 mg/m ³ (ART 1.5) RCR = 0.122	Final RCR = 0.122
Inhalation, systemic, acute	Vapour	2.257 mg/m ³ (TRA Workers) RCR = 4.79E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.122
Combined routes, systemic, acute			Final RCR < 0.01

CS6: Operation of solids filtering equipment RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.145 mg/m ³ (TRA Workers) RCR = 0.806	Final RCR = 0.806

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Inhalation, systemic, acute	Vapour	0.967 mg/m ³ (TRA Workers) RCR = 2.05E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.806
Combined routes, systemic, acute			Final RCR < 0.01

CS7: Equipment cleaning and maintenance RCR (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.029 mg/m ³ (TRA Workers) RCR = 0.162	Final RCR = 0.224
	Vapour	0.011 mg/m ³ (TRA Workers) RCR = 0.062	
Inhalation, systemic, acute	Aerosol	0.194 mg/m ³ (TRA Workers) RCR = 4.12E-5	Final RCR < 0.01
	Vapour	0.075 mg/m ³ (TRA Workers) RCR = 1.58E-5	
Dermal, systemic, long term	Dermal	0.03 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.462	Final RCR = 0.462
Combined routes, systemic, long-term			Final RCR = 0.686
Combined routes, systemic, acute			Final RCR < 0.01

CS8: Storage RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS9: Storage RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.113 mg/m ³ (TRA Workers) RCR = 0.627	Final RCR = 0.627
Inhalation, systemic, acute	Vapour	2.257 mg/m ³ (TRA Workers) RCR = 4.79E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.627

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Combined routes, systemic, acute		Final RCR < 0.01
4.2. Environment		
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).		
Maximum Risk Characterisation Ratio for Air Emissions RCRair		9,7E-02
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater		9,0E-01

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FUEL OIL

Q8 Quaser s.r.l.

12b Use in fuel; Professional; Closed system

Section 1	
Title	
12b - Use in fuel; Professional; Closed systems	
Use Descriptor	
Sector(s) of Use	
Process Categories	1, 2, 8a, 8b, 16, 28
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	ESVOC SpERC 9.12b.v1
Processes, tasks, activities covered	
Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste.	
Assessment Method	
See Section 3.	
Section 2 Operational conditions and risk management measures	
Section 2.1 Control of worker exposure	
Product characteristics	
Physical form of product	Liquid
Vapour pressure	Liquid, vapour pressure < 0.5 kPa at Standard Temperature and Pressure With potential for aerosol generation
Concentration of substance in product	Covers percentage substance in the product up to 100 %. (unless stated differently)
Frequency and duration of use/exposure	Covers daily exposures up to 8 hours (unless stated differently)
Other Operational Conditions affecting exposure	Assumes a good basic standard of occupational hygiene is implemented
Contributing Scenarios	Specific Risk Management Measures and Operating Conditions
General measures (carcinogens)	Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down and flush system prior to equipment break-in or maintenance. Access to work area only for authorised persons. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Wear suitable coveralls to prevent exposure to the skin. Wear respiratory protection when its use is identified for certain contributing scenarios. For further specification, refer to section 8 of the SDS. Clear spills immediately. Dispose of this material and its container at hazardous or special waste collection point. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Ensure control measures are regularly inspected and maintained. Consider the need for risk based health surveillance.
General measures (aspiration hazard)	applicable if classified as H304. refer to section 2 of the SDS; Do not ingest. If swallowed then seek immediate medical assistance.
CS1 General exposures; Closed systems (PROC_1)	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.

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CS2 General exposures; Closed systems (PROC_2)	Covers use up to 4.0 h/day Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure. Wear a respirator conforming to EN140. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS3 Bulk transfers; Unloading; Closed systems (PROC_8b)	Covers use up to 4.0 h/day Ensure material transfers are under containment or extract ventilation. Wear a respirator conforming to EN140. Ensure operation is undertaken outdoors. Assumes process temperature up to 90.0 °C. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS4 Drum/batch transfers; Dedicated facility (PROC_8b)	Covers use up to 1.0 h/day Ensure material transfers are under containment or extract ventilation. Assumes process temperature up to 60.0 °C Covers transfer rate <1000 l/min Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS5 Refuelling (PROC_8b)	Covers use up to 1.0 h/day Ensure material transfers are under containment or extract ventilation. Ensure operation is undertaken outdoors Assumes process temperature up to 60.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes. Ensure no splashing occurs during transfer.
CS6 Use of fuels; Closed systems (PROC_16)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Handle substance within a closed system. Assumes process temperature up to 90.0 °C Operate activity away from sources of substance emission or release. Assumes large workrooms. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS7 Equipment cleaning and maintenance (PROC_8a, PROC_28)	Covers use up to 1.0 h/day Drain down and flush system prior to equipment break-in or maintenance. Wear a respirator conforming to EN140. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. If skin contamination is expected to extend to other parts of the body, then these body parts should also be protected with impervious garments in a manner equivalent to those described for the hands. For further specification, refer to section 8 of the SDS. Covers use at ambient temperatures. Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Wear suitable coveralls to prevent exposure to the skin. Provide employee with skin care programmes. Clear spills immediately.
CS8 Storage (PROC_1)	Store substance within a closed system. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.
CS9 Storage (PROC_2)	Covers use up to 1.0 h/day Provide extract ventilation to points where emissions occur. Store substance within a closed system. Assumes process temperature up to 90.0 °C Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply. Provide employee with skin care programmes.

Section 2.2 Control of environmental exposure

Product characteristics

Substance is complex UVCB. Predominantly hydrophobic.

Amounts used

Fraction of EU tonnage used in region	0,1
Regional use tonnage (tonnes/year)	1,6E+06
3.1E+04	5,0E-04
Annual site tonnage (tonnes/year)	7,8E+02

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Maximum daily site tonnage (kg/day)	2,1E+03
Frequency and duration of use	
Continuous release.	
Emission days (days/year)	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor	10
Local marine water dilution factor	100
Other given operational conditions affecting environmental exposure	
Release fraction to air from wide dispersive use (regional use only)	5,0E-03
Release fraction to wastewater from wide dispersive use	1,0E-6
Release fraction to soil from wide dispersive use (regional use only)	0,00025
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion).	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required	
Treat air emission to provide a typical removal efficiency of (%)	N/A
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency >= (%)	88,2
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0,0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Not applicable as there is no release to wastewater.	
Estimated substance removal from wastewater via domestic sewage treatment (%)	90,6
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	90,6
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	2,7E+03
Assumed domestic sewage treatment plant flow (m3/d)	2.0E+03
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Combustion emissions considered in regional exposure assessment. External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the PETRORISK model.	
Section 4 Guidance to check compliance with the Exposure Scenario	
4.1. Health	

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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.; Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.; Available hazard data do not enable the derivation of a DNEL for aspiration effects.; Risk management measures are based on qualitative risk characterisation.

CS1: General exposures; Closed systems RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS2: General exposures; Closed systems RCR (PROC 2)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.169 mg/m ³ (TRA Workers) RCR = 0.941	Final RCR = 0.941
Inhalation, systemic, acute	Vapour	1.129 mg/m ³ (TRA Workers) RCR = 2.39E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.941
Combined routes, systemic, acute			Final RCR < 0.01

CS3: Bulk transfers; Unloading; Closed systems RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.018 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.102 Supportive exposure (not used for RC): 0.183 mg/m ³ (TRA Workers)	Final RCR = 0.29
	Vapour	0.034 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.188 Supportive exposure (not used for RC): 0.339 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	0.122 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 2.59E-5 Supportive exposure (not used for RC): 1.223 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	0.226 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 4.79E-5 Supportive exposure (not used for RC): 2.257 mg/m ³ (TRA Workers)	

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Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.362
Combined routes, systemic, acute			Final RCR < 0.01

CS4: Drum/batch transfers; Dedicated facility RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.033 mg/m ³ (ART 1.5) RCR = 0.183	Final RCR = 0.722
	Vapour	0.097 mg/m ³ (TRA Workers) RCR = 0.539	
Inhalation, systemic, acute	Aerosol	3.696 mg/m ³ (TRA Workers) RCR = 7.84E-4	Final RCR < 0.01
	Vapour	1.939 mg/m ³ (TRA Workers) RCR = 4.11E-4	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.794
Combined routes, systemic, acute			Final RCR < 0.01

CS5: Refuelling RCR (PROC 8b)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic long term	Aerosol	0.065 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.359 Supportive exposure (not used for RC): 0.647 mg/m ³ (TRA Workers)	Final RCR = 0.737
	Vapour	0.068 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 0.377 Supportive exposure (not used for RC): 0.679 mg/m ³ (TRA Workers)	
Inhalation, systemic, acute	Aerosol	1.293 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 2.74E-4 Supportive exposure (not used for RC): 12.94 mg/m ³ (TRA Workers)	Final RCR < 0.01
	Vapour	1.357 mg/m ³ (ECETOC TRA Workers 3.0) RCR = 2.88E-4 Supportive exposure (not used for RC): 13.57 mg/m ³ (TRA Workers)	
Dermal, systemic, long term	Dermal	4.7E-3 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.072	Final RCR = 0.072
Combined routes, systemic, long-term			Final RCR = 0.809

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Combined routes, systemic, acute			Final RCR < 0.01
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CS 6: Use of fuels; Closed systems RCR (PROC 16)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.022 mg/m ³ (ART 1.5) RCR = 0.122	Final RCR = 0.122
Inhalation, systemic, acute	Vapour	2.257 mg/m ³ (TRA Workers) RCR = 4.79E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.122
Combined routes, systemic, acute			Final RCR < 0.01

CS7: Equipment cleaning and maintenance RCR (PROC 8a, PROC 28)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Aerosol	0.039 mg/m ³ (TRA Workers) RCR = 0.216	Final RCR = 0.32
	Vapour	0.019 mg/m ³ (TRA Workers) RCR = 0.104	
Inhalation, systemic, acute	Aerosol	0.777 mg/m ³ (TRA Workers) RCR = 1.65E-4	Final RCR < 0.01
	Vapour	0.374 mg/m ³ (TRA Workers) RCR = 7.92E-5	
Dermal, systemic, long term	Dermal	0.03 mg/kg bw/day (Measured data: Christopher et al. (2011)) RCR = 0.462	Final RCR = 0.462
Combined routes, systemic, long-term			Final RCR = 0.781
Combined routes, systemic, acute			Final RCR < 0.01

CS8: Storage RCR (PROC 1)

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	8.06E-3 mg/m ³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, systemic, acute	Vapour	0.032 mg/m ³ (TRA Workers) RCR = 6.84E-6	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.045
Combined routes, systemic, acute			Final RCR < 0.01

CS9: Storage RCR (PROC 2)

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Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Vapour	0.161 mg/m ³ (TRA Workers) RCR = 0.896	Final RCR = 0.896
Inhalation, systemic, acute	Vapour	3.225 mg/m ³ (TRA Workers) RCR = 6.84E-4	Final RCR < 0.01
Combined routes, systemic, long-term			Final RCR = 0.896
Combined routes, systemic, acute			Final RCR < 0.01
4.2. Environment			
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).			
Maximum Risk Characterisation Ratio for Air Emissions RCRair			7,8E-03
Maximum Risk Characterisation Ratio for Wastewater Emissions RCRwater			7,9E-01