

SAFETY DATA SHEET

According to EC No 1907/2006 as amended as at the date of this SDS

Shell Fuel Olie 45 0 50 % S

Version 4.0

Revision Date 16.09.2020

Print Date 17.09.2020

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

1.1 Product identifier

Trade name : Shell Fuel Olie 45 0 50 % S
Product code : 002C0138
Registration number : 01-2119474894-22-0045
CAS-No. : 68476-33-5

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

Use of the Substance/Mixture : Please refer to Ch16 for the registered uses under REACH.
Uses advised against : This product must not be used in applications other than those listed in Section 1 without first seeking the advice of the supplier.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier : **A/S Dansk Shell**
Egeskovvej 265
DK-7000 Fredericia
Telephone : (+45) 79203522
Telefax : (+45) 79203544
Email Contact for Safety Data Sheet : If you have any enquiries about the content of this SDS please email fuelSDS@shell.com

1.4 Emergency telephone number : Giftlinjen +45 8212 12 12

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

| | |
|--|--|
| Acute toxicity, Category 4, Inhalation | H332: Harmful if inhaled. |
| Reproductive toxicity, Category 2 | H361: Suspected of damaging fertility or the unborn child. |
| Carcinogenicity, Category 1B | H350: May cause cancer. |
| Specific target organ toxicity - repeated exposure, Category 2, Blood, Liver, thymus | H373: May cause damage to organs through prolonged or repeated exposure. |
| Short-term (acute) aquatic hazard, Category 1 | H400: Very toxic to aquatic life. |
| Long-term (chronic) aquatic hazard, Category 1 | H410: Very toxic to aquatic life with long lasting effects. |
| Supplemental Hazard Statements | EUH066: Repeated exposure may cause skin |

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dryness or cracking.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

| | | |
|--------------------------------|---|---|
| Hazard pictograms | : |  |
| Signal word | : | Danger |
| Hazard statements | : | <p>PHYSICAL HAZARDS: Not classified as a physical hazard according to CLP criteria.</p> <p>HEALTH HAZARDS: H332 Harmful if inhaled. H361 Suspected of damaging fertility or the unborn child. H350 May cause cancer. H373 May cause damage to organs (Blood, Liver, thymus) through prolonged or repeated exposure.</p> <p>ENVIRONMENTAL HAZARDS: H410 Very toxic to aquatic life with long lasting effects.</p> |
| Supplemental Hazard Statements | : | EUH066 Repeated exposure may cause skin dryness or cracking. |
| Precautionary statements | : | <p>Prevention: P201 Obtain special instructions before use. P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray. P273 Avoid release to the environment. P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.</p> <p>Response: P308 + P313 IF exposed or concerned: Get medical advice/ attention.</p> <p>Storage: No precautionary phrases.</p> <p>Disposal: P501 Dispose of contents/ container to an approved waste disposal plant.</p> |

2.3 Other hazards

The substance does not meet the criteria for PBT or vPvB in accordance with Annex XIII.
Hydrogen sulphide is highly toxic and may be fatal if inhaled.

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Hydrogen sulphide (H₂S), an extremely flammable and toxic gas, and other hazardous vapours may evolve and collect in the headspace of storage tanks, transport vessels and other enclosed containers.

May dull the sense of smell, so do not rely on odour as an indication of hazard.

May ignite on surfaces at temperatures above auto-ignition temperature.

This material is a static accumulator.

Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.

Not classified as flammable but will burn.

Flammable vapours may be present even at temperatures below the flash point.

Therefore it should be treated as a potentially flammable liquid.

Contact with hot material can cause thermal burns which may result in permanent skin damage.

SECTION 3: Composition/information on ingredients

3.1 Substances

Hazardous components

| Chemical name | CAS-No. EC-No. | Concentration (% w/w) |
|--------------------|-------------------------|-----------------------|
| fuel oil, residual | 68476-33-5 270-675-6 | 100 |

Contains hydrogen sulphide, CAS # 7783-06-4.

Residues and their blends with distillates can be used as heavy fuel oils and need to be heated for use.

SECTION 4: First aid measures

4.1 Description of first aid measures

- General advice : Vapourisation of H₂S that has been trapped in clothing can be dangerous to rescuers. Maintain respiratory protection to avoid contamination from the victim to rescuer. Mechanical ventilation should be used to resuscitate if at all possible.
- Protection of first-aiders : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.
- If inhaled : Call emergency number for your location / facility.
Remove to fresh air.
Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardiopulmonary Resuscitation (CPR) as required and transport to the nearest medical facility.
Casualties suffering ill effects as a result of exposure to hydrogen sulphide should be removed to fresh air.
If inhalation of mists, fumes or vapour causes irritation to the

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nose or throat, remove to fresh air.

Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.

In case of skin contact

- : Cold product -
Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available.
If persistent irritation occurs, obtain medical attention.
- Hot product -
If contact with hot product, immediately cool the burn area by flushing with large amounts of water for at least 15 minutes.
Do not attempt to remove anything from the burn area.
Do not apply burn creams or ointments.
Cover the burn area loosely with a sterile dressing, if available.
Transport to the nearest medical facility for additional treatment.
All burns should receive medical attention.

In case of eye contact

- : Cold product -
Flush eye with copious quantities of water.
Remove contact lenses, if present and easy to do. Continue rinsing.
If persistent irritation occurs, obtain medical attention.
- Hot product -
If contact with hot product, immediately cool the burn area by flushing with large amounts of water.
Do not attempt to remove anything from the burn area.
Do not apply burn creams or ointments.
Remove contact lenses, if present and easy to do. Continue rinsing.
Cover the burn area loosely with a sterile dressing, if available.
Transport to the nearest medical facility for additional treatment.
All burns should receive medical attention.

Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.

If swallowed

- : In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms

- : Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Skin irritation signs and symptoms may include a burning sensation, redness, or swelling.

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Defatting dermatitis signs and symptoms may include a burning sensation and/or a dried/cracked appearance.
Hot product - Contact with the skin can cause severe burns, redness, swelling, blisters and/or tissue damage.
Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.
Hot product - Contact with the eye can cause severe burns, redness, swelling, blurred vision, and may result in permanent loss of vision.
Ingestion may result in nausea, vomiting and/or diarrhoea.
Liver damage may be indicated by loss of appetite, jaundice (yellowish skin and eye colour), fatigue, bleeding or easy bruising and sometimes pain and swelling in the upper right abdomen.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!
Call a doctor or poison control center for guidance.
Treat symptomatically.
Hydrogen sulphide (H₂S) - CNS asphyxiant. May cause rhinitis, bronchitis and occasionally pulmonary oedema after severe exposure. CONSIDER: Oxygen therapy. Consult a Poison Control Center for guidance.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media : Do not use direct water jets on the burning product as they could cause a steam explosion and spread of 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

Specific hazards during firefighting : Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Oxides of nitrogen Oxides of sulphur. Unidentified organic and inorganic compounds. Flammable vapours may be present even at temperatures below the flash point. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Sinks in fresh water, floats on sea water and may be reignited on surface water. Hydrogen sulphide (H₂S) and toxic sulphur oxides may be given off when this material is heated. Do not depend on sense of smell for warning. Carbon monoxide may be evolved if incomplete combustion occurs.

5.3 Advice for firefighters

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- Special protective equipment for firefighters : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).
- Specific extinguishing methods : Use water spray to cool unopened containers.
- Further information : Keep adjacent containers cool by spraying with water. If possible remove containers from the danger zone. If the fire cannot be extinguished the only course of action is to evacuate immediately. Contain residual material at affected sites to prevent material from entering drains (sewers), ditches, and waterways.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Personal precautions : 6.1.1 For non emergency personnel:
Do not breathe fumes, vapour.
Do not operate electrical equipment.
6.1.2 For emergency responders:
Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area and evacuate all personnel. Attempt to disperse the gas or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Monitor area with combustible gas meter.
May ignite on surfaces at temperatures above auto-ignition temperature.

6.2 Environmental precautions

- Environmental precautions : Take measures to minimise the effects on groundwater. Contain residual material at affected sites to prevent material from entering drains (sewers), ditches, and waterways. Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.3 Methods and materials for containment and cleaning up

- Methods for cleaning up : Take precautionary measures against static discharges. For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an

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appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

For large liquid spills (> 1 drum), 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.

Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.

Observe all relevant local and international regulations.

Remove contaminated clothing.

Evacuate the area of all non-essential personnel.

Avoid contact with skin, eyes and clothing.

Ventilate contaminated area thoroughly.

6.4 Reference to other sections

For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet., Notify authorities if any exposure to the general public or the environment occurs or is likely to occur., For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet., Local authorities should be advised if significant spillages cannot be contained., Maritime spillages should be dealt with using a Shipboard Oil Pollution Emergency Plan (SOPEP), as required by MARPOL Annex 1 Regulation 26.

SECTION 7: Handling and storage

General Precautions : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Prevent spillages.
Contaminated leather articles including shoes cannot be decontaminated and should be destroyed to prevent reuse.
Ensure that all local regulations regarding handling and storage facilities are followed.

Maintenance and Fuelling Activities - Avoid inhalation of vapours and contact with skin.

7.1 Precautions for safe handling

Advice on safe handling : Ensure that all local regulations regarding handling and storage facilities are followed.
The inherent toxic and olfactory (sense of smell) fatiguing properties of hydrogen sulphide require that air monitoring alarms be used if concentrations are expected to reach harmful levels such as in enclosed spaces, heated transport vessels and spill or leak situations. If the air concentration

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exceeds 10 ppm, the area should be evacuated unless respiratory protection is in use.
Avoid prolonged or repeated contact with skin.
When using do not eat or drink.
Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks.
Earth all equipment.
Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols.
Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges.
These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements.
These activities may lead to static discharge e.g. spark formation.
Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling.

Product Transfer : Avoid splash filling Wait 2 minutes after tank filling (for tanks such as those on road tanker vehicles) before opening hatches or manholes. Wait 30 minutes after tank filling (for large storage tanks) before opening hatches or manholes. Keep containers closed when not in use. Refer to guidance under Handling section.

Fire-fighting class : Fire hazard classification:

III-1

7.2 Conditions for safe storage, including any incompatibilities

Other data : Drum and small container storage: Drums should be stacked to a maximum of 3 high. Use properly labeled and closable containers. Prevent ingress of water. Tank storage: Tanks must be specifically designed for use with this product. Bulk storage tanks should be diked (bunded). Locate tanks away from heat and other sources of ignition. Tanks should be fitted with heating coils. Ensure heating coils are always covered with product (minimum 15 cm). Electrostatic charges will be generated during pumping. Electrostatic discharge may cause

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fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk. The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable. Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.

Packaging material : Suitable material: For containers, or container linings use mild steel, stainless steel., Aluminium may also be used for applications where it does not present an unnecessary fire hazard., Examples of suitable materials are: high density polyethylene (HDPE) and Viton (FKM), which have been specifically tested for compatibility with this product., For container linings, use amine-adduct cured epoxy paint., For seals and gaskets use: graphite, PTFE, Viton A, Viton B. Unsuitable material: Some synthetic materials may be unsuitable for containers or container linings depending on the material specification and intended use. Examples of materials to avoid are: natural rubber (NR), nitrile rubber (NBR), ethylene propylene rubber (EPDM), polymethyl methacrylate (PMMA), polystyrene, polyvinyl chloride (PVC), polyisobutylene., However, some may be suitable for glove materials.

Container Advice : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.

7.3 Specific end use(s)

Specific use(s) : Please refer to Ch16 and/or the annexes for the registered uses under REACH.

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance
Consult the technical guidelines for the use of this substance/mixture.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

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| Components | CAS-No. | Value type (Form of exposure) | Control parameters | Basis |
|---------------------|---|-------------------------------|--------------------------------|--|
| Hydrogen sulfide | 7783-06-4 | GV | 5 ppm 7 mg/m ³ | Denmark. Occupational Exposure Limits |
| Hydrogen sulfide | 7783-06-4 | TWA | 5 ppm 7 mg/m ³ | 2009/161/EU |
| Further information | Indicative | | | |
| Hydrogen sulfide | 7783-06-4 | STEL | 10 ppm 14 mg/m ³ | 2009/161/EU |
| Further information | Indicative | | | |
| Hydrogen sulfide | 7783-06-4 | TWA | 5 ppm 7 mg/m ³ | 2009/161/EU |
| Further information | This value is for information where there is no national limit value available. | | | |
| Hydrogen sulfide | 7783-06-4 | STEL | 10 ppm 14 mg/m ³ | 2009/161/EU |
| Further information | This value is for information where there is no national limit value available. | | | |
| Hydrogen sulfide | 7783-06-4 | TWA | 1 ppm | ACGIH |
| Further information | Central Nervous System impairment, Upper Respiratory Tract irritation | | | |
| Hydrogen sulfide | 7783-06-4 | STEL | 5 ppm | ACGIH |
| Further information | Central Nervous System impairment, Upper Respiratory Tract irritation | | | |

Biological occupational exposure limits

No biological limit allocated.

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Fuel oil, residual; Heavy Fuel oil : End Use: Workers
Exposure routes: Dermal
Exposure time: 8 h
Value: 0,065 mg/kg long term, systemic effects

End Use: Workers
Exposure routes: Inhalation
Value: 0,12 mg/m³/8h (aerosol) long term, systemic effects

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance is a hydrocarbon with a complex, unknown or variable composition. Conventional methods of deriving PNECs are not appropriate and it is not possible to identify a single

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representative PNEC for such substances.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.

Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.

Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods <http://www.cdc.gov/niosh/>

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods <http://www.osha.gov/>

Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances <http://www.hse.gov.uk/>

Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany <http://www.dguv.de/inhalt/index.jsp>

L'Institut National de Recherche et de Sécurité, (INRS), France <http://www.inrs.fr/accueil>

8.2 Exposure controls

Engineering measures Read in conjunction with the Exposure Scenario for your specific use contained in the Annex.

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:

Use sealed systems as far as possible.

Firewater monitors and deluge systems are recommended.

Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.

Local exhaust ventilation is recommended.

Eye washes and showers for emergency use.

General Information:

Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

Do not ingest. If swallowed, then seek immediate medical assistance.

Personal protective equipment

Read in conjunction with the Exposure Scenario for your specific use contained in the Annex.

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

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The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards.

Eye protection : If material is handled such that it could be splashed into eyes, protective eyewear is recommended. Wear safety glasses and face shield (preferably with a chin guard) if splashes are likely to occur.

Approved to EU Standard EN166.

Hand protection

Remarks : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. When prolonged or frequent repeated contact occurs, Nitrile gloves may be suitable. (Breakthrough time of > 240 minutes.) For incidental contact/splash protection Neoprene, PVC gloves may be suitable. When handling heated product wear heat resistant gloves.

For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Glove thickness should be typically greater than 0.35 mm depending on the glove make and model.

Skin and body protection : Wear chemical and heat resistant gloves and boots. Where risk of splashing, also wear an apron.

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Respiratory protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.

Select a filter suitable for organic gases and vapours [Type A boiling point > 65°C (149°F)] meeting EN14387.

In areas where hydrogen sulphide vapours may accumulate, a positive-pressure air-supplied respirator is advised.

Thermal hazards : When handling heated product, wear heat resistant gloves, safety hat with chin strap, face shield (preferably with a chin guard), safety glasses, heat resistant coveralls (with cuffs over gloves and legs over boots), neck protection and heavy duty boots, e.g. leather for heat resistance.

Hygiene measures : Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

Environmental exposure controls

General advice : Read in conjunction with the Exposure Scenario for your specific use contained in the Annex. Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour. Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6. Take appropriate measures to fulfil the requirements of relevant environmental protection legislation. Avoid contamination of the environment by following advice given in Section 6. If necessary, prevent undissolved material from being discharged to waste water. Waste water should be treated in a municipal or industrial waste water treatment plant

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before discharge to surface water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

| | |
|---|---|
| Appearance | : liquid |
| Colour | : Brown to black |
| Odour | : Hydrocarbon |
| Odour Threshold | : Data not available |
| pH | : Not applicable |
| Freezing point | : Data not available |
| Initial boiling point and boiling range | : Typical 150 - 400 °C |
| Flash point | : ≥ 65 °C |
| Evaporation rate | : Data not available |
| Flammability (solid, gas) | : Not applicable |
| Upper explosion limit | : Typical 5 %(V) Typical 5 %(V) |
| Lower explosion limit | : Typical 0,5 %(V) |
| Vapour pressure | : $\leq 0,4$ kPa (38,0 °C) Method: Unspecified |
| Relative vapour density | : Data not available |
| Relative density | : Data not available |
| Density | : 900 - 998 kg/m ³ (15,0 °C) |
| Solubility(ies) | |
| Water solubility | : negligible |
| Solubility in other solvents | : Data not available |
| Partition coefficient: n-octanol/water | : log Pow: ca. 2 - 20 |
| Auto-ignition temperature | : > 250 °C |
| Decomposition temperature | : Data not available |

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Viscosity

Viscosity, kinematic : 134 - 188 mm²/s (50 °C)

Explosive properties : Classification Code: Not classified.

Oxidizing properties : Not applicable

9.2 Other information

Conductivity : Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semiconductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid

SECTION 10: Stability and reactivity

10.1 Reactivity

Stable under recommended storage conditions.

10.2 Chemical stability

Stable under normal conditions of use.

10.3 Possibility of hazardous reactions

Hazardous reactions : No hazardous reaction is expected when handled and stored according to provisions

10.4 Conditions to avoid

Conditions to avoid : Avoid heat, sparks, open flames and other ignition sources.

In certain circumstances product can ignite due to static electricity.

10.5 Incompatible materials

Materials to avoid : Strong oxidising agents.

10.6 Hazardous decomposition products

Hazardous decomposition products : Hazardous decomposition products are not expected to form during normal storage.
Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides

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and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.
Hydrogen sulphide.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

- Basis for assessment : Information given is based on product data, a knowledge of the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
- Information on likely routes of exposure : Skin and eye contact are the primary routes of exposure although exposure may occur through inhalation or following accidental ingestion.

Acute toxicity

Product:

- Acute oral toxicity : LD50 Oral Rat: > 5.000 mg/kg
Remarks: Low toxicity:
- Acute inhalation toxicity : LC 50 Rat: >1 - <=5 mg/l
Exposure time: 4 h
Remarks: Harmful if inhaled.
- Acute dermal toxicity : LD 50 Rabbit: > 2.000 mg/kg
Remarks: Low toxicity:

Skin corrosion/irritation

Product:

Remarks: Prolonged/repeated contact may cause defatting of the skin which can lead to dermatitis., Contact with hot material can cause thermal burns which may result in permanent skin damage., Slightly irritating to skin., Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation

Product:

Remarks: Hot product may cause severe eye burns and/or blindness., Slightly irritating to the eye., Based on available data, the classification criteria are not met.

Remarks: Irritating to eyes. (Hydrogen Sulfide)

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Remarks: Irritating to eyes. (Hydrogen Sulfide)

Respiratory or skin sensitisation

Product:

Test Method: Respiratory sensitisation

Remarks: Not a sensitiser., Based on available data, the classification criteria are not met.

Test Method: Skin sensitisation

Remarks: Not a skin sensitiser., Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Product:

: Remarks: Positive in in-vitro, but negative in in-vivo mutagenicity assays.

Carcinogenicity

Product:

Remarks: Causes cancer in laboratory animals.

| Material | GHS/CLP Carcinogenicity Classification |
|--------------------|--|
| fuel oil, residual | Carcinogenicity Category 1B |

Reproductive toxicity

Product:

: Remarks: Causes foetotoxicity at doses which are maternally toxic.

STOT - single exposure

Product:

Remarks: Inhalation of vapours or mists cause irritation to the respiratory system. (Hydrogen Sulfide)

STOT - repeated exposure

Product:

Remarks: May cause damage to organs or organ systems through prolonged or repeated

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exposure.

Target Organs: Blood, Liver, thymus

Aspiration toxicity

Product:

Not an aspiration hazard.

Further information

Product:

Remarks: H₂S has a broad range of effects dependent on the airborne concentration and length of exposure: 0.02 ppm odour threshold, smell of rotten eggs; 10 ppm eye and respiratory tract irritation; 100 ppm coughing, headache, dizziness, nausea, eye irritation, loss of sense of smell in minutes; 200 ppm potential for pulmonary oedema after >20-30 minutes; 500 ppm loss of consciousness after short exposures, potential for respiratory arrest; >1000ppm immediate loss of consciousness, may lead rapidly to death, prompt cardiopulmonary resuscitation may be required. Do not depend on sense of smell for warning. H₂S causes rapid olfactory fatigue (deadens sense of smell). There is no evidence that H₂S will accumulate in the body tissue after repeated exposure., Classifications by other authorities under varying regulatory frameworks may exist.

Summary on evaluation of the CMR properties

Germ cell mutagenicity- Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Carcinogenicity - Assessment : Category 1B

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

SECTION 12: Ecological information

12.1 Toxicity

Basis for assessment : Fuels are typically made from blending several refinery streams. Ecotoxicological studies have been carried out on a variety of hydrocarbon blends and streams but not those containing additives.
Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Product:

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| | | |
|---|---|---|
| Toxicity to fish (Acute toxicity) | : | Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l |
| Toxicity to crustacean (Acute toxicity) | : | Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l |
| Toxicity to algae/aquatic plants (Acute toxicity) | : | Remarks: Very toxic. LL/EL/IL50 < 1 mg/l |
| Toxicity to fish (Chronic toxicity) | : | Remarks: NOEC/NOEL > 0.01 - <=0.1 mg/l |
| Toxicity to crustacean (Chronic toxicity) | : | Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l |
| Toxicity to microorganisms (Acute toxicity) | : | Remarks: LL/EL/IL50 > 100 mg/l Practically non toxic: Based on available data, the classification criteria are not met. |

12.2 Persistence and degradability

Product:

| | | |
|------------------|---|--|
| Biodegradability | : | Remarks: The volatile constituents will oxidize rapidly by photochemical reactions in air., Major constituents are inherently biodegradable. |
|------------------|---|--|

12.3 Bioaccumulative potential

Product:

| | | |
|--|---|---|
| Bioaccumulation | : | Remarks: Contains constituents with the potential to bioaccumulate. |
| Partition coefficient: n-octanol/water | : | log Pow: ca. 2 - 20 |

12.4 Mobility in soil

Product:

| | | |
|----------|---|--|
| Mobility | : | Remarks: Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day., Large volumes may penetrate soil and could contaminate groundwater., Contains volatile components., May float or sink in water. |
|----------|---|--|

12.5 Results of PBT and vPvB assessment

Product:

| | | |
|------------|---|---|
| Assessment | : | The substance does not meet the criteria for PBT or vPvB in accordance with Annex XIII. |
|------------|---|---|

12.6 Other adverse effects

Product:

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Additional ecological information : Films formed on water may affect oxygen transfer and damage organisms.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Recover or recycle if possible.
It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.
Do not dispose into the environment, in drains or in water courses
Do not dispose of tank water bottoms by allowing them to drain into the ground.
Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

Contaminated packaging : Send to drum recoverer or metal reclaimer.
Drain container thoroughly.
After draining, vent in a safe place away from sparks and fire.
Residues may cause an explosion hazard if heated above the flash point. Do not puncture, cut or weld uncleaned drums.
Do not pollute the soil, water or environment with the waste container.
Comply with any local recovery or waste disposal regulations.

Local legislation

Remarks : EU Waste Disposal Code (EWC):
13 07 01 fuel oil and diesel.
The number given to waste is associated with the appropriate usage. The user must decide if their particular use results in another waste code being assigned.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.
Local regulations may be more stringent than regional or national requirements and must be complied with.

By dispose to Kommunekemi state the chemical waste group.
C.

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SECTION 14: Transport information

14.1 UN number

ADR : 3082
RID : 3082
IMDG : 3082
IATA : 3082

14.2 Proper shipping name

ADR : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Fuel oil, residual, Heavy fuel oil)
RID : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Fuel oil, residual, Heavy fuel oil)
IMDG : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Fuel oil, residual, Heavy fuel oil)
IATA : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(Fuel oil, residual, Heavy fuel oil)

14.3 Transport hazard class

ADR : 9
RID : 9
IMDG : 9
IATA : 9

14.4 Packing group

ADR
Packing group : III
Classification Code : M6
Hazard Identification Number : 90
Labels : 9
RID
Packing group : III
Classification Code : M6
Hazard Identification Number : 90
Labels : 9
IMDG
Packing group : III
Labels : 9
IATA
Packing group : III
Labels : 9

14.5 Environmental hazards

ADR
Environmentally hazardous : yes
RID

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Environmentally hazardous : yes

IMDG

Marine pollutant : yes

14.6 Special precautions for user

Remarks : Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

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

Not applicable for product as supplied. MARPOL Annex 1 rules apply for bulk shipments by sea.

SECTION 15: Regulatory information

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

Product Registration number : 1806883

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

34d

Petroleum products: (a) gasolines and naphthas, (b) kerosenes (including jet fuels), (c) gas oils (including diesel fuels, home heating oils and gas oil blending streams),(d) heavy fuel oils (e) alternative fuels serving the same purposes and with similar properties as regards flammability and environmental hazards as the products referred to in points (a) to (d)

Other regulations : The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Contains component(s) which are restricted for use with young people.

Contains component(s) which may potentially endanger the health of pregnant woman and the unborn child.

Product is subject to Risk Executive Order (BEK nr 372) based on Seveso III directive (2012/18/EU).

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), annex XIV.

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), annex XVII.

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens or mutagens at work

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and its amendments.
Directive 1994/33/EC on the protection of young people at work and its amendments.
Council Directive 92/85/EEC on the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding and its amendments.

The components of this product are reported in the following inventories:

EINECS : All components listed.

15.2 Chemical safety assessment

A Chemical Safety Assessment was performed for this substance.

SECTION 16: Other information

Full text of other abbreviations

| | |
|-----------------|--|
| Acute Tox. | Acute toxicity |
| Aquatic Acute | Short-term (acute) aquatic hazard |
| Aquatic Chronic | Long-term (chronic) aquatic hazard |
| Carc. | Carcinogenicity |
| Repr. | Reproductive toxicity |
| STOT RE | Specific target organ toxicity - repeated exposure |

Abbreviations and Acronyms : The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut für Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and

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Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HP V = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

Further information

Training advice :

Provide adequate information, instruction and training for operators.

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Other information : This product is intended for use in closed systems only.

The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

A vertical bar (|) in the left margin indicates an amendment from the previous version.

Due to a change in detail in Section 15, this document has been released as a significant change.

Sources of key data used to compile the Safety Data Sheet :

The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

Identified Uses according to the Use Descriptor System

Uses - Worker

Title : Manufacture of substance- Industrial

Uses - Worker

Title : Use as an intermediate- Industrial

Uses - Worker

Title : Distribution of substance- Industrial

Uses - Worker

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

Uses - Worker

Title : Use as a fuel- Industrial

Uses - Worker

Title : Use as a fuel- Professional

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

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Exposure Scenario - Worker

| | |
|-------------------------|---|
| 30000000022 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Manufacture of substance- Industrial |
| Use Descriptor | <p>Sector of Use: SU3, SU8, SU9</p> <p>Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15</p> <p>Environmental Release Categories: ERC1, ERC4, ESVOC SpERC 1.1.v1</p> |
| Scope of process | Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). |

| | |
|------------------|--|
| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|------------------|--|

| | |
|--|--|
| Section 2.1 | Control of Worker Exposure |
| Product Characteristics | |
| Physical form of product | Liquid, vapour pressure < 0.5 kPa at STP |
| Concentration of the Substance in Mixture/Article | Covers use of substance/product up to 100% (unless stated differently)., |
| Frequency and Duration of Use | |
| Covers daily exposures up to 8 hours (unless stated differently). | |
| Other Operational Conditions affecting Exposure | |
| Operation is carried out at elevated temperature (> 20°C above ambient temperature). Assumes a good basic standard of occupational hygiene is implemented. | |

| | |
|---------------------------------|---|
| Contributing Scenarios | Risk Management Measures |
| General measures (carcinogens). | <p>Consider technical advances and process upgrades (including automation) for the elimination of releases.</p> <p>Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> |

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| | |
|------------------------------------|---|
| | Consider the need for risk based health surveillance. |
| General exposures (closed systems) | Handle substance within a closed system. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Process samplingOutdoor | Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Laboratory activities | Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Wear suitable gloves tested to EN374. |
| Marine vessel/barge (un)loading. | Avoid carrying out activities involving exposure for more than 4 hours Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Road tanker/rail car loading. | Ensure material transfers are under containment or extract ventilation. , or: Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Equipment cleaning and maintenance | Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. |
| Bulk product storage | Store substance within a closed system. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |

| | |
|--|--|
| Section 2.2 | Control of Environmental Exposure |
| Substance is complex UVCB. | |
| Predominantly hydrophobic. | |
| Amounts Used | |
| Fraction of EU tonnage used in region: | 0,1 |

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| | |
|---|---------|
| Regional use tonnage (tonnes/year): | 1,1E+07 |
| Fraction of Regional tonnage used locally: | 5,2E-02 |
| Annual site tonnage (tonnes/year): | 6,0E+05 |
| Maximum daily site tonnage (kg/day): | 2,0E+06 |
| Frequency and Duration of Use | |
| Continuous release. | |
| Emission Days (days/year): | 300 |
| Environmental factors not influenced by risk management | |
| Local freshwater dilution factor: | 10 |
| Local marine water dilution factor: | 100 |
| Other Operational Conditions affecting Environmental Exposure | |
| Release fraction to air from process (initial release prior to RMM): | 1,0E-04 |
| Release fraction to wastewater from process (initial release prior to RMM): | 3,0E-06 |
| Release fraction to soil from process (initial release prior to RMM): | 1,0E-04 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process release estimates used. | |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | |
| Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. | |
| Treat air emission to provide a typical removal efficiency of (%) | 90 |
| Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%) | 85,9 |
| If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%) | 0,0 |
| Organisational measures to prevent/limit release from site | |
| Do not apply industrial sludge to natural soils. | |
| Sludge should be incinerated, contained or reclaimed. | |
| Conditions and Measures related to municipal sewage treatment plant | |
| Estimated substance removal from wastewater via domestic sewage treatment (%) | 88,8 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 2,3E+06 |
| Assumed domestic sewage treatment plant flow (m3/d) | 10.000 |
| Conditions and Measures related to external treatment of waste for disposal | |
| During manufacturing no waste of the substance is generated. | |
| Conditions and measures related to external recovery of waste | |
| During manufacturing no waste of the substance is generated. | |

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| SECTION 3 | EXPOSURE ESTIMATION |
|---|----------------------------|
| Section 3.1 - Health | |
| The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. | |

| | |
|--|--|
| Section 3.2 -Environment | |
| The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model. | |

| SECTION 4 | GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO |
|---|--|
| Section 4.1 - Health | |
| Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation. | |

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

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Exposure Scenario - Worker

| | |
|-------------------------|--|
| 30000000023 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use as an intermediate- Industrial |
| Use Descriptor | <p>Sector of Use: SU3, SU8, SU9</p> <p>Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15</p> <p>Environmental Release Categories: ERC6a, ESVOC SpERC 6.1a.v1</p> |
| Scope of process | Use of substance as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container). |

| | |
|------------------|--|
| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|------------------|--|

| | |
|--|--|
| Section 2.1 | Control of Worker Exposure |
| Product Characteristics | |
| Physical form of product | Liquid, vapour pressure < 0.5 kPa at STP |
| Concentration of the Substance in Mixture/Article | Covers use of substance/product up to 100% (unless stated differently)., |
| Frequency and Duration of Use | |
| Covers daily exposures up to 8 hours (unless stated differently). | |
| Other Operational Conditions affecting Exposure | |
| Operation is carried out at elevated temperature (> 20°C above ambient temperature). Assumes a good basic standard of occupational hygiene is implemented. | |

| | |
|---------------------------------|---|
| Contributing Scenarios | Risk Management Measures |
| General measures (carcinogens). | <p>Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks.</p> |

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| | |
|---|---|
| | Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. |
| General exposures (closed systems) | Handle substance within a closed system. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| General exposures (closed systems)Process samplingOutdoor | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Laboratory activities | Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Wear suitable gloves tested to EN374. |
| Marine vessel/barge (un)loading. | Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Avoid carrying out activities involving exposure for more than 4 hours Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Road tanker/rail car loading. | Ensure material transfers are under containment or extract ventilation. , or: Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Equipment cleaning and maintenance | Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. |
| Bulk product storage | Store substance within a closed system. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |

| | |
|----------------------------|--|
| Section 2.2 | Control of Environmental Exposure |
| Substance is complex UVCB. | |
| Predominantly hydrophobic. | |

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| Amounts Used | |
|---|---------|
| Fraction of EU tonnage used in region: | 0,1 |
| Regional use tonnage (tonnes/year): | 1,3E+05 |
| Fraction of Regional tonnage used locally: | 1,2E-01 |
| Annual site tonnage (tonnes/year): | 1,5E+04 |
| Maximum daily site tonnage (kg/day): | 5,0E+04 |
| Frequency and Duration of Use | |
| Continuous release. | |
| Emission Days (days/year): | 300 |
| Environmental factors not influenced by risk management | |
| Local freshwater dilution factor: | 10 |
| Local marine water dilution factor: | 100 |
| Other Operational Conditions affecting Environmental Exposure | |
| Release fraction to air from process (initial release prior to RMM): | 1,0E-05 |
| Release fraction to wastewater from process (initial release prior to RMM): | 1,0E-05 |
| Release fraction to soil from process (initial release prior to RMM): | 1,0E-03 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process release estimates used. | |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | |
| Risk from environmental exposure is driven by freshwater sediment. | |
| If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| Treat air emission to provide a typical removal efficiency of (%) | 80 |
| Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%) | 54,0 |
| If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%) | 0 |
| Organisational measures to prevent/limit release from site | |
| Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed. | |
| Conditions and Measures related to municipal sewage treatment plant | |
| Estimated substance removal from wastewater via domestic sewage treatment (%) | 88,8 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 1,9E+05 |
| Assumed domestic sewage treatment plant flow (m3/d) | 2.000 |
| Conditions and Measures related to external treatment of waste for disposal | |
| This substance is consumed during use and no waste of substance is generated. | |
| Conditions and measures related to external recovery of waste | |
| This substance is consumed during use and no waste of substance is generated. | |

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| SECTION 3 | EXPOSURE ESTIMATION |
|---|----------------------------|
| Section 3.1 - Health | |
| The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. | |

| | |
|--|--|
| Section 3.2 -Environment | |
| The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model. | |

| SECTION 4 | GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO |
|---|--|
| Section 4.1 - Health | |
| Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation. | |

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

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Exposure Scenario - Worker

| | |
|-------------------------|--|
| 30000000024 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Distribution of substance- Industrial |
| Use Descriptor | <p>Sector of Use: SU3</p> <p>Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15</p> <p>Environmental Release Categories: ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SpERC 1.1b.v1</p> |
| Scope of process | Bulk loading (including marine vessel/barge, rail/road car and IBC loading) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance and associated laboratory activities. |

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| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|------------------|--|

| | |
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| Section 2.1 | Control of Worker Exposure |
| Product Characteristics | |
| Physical form of product | Liquid, vapour pressure < 0.5 kPa at STP |
| Concentration of the Substance in Mixture/Article | Covers use of substance/product up to 100% (unless stated differently)., |
| Frequency and Duration of Use | |
| Covers daily exposures up to 8 hours (unless stated differently). | |
| Other Operational Conditions affecting Exposure | |
| Assumes use at not more than 20°C above ambient temperature (unless stated differently). Assumes a good basic standard of occupational hygiene is implemented. | |

| | |
|---------------------------------|--|
| Contributing Scenarios | Risk Management Measures |
| General measures (carcinogens). | <p>Consider technical advances and process upgrades (including automation) for the elimination of releases.</p> <p>Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks.</p> <p>Regularly inspect, test and maintain all control measures.</p> |

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| | |
|------------------------------------|---|
| | Consider the need for risk based health surveillance. |
| General exposures (closed systems) | Handle substance within a closed system. Avoid carrying out activities involving exposure for more than 4 hours Sample via a closed loop or other system to avoid exposure Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Process samplingOutdoor | Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Laboratory activities | Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Wear suitable gloves tested to EN374. |
| Marine vessel/barge (un)loading. | Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Road tanker/rail car loading. | Ensure material transfers are under containment or extract ventilation. , or: Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Equipment cleaning and maintenance | Drain down and flush system prior to equipment break-in or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Retain drain downs in sealed storage pending disposal or for subsequent recycle. |
| Bulk product storage | Store substance within a closed system. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Product sampling. | Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in |

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| | |
|--|---|
| | combination with 'basic' employee training. |
|--|---|

| Section 2.2 | Control of Environmental Exposure |
|---|-----------------------------------|
| Substance is complex UVCB. | |
| Predominantly hydrophobic. | |
| Amounts Used | |
| Fraction of EU tonnage used in region: | 0,1 |
| Regional use tonnage (tonnes/year): | 1,1E+07 |
| Fraction of Regional tonnage used locally: | 2,0E-03 |
| Annual site tonnage (tonnes/year): | 2,3E+04 |
| Maximum daily site tonnage (kg/day): | 7,7E+04 |
| Frequency and Duration of Use | |
| Continuous release. | |
| Emission Days (days/year): | 300 |
| Environmental factors not influenced by risk management | |
| Local freshwater dilution factor: | 10 |
| Local marine water dilution factor: | 100 |
| Other Operational Conditions affecting Environmental Exposure | |
| Release fraction to air from process (initial release prior to RMM): | 1,0E-04 |
| Release fraction to wastewater from process (initial release prior to RMM): | 1,0E-07 |
| Release fraction to soil from process (initial release prior to RMM): | 1,0E-05 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process release estimates used. | |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | |
| Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). | |
| No wastewater treatment required. | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| 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 of >= (%) | 0 |
| If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%) | 0 |
| Organisational measures to prevent/limit release from site | |
| Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed. | |
| Conditions and Measures related to municipal sewage treatment plant | |
| Estimated substance removal from wastewater via domestic sewage treatment (%) | 88,8 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 3,8E+05 |
| Assumed domestic sewage treatment plant flow (m3/d) | 2.000 |
| Conditions and Measures related to external treatment of waste for disposal | |

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External treatment and disposal of waste should comply with applicable local and/or regional regulations.

Conditions and measures related to external recovery of waste

External recovery and recycling of waste should comply with applicable local and/or regional regulations.

SECTION 3

EXPOSURE ESTIMATION

Section 3.1 - Health

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

Section 3.2 -Environment

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

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Available hazard data do not enable the derivation of a DNEL for carcinogenic effects.
Risk Management Measures are based on qualitative risk characterisation.

Section 4.2 -Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.

Further details on scaling and control technologies are provided in SpERC factsheet (<http://cefic.org/en/reach-for-industries-libraries.html>).

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Exposure Scenario - Worker

| | |
|-------------------------|---|
| 30000000025 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Formulation & (re)packing of substances and mixtures-Industrial |
| Use Descriptor | Sector of Use: SU3, SU10 Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15 Environmental Release Categories: ERC2, ESVOC SpERC 2.2.v1 |
| Scope of process | Formulation of the substance and its mixtures in batch or continuous operations within closed or contained systems, including incidental exposures during storage, materials transfers, mixing, maintenance, sampling and associated laboratory activities. |

| | |
|------------------|--|
| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|------------------|--|

| | |
|---|--|
| Section 2.1 | Control of Worker Exposure |
| Product Characteristics | |
| Physical form of product | Liquid, vapour pressure < 0.5 kPa at STP |
| Concentration of the Substance in Mixture/Article | Covers use of substance/product up to 100% (unless stated differently)., |
| Frequency and Duration of Use | |
| Covers daily exposures up to 8 hours (unless stated differently). | |
| Other Operational Conditions affecting Exposure | |
| Assumes use at not more than 20°C above ambient temperature (unless stated differently). Assumes a good basic standard of occupational hygiene is implemented. | |

| | |
|---------------------------------|---|
| Contributing Scenarios | Risk Management Measures |
| General measures (carcinogens). | Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. |

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| | Consider the need for risk based health surveillance. |
| General exposures (closed systems)Process sampling | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| General exposures (closed systems) | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Laboratory activities | Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Wear suitable gloves tested to EN374. |
| Marine vessel/barge (un)loading. | Transfer via enclosed lines. Clear transfer lines prior to de-coupling. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Road tanker/rail car loading. | Ensure material transfers are under containment or extract ventilation. , or: Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Drum/batch transfers | Ensure material transfers are under containment or extract ventilation. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). , or: Ensure operation is undertaken outdoors. Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Equipment cleaning and maintenance | Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in |

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| | |
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| | combination with specific activity training. |
| Bulk product storage | Store substance within a closed system. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Product sampling. | Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 15 minutes. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |

| Section 2.2 | Control of Environmental Exposure |
|---|-----------------------------------|
| Substance is complex UVCB. | |
| Predominantly hydrophobic. | |
| Amounts Used | |
| Fraction of EU tonnage used in region: | 0,1 |
| Regional use tonnage (tonnes/year): | 1,1E+07 |
| Fraction of Regional tonnage used locally: | 2,6E-03 |
| Annual site tonnage (tonnes/year): | 3,0E+04 |
| Maximum daily site tonnage (kg/day): | 1,0E+05 |
| Frequency and Duration of Use | |
| Continuous release. | |
| Emission Days (days/year): | 300 |
| Environmental factors not influenced by risk management | |
| Local freshwater dilution factor: | 10 |
| Local marine water dilution factor: | 100 |
| Other Operational Conditions affecting Environmental Exposure | |
| Release fraction to air from process (after typical onsite RMMs consistent with EU Solvent Emissions Directive requirements): | 2,2E-03 |
| Release fraction to wastewater from process (initial release prior to RMM): | 5,0E-06 |
| Release fraction to soil from process (initial release prior to RMM): | 1,0E-04 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process release estimates used. | |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | |
| Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). | |
| If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| 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 of >= (%) | 54,0 |
| If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%) | 0 |

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| | |
|---|---------|
| Organisational measures to prevent/limit release from site | |
| Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed. | |
| Conditions and Measures related to municipal sewage treatment plant | |
| Estimated substance removal from wastewater via domestic sewage treatment (%) | 88,8 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 1,1E+05 |
| Assumed domestic sewage treatment plant flow (m3/d) | 2.000 |
| Conditions and Measures related to external treatment of waste for disposal | |
| External treatment and disposal of waste should comply with applicable local and/or regional regulations. | |
| Conditions and measures related to external recovery of waste | |
| External recovery and recycling of waste should comply with applicable local and/or regional regulations. | |

| | |
|---|----------------------------|
| SECTION 3 | EXPOSURE ESTIMATION |
| Section 3.1 - Health | |
| The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. | |

| | |
|--|--|
| Section 3.2 -Environment | |
| The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model. | |

| | |
|---|--|
| SECTION 4 | GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO |
| Section 4.1 - Health | |
| Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation. | |

| | |
|--|--|
| Section 4.2 -Environment | |
| Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. | |
| Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. | |
| Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. | |
| Further details on scaling and control technologies are provided in SpERC factsheet | |

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Exposure Scenario - Worker

| | |
|-------------------------|---|
| 300000000026 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use as a fuel- Industrial |
| Use Descriptor | Sector of Use: SU3 Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 Environmental Release Categories: ERC7, ESVOC SpERC 7.12a.v1 |
| Scope of process | Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste. |

| | |
|------------------|--|
| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|------------------|--|

| | |
|---|--|
| Section 2.1 | Control of Worker Exposure |
| Product Characteristics | |
| Physical form of product | Liquid, vapour pressure < 0.5 kPa at STP |
| Concentration of the Substance in Mixture/Article | Covers use of substance/product up to 100% (unless stated differently)., |
| Frequency and Duration of Use | |
| Covers daily exposures up to 8 hours (unless stated differently). | |
| Other Operational Conditions affecting Exposure | |
| Assumes use at not more than 20°C above ambient temperature (unless stated differently). Assumes a good basic standard of occupational hygiene is implemented. | |

| | |
|---------------------------------|---|
| Contributing Scenarios | Risk Management Measures |
| General measures (carcinogens). | Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. |

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| | |
|---|---|
| General exposures (closed systems) | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| General exposures (closed systems)Product sampling. | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 1 hour. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Bulk closed unloading.Outdoor | Transfer via enclosed lines. Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Drum/batch transfers | Ensure material transfers are under containment or extract ventilation. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Operation of solids filtering equipment | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Use as a fuel(closed systems) | Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Equipment cleaning and maintenance | Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. |
| Bulk product storage | Store substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than |

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| | 4 hours Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
|--|--|

| Section 2.2 | Control of Environmental Exposure |
|---|-----------------------------------|
| Substance is complex UVCB. | |
| Predominantly hydrophobic. | |
| Amounts Used | |
| Fraction of EU tonnage used in region: | 0,1 |
| Regional use tonnage (tonnes/year): | 1,1E+07 |
| Fraction of Regional tonnage used locally: | 1,4E-01 |
| Annual site tonnage (tonnes/year): | 1,5E+06 |
| Maximum daily site tonnage (kg/day): | 5,0E+06 |
| Frequency and Duration of Use | |
| Continuous release. | |
| Emission Days (days/year): | 300 |
| Environmental factors not influenced by risk management | |
| Local freshwater dilution factor: | 10 |
| Local marine water dilution factor: | 100 |
| Other Operational Conditions affecting Environmental Exposure | |
| Release fraction to air from process (initial release prior to RMM): | 7,0E-04 |
| Release fraction to wastewater from process (initial release prior to RMM): | 4,4E-07 |
| Release fraction to soil from process (initial release prior to RMM): | 0 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process release estimates used. | |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | |
| Risk from environmental exposure is driven by freshwater sediment. | |
| If discharging to domestic sewage treatment plant, no onsite wastewater treatment required. | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| Treat air emission to provide a typical removal efficiency of (%) | 95 |
| Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%) | 87,7 |
| If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%) | 0 |
| Organisational measures to prevent/limit release from site | |
| Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed. | |
| Conditions and Measures related to municipal sewage treatment plant | |
| Estimated substance removal from wastewater via domestic sewage treatment (%) | 88,8 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 5,2E+06 |

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|---|-------|
| Assumed domestic sewage treatment plant flow (m3/d) | 2.000 |
| Conditions and Measures related to external treatment of waste for disposal | |
| Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment. | |
| Conditions and measures related to external recovery of waste | |
| This substance is consumed during use and no waste of substance is generated. | |

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| SECTION 3 | EXPOSURE ESTIMATION |
| Section 3.1 - Health | |

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| Section 3.2 -Environment | |
| The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model. | |

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| SECTION 4 | GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO |
| Section 4.1 - Health | |

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| Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not enable the derivation of a DNEL for carcinogenic effects. Risk Management Measures are based on qualitative risk characterisation. | |
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| Section 4.2 -Environment | |
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| Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. | |
| Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. | |
| Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination. | |
| Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). | |

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Exposure Scenario - Worker

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| 30000000027 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use as a fuel- Professional |
| Use Descriptor | Sector of Use: SU22 Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16 Environmental Release Categories: ERC9a, ERC9b, ESVOC SpERC 9.12b.v1 |
| Scope of process | Covers the use as a fuel (or fuel additives and additive components) within closed or contained systems, including incidental exposures during activities associated with its transfer, use, equipment maintenance and handling of waste. |

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| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
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| Section 2.1 | Control of Worker Exposure |
| Product Characteristics | |
| Physical form of product | Liquid, vapour pressure < 0.5 kPa at STP |
| Concentration of the Substance in Mixture/Article | Covers use of substance/product up to 100% (unless stated differently)., |
| Frequency and Duration of Use | |
| Covers daily exposures up to 8 hours (unless stated differently). | |
| Other Operational Conditions affecting Exposure | |
| Assumes use at not more than 20°C above ambient temperature (unless stated differently). Assumes a good basic standard of occupational hygiene is implemented. | |

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| Contributing Scenarios | Risk Management Measures |
| General measures (carcinogens). | Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance. |

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| General exposures (closed systems) | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 1 hour. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| General exposures (closed systems)Product sampling. | Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 1 hour. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. |
| Bulk closed unloading. | Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Ensure material transfers are under containment or extract ventilation. , or: Avoid carrying out activities involving exposure for more than 1 hour. |
| Drum/batch transfers | Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Ensure material transfers are under containment or extract ventilation. , or: Avoid carrying out activities involving exposure for more than 1 hour. |
| Refueling. | Ensure material transfers are under containment or extract ventilation. Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Use as a fuel(closed systems) | Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Equipment cleaning and maintenance | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Drain down system prior to equipment opening or maintenance. Retain drain downs in sealed storage pending disposal or for |

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| | <p>subsequent recycle. Clear spills immediately. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.</p> |
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| Section 2.2 | Control of Environmental Exposure |
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| Substance is complex UVCB. | |
| Predominantly hydrophobic. | |
| Amounts Used | |
| Fraction of EU tonnage used in region: | 0,1 |
| Regional use tonnage (tonnes/year): | 3,3E+05 |
| Fraction of Regional tonnage used locally: | 5,0E-04 |
| Annual site tonnage (tonnes/year): | 1,7E+02 |
| Maximum daily site tonnage (kg/day): | 4,6E+02 |
| Frequency and Duration of Use | |
| Continuous release. | |
| Emission Days (days/year): | 365 |
| Environmental factors not influenced by risk management | |
| Local freshwater dilution factor: | 10 |
| Local marine water dilution factor: | 100 |
| Other Operational Conditions affecting Environmental Exposure | |
| Release fraction to air from wide dispersive use (regional only): | 1,0E-04 |
| Release fraction to wastewater from wide dispersive use: | 1,0E-05 |
| Release fraction to soil from wide dispersive use (regional only): | 1,0E-05 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process release estimates used. | |
| Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil | |
| Risk from environmental exposure is driven by humans via indirect exposure (primarily ingestion). | |
| No wastewater treatment required. | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| Treat air emission to provide a typical removal efficiency of (%) | |
| Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%) | 0 |
| If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of (%) | 0 |
| Organisational measures to prevent/limit release from site | |
| Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed. | |
| Conditions and Measures related to municipal sewage treatment plant | |
| Estimated substance removal from wastewater via domestic sewage treatment (%) | 88,8 |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%) | 88,8 |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 2,3E+03 |

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| This substance is consumed during use and no waste of substance is generated. | |

| | |
|---|----------------------------|
| SECTION 3 | EXPOSURE ESTIMATION |
| Section 3.1 - Health | |
| The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated. | |

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|--|--|
| Section 3.2 -Environment | |
| The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model. | |

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|---|--|
| SECTION 4 | GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO |
| Section 4.1 - Health | |
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