

ZapSibNeftekhim LLC

SAFETY DATA SHEET

According to Regulations (EC) 1907/2006 (REACH), (EC) 1272/2008 (CLP) & (EU) 2015/830

ISOPENTANE FRACTION

Version: 3.1

Date created: 22/12/2020

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

1.1. Product identifier

Product form:	Substance
Substance name:	2-methylbutane
Chemical name:	2-methylbutane
EC index No.:	601-085-00-2
EC No.:	201-142-8
CAS-No.:	78-78-4
REACH registration No:	01-2119475602-38-0004
Formula:	C ₅ H ₁₂
Synonyms:	Isopentane
Trade names:	2-methylbutane, isopentane fraction

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

1.2.1. Relevant identified uses

Use of the substance/mixture:	<u>Industrial uses</u> Manufacture of Substance and use as an intermediate Distribution of Substance Formulation & (Re)packing of Substances and Mixtures Uses in Coatings Uses in Cleaning Use in Blowing Agents Use as Functional Fluids Use in Laboratories <u>Professional uses</u> Use in Fuels Use in Functional Fluids Use in Laboratories <u>Consumer uses</u> Use in Fuels Use in Other Consumer Uses <i>See Section 16 for a complete list of uses for which an ES is provided as an Annex.</i>
Most common technical function of substance:	Solvents

1.2.2. Uses advised against

Restrictions on use:	Uses other than those given in section 1.2.1 are not recommended unless an assessment is completed, prior to commencement of that use, which demonstrates that the use will be controlled
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1.3. Details of the supplier of the safety data sheet

Only representative

Company name: Gazprom Marketing and Trading France
Address: 68 avenue des Champs-Élysées, 75008, Paris, France
Contact Telephone: +33 1 42 99 73 50
Fax: +33 1 42 99 73 99
Email Address: didier.lebout@gazprom-mt.com

Manufacturer

Company name: ZapSibNeftekhim LLC
Address: Promzona, 626150, Tobolsk, Tumen region, Russian Federation
Contact phone: +7 (3456) 398-000
Fax: +7 (3456) 266-449
Email Address: ZapSib@sibur.ru
Emergency Telephone: +7 (3456) 398-755; +7 (3456) 398-000, ext. 8899 (office hours only, GMT+5)

Importer: List of importers is available with the Only Representative

1.4. Emergency telephone number

Emergency phone in the country of delivery 112 (Please note that emergency numbers may vary depending upon the country of delivery though 112 remains valid as universal number)

SECTION 2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

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

Flam. Liq. 1 H224
Asp. Tox. 1 H304
STOT SE 3 H336
Aquatic Chronic 2 H411

Full text of hazard classes and H-statements : see section 16

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP):



GHS02



GHS07



GHS08



GHS09

Signal word (CLP):

Danger

Hazard statements (CLP):

H224: Extremely flammable liquid and vapour.
H304: May be fatal if swallowed and enters airways.
H336: May cause drowsiness or dizziness.
H411: Toxic to aquatic life with long lasting effects.

Precautionary statements (CLP):

P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
P261: Avoid breathing fume/gas/mist/vapours/spray.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P240: Ground and bond container and receiving equipment.
P243: Take actions to prevent static discharges.

P301 + P310 + P331 IF SWALLOWED: Immediately call a POISON CENTER/doctor. Do NOT induce vomiting.

P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

EUH-statements: EUH066: Repeated exposure may cause skin dryness or cracking.

2.3. Other hazards

Other hazards not contributing to the classification: No other hazards identified.

Assessment PBT / vPvB: According to Annex XIII of Regulation (EC) No.1907/2006 (REACH):
- not fulfilling PBT (persistent/bioaccumulative/toxic) criteria;
- not fulfilling vPvB (very persistent/very bioaccumulative) criteria.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Name	Product identifier	%	Classification [CLP]
2-methylbutane	(CAS-No.) 78-78-4 (EC No.) 201-142-8 (EC index No.) 601-085-00-2 (REACH-no) 01-2119475602-38-0004	>97.5	H224, H304, H336, H411, EUH066

Full text of hazard classes and H-statements : see section 16.

The product does not contain impurities or additives that could affect product's labelling and classification according to Regulation (EC) No 1272/2008 (CLP).

3.2. Mixtures

Not applicable

SECTION 4. FIRST-AID MEASURES

4.1. Description of first aid measures

First-aid measures general

If high-pressure injuries or ingestion occur, obtain immediate medical attention.

Warning before intervention: Before attempting to rescue casualties, isolate area from all potential sources of ignition including disconnecting electrical supply. Ensure adequate ventilation and check that a safe, breathable atmosphere is present before entry into confined spaces. Drench contaminated clothing with water before removing to avoid risk of sparks from static electricity.

First-aid measures after inhalation

If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

If the casualty is unconscious and not breathing – ensure that there is no obstruction to breathing and give artificial respiration by trained personnel. If necessary, give external cardiac massage and obtain medical assistance.

If the casualty is unconscious and breathing - place in the recovery position and keep the head below the level of the torso. Administer oxygen if necessary;

Obtain medical attention if casualty has an altered state of consciousness or if symptoms do not resolve.

First-aid measures after skin contact

Remove contaminated clothing and footwear and dispose of safely. Wash affected area thoroughly with soap and water.

Seek medical attention if skin irritation, swelling or redness develops and persists.

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. 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. However, body hypothermia must be avoided.

First-aid measures after eye contact

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing. If irritation, blurred vision or swelling occurs and persists, obtain medical advice from a specialist.

First-aid measures after ingestion

Ingestion (swallowing) of this material may result in an altered state of consciousness and loss of coordination.

In case of ingestion, always assume that aspiration has occurred. The casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.

Do not induce vomiting as there is high risk of aspiration.

Do not give anything by mouth to an unconscious person.

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

Symptoms/effects after inhalation: Inhalation of vapours may cause headache, nausea, vomiting and an altered state of consciousness

Symptoms/effects after skin contact: Reddening, irritation

Symptoms/effects after eye contact: Slight irritation (unspecific).

Symptoms/effects after ingestion: Few or no symptoms expected. If any, nausea and diarrhoea might occur. Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

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

Advice to physician This light hydrocarbon material, or a component, may be associated with cardiac sensitisation following very high exposures (well above occupational exposure limits) or with concurrent exposure to high stress levels or heart-stimulating substances like epinephrine. Administration of such substances should be avoided.

SECTION 5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media LARGE FIRE: Use water spray or fog, alcohol-resistant foam
SMALL FIRE: Dry chemical powder, carbon dioxide (CO₂), sand or earth

Unsuitable extinguishing media This material is lighter than water and insoluble in water. 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

Fire hazard: Extremely flammable liquid and vapour. This substance will float and can be reignited on surface water. The vapour is heavier than air, spreads along the ground and distant ignition is possible.

Explosion hazard: Vapours may form explosive mixtures with air. Heating will cause pressure rise with risk of bursting and subsequent explosion.

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Hazardous
decomposition
products in case of fire:

Smoke, fume, incomplete combustion products, carbon dioxide, carbon
monoxide

5.3. Advice for fire-fighters

Firefighting instructions:	Evacuate area. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. Use water spray to cool fire exposed surfaces and to protect personnel.
Protection during firefighting:	Fire-fighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA).

SECTION 6. ACCIDENTAL RELEASE MEASURE

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

Emergency procedures	Persons not engaged in emergency response should be taken away. Avoid walking through spilled product and do not touch spilt material. Use suitable protective equipment, refer to Section 8.
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6.1.2. For emergency responders

Emergency procedures	<p>Stop or contain leak at the source if safe to do so. All equipment used when handling the product must be grounded. Avoid direct contact with released material. Stay upwind. In case of large spillages, alert occupants in downwind areas. The vapour is heavier than air; beware of pits and confined spaces.</p> <p>Wear suitable protective equipment (See Section 8).</p> <p>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.</p> <p>Eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares). If required, notify relevant authorities according to all applicable regulations.</p>
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6.2. Environmental precautions

Prevent product from entering sewers, rivers, waterways or other bodies of water. Protect ecologically sensitive areas and water supply systems from contact with spilled product. Spillages or uncontrolled discharges into watercourses must be alerted to the Environment Agency or other appropriate regulatory body.

Land spillage: Prevent product from entering sewers, rivers, waterways or other bodies of water. If necessary dike the product with dry earth, sand or similar non-combustible materials.

Large spillages may be cautiously covered with foam, if available, to limit vapour cloud formation. Water spray may reduce vapour, but may not prevent ignition in enclosed spaces. Do not use direct jets.

When inside buildings or confined spaces, ensure adequate ventilation.

Absorb spilled product with suitable non-combustible materials.

Collect free product with suitable means. Transfer collected product and other contaminated materials to suitable containers for recovery or safe disposal.

In case of soil contamination, remove contaminated soil and treat in accordance with local regulations.

Water spillage: Allow liquid to evaporate from the surface. Seek the advice of a specialist before using dispersants.

6.3. Methods and material for containment and cleaning up

Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Dispose contaminated material as waste according 'Disposal considerations'. Dispose of the material collected according to regulations. Ensure adequate ventilation.

Small spills: transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

Large spills: transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

6.4. Reference to other sections

SECTION 8: Exposure controls/personal protection. SECTION 13: Disposal considerations.

6.5. Additional information:

Note: recommended measures are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Local regulations may prescribe or limit action to be taken.

SECTION 7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Precautions for safe handling	<p>Risk of explosive mixtures of vapour and air. Ensure that all relevant regulations regarding explosive atmospheres, and handling and storage facilities of flammable products, are followed.</p> <p>Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Use and store only outdoors or in a well-ventilated area. Prevent small spills and leakage to avoid slip hazard. Avoid contact with the product. Avoid release to the environment.</p> <p>Take precautionary measures against static electricity. Handle with care. Avoid jolting, friction and impact. Ground/bond containers, tanks and transfer/receiving equipment. Use only non-sparking tools. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Do not use compressed air for filling, discharging, or handling operations.</p> <p>Avoid contact with skin and eyes. Do not ingest. Avoid breathing vapours. Use personal protective equipment as required (see Section 8). For more information regarding protective equipment and operational conditions see Exposure scenarios.</p>
Hygiene measures	<p>Ensure that proper housekeeping measures are in place. Contaminated materials should not be allowed to accumulate in the workplace and should never be kept inside the pockets. Keep away from food and beverages. Do not eat, drink or smoke when using this product. Wash the hands thoroughly after handling. Change contaminated clothes at the end of working shift.</p>

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions	<p>Storage installations should be designed with adequate bunds so as to prevent ground and water pollution in case of leaks or spills.</p>
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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.

Ample fire water supply should be available. A fixed sprinkler/deluge system is recommended.

Before entering storage tanks and commencing any operation in a confined area check the atmosphere for oxygen content and flammability.

If the product is supplied in containers: Keep only in the original container or in a suitable container for this kind of product. Keep containers tightly closed and properly labelled. Protect from the sunlight. Store in a cool, well-ventilated area. Fixed storage containers, transfer containers and associated equipment should be earthed and bonded to prevent accumulation of static charge. Light hydrocarbon vapours can build up in the headspace of containers. These can cause flammability / explosion hazards. Empty containers may contain flammable product residues. Do not weld, solder, drill, cut or incinerate empty containers, unless they have been properly cleaned.

Incompatible materials Store separately from strong oxidising agents, strong acids or bases, selected amines.

Storage area Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation.

Packaging materials Recommended containers/packing: tank trucks; bulk liquid container (BLC); barges; drums.

Recommended materials and coatings: carbon steel; stainless steel; polyethylene; polypropylene; polyester; teflon.

Unsuitable materials and coatings: natural rubber; butyl rubber; ethylene-propylene-diene monomer (EPDM); polystyrene.

7.3. Specific end use(s)

Please check the identified uses given in Section 1.2 of this safety data sheet. For more information please see the relevant exposure scenarios, available in the annex of this safety data sheet.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

8.1.1 Occupational Exposure Limits

2-methylbutane (CAS 78-78-4)

	LTEL TWA		STEL		Note
	ppm	mg/m ³	ppm	mg/m ³	
European Union	1000	3000			
Austria	600	1800	1200	3600	
Belgium	600	1800	750	2250	
Denmark	500	1500	1000	3000	
Finland	500	1500	630 (1)	1900 (1)	(1) 15 minutes average value
France	1000*	3000*			*Indicative statutory limit values
Germany (AGS)	1000	3000	2000 (1)	6000 (1)	(1) 15 minutes average value
Germany (DFG)	1000	3000	2000	6000	STV 15 minutes average value
Hungary		3000		1	

Ireland	1000	3000			
Italy	667	2000			
Latvia	1000	3000			
Poland		3000			
Romania	1000	3000			
Spain	1000	3000			
Sweden	600	1800	750 (1)	2000 (1)	(1) 15 minutes average value
Switzerland	600	1800	1200	3600	
The Netherlands		1800			
Turkey	1000	3000			
United Kingdom	600	1800			

8.1.2 DNEL/ PNEC values

2-methylbutane (CAS 78-78-4)

DNEL/DMEL (Workers)

Acute - systemic effects, dermal	No hazard identified
Acute - systemic effects, inhalation	No hazard identified
Acute - local effects, dermal	No hazard identified
Acute - local effects, inhalation	No hazard identified
Long-term - systemic effects, dermal	(DNEL) 432 mg/kg bw/day (Most sensitive endpoint: repeated dose toxicity)
Long-term - systemic effects, inhalation	(DNEL) 3000 mg/m ³ (Most sensitive endpoint: repeated dose toxicity)
Long-term - local effects, dermal	No hazard identified
Long-term - local effects, inhalation	No hazard identified
Eyes, local effects	No hazard identified

DNEL/DMEL (General population)

Acute - systemic effects, dermal	No hazard identified
Acute - systemic effects, inhalation	No hazard identified
Acute - systemic effects, oral	No hazard identified
Acute - local effects, dermal	No hazard identified
Acute - local effects, inhalation	No hazard identified
Long-term - systemic effects, dermal	(DNEL) 214 mg/kg bw/day (Most sensitive endpoint: repeated dose toxicity)
Long-term - systemic effects, inhalation	(DNEL) 643 mg/m ³ (Most sensitive endpoint: repeated dose toxicity)
Long-term - systemic effects, oral	(DNEL) 214 mg/kg bw/day (Most sensitive endpoint: repeated dose toxicity)
Long-term - local effects, dermal	No hazard identified
Long-term - local effects, inhalation	No hazard identified
Eyes, local effects	No hazard identified

PNEC (water)

PNEC aqua (freshwater)	No hazard identified
PNEC aqua (marine water)	No hazard identified
PNEC aqua (intermittent, freshwater)	No hazard identified

PNEC (Sediment)

PNEC sediment (freshwater)	No hazard identified
PNEC sediment (marine water)	No hazard identified

PNEC (Soil)	
PNEC soil	No hazard identified
PNEC (Oral)	
PNEC oral (secondary poisoning)	No potential for bioaccumulation
PNEC (STP)	
PNEC sewage treatment plant	No hazard identified

8.2. Exposure controls

Appropriate engineering controls:

Read in conjunction with Exposure scenarios for the identified uses contained in the annex. Select controls based on a risk assessment of local circumstances.

Appropriate measures include: closed system, adequate exhaust ventilation system, explosion-proof electrical/ventilating/lighting equipment, only non-sparking tools, regular cleaning of equipment and work area, etc.

Personal protection equipment:

Personal protection equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Follow the principles of good occupational and personal hygiene to control personal exposures.

Hand protection:

Wear gloves (tested to EN 374) if hand contamination likely.

Work gloves providing adequate chemical resistance, specifically to aromatic hydrocarbons.

Note: gloves made of PVA are not water-resistant, and are not suitable for emergency use.

Eye protection:

Goggles or face shield, if splashes or contact with eyes is possible or anticipated (BS EN 166)

Skin and body protection:

Work helmet. Antistatic non-skid safety shoes or boots. Normal antistatic working clothes are usually adequate.

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

Respiratory protection:

Wear suitable respiratory protective equipment if exposure to levels above the occupational exposure limit is likely. (BS EN 14387:2004 or EN 140)

A half or full-face respirator with filter(s) for organic vapours 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.

Environmental exposure controls:

Avoid release to the environment.

Other information:

Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Discard contaminated clothing and footwear that cannot be cleaned. Ensure that eyewash stations and safety showers are close to the workstation location.

Assumes a good basic standard of occupational hygiene is implemented. Provide basic employee training to prevent/ minimize exposures and to report any skin effects that may develop.

For more information please see the relevant exposure scenario in Annex of this SDS.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state at 20 °C and	Liquid
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101.3 kPa	Form: volatile
Colour	Colourless
Odour	Faint
Melting / freezing point	-159.77 °C
Boiling point	25 to 65 °C (ASTM D 1078)
Relative density	0.62 g/cm ³ at 20 °C 0.61 to 0.65 g/cm ³ at 15°C (ISO 12185)
Vapour pressure	100kPa at 27.5 °C 74 and 79 kPa at 20°C (calculated)
Surface tension	13.7 to 16 mN/m at 25°C
Water solubility	48.5 mg/L at 25°C 48 mg/L at 20 °C (slightly soluble)
Partition coefficient n-octanol/water (log value)	log Kow = 4 at 25 °C log Kow = 3.4 at 20 °C
Flash point	<0°C (DIN 51755) -51°C (literature data)
Flammability	Extremely flammable The explosion limits of 2-methylbutane are 1.3-7.8%. This data would result in a classification of category 1 flammable liquid and the hazard statement 'extremely flammable liquid '.
Explosive properties	Non-explosive
Self-ignition temperature	>250°C (ASTM E 659) 420 °C at atm. press. of 1013.0 hPa (literature data)
Oxidising properties	Not applicable
Viscosity	0.31 to 0.52 mm ² /s at 20°C (ASTM D 445) 0.214 mPa s at 25 °C
Granulometry	Not applicable
Stability in organic solvents and identity of relevant degradation products	Not applicable
Dissociation constant	Not applicable

9.2. Other information

Not available.

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

Material is stable under normal conditions.

Volatile liquid. Extremely flammable. Stable at room temperature in closed containers under normal storage and handling conditions.

10.2. Chemical stability

Stable under normal pressures and temperatures.

10.3. Possibility of hazardous reactions

Risk of explosive mixtures of vapour and air. Heating will cause pressure rise with risk of bursting and subsequent explosion. Ensure that all relevant regulations regarding explosive atmospheres, and handling and storage facilities of flammable products, are followed.

10.4. Conditions to avoid

Keep away from heat, sparks, open flames and other ignition sources. No smoking

10.5. Incompatible materials

Strong oxidising agents, strong acids or bases, selected amines.

10.6. Hazardous decomposition products

Not expected to form during normal storage.

Incomplete combustion products: a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide and/or carbon dioxide, and unidentified organic and inorganic compounds.

SECTION 11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute toxicity

<i>2-methylbutane</i> (CAS 78-78-4)	
LD50, oral, rats	> 2000 mg/kg bw (equivalent or similar to OECD 401 / EU Method B.1)
	> 5000 mg/kg bw (equivalent or similar to OECD 423)
LC50, inhalation, rats	> 25.3 mg/L – 4h (equivalent or similar to OECD 403)
LC50, dermal	The physicochemical properties of the product (log Kow; water solubility) indicate that it will not readily penetrate the skin. Based on the the physicochemical data, acute dermal studies do not appear to be scientifically necessary or justified.

Skin corrosion/irritation

Mild irritating. Not classified (migrated information: read-across based on grouping of substances (category approach))

Additional information

Test material (CAS number): 109-66-0 (n-pentane).
 Samples were tested in rabbit skin irritation studies (24 hour semioccluded) (OECD 404 / EU Method B.4).
 Primary dermal irritation index: 0.67 (mean) (Time point: 24 and 72 hours).
 Erythema score: 0.5 (mean) (Time point: 24 and 72 hours). Edema score: 0.06 (mean) (Time point: 24 and 72 hour).
 Based on a lack of significant skin irritation, substance is not classified as skin irritant.

Serious eye damage/irritation

Mild irritating. Not classified (migrated information: read-across based on grouping of substances (category approach))

Additional information

Test material (CAS number): 109-66-0 (n-pentane).
 Test animals: rabbits.
 Test method: equivalent or similar to OECD 405.
 Redness: 2.33 of max. 110 (mean) (Time point: 1 hour) (fully reversible within: 72 hours).
 Redness: 1.33 of max. 110 (mean) (Time point: 4 hours) (fully reversible within: 72 hours).
 Redness: 0.33 of max. 110 (mean) (Time point: 48 hours) (fully reversible within: 72 hours).
 Chemosis score: 0.33 of max. 110 (mean) (Time point: 1 hour) (fully reversible within: 72 hours).
 Based on a lack of significant eye irritation, substance is not classified as eye irritant.

Respiratory or skin sensitisation	Not sensitizing (equivalent or similar to OECD 406), guinea pig
Germ cell mutagenicity	CLP classification (Regulation (EC) No 1272/2008): no classification required.
Additional information	In-vitro studies (bacterial reverse mutation assay, e.g. Ames test, gene mutation (<i>S. typhimurium</i> TA)): negative (equivalent or similar to OECD 471). In-vitro studies (mammalian cell chromosome aberration test, cytogenicity): negative (EU Method B.10). In vivo studies (micronucleus assay, chromosome aberration (inhalation, rat)): negative (EU Method B.12).
Carcinogenicity	CLP classification (Regulation (EC) No 1272/2008): no classification required.
Toxicity for reproduction	CLP classification (Regulation (EC) No 1272/2008): no classification required.

<i>2-methylbutane (CAS 78-78-4)</i>	
NOAEC (effects on fertility), inhalation, rat	2000 ppm (6880 mg/m ³) (read-across) Test material: Cyclohexane Test method: equivalent or similar to OECD 416
NOAEL (developmental toxicity), oral, rat	1000 mg/kg/day (maternal toxicity) (read-across) Test material: n-pentane Test method: equivalent or similar to OECD 414 / EU Method B.31.

STOT-single exposure	2-methylbutane is classified as STOT Single Exp. 3 (H336: May cause drowsiness or dizziness) in accordance with CLP EU Regulation 1272/2008. Affected organs: Central Nervous System. Route of exposure: Inhalation. [Based on the information on anaesthetic activity of n-pentane]
Repeated dose toxicity	CLP classification (Regulation (EC) No 1272/2008): Specific Target Organ Toxicity: Repeated Exposure: no classification required.

<i>2-methylbutane (CAS 78-78-4)</i>	
NOAEC, short-term repeated dose toxicity, inhalation, rat, male	1000 ppm (2951 mg/m ³) (equivalent or similar to OECD 412)
NOAEC, subchronic toxicity, inhalation, rats	20 - 30 mg/L air (equivalent or similar to OECD 413)
NOEC, subchronic toxicity, inhalation, rats	> 2220 ppm (organ weights) (equivalent or similar to OECD 413)
NOEC, neurotoxicity, inhalation, rats	>= 6646 ppm (overall effects) (equivalent or similar to OECD 413)

Aspiration hazard	Asp. Tox. 1. May be fatal if swallowed and enters airways.
Additional information	Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

SECTION 12. ECOLOGICAL INFORMATION

12.1.Toxicity

CLP classification (Regulation (EC) No 1272/2008): Aquatic Chronic 2 (Toxic to aquatic life with long lasting effects)

2-methylbutane (CAS 78-78-4)	
Fish (Short-term toxicity)	
LL50 (96h)	34.05 mg/L - <i>Oncorhynchus mykiss</i> (freshwater) (QSAR (PETROTOX) modelled data)
LC50 (96h)	4.26 mg/L - <i>Oncorhynchus mykiss</i> (freshwater) (read-across, OECD 203)
Fish (Long-term toxicity)	
NOELR (28 days)	7.618 mg/L <i>Oncorhynchus mykiss</i> (freshwater) (QSAR (PETROTOX) modelled data)
Aquatic invertebrates (Short-term toxicity)	
EL50 (48 h)	59.44 mg/L <i>Daphnia magna</i> (freshwater) (QSAR (PETROTOX) modelled data)
EC50 (48 h)	2.3 mg/L <i>Daphnia magna</i> (freshwater) (OECD 202)
Aquatic invertebrates (Long-term toxicity)	
NOELR (21 days)	13.29 mg/L <i>Daphnia magna</i> (freshwater) (QSAR (PETROTOX) modelled data)
Algae and aquatic plants	
EC50 (96 h)	5.2 mg/L <i>Green algae</i> (freshwater) (calculated using the neutral organic QSAR)
EL50 (72 h)	25.12 mg/L <i>Pseudokirchnerella subcapitata</i> (freshwater) (QSAR (PETROTOX) modelled data)
NOELR (72 h)	5.62 mg/L <i>Pseudokirchnerella subcapitata</i> (freshwater) (QSAR (PETROTOX) modelled data)
EC50 (72 h)	10.7 mg/L <i>Scenedesmus capricornutum</i> (freshwater) (OECD 201)
NOEC (72 h)	2.04 mg/L <i>Scenedesmus capricornutum</i> (freshwater) (OECD 201)
Toxicity to aquatic micro-organisms	
EL50 (48 h)	130.9 mg/L <i>Tetrahymena pyriformis</i> (freshwater) (QSAR (PETROTOX) modelled data)
NOEL (48 h)	29.28 mg/L <i>Tetrahymena pyriformis</i> (freshwater) (QSAR (PETROTOX) modelled data)
12.2.Persistence and degradability	
Abiotic degradation:	<p><u>Hydrolysis</u> This chemical substance consists entirely of carbon and hydrogen and does not contain hydrolyzable groups. As such, it has a very low potential to hydrolyze. Therefore, this degradative process will not contribute to its removal from the environment.</p> <p><u>Phototransformation in air</u> Half-life (DT50): 55.2 h (2.3 d) (calculation data accordance with the TGD)</p>
Biodegradation	<p>Readily biodegradable % Degradation of test substance: 71.43 after 28 d (equivalent or similar to OECD Guideline 301F).</p>
Persistence and degradability	Based on the available measured data, 2-methylbutane is biodegradable. Therefore, based on initial persistence screening the substance is not expected to meet the Persistent (P) or very Persistent (vP) criteria.
12.3.Environmental distribution	
Adsorption / desorption	Log Kow: 3.45; Koc at 20 °C: 794.3; Log Koc: 2.9 (QSAR data)

	The adsorptivity of 2-methylbutane is moderate, but it still has good mobility in the environment.
Environmental distribution:	Percent distribution in media (PETRORISK Model, version 5.2): Air (%): 95.9 Sediment (%): 0.9 Water (%): 3 Susp. sediment (%): 0 Soil (%): 0.1 Biota (%): 0

12.4. Bioaccumulative potential

Aquatic bioaccumulation:	The calculated BCF of 171 indicates that isopentane does not greatly bioaccumulate in the lipids of ecological receptors. The log Kow used to calculate this BCF is that reported for n-pentane. Bioaccumulation factor: BCF: 171 (log Kow of 3.45) (QSAR)
Secondary poisoning:	Based on the available information, there is no indication of a bioaccumulation potential and, hence, secondary poisoning is not considered relevant.

12.5. Mobility in soil

Biodegradation in soil:	In accordance with column 2 of REACH Annex IX, no simulation tests in soil are required, since 2-methylbutane is readily biodegradable according to OECD criteria.
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12.6. Results of PBT and vPvB assessment

Regarding all available data on biotic and abiotic degradation, bioaccumulation and toxicity it can be stated that the substance does not fulfill the PBT criteria (not PBT) and not the vPvB criteria (not vPvB).

12.7. Other adverse effects

Not available.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste disposal recommendations

Disposal methods:

Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Product disposal:

Recover and recycle product if possible. If recovery and recycling are not possible, isopentane may be disposed of by incineration. Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

Packaging disposal:

Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL,

GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

European List of Waste (LoW) code

08 XX XX

NOTE: These codes are assigned based upon the most common uses for this material and may not reflect contaminants resulting from actual use. Waste producers need to assess the actual process used when generating the waste and its contaminants in order to assign the proper waste disposal code(s).

SECTION 14. TRANSPORT INFORMATION

14.1. Land transport (ADR/ RID)

UN-No. 1265
Proper Shipping Name: PENTANES
Hazard class: 3
Packing group: I
Hazard label: 3



Classification Code: F1
Hazard identification number (HIN): 33
EAC code: 3YE
Transport category (Tunnel restriction code): 1 (D/E)
Environmental hazard: Yes

14.2. Inland waterway transport (ADN)

UN-No. 1265
Proper Shipping Name: PENTANES (2-METHYLBUTANE)
Hazard class: 3
Packing group: I
Hazard label: 3 (N2)



Classification Code: 1F
Hazard identification number (HIN): 33
Environmental hazard: Yes

14.3. Sea transport (IMDG)

UN-No. 1265
Proper Shipping Name: PENTANES (ISOPENTANE; 2-METHYLBUTANE)
Hazard class: 3
Packing group: I
Hazard label: 3



EmS-No. (Fire) F-E
EmS-No. (Spillage) S-D
Properties and Observations: Colourless liquids with a paraffin-like odour.
Explosive limits: 1.4% to 8%.
Boiling point 28°C.
Immiscible with water.
Slightly irritating to skin, eyes and mucous membranes.
Narcotic in high concentrations.
Marine pollutant: Yes

14.4. Air transport (IATA/ICAO)

UN-No. 1265
Proper Shipping Name: PENTANES
Hazard class: 3
Packing group: I
Hazard label: 3



Environmental hazard: Yes
ERG Code 3H

PASSENGER AND CARGO

AIRCRAFT:

- Excepted Quantities: E3
Packing instruction: 351
max net quantity: 1 L
- Limited quantity:
Packing instruction: FORBIDDEN
max net quantity: FORBIDDEN

CARGO AIRCRAFT:

Packing instruction: 361
max. net quantity: 30 L

14.5. Special precautions for user

Always transport in closed containers. Ensure that persons transporting the product know what to do in the event of an accident or spillage. For information regarding Exposure Controls/Personal Protection see Section 8 of the SDS

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

Product name: Pentane (all isomers)
Pollution category: Y
Ship type required: 3
Hazard: P
Tank type: 2G

SECTION 15. REGULATORY INFORMATION

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

15.1.1. EU-Regulations

Authorisations and/or restrictions on use (Annex XVII)

(H304, Aspiration hazard)

1. Shall not be used in:

- ornamental articles intended to produce light or colour effects by means of different phases, for example in ornamental lamps and ashtrays,
- tricks and jokes,
- games for one or more participants, or any article intended to be used as such, even with ornamental aspects,

2. Articles not complying with paragraph 1 shall not be placed on the market.

3. Shall not be placed on the market if they contain a colouring agent, unless required for fiscal reasons, or perfume, or both, if they:

- can be used as fuel in decorative oil lamps for supply to the general public, and,
- present an aspiration hazard and are labelled with R65 or H304,

4. Decorative oil lamps for supply to the general public shall not be placed on the market unless they conform to the European Standard on Decorative oil lamps (EN 14059) adopted by the European Committee for Standardisation (CEN).

5. Without prejudice to the implementation of other Community provisions relating to the classification, packaging and labelling of dangerous substances and mixtures, suppliers shall ensure, before the placing on the market, that the following requirements are met:

(a) lamp oils, labelled with R65 or H304, intended for supply to the general public are visibly, legibly and indelibly marked as follows: 'Keep lamps filled with this liquid out of the reach of children'; and, by 1 December 2010, 'Just a sip of lamp oil — or even sucking the wick of lamps — may lead to lifethreatening lung damage';

(b) grill lighter fluids, labelled with R65 or H304, intended for supply to the general public are legibly and indelibly marked by 1 December 2010 as follows: 'Just a sip of grill lighter may lead to life threatening lung damage';

(c) lamp oils and grill lighters, labelled with R65 or H304, intended for supply to the general public are packaged in black opaque containers not exceeding 1 litre by 1 December 2010.

6. No later than 1 June 2014, the Commission shall request the European Chemicals Agency to prepare a dossier, in accordance with Article 69 of the present Regulation with a view to ban, if appropriate, grill lighter fluids and fuel for decorative lamps, labelled R65 or H304, intended for supply to the general public.

7. Natural or legal persons placing on the market for the first time lamp oils and grill lighter fluids, labelled with R65 or H304, shall by 1 December 2011, and annually thereafter, provide data on alternatives to lamp oils and grill lighter fluids labelled R65 or H304 to the competent authority in the Member State concerned. Member States shall make those data available to the Commission.

2-methylbutane (CAS 78-78-4) is not on the REACH **Candidate List**.

2-methylbutane (CAS 78-78-4) is not on the REACH **Annex XIV List**.

Other information, restriction and prohibition regulation

Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II - Not listed.

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances- (SEVESO III):

Physical Hazard – P5a - Flammable liquids.
 Environmental Hazard – E2 – Hazardous to the Aquatic Environment

Directive 2013/39/EU priority substances in the field of water policy (amending Directive 2006/60/EC – Water Framework Directive and Directive 2008/105/EC on environmental quality standards in the field of water policy): Not listed.

Regulation (EC) No 850/2004 on persistent organic pollutants:
 Annex III – Not listed.

Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of dangerous chemicals: Not listed.

15.1.2. National regulations

Germany
 Ordinance on facilities for handling substances that are hazardous to water (Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV)) of 18 April 2017 (BGBl 2017, Teil I, Nr. 22, Seite 905).
 Kennnummer: 648
 WGK: 2 - distinct hazard to waters.

15.2. Chemical safety assessment

Chemical Safety Report has been performed for 2-methylbutane (CAS 78-78-4).

SECTION 16. OTHER INFORMATION

16.1 Indication of changes

Version	Date of change	Section	Description of changes
Version: 1.0	16/03/2010	All	Initial SDS. Version created according to Regulations (EC) No 1907/2006 (Article 31.1).
Version: 2.0	08/12/2010	All	Version created according to Regulation (EC) No 1272/2008 (Regulation CLP) & 453/2010.
Version: 2.1	08/02/2011	11; 12	Sections 11; 12 were fully reconfigured.
Version: 2.2	30/06/2011	8	Section 8 was fully reconfigured
Version: 2.3	09/01/2014	All	1. Sections 2; 4; 5 were fully reconfigured. 2. Sections 6; 7; 8; 10; 13; 14; 15; 16 were fully reconfigured, new information was added. 3. Version was checked for compliance with Candidate List of Substances of Very High Concern for Authorisation updated on December, 16, 2013.
Version: 2.4	26/09/2014	8.1.1; 9; 16.1	Sections 8.1.1; 9; 16.1 were corrected.
Version: 2.5	17/05/2016	Title, 1.3	Company name of the Supplier was changed from «Tobolsk-Neftekhim» on «SIBUR Tobolsk».
Version: 3.0	14/02/2020	1-16, Annex	SDS have been corrected in according to new data of Registration dossier, Chemical Safety Report and new Transport information
Version: 3.1	22/12/2020	1.3, 1.4	Company name of the Supplier was changed

16.2 Abbreviations and acronyms

ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
AGS	German Committee on Hazardous Substances (Ausschuss für Gefahrstoffe – AGS)
BCF	Bioconcentration factor
DFG	Germany Research Foundation
DMEL	Derived Minimum Effect Level
DNEL	Derived No Effect Level
DT50	Disappearance Time for 50%
EAC	Emergency Action Code
EmS	Emergency Procedures for Ships Carrying Dangerous Goods
ERG	Emergency Response Guidance
EC50	Effect Concentration to 50%
EL50	Effect Load for 50%
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
ICAO-TI	Technical Instructions for the Safe Transport of Dangerous Goods by Air
Koc	Adsorption coefficient
Kow	Octanol-water partition coefficient
LC50	Lethal Concentration to 50 % of a test population
LD50	Lethal Dose to 50% of a test population (Median Lethal Dose)
LL50	Lethal Load for 50%
LOAEC	Lowest Observable Adverse Effect Concentration
LTEL	Long Term Exposure Limit
NOEC	No Observed Effect Concentration
NOAEL	No Observed Adverse Effect Level
NOAEC	No Observable Adverse Effect Concentration
NOEL	No Observed Effect Loading
NOELR	No Observed Effect Loading Rate
OECD	Organization for Economic Co-operation and Development
PNEC	Predicted No Effect Concentration
PBT	Persistent, bioaccumulative, toxic chemical
vPvB	Very Persistent, Very Bioaccumulative
QSAR	Quantitative structure activity relationship
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
STEL	Short Term Exposure Limit
STP	sewage treatment plant
STOT	Specific Target Organ Toxicity
(STOT) RE	Repeated Exposure
(STOT) SE	Single Exposure
TGD	Technical Guidance Documents
TWA	Time Weighted Average
UN	United Nations

16.3. Full text of H- and EUH-statements:

H224	Flam. Liquid 1	Extremely flammable liquid and vapour.
H304	Asp. Tox. 1	May be fatal if swallowed and enters airways.
H336	STOT Single Exp. 3	May cause drowsiness or dizziness.
H411	Aquatic Chronic 2	Toxic to aquatic life with long lasting effects.
EUH066	Repeated exposure may cause skin dryness or cracking.	

16.4. List of ES (exposure scenario) given in Annex to the extended SDS

ES1	Manufacture of Substance (including use as an intermediate)– Industrial
ES2	Distribution of Substance – Industrial
ES3	Formulation & (Re)packing of Substances and Mixtures – Industrial
ES4	Uses in Coatings – Industrial
ES5	Uses in Cleaning Agents – Industrial
ES6	Use as a Blowing Agent – Industrial
ES7	Use as a Fuel – Professional
ES8	Use as a Fuel - Consumer
ES9	Use as Functional Fluids – Industrial
ES10	Use as Functional Fluids – Professional
ES11	Other Consumer Uses – Consumer
ES12	Use in Laboratories – Industrial
ES13	Use in Laboratories – Professional

16.5. Key literature references and sources

DOCUMENTS, PROVIDED BY CONSORTIUM:

CHEMICAL SAFETY REPORT to 2-methylbutane (CAS 78-78-4).

EU DIRECTIVES

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

Regulation (EC) No 1272/2008 REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Regulations. Commission regulation (EU) no 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

Training advice

Product handling instruction shall be included into the educational system about the safety work (initial training, training at the workplace, repeated training) according to specific conditions at the workplace.

DISCLAIMER

This information is based on our current level of knowledge. This information may be subject to revision as new knowledge and experience becomes available, and SIBUR makes no warranties and assumes no liability in connection with any use of this information. Since SIBUR cannot be aware of all aspects of your business and the impact the REACH Regulation has for your company, SIBUR

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LANGUAGE: ENGLISH



strongly encourages you to get familiar with the REACH Regulation in order to comply with its requirements and timelines.

ANNEX. EXPOSURE SCENARIOS	
Exposure Scenario 1 (ES1): Manufacture of Substance – Industrial	
Section 1 Exposure Scenario Title	
Title	
Manufacture of Substance – Industrial	
Use Descriptor	
Sector(s) of Use	3, 8, 9
Process Categories	1, 2, 3, 4, 8a, 8b, 15
Environmental Release Categories	1, 4
Specific Environmental Release Category	ESVOC 1.1.v1
Processes, tasks, activities covered	
Manufacture of the substance or use as an intermediate or process chemical or extraction agent. Includes 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.	
Risk Management Measures	
HIGH General exposures (closed systems) [CS15]	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC2	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC3	No specific measures identified[EI18]
General exposures (open systems) [CS16] PROC4	No specific measures identified[EI18]
Process sampling [CS2] PROC8b	No specific measures identified[EI18]
Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
Bulk transfers[CS14](open systems)[CS108] PROC8b	No specific measures identified[EI18]
Bulk transfers[CS14](open systems)[CS108] PROC8b	No specific measures identified[EI18]
Bulk transfers[CS14](closed systems)[CS107] PROC8b	No specific measures identified[EI18]
Equipment cleaning and maintenance[CS39] PROC8a	No specific measures identified[EI18]
Material storage[CS67] PROC1	No specific measures identified[EI18]
Material storage[CS67] PROC2	No specific measures identified[EI18]
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	3.7e4
Fraction of Regional tonnage used locally	1
Annual site tonnage (tonnes/year)	3.7e4
Maximum daily site tonnage (kg/day)	1.2e5
Frequency and duration of use	

Continuous release [FD2].	
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-2
Release fraction to wastewater from process (initial release prior to RMM)	3.0e-4
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment [TCR1b]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency \geq (%)	40.4
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	2.5e6
Assumed domestic sewage treatment plant flow (m ³ /d)	10000
Conditions and measures related to external treatment of waste for disposal	
During manufacturing no waste of the substance is generated. [ETW4]	
Conditions and measures related to external recovery of waste	
During manufacturing no waste of the substance is generated. [ERW2]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 1.1.v1. Scaled assessments for EU refineries have been performed using site-specific data and are attached in PETRORISK file – “Site-Specific Production” worksheet [DSU6].

Exposure Scenario 2 (ES2) Distribution of Substance – Industrial

Section 1 Exposure Scenario Title

Title

Distribution of Substance – Industrial

Use Descriptor

Sector(s) of Use	3, 8, 9
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Process Categories	1, 2, 3, 4, 8a, 8b, 9, 15
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Environmental Release Categories	1, 2, 3, 4, 5, 6, 7
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Specific Environmental Release Category	ESVOC 1.1b.v1
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Processes, tasks, activities covered

Bulk loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, maintenance and associated laboratory activities. Excludes emissions during transport.

Assessment Method

See Section 3.

Section 2	Operational conditions and risk management measures
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Section 2.1	Control of worker exposure
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Product characteristics	
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Physical form of product	Liquid, vapour pressure >10KPa at STP [OC5]
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Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
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Amounts used	No Limit
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Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
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Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
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	Assumes a good basic standard of occupational hygiene has been implemented [G1]
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Risk Management Measures	
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General exposures (closed systems) [CS15] PROC1	No specific measures identified[EI18]
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General exposures (closed systems) [CS15] PROC2	No specific measures identified[EI18]
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General exposures (closed systems) [CS15] PROC3	No specific measures identified[EI18]
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General exposures (open systems) [CS16] PROC4	No specific measures identified[EI18]
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Process sampling [CS2] PROC3	No specific measures identified[EI18]
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Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
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Bulk transfers[CS14](closed systems)[CS107] PROC8b	No specific measures identified[EI18]
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Bulk transfers[CS14](open systems)[CS108] PROC8b	No specific measures identified[EI18]
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Bulk transfers[CS14](open systems)[CS108] PROC8b	No specific measures identified[EI18]
Drum and small package filling[CS6] PROC9	No specific measures identified[EI18]
Equipment cleaning and maintenance[CS39] PROC8a	No specific measures identified[EI18]
Material storage[CS67] PROC1	No specific measures identified[EI18]
Material storage[CS67] PROC2	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	1.1e4
Fraction of Regional tonnage used locally	2.0e-3
Annual site tonnage (tonnes/year)	2.3e1
Maximum daily site tonnage (kg/day)	1.1e3
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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-3
Release fraction to wastewater from process (initial release prior to RMM)	1.0e-5
Release fraction to soil from process (initial release prior to RMM)	0.00001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment [TCR1b]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1

Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	1.5e7
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
Section 3 Exposure Estimation	
3.1. Health	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 1.1b.v1.	
Exposure Scenario 3 (ES3): Formulation & (Re)packing of Substances and Mixtures – Industrial	
Section 1 Exposure Scenario Title	
Title	
Formulation & (Re)packing of Substances and Mixtures – Industrial	
Use Descriptor	
Sector(s) of Use	3, 10
Process Categories	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15
Environmental Release Categories	2
Specific Environmental Release Category	ESVOC 2.2.v1
Processes, tasks, activities covered	
Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tableting, compression, pelletization, extrusion, large and small scale packing, 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 >10KPa at STP [OC5]

Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	
General exposures (closed systems) [CS15] PROC1	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC2	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC3	No specific measures identified[EI18]
General exposures (open systems) [CS16] PROC4	No specific measures identified[EI18]
General exposures (open systems) [CS16] PROC4	No specific measures identified[EI18]
Batch processes at elevated temperatures[CS136]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC3	No specific measures identified[EI18]
Process sampling [CS2] PROC3	No specific measures identified[EI18]
Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
Bulk transfers[CS14] PROC8b	No specific measures identified[EI18]
Mixing operations (open systems)[CS30] PROC5	No specific measures identified[EI18]
Manual[CS34]Transfer from/pouring from containers [CS22] PROC8a	No specific measures identified[EI18]
Drum/batch transfers [CS8] PROC8b	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	1.1e4
Fraction of Regional tonnage used locally	1

Annual site tonnage (tonnes/year)	1.1e4
Maximum daily site tonnage (kg/day)	3.7e4
Frequency and duration of use	
Continuous release [FD2].	
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 (after typical onsite RMMs, consistent with EU Solvent Emissions Directive requirements)	2.5e-2
Release fraction to wastewater from process (initial release prior to RMM)	2.0e-4
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment [TCR1b]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required [TCR9].	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency \geq (%)	41.2
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	7.5e5
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
Section 3 Exposure Estimation	
3.1. Health	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
3.2. Environment	

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].

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.

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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 2.2.v1.

Exposure Scenario 4 (ES 4): Uses in Coatings – Industrial

Section 1 Exposure Scenario Title

Title

Uses in Coatings – Industrial

Use Descriptor

Sector(s) of Use	3
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Process Categories	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 14, 15
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Environmental Release Categories	4
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Specific Environmental Release Category	ESVOC 4.3a.v1
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Processes, tasks, activities covered

Covers the use in coatings (paints, inks, adhesives, etc) including exposures during use (including materials receipt, storage, preparation and transfer from bulk and semi-bulk, application by spray, roller, spreader, dip, flow, fluidised bed on production lines and film formation) and equipment cleaning, maintenance and associated laboratory activities.

Assessment Method

See Section 3.

Section 2	Operational conditions and risk management measures
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Section 2.1	Control of worker exposure
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Product characteristics

Physical form of product	Liquid, vapour pressure >10KPa at STP [OC5]
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Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
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Amounts used	No Limit
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Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
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Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
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	Assumes a good basic standard of occupational hygiene has been implemented [G1]
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Risk Management Measures

General exposures (closed systems) [CS15] PROC1	No specific measures identified[EI18]
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General exposures (closed systems) [CS15]with sample collection[CS56]Use in	No specific measures identified[EI18]
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contained systems[CS38] PROC2	
Film formation - force drying (50 - 100°C). Stoving (>100°C). UV/EB radiation curing[CS94]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC2	No specific measures identified[EI18]
Mixing operations (closed systems)[CS29]General exposures (closed systems) [CS15] PROC3	No specific measures identified[EI18]
Film formation - air drying[CS95] PROC4	No specific measures identified[EI18]
Film formation - air drying[CS95] PROC4	No specific measures identified[EI18]
Preparation of material for application[CS96]Mixing operations (open systems)[CS30] PROC5	No specific measures identified[EI18]
Preparation of material for application[CS96]Mixing operations (open systems)[CS30] PROC5	No specific measures identified[EI18]
Spraying (automatic/robotic)[CS97] PROC7	No specific measures identified[EI18]
Manual [CS34]. Spraying[CS10] PROC7	No specific measures identified[EI18]
Material transfers [CS3] PROC8a	No specific measures identified[EI18]
Material transfers [CS3] PROC8a	No specific measures identified[EI18]
Material transfers [CS3] PROC8b	No specific measures identified[EI18]
Roller, spreader, flow application[CS98] PROC10	No specific measures identified[EI18]
Dipping, immersion and pouring[CS4] PROC13	No specific measures identified[EI18]
Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
Material transfers [CS3]Drum/batch transfers [CS8]Transfer from/pouring from containers [CS22] PROC9	No specific measures identified[EI18]
Material transfers [CS3]Drum/batch transfers	No specific measures identified[EI18]

[CS8]Transfer from/pouring from containers [CS22] PROC9	
Production or preparation or articles by tableting, compression, extrusion or pelletisation[CS100] PROC14	No specific measures identified[EI18]
Production or preparation or articles by tableting, compression, extrusion or pelletisation[CS100] PROC14	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	6.0e-1
Fraction of Regional tonnage used locally	1
Annual site tonnage (tonnes/year)	6.0e-1
Maximum daily site tonnage (kg/day)	3.0e-1
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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)	0.98
Release fraction to wastewater from process (initial release prior to RMM)	7.0e-4
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment [TCR1b]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	

Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	2.1e5
Assumed domestic sewage treatment plant flow (m3/d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC SpERC 4.3a.v1.	
Exposure Scenario 5 (ES 5): Uses in Cleaning Agents – Industrial	
Section 1 Exposure Scenario Title	
Title	
Use in Cleaning Agents – Industrial	
Use Descriptor	
Sector(s) of Use	3
Process Categories	2, 3, 4, 7, 8a, 8b, 10, 13
Environmental Release Categories	4
Specific Environmental Release Category	ESVOC 4.4a.v1
Processes, tasks, activities covered	
Covers the use as a component of cleaning products including transfer from storage, pouring/unloading from drums or containers. Exposures during mixing/diluting in the preparatory phase and cleaning activities (including spraying, brushing, dipping, wiping, automated and by hand), related equipment cleaning and maintenance.	
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 >10KPa at STP [OC5]
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	
Bulk transfers[CS14] PROC8a	No specific measures identified[EI18]
Bulk transfers[CS14] PROC8a	No specific measures identified[EI18]
Automated process with (semi) closed systems.[CS93]Use in contained systems[CS38] PROC2	No specific measures identified[EI18]
Automated process with (semi) closed systems.[CS93]Use in contained systems[CS38] PROC2	No specific measures identified[EI18]
Automated process with (semi) closed systems.[CS93]Drum/batch transfers [CS8] PROC3	No specific measures identified[EI18]
Automated process with (semi) closed systems.[CS93]Drum/batch transfers [CS8] PROC3	No specific measures identified[EI18]
Application of cleaning products in closed systems [CS101] PROC2	No specific measures identified[EI18]
Application of cleaning products in closed systems [CS101] PROC2	No specific measures identified[EI18]
Filling / preparation of equipment from drums or containers.[CS45] PROC8b	No specific measures identified[EI18]
Filling / preparation of equipment from drums or containers.[CS45] PROC8b	No specific measures identified[EI18]
Use in contained batch processes [CS37] PROC4	No specific measures identified[EI18]
Use in contained batch processes [CS37] PROC4	No specific measures identified[EI18]
Degreasing small objects in cleaning station[CS41] PROC13	No specific measures identified[EI18]
Degreasing small objects in cleaning station[CS41] PROC13	No specific measures identified[EI18]
Cleaning with low-pressure washers[CS42] PROC10	No specific measures identified[EI18]

Cleaning with low-pressure washers[CS42] PROC10	No specific measures identified[EI18]
Cleaning with high pressure washers [CS44] PROC7	No specific measures identified[EI18]
Cleaning with high pressure washers [CS44] PROC7	No specific measures identified[EI18]
Manual[CS34]Surfaces[CS48]Cleaning[CS47]no spraying[CS60] PROC10	No specific measures identified[EI18]
Manual[CS34]Surfaces[CS48]Cleaning[CS47]no spraying[CS60] PROC10	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	4.3e0
Fraction of Regional tonnage used locally	1
Annual site tonnage (tonnes/year)	4.3e0
Maximum daily site tonnage (kg/day)	2.2e2
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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)	1.0
Release fraction to wastewater from process (initial release prior to RMM)	3.0e-6
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater [TCR1a]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	70
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency ≥ (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of ≥ (%)	0
Organisation measures to prevent/limit release from site	

Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	1.5e7
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 4.4a.v1.	
Exposure Scenario 6 (ES 6): Use as a Blowing Agent – Industrial	
Section 1 Exposure Scenario Title	
Title	
Use as a Blowing Agent – Industrial	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 3, 8b, 9, 12
Environmental Release Categories	4
Specific Environmental Release Category	ESVOC 4.9.v1
Processes, tasks, activities covered	

Use as a blowing agent for rigid and flexible foams, including material transfers, mixing and injection, curing, cutting, storage and packing.	
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 >10KPa at STP [OC5]
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	
Bulk transfers[CS14] PROC8b	No specific measures identified[EI18]
Mixing operations (closed systems)[CS29] PROC1	No specific measures identified[EI18]
Extrusion and expansion of polymer mass[CS122] PROC12	No specific measures identified[EI18]
Cutting and shaving[CS134] PROC12	No specific measures identified[EI18]
Collection and re-processing of shavings, cuttings, etc[CS123] PROC12	No specific measures identified[EI18]
Product packaging[CS124] PROC12	No specific measures identified[EI18]
Material storage[CS67] PROC12	No specific measures identified[EI18]
Mixing operations (closed systems)[CS29]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC3	No specific measures identified[EI18]
Intermediate polymer storage [CS66]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC3	No specific measures identified[EI18]
Centrifuging including discharging[CS127]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC3	No specific measures identified[EI18]
Drying and storage [CS12] PROC12	No specific measures identified[EI18]
Semi-bulk packaging[CS128] PROC8b	No specific measures identified[EI18]

Treatment by heating[CS129]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC12	No specific measures identified[EI18]
Drying and storage [CS12] PROC12	No specific measures identified[EI18]
Article formation in mould (re-wording of CS89?)[CS130]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC12	No specific measures identified[EI18]
Cutting by heated wire[CS131]Manual[CS34] PROC12	No specific measures identified[EI18]
Mixing operations (closed systems)[CS29] PROC3	No specific measures identified[EI18]
Drum and small package filling[CS6]Filling / preparation of equipment from drums or containers.[CS45] PROC9	No specific measures identified[EI18]
Foaming[CS132] PROC12	No specific measures identified[EI18]
Compression[CS133] PROC12	No specific measures identified[EI18]
Cutting by heated wire[CS131] PROC12	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	9.6e2
Fraction of Regional tonnage used locally	1
Annual site tonnage (tonnes/year)	9.6e2
Maximum daily site tonnage (kg/day)	4.8e4
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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)	1.0
Release fraction to wastewater from process (initial release prior to RMM)	3.0e-5
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment [TCR1b]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency \geq (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	5.0e6
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 4.9.v1.	

Exposure Scenario 7 (ES 7): Use as a Fuel – Professional	
Section 1 Exposure Scenario Title	
Title	
Use as a Fuel – Professional	
Use Descriptor	
Sector(s) of Use	22
Process Categories	1, 2, 3, 8a, 8b, 16
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	Specific Environmental Release Category
Processes, tasks, activities covered	
Covers the use as a fuel (or fuel additives and additive components) and includes 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 >10KPa at STP [OC5]
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	
Bulk transfers[CS14] PROC8b	No specific measures identified[EI18]
Drum/batch transfers [CS8] PROC8b	No specific measures identified[EI18]
General exposures (closed systems) [CS15]Use in contained batch processes [CS37] PROC1	No specific measures identified[EI18]
General exposures (closed systems) [CS15]Use in contained batch processes [CS37] PROC2	No specific measures identified[EI18]
General exposures (closed systems) [CS15]Use in contained batch processes [CS37] PROC3	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC1	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC2	No specific measures identified[EI18]
General exposures (closed systems) [CS15](closed systems)[CS107] PROC16	No specific measures identified[EI18]
General exposures (closed systems) [CS15](closed systems)[CS107] PROC3	No specific measures identified[EI18]

Equipment cleaning and maintenance[CS39] PROC8a	No specific measures identified[EI18]
Vessel and container cleaning[CS103] PROC8a	No specific measures identified[EI18]
Material storage[CS67] PROC1	No specific measures identified[EI18]
Material storage[CS67] PROC2	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	7.0e1
Fraction of Regional tonnage used locally	5.0e-4
Annual site tonnage (tonnes/year)	3.5e-2
Maximum daily site tonnage (kg/day)	9.6e-2
Frequency and duration of use	
Continuous release [FD2].	
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 process (initial release prior to RMM)	1.0e-2
Release fraction to wastewater from process (initial release prior to RMM)	0.00001
Release fraction to soil from process (initial release prior to RMM)	0.00001
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater [TCR1a]. No wastewater treatment required [TCR6].	
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 \geq (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1

Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	9.4e3
Assumed domestic sewage treatment plant flow (m^3/d)	2000
Conditions and measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2]. External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3]	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated. [ERW3]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 7.12a.v1.	
Exposure Scenario 8 (ES 8): Use as a Fuel - Consumer	
Section 1 Exposure Scenario Title	
Title	
Use as a Fuel – Consumer	
Use Descriptor	
Sector(s) of Use	21
Product Categories	13
Environmental Release Categories	9a, 9b
Specific Environmental Release Category	ESVOC 9.12c.v1
Processes, tasks, activities covered	
Covers consumer uses in fuels	
Assessment Method	
See Section 3.	
Section 2	Operational conditions and risk management measures
<i>Field for additional statements to explain scenario if required - pending better understanding from ECHA</i>	
Section 2.1	Control of consumer exposure

Product characteristics		
Physical form of product		liquid
Vapour pressure		300000
Concentration of substance in product		Unless otherwise stated, cover concentrations up to 100% [ConsOC1]
Amounts used		Unless otherwise stated, covers use amounts up to 37500g [ConsOC2]; covers skin contact area up to 420cm ² [ConsOC5]
Frequency and duration of use/exposure		Unless otherwise stated, covers use frequency up to 0.143 times per day [ConsOC4]; covers exposure up to 2 hours per event [ConsOC14]
Other Operational Conditions affecting exposure		Unless otherwise stated assumes use at ambient temperatures [ConsOC15]; assumes use in a 20 m ³ room [ConsOC11]; assumes use with typical ventilation [ConsOC8].
Section 2.1.1		
Product categories		
PC13:Fuels--Liquid - subcategories added: Automotive Refuelling	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 37500g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 0.05hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
PC13:Fuels--Liquid - subcategories added: Scooter Refuelling	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 3750g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
PC13:Fuels--Liquid - subcategories added: Garden Equipment - Use	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; for each use event, covers use amounts up to 750g [ConsOC2]; covers outdoor use [ConsOC12]; covers use in room size of 100m ³ [ConsOC11]; for each use event, covers exposure up to 2.00hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
PC13:Fuels--Liquid (subcategories added): Garden Equipment - Refueling	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 26 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 420.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 750g [ConsOC2]; Covers use in a one car garage (34m ³) under typical ventilation [ConsOC10]; covers use in room size of 34m ³ [ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated

PC13:Fuels--Liquid (subcategories added): Home space heater fuel	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 365 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 3000g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.03hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
PC13:Fuels--Liquid - subcategories added: Lamp oil	OC	Unless otherwise stated, covers concentrations up to 100% [ConsOC1]; covers use up to 52 days/year[ConsOC3]; covers use up to 1 time/on day of use[ConsOC4]; covers skin contact area up to 210.00 cm ² [ConsOC5]; for each use event, covers use amounts up to 100g [ConsOC2]; covers use under typical household ventilation [ConsOC8]; covers use in room size of 20m ³ [ConsOC11]; for each use event, covers exposure up to 0.01hr/event[ConsOC14];
	RMM	No specific RMMs developed beyond those OCs stated
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR		
Section 2.2 Control of environmental exposure		
Product characteristics		
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].		
Fraction of EU tonnage used in region		5.0e-4
Regional use tonnage (tonnes/year)		2.1e4
Fraction of Regional tonnage used locally		0.0005
Annual site tonnage (tonnes/year)		1.0e1
Maximum daily site tonnage (kg/day)		2.9e1
Frequency and duration of use		
Continuous release [FD2].		
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 process (initial release prior to RMM)		1.0e-2
Release fraction to wastewater from process (initial release prior to RMM)		0.00001
Release fraction to soil from process (initial release prior to RMM)		0.00001
Conditions and measures related to municipal sewage treatment plant		
Estimated substance removal from wastewater via domestic sewage treatment (%)		97.1
Maximum allowable site tonnage (M _{Safe}) based on release following total wastewater treatment removal (kg/d).		2.4e6
Assumed domestic sewage treatment plant flow (m ³ /d)		2000
Conditions and measures related to external treatment of waste for disposal		
Combustion emissions limited by required exhaust emission controls [ETW1]. Combustion emissions considered in regional exposure assessment [ETW2]. External treatment and disposal of waste should comply with applicable local and/or national regulations. [ETW3]		

Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of the substance is generated. [ERW3]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD. Where exposure determinants differ to these sources, then they are indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
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.	
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 [DSU1].	
Exposure Scenario 9 (ES 9): Use as Functional Fluids – Industrial	
Section 1 Exposure Scenario Title	
Title	
Use as Functional Fluids – Industrial	
Use Descriptor	
Sector(s) of Use	3
Process Categories	1, 2, 4, 8a, 8b, 9
Environmental Release Categories	7
Specific Environmental Release Category	ESVOC 7.13a.v1
Processes, tasks, activities covered	
Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers	
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 >10KPa at STP [OC5]
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	

Bulk transfers[CS14](closed systems)[CS107] PROC1	No specific measures identified[EI18]
Bulk transfers[CS14](closed systems)[CS107] PROC2	No specific measures identified[EI18]
Drum/batch transfers [CS8] PROC8b	No specific measures identified[EI18]
Filling of articles/equipment[CS84](closed systems)[CS107] PROC9	No specific measures identified[EI18]
Filling / preparation of equipment from drums or containers.[CS45] PROC8a	No specific measures identified[EI18]
General exposures (closed systems) [CS15] PROC2	No specific measures identified[EI18]
General exposures (open systems) [CS16] PROC4	No specific measures identified[EI18]
General exposures (open systems) [CS16]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC4	No specific measures identified[EI18]
General exposures (open systems) [CS16]Operation is carried out at elevated temperature (> then 20°C above ambient temperature)[OC7] PROC4	No specific measures identified[EI18]
Remanufacture of reject articles[CS19] PROC9	No specific measures identified[EI18]
Equipment maintenance [CS5] PROC8a	No specific measures identified[EI18]
Material storage[CS67] PROC1	No specific measures identified[EI18]
Material storage[CS67] PROC2	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	4.6e1
Fraction of Regional tonnage used locally	2.2e-1
Annual site tonnage (tonnes/year)	1.0e1
Maximum daily site tonnage (kg/day)	5.0e2
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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-2
Release fraction to wastewater from process (initial release prior to RMM)	3.0e-5
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater [TCR1a]. Prevent discharge of undissolved substance to or recover from onsite wastewater [TCR14]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency \geq (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	5.0e6
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal	

efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 7.13a.v1.

Exposure Scenario 10 (ES 10): Use as Functional Fluids – Professional

Section 1 Exposure Scenario Title

Title

Use as Functional Fluids – Professional

Use Descriptor

Sector(s) of Use | 22

Process Categories | 1, 2, 3, 8a, 9, 20

Environmental Release Categories | 9a, 9b

Specific Environmental Release Category | ESVOC 9.13b.v1

Processes, tasks, activities covered

Use as functional fluids e.g. cable oils, transfer oils, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers.

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 >10KPa at STP [OC5]

Concentration of substance in product | Covers percentage substance in the product up to 100% (unless stated differently) [G13]

Amounts used | No Limit

Frequency and duration of use | Covers daily exposures up to 8 hours (unless stated) [G2]

Other Operational Conditions affecting worker exposure | Assumes use at not > 20oC above ambient [G15]

Assumes a good basic standard of occupational hygiene has been implemented [G1]

Risk Management Measures

Drum/batch transfers [CS8] PROC8a | No specific measures identified[EI18]

Transfer from/pouring from containers [CS22] PROC9 | No specific measures identified[EI18]

Filling / preparation of equipment from drums or containers.[CS45] PROC9 | No specific measures identified[EI18]

General exposures (closed systems) [CS15] PROC1 | No specific measures identified[EI18]

General exposures (closed systems) [CS15] PROC2 | No specific measures identified[EI18]

General exposures (closed systems) [CS15] PROC3 | No specific measures identified[EI18]

General exposures (open systems) [CS16] PROC20 | No specific measures identified[EI18]

General exposures (open systems) [CS16] Operation is carried out at elevated temperature (> then 20°C | No specific measures identified[EI18]

above ambient temperature)[OC7] PROC20	
Remanufacture of reject articles[CS19] PROC9	No specific measures identified[EI18]
Equipment maintenance [CS5] PROC8a	No specific measures identified[EI18]
Material storage[CS67] PROC1	No specific measures identified[EI18]
Material storage[CS67] PROC2	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	2.3e1
Fraction of Regional tonnage used locally	5.0e-4
Annual site tonnage (tonnes/year)	1.1e-2
Maximum daily site tonnage (kg/day)	3.1e-2
Frequency and duration of use	
Continuous release [FD2].	
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 process (initial release prior to RMM)	0.05
Release fraction to wastewater from process (initial release prior to RMM)	0.025
Release fraction to soil from process (initial release prior to RMM)	0.025
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater [TCR1a]. No wastewater treatment required [TCR6].	
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 \geq (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	

Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	2.1e3
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 9.13b.v1.	
Exposure Scenario 11 (ES 11): Other Consumer Uses – Consumer	
Section 1 Exposure Scenario Title	
Title	
Other Consumer Uses – Consumer	
Use Descriptor	
Sector(s) of Use	21
Product Categories	28, 39
Environmental Release Categories	8a, 8d
Specific Environmental Release Category	ESVOC 8.16.v1
Processes, tasks, activities covered	
Consumer uses not covered in consumer examples listed above e.g. use as a carrier in cosmetics/personal care products, perfumes and fragrances. Note: For cosmetic and personal care products, risk assessment only required for the environment under REACH as human health is covered by alternative legislation.	
Assessment Method	
See Section 3.	

Section 2 Operational conditions and risk management measures	
Section 2.1 Control of consumer exposure	
Product characteristics	
Physical form of product	Liquid, vapour pressure >10KPa at STP [OC5]
Vapour pressure (kPa)	>10
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Frequency and duration of use/exposure	
Other Operational Conditions affecting exposure	
Product Category	Specific Risk Management Measures and Operating Conditions (only required controls to demonstrate safe use listed)
General measures (dermal irritants)	Not applicable
General measures (carcinogens)	Not applicable
PC28	Not applicable
PC39	Not applicable
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	1.0e1
Fraction of Regional tonnage used locally	0.0005
Annual site tonnage (tonnes/year)	5.0e-3
Maximum daily site tonnage (kg/day)	1.4e-2
Frequency and duration of use	
Continuous release [FD2].	
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 process (initial release prior to RMM)	0.95
Release fraction to wastewater from process (initial release prior to RMM)	0.025
Release fraction to soil from process (initial release prior to RMM)	0.025
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1.0
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	1.1e3
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	

Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate consumer exposures, consistent with the content of ECETOC Report #107 and the Chapter R15 of the IR&CSA TGD. Where exposure determinants differ to these sources, then they are indicated.	
3.2. Environment	
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
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.	
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 [DSU1].	
Exposure Scenario 12 (ES 12): Use in Laboratories – Industrial	
Section 1 Exposure Scenario Title	
Title	
Use in Laboratories – Industrial	
Use Descriptor	
Sector(s) of Use	3
Process Categories	10, 15
Environmental Release Categories	2, 4
Specific Environmental Release Category	<i>Not Applicable</i>
Processes, tasks, activities covered	
Use of the substance within laboratory settings, including material transfers and equipment cleaning	
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 >10KPa at STP [OC5]
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]
	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	

Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
Cleaning[CS47] PROC10	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	5.0e0
Fraction of Regional tonnage used locally	4.0e-1
Annual site tonnage (tonnes/year)	2.0e0
Maximum daily site tonnage (kg/day)	1.0e2
Frequency and duration of use	
Continuous release [FD2].	
Emission days (days/year)	20
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)	0.025
Release fraction to wastewater from process (initial release prior to RMM)	0.02
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment [TCR1b]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency \geq (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	7.5e3
Assumed domestic sewage treatment plant flow (m ³ /d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
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 [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3].	
Exposure Scenario 13 (ES 13): Use in Laboratories – Professional	
Section 1 Exposure Scenario Title	
Title	
Use in Laboratories – Professional	
Use Descriptor	
Sector(s) of Use	22
Process Categories	10, 15
Environmental Release Categories	8a
Specific Environmental Release Category	ESVOC 8.17.v1
Processes, tasks, activities covered	
Use of the substance within laboratory settings, including material transfers and equipment cleaning	
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 >10KPa at STP [OC5]
Concentration of substance in product	Covers percentage substance in the product up to 100% (unless stated differently) [G13]
Amounts used	No Limit
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated) [G2]
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]

	Assumes a good basic standard of occupational hygiene has been implemented [G1]
Risk Management Measures	
Laboratory activities [CS36] PROC15	No specific measures identified[EI18]
Cleaning[CS47] PROC10	No specific measures identified[EI18]
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Appendices 1 to 3 CSR	
Section 2.2 Control of environmental exposure	
Product characteristics	
Substance is isomeric mixture [PrC2].Predominantly hydrophobic [PrC4a].	
Amounts used	
Fraction of EU tonnage used in region	0.1
Regional use tonnage (tonnes/year)	5.0e-1
Fraction of Regional tonnage used locally	5.0e-4
Annual site tonnage (tonnes/year)	2.5e-4
Maximum daily site tonnage (kg/day)	6.9e-4
Frequency and duration of use	
Continuous release [FD2].	
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 process (initial release prior to RMM)	0.5
Release fraction to wastewater from process (initial release prior to RMM)	0.5
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 [TCS1].	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater [TCR1a]. No wastewater treatment required [TCR6].	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency \geq (%)	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of \geq (%)	0
Organisation measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils [OMS2]. Sludge should be incinerated, contained or reclaimed [OMS3].	
Conditions and measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	97.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.1
Maximum allowable site tonnage (M_{Safe}) based on release following total wastewater treatment removal (kg/d).	5.6e1

Assumed domestic sewage treatment plant flow (m3/d)	2000
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. [ETW3]	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or national regulations. [ERW1]	
Additional information on the basis for the allocation of the identified OCs and RMMs is contained in Petrorisk file in IUCLID section 13 – “LocalCSR” worksheet.	
Section 3 Exposure Estimation	
3.1. Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.	
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The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model [EE2].	
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.	
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 [DSU1]. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination [DSU2]. Required removal efficiency for air can be achieved using onsite technologies, either alone or in combination [DSU3]. Further details on scaling and control technologies are provided in factsheet for ESVOC 8.17.v1.	

END OF SAFETY DATA SHEET