# Residual Fuel Oil

Safety Data Sheet

EU SDS format according to COMMISSION REGULATION (EU) 2020/878
Release Date: 2025-06-10 Revision Date: 2025-06-05 Replaces Version On: 2021-04-21 Version: 3.0

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

### 1.1. Product identifier

| | | |
|---|---|---|
| Product form | : | Substance (UVCB) |
| Trade name | : | Residual fuel oil; Fuel oil (all types); OC ATZ; OC BTZ; FUEL OIL (all kinds); FO 3,5% S; FO 0,5% S; HSFO; LSFO; VLSFO; ULSFO |
| Chemical name | : | Fuel Oil, Residue - Heavy Fuel Oil |
| N. CE index | : | 649-024-00-9 |
| EC number | : | 270-675-6 |
| CAS Number | : | 68476-33-5 |
| REACH registration number | : | 01-2119474894-22-0198 |
| Product Type | : | Hydrocarbon blend |
| Product group | : | Commercial Product |

### 1.2. Relevant identified uses of the substance or mixture and discouraged uses

#### 1.2.1. Relevant identified uses

| | | |
|---|---|---|
| Main Use Category | : | Industrial Use,Professional Use |
| Specification for professional/industrial use | : | Closed system useNon-dispersive use |
| Use of substance/mixture | : | Fuels / FuelsIntermediates |
| Function or use category | : | Fuels / Fuels, Intermediates |

| Title | Use Descriptors |
|---|---|
| Distribution of the substance<br>(Ref. SE: 01a) | SU3, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7, ESVOC SPERC 1.1b.v1 |
| Formulation and (re)packaging of substances and mixtures<br>(Ref. SE: 02) | SU3, SU10, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC2, ESVOC SPERC 2.2.v1 |
| Use as fuel<br>(Ref. SE: 12a) | SU3, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16, ERC7, ESVOC SPERC 7.12a.v1 |
| Use as fuel<br>(Ref. SE: 12b) | SU22, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC16, ERC9a, ERC9b, ESVOC SPERC 9.12b.v1 |

Full text of the descriptors of use : see section 16

#### 1.2.2. Not recommended uses

Relevant uses are listed above. No other uses shall be recommended unless an assessment has been carried out, prior to the start of such use, demonstrating that the risks associated with such use are controlled.

| Title | Use Descriptors | Motive |
|---|---|---|
| Use in coatings | SU22, PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC15, ERC8a, ERC8d, ESVOC SPERC 8.3b.v1 | |
| Applications in road construction and construction | SU22, PROC8a, PROC8b, ERC8d, ERC8f, ESVOC SPERC 8.15.v1 | |

Full text of the descriptors of use : see section 16

### 1.3. Information on the safety data sheet provider

**Producer**
JEnergy S.p.A.Via Adolfo Ravà, 49IT 00142 Rome, Italy
T +39 06590101, F +39 065414923
reach@jenergyspa.it

### 1.4. Emergency telephone number

Emergency number : +39 06590101
Bambino Gesù Children's Hospital - Rome - +39 06 6859 3726 - 24h
"University of Foggia Hospital - Foggia - +39 800 18 3459 - 24h
"A. Cardarelli" Hospital - Naples - +39 081 5453 333 - 24h
Umberto I Polyclinic - Rome - +39 06 4997 8000 - 24hA. Gemelli Polyclinic - Rome - +39 06 3054 343 - 24h
"Careggi Hospital Department of Medical Toxicology - Florence - +39 055 7947 819 - 24h
National Center of Toxicological Information - Pavia - +39 0382 24444 - 24h
"Niguarda Ca' Granda Hospital - Milan - +39 02 6610 1029 - 24h
"Papa Giovanni XXIII Hospital - Bergamo - +39 800 88 3300 - 24h
Verona Integrated Hospital - Verona - +39 800 01 1858 - 24h

## SECTION 2: Hazard Identification

### 2.1. Classification of the substance or mixture

**Classification according to Regulation (EC) No 1272/2008 [EU-GHS / CLP]**

| | | |
|---|---|---|
| Acute toxicity (by inhalation: dust, mist) category 4 | H332 | |
| Germ cell mutagenicity, category 2 | H341 | |
| Carcinogenicity, category 1B | H350 | |
| Reproductive toxicity, category 2 | H361d | |
| Specific Target Organ Toxicity – Repeated Exposure, category 2 | H373 | |
| Aspiration hazard, category 1 | H304 | |
| Hazardous to the aquatic environment – Acute hazard, category 1 | H400 | (M=1) |
| Hazardous to the aquatic environment – Chronic hazard, category 1 | H410 | (M=1) |

Full text of H and EUH phrases: see section 16

**Adverse physicochemical effects on human health and the environment**

Harmful by inhalation. It can be fatal if swallowed and penetrated into the respiratory tract. It can cause cancer. Suspected of harming the fetus. Suspected of causing genetic alterations (in contact with skin). Contact with the eyes may cause temporary redness and irritation. Repeated and prolonged contact can cause skin redness, irritation and contact dermatitis due to degreasing effect. It can cause damage to organs (blood, liver, thymus) in case of prolonged or repeated exposure (in contact with the skin). Highly toxic to aquatic organisms, it can cause long-term negative effects for the aquatic environment. For specific information on the toxicological characteristics and classification of the product, please refer to section 11 and/or 12 of the data sheet.

### 2.2. Label elements

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

Hazard pictograms (CLP) :

GHS07 GHS08 GHS09

Warning (CLP) : Danger

Hazard statements (CLP) : H304 - May be fatal if swallowed and enters the respiratory tract.
H332 - Harmful if inhaled.
H341 - Suspected of causing genetic alterations (Dermal).
H350 - May cause cancer.
H361d - Suspected of harming an unborn child.
H373 - May cause damage to organs (blood, liver, thymus) in case of prolonged or repeated exposure (Dermal).
H410 - Very toxic to aquatic organisms with long-lasting effects.

Precautionary statements (CLP) : P201 - Obtain specific instructions before use.
P260 - Do not breathe mists/vapors/aerosols.
P273 - Do not disperse in the environment.

P280 - Wear protective gloves, Wear protective clothing. Protect your eyes, face.
P301+P310 - IF SWALLOWED: Contact a POISON CENTER/physician immediately.
P308+P313 - IF exposure or possible exposure occurs, seek medical attention.
P312 - If you feel unwell, contact a POISON CENTER, a doctor.
P331 - DO NOT induce vomiting.
P501 - Dispose of the product and container in compliance with the applicable regulations (Legislative Decree 152/2006 and subsequent amendments).

Frasi EUH : EUH066 - Repeated exposure may result in dryness or cracking of the skin.

### 2.3. Other hazards (not relevant to classification)

Other hazards that do not appear in the classification : Combustible product, but not classified as flammable. The generation of flammable vapors occurs at temperatures that are higher than normal ambient temperatures. The vapours can extend a considerable distance at ground level before igniting and/or backfiring back to the source of the vapour. It can cause slight eye irritation. When handled or used at high temperatures, contact with the hot product or vapours may cause burns. Any substance, in the case of accidents with pressure pipes and the like, can be accidentally injected into the subcutaneous tissues, even without apparent external injuries. In this case, it is necessary to take the injured person to the hospital as soon as possible for treatment. Do not wait for symptoms to appear. A potential risk can be the development of hydrogen sulfide (toxic gas) when the product is stored or handled at high temperatures. Hydrogen sulphide can accumulate in tanks or confined spaces, posing a danger to operators who need to access them. In this case, overexposure can cause respiratory irritation, dizziness, nausea, loss of consciousness and death.

This substance/mixture does not meet the PBT criteria of the REACH Regulation, Annex XIII
This substance/mixture does not meet the vPvB criteria of the REACH Regulation, Annex XIII
Does not contain PBT and/or vPvB substances ≥ 0.1% evaluated in accordance with Annex XIII of REACH

The substance is not included in the list established in accordance with Article 59(1) of REACH for endocrine disrupting properties, or is not identified as having endocrine disrupting properties according to the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

## SECTION 3: Composition/Ingredient Information

### 3.1. Substances

Notes : fuel oil, residue; heavy fuel oil; [liquid product deriving from various refinery streams, usually residues. The composition is complex and varies with the source of the blank.]
Type of substance : UVCB
Name : Fuel Oil, Residue - Heavy Fuel Oil
CAS Number : 68476-33-5
EC number : 270-675-6
N. CE index : 649-024-00-9

| Name | Product identifier | % | Classification according to Regulation (EC) No 1272/2008 [EU-GHS / CLP] |
|---|---|---|---|
| Fuel Oil, Residue - Heavy Fuel Oil | CAS Number: 68476-33-5<br>EC Number: 270-675-6<br>EC index number: 649-024-00-9<br>REACH no.: 01-2119474894-22-0198 | 100 | See Section 2.1 |
| hydrogen sulfide | CAS Number: 7783-06-4<br>EC Number: 231-977-3<br>EC index number: 016-001-00-4<br>no. REACH: N/A | < 0.1 | Flam. Gas 1A, H220Press. GasAcute Tox. 2 (per inalazione), H330 (ATE=100 ppmv/4h)Aquatic Acute 1, H400 |

Full text of H and EUH phrases: see section 16

## SECTION 4: First Aid Measures

### 4.1. Description of first aid measures

General first aid measures : Seek medical attention in all cases of severe burns.

First aid measures in case of inhalation : If you feel unwell from inhaling vapors or mists, transport the subject to an unpolluted atmosphere. Keep at rest. Call a doctor if necessary. If the injured person is unconscious and not breathing: check for obstacles to breathing and practice artificial respiration by competent personnel. If necessary, perform external cardiac massage and consult a doctor. If the victim is breathing: Keep in a lateral safety position. Administer oxygen if necessary. If hydrogen sulfide (H2S) inhalation is suspected, rescuers should wear appropriate breathing equipment, seat belts, and ropes, and adopt the appropriate rescue procedures. Immediately transfer the injured person to the hospital. Begin artificial respiration immediately if breathing has stopped. Administer oxygen if necessary.

First aid measures in the event of skin contact : Remove contaminated clothing and footwear. Wash the skin with soap and water. Never use gasoline, kerosene, or other solvent to clean contaminated skin. If you experience skin irritation or rash, seek medical attention. In case of contact with the product at a high temperature, cool the part with plenty of cold water and cover with gauze or clean cloths. Call a doctor or take to the hospital. Do not apply ointments or anything else, unless medically ordered. Avoid general hypothermia. Do not apply ice to the burn. DO NOT attempt to remove portions of clothing attached to burnt skin but cut off the contours of the leather.

First aid measures in case of contact with eyes : Rinse thoroughly for at least 15 minutes. Keep the eyelids wide open. Remove contact lenses, if present, if the situation allows the operation to be carried out easily. Continue rinsing. If you experience irritation, blurred vision, or persistent swelling, consult a medical professional. In case the hot product comes into contact with the eyes, rinse the injured part with water to dissipate the heat. Seek immediate medical attention for an assessment of the condition and appropriate treatment for the injured person.

First aid measures in case of ingestion : Do not induce vomiting to avoid aspiration of product into the lungs. If the person is conscious, rinse the mouth with water without swallowing. Keep at rest. Call a doctor or take to the hospital. If the person is unconscious, keep in a lateral safety position. Do not administer anything by mouth to a person who is unconscious. In case of spontaneous vomiting, keep the head down, to avoid the risk of aspiration into the lungs.

### 4.2. Main symptoms and effects, both acute and delayed

Symptoms/effects : Potential chronic health effects are to be considered.

Symptoms/effects in case of inhalation : Harmful if inhaled. Inhalation of fumes or oil mists produced at high temperatures may cause irritation of the respiratory tract. Danger of serious damage to health in the event of prolonged exposure by inhalation.

Symptoms/effects in case of skin contact : Repeated and prolonged contact can cause skin redness, irritation and contact dermatitis due to degreasing effect. Contact with the hot product may cause thermal burns.

Symptoms/effects in case of contact with eyes : Contact with the eyes may cause slight transient irritation. Contact with hot product or vapors may cause burns.

Symptoms/effects in case of ingestion : Ingestion of the fluid can cause aspiration into the lungs with the risk of chemical pneumonia.

Symptoms/effects after intravenous administration : No information available.

Chronic symptoms : It can cause cancer. Suspected of causing genetic alterations. Suspected of harming the fetus. It can cause damage to organs with prolonged or repeated exposure. It can cause kidney damage. blood. thyme.

### 4.3. Indication of the need for immediate medical advice and special treatment

Seek medical attention if the victim is in an altered state of consciousness, or if symptoms do not disappear. If swallowed, always assume that aspiration has taken place. Seek medical attention in all cases of severe burns. If hydrogen sulfide (H2S) inhalation is suspected, rescuers should wear appropriate breathing equipment, seat belts, and ropes, and adopt the appropriate rescue procedures. Immediately transfer the injured person to the hospital. Begin artificial respiration immediately if breathing has stopped. Administer oxygen if necessary. Immediately transport the injured person to the hospital. Do not wait for symptoms to appear.

## SECTION 5: Firefighting Measures

### 5.1. Extinguishing means

Suitable extinguishing means : Small fires: carbon dioxide, dust, foam, sand or soil. Large fires: foam or water spray. These vehicles should only be used by suitably trained personnel. Other extinguishing gases (according to regulations).

Unsuitable extinguishing media : Do not use direct jets of water. These can cause splashing, and extend the fire. Avoid using foam and water on the same surface at the same time as water destroys the foam.

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

Fire hazard : Combustible product, but not classified as flammable. The generation of flammable vapors occurs at temperatures that are higher than normal ambient temperatures.

Danger of explosion : Vapors are flammable and can form flammable and explosive mixtures with air.

Hazardous combustion products in the event of fire : Incomplete combustion generates carbon monoxide, carbon dioxide and other toxic gases. The products of combustion include sulphur oxides (SO2 and SO3) and hydrogen sulphide (H2S). Oxygenated compounds (aldehydes, etc.).

### 5.3. Recommendations for firefighters

Instructions for extinguishing : If possible, stop product leaks at the source. Remove containers from the fire zone if it can be done without personal hazard. Cover any spills that have not caught fire with foam or soil. Use water jets to cool surfaces and containers exposed to flame or heat. If the fire cannot be controlled, evacuate the area.

Protection during firefighting : Personal protective equipment for firefighters (see also section 8). In the event of a fire or in confined or poorly ventilated spaces, wear full flame retardant protective clothing and a self-contained respirator equipped with a full mask operating under positive pressure. Use a self-contained respirator and also protective clothing. EN 15090. EN 443. EN 469. EN 659. Do not enter the fire area without the appropriate protective equipment, including breathing apparatus.

Other information : In the event of a fire, do not disperse wastewater, residual product and other contaminated materials, but collect separately and treat appropriately.

## SECTION 6: Accidental Release Measures

### 6.1. Personal Precautions, Protective Equipment and Emergency Procedures

General measures : Eliminate all sources of ignition if safety conditions allow it (e.g.: electricity, sparks, fires, torches). If safety conditions permit, stop or contain the leak at source. Avoid direct contact with the released material. To remain upwind.

#### 6.1.1. For those who do not intervene directly

Means of protection : See section 8.

Emergency procedures : Remove uninvolved personnel from the spill area. Alert emergency teams. Except in the case of small payments, the feasibility of the interventions must always be evaluated and approved, if possible, by qualified and competent personnel in charge of managing the emergency. In the event of a large spill, warn the residents of the leeward areas. In cases where the presence of dangerous amounts of H2S in the spilled/spilled product is suspected or ascertained, additional or special actions may be indicated, such as limiting access, using special personal protective equipment, adopting specific procedures and training personnel.

#### 6.1.2. For those who intervene directly

| | | |
|---|---|---|
| Means of protection | : | Small spills: Normal anti-static work clothing is generally appropriate. Large spills: Chemically resistant all-protective garment made of antistatic material. If necessary, heat-resistant and thermally insulated. Work gloves that provide adequate resistance to chemical agents, especially aromatic hydrocarbons. Gloves made of PVA (polyvinyl alcohol) are not water-resistant and are not suitable for emergency use. If contact with the hot product is possible or foreseeable, the gloves must be heat-resistant and thermally insulated. Anti-static and non-slip safety shoes or boots, chemical-resistant if necessary, heat-resistant and thermally insulated. Protective helmet. Safety goggles and/or face protection if splashing or eye contact is possible or foreseeable. Respiratory protection: A half mask or full mask equipped with an organic vapour filter(s) (AX) (and H2S (B), where applicable), or a stand-alone respirator, depending on the extent of the spill and the foreseeable level of exposure. A stand-alone respirator may be used depending on the extent of the spill and the foreseeable level of exposure. In the event that the situation cannot be fully assessed or if there is a risk of oxygen deficiency, use a stand-alone respirator exclusively. |
| Emergency procedures | : | Notify the competent authorities in accordance with current regulations. |

### 6.2. Environmental precautions

Do not allow the product to accumulate in confined spaces or below ground level. Do not allow the product to flow into sewers or waterways, or in any case to be dispersed into the environment. In the event of contamination of the environmental matrices (soil, subsoil, surface water and groundwater), remove the contaminated soil if possible and in any case treat the contaminated matrices in accordance with Legislative Decree 152/06 and subsequent amendments (and applicable local regulations).

### 6.3. Methods and materials for containment and remediation

| | | |
|---|---|---|
| Methods for containment | : | Collect free liquid and waste materials in special waterproof and hydrocarbon-resistant containers. Clean the contaminated area. If necessary, dam the product with dry soil, sand, or other non-flammable material. Allow the hot product to cool naturally. Inside buildings or confined spaces, ensure appropriate ventilation. Large spills can be covered, with caution, with foam, if available, in order to prevent fire hazards. Do not use direct water jets. Absorb spilled product with non-flammable materials. Eliminate in accordance with Legislative Decree 152/06 and subsequent amendments If it is necessary to store contaminated material for subsequent safe disposal, use only suitable containers (leak-proof, sealed, waterproof, earthed). If in water: The product is heavier than water and normally this does not allow any intervention to be carried out. If possible, collect the contaminated product and material by mechanical means and proceed with storage/disposal in accordance with Legislative Decree 152/06 and subsequent amendments. Do not use solvents or dispersing agents, unless expressly indicated by an expert and, where required, authorized by the competent local authorities. |
| Other information | : | The recommended measures are based on the most likely spill scenarios for this product. Local conditions (wind, air temperature, direction and speed of waves and currents) can, however, significantly influence the choice of action to be taken. Therefore, consult local experts if necessary. Local legislation may determine or limit the actions to be taken. The concentration of H2S at the top of tanks or containers can reach dangerous values, particularly in the case of prolonged storage. This situation is particularly relevant for operations involving direct exposure to vapors inside tanks or other confined spaces. The pouring of a limited quantity of product, particularly in the open air where vapours disperse more quickly, is a dynamic situation that can presumably limit exposure to dangerous concentrations. Since H2S has a higher density than ambient air, a possible exception may be the accumulation of hazardous concentrations in specific places such as ditches, depressions or enclosed spaces. In all these circumstances, however, the assessment of the correct intervention to be adopted must be carried out on a case-by-case basis. See also Sec. 16, "Other Information." |

### 6.4. Reference to other sections

For more information, see section 8: "Exposure control-personal protection". For more information, see section 13.

## SECTION 7: Handling and Storage

### 7.1. Precautions for safe handling

| | | |
|---|---|---|
| Precautions for safe handling | : | The material is combustible but does not ignite easily. Due to the extremely slippery nature of this material, greater care than normal must be exercised in handling the material in order to avoid contact with passing surfaces. Prevent the risk of slipping. Floors, walls and other surfaces in the danger zone should be cleaned periodically. Steam is heavier than air. Pay special attention to accumulation in wells and confined spaces. Use and store only outside or in a well-ventilated place. Use appropriate personal protective equipment if necessary. Do not release into the environment. Empty containers may contain combustible product residues. Do not puncture, cut, grind, weld, braze, burn, or incinerate unreclaimed empty containers or drums. The product can release hydrogen sulphide: carry out a specific assessment of the inhalation risks deriving from the presence of hydrogen sulphide in the free spaces of tanks, in confined spaces, in residues and surpluses of product, in the sludge and wastewater of tanks, and in all situations of unintentional release, to determine which are the best means of control according to local conditions. Before accessing the storage tanks and starting any type of intervention in a confined space (e.g. tunnels), carry out adequate remediation, check the atmosphere and check the oxygen content, the degree of flammability, and the presence of sulfur compounds. See also Sec. 16, "Other Information." |
| Hygiene measures | : | Make sure that adequate housekeeping measures are taken. Use appropriate personal protective equipment if necessary. Keep away from food and drink. Do not breathe fumes/mists/vapors. Avoid contact with skin. Wash hands thoroughly after handling. Do not swallow. Do not smoke. Contaminated material must not accumulate in the workplace and should never be stored in your pocket. Do not reuse clothing that is still contaminated. Prevent the risk of slipping. Keep work clothing separate from civilian clothing. Wash them separately. Wash hands and other areas of skin exposed to the substance with mild soap and water before eating, drinking, smoking and when leaving the workplace. |

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

| | | |
|---|---|---|
| Storage conditions | : | Store in a dry and well-ventilated place. Store away from open flames, hot surfaces and sources of ignition. Do not smoke. |
| Incompatible products | : | Store away from: strong oxidants. |
| Storage location | : | The structure of the storage area, the characteristics of the tanks, the equipment and the operating procedures must comply with the relevant legislation at European, national or local level. Storage facilities must be equipped with appropriate systems to prevent soil and water contamination in the event of leaks or spills. The cleaning, inspection and maintenance of the internal structure of the storage tanks must be carried out by qualified and properly equipped personnel, as established by national, local, or company regulations. Before accessing the storage tanks and starting any type of intervention in a confined space (e.g. tunnels), carry out adequate remediation, check the atmosphere and check the oxygen content, the degree of flammability, and the presence of sulfur compounds. |
| Packaging and containers: | : | If the product is supplied in containers: Store only in the original container or in a container suitable for the type of product. Store in a well-ventilated place. Keep containers carefully closed and correctly labelled. Empty containers may contain combustible product residues. Do not weld, braze, drill, cut, or incinerate empty containers unless they have been properly cleaned/reclaimed. |
| Packaging Materials | : | For the production of containers or internal coatings, use approved material suitable for the use of the product. Use mild steel and stainless steel for containers and coatings. Some synthetic materials may not be suitable for containers or coatings based on the characteristics of the material and the intended uses. Check with the manufacturer for compatibility. |

### 7.3. Special end-uses

See the list of identified uses and exposure scenarios in the annex to the safety data sheet.

## SECTION 8: Exposure/Personal Protective Controls

### 8.1. Control parameters

#### 8.1.1 National occupational and biological exposure limit values

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| **Austria - Occupational exposure limit values** | |
| MAK (OEL TWA) | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **Belgium - Occupational exposure limit values** | |
| OEL TWA | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **Denmark - Occupational exposure limit values** | |
| OEL TWA | 1 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| OEL STEL | 2 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **Hungary - Occupational exposure limit values** | |
| AND (OEL THREE) | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **Netherlands - Occupational exposure limit values** | |
| TGG-8u (OEL TWA) | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **Spain - Occupational exposure limit values** | |
| CUSTARD-ED (UL TWA) | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| VLA-EC (OEL STEL) | 10 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **Sweden - Occupational exposure limit values** | |
| NGV (OEL TWA) | 1 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| KGV (OEL SET) | 3 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **United Kingdom - Occupational exposure limit values** | |
| WEL TWA (OEL TWA) | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| WELL SET (OEL SET) | 10 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| **USA - ACGIH - Occupational Exposure Limit Values** | |
| ACGIH® TLV® TWA | 5 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |
| ACGIH® TLV® STEL | 10 mg/m³ (Mists of mineral base oil, severely refined, DMSO extract <3% m/m) |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| **EU - Indicative Occupational Exposure Limit Value (IOEL)** | |
| Local name | Hydrogen sulphide |
| IOEL TWA | 7 mg/m³ |
| | 5 ppm |
| IOEL STEL | 14 mg/m³ |
| | 10 ppm |
| Regulatory reference | COMMISSION DIRECTIVE 2009/161/EU |
| **Austria - Occupational exposure limit values** | |
| MAK (OEL TWA) | 7 mg/m³ |
| | 5 ppm |
| MAK (OEL STEL) | 7 mg/m³ |
| | 5 ppm |
| **Belgium - Occupational exposure limit values** | |
| OEL TWA | 2.3 mg/m³ |
| | 1,64 ppm |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| OEL STEL | 5.61 mg/m³ |
| | 4 ppm |
| **Denmark - Occupational exposure limit values** | |
| OEL TWA | 7 mg/m³ |
| | 5 ppm |
| OEL STEL | 14 mg/m³ |
| | 10 ppm |
| **Finland - Occupational exposure limit values** | |
| HTP (OEL TWA) | 7 mg/m³ |
| | 5 ppm |
| HTP (OEL STEL) | 14 mg/m³ |
| | 10 ppm |
| **France - Occupational exposure limit values** | |
| VME (UL TWA) | 7 mg/m³ |
| | 5 ppm |
| VLE (OEL C/STEL) | 14 mg/m³ |
| | 10 ppm |
| **Germany - Occupational exposure limit values (TRGS 900)** | |
| AGW (OEL TWA) | 7,1 mg/m³ |
| | 5 ppm |
| AGW (OEL C) | 14,2 mg/m³ |
| AGW (OEL C) [ppm] | 10 ppm |
| **Hungary - Occupational exposure limit values** | |
| AND (OEL THREE) | 7 mg/m³ |
| CK (OEL STEL) | 14 mg/m³ |
| **Ireland - Occupational exposure limit values** | |
| OEL TWA | 7 mg/m³ |
| | 5 ppm |
| OEL STEL | 14 mg/m³ |
| | 10 ppm |
| **Italy - Occupational exposure limit values** | |
| Local name | Hydrogen sulfide |
| OEL TWA | 7 mg/m³ |
| | 5 ppm |
| OEL STEL | 14 mg/m³ |
| | 10 ppm |
| Regulatory reference | Annex XXXVIII of Legislative Decree No. 135 of 4 September 2024 |
| **Latvia - Occupational exposure limit values** | |
| OEL TWA | 7 mg/m³ |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| | 5 ppm |
| OEL STEL | 14 mg/m³ |
| | 10 ppm |
| **Netherlands - Occupational exposure limit values** | |
| TGG-8u (OEL TWA) | 2,3 mg/m³ |
| | 1,64 ppm |
| **Poland - Occupational exposure limit values** | |
| NDS (OEL TWA) | 7 mg/m³ |
| NDSCh (OEL STEL) | 14 mg/m³ |
| **Romania - Occupational exposure limit values** | |
| OEL TWA | 7 mg/m³ |
| | 5 ppm |
| OEL STEL | 14 mg/m³ |
| | 10 ppm |
| **Spain - Occupational exposure limit values** | |
| CUSTARD-ED (UL TWA) | 7 mg/m³ |
| | 5 ppm |
| VLA-EC (OEL STEL) | 14 mg/m³ |
| | 10 ppm |
| **Sweden - Occupational exposure limit values** | |
| NGV (OEL TWA) | 7 mg/m³ |
| | 5 ppm |
| KGV (OEL SET) | 14 mg/m³ |
| | 10 ppm |
| **United Kingdom - Occupational exposure limit values** | |
| WEL TWA (OEL TWA) | 7 mg/m³ |
| | 5 ppm |
| WELL SET (OEL SET) | 14 mg/m³ |
| | 10 ppm |
| **Norway - Occupational exposure limit values** | |
| Grenseverdi (OEL TWA) | 7 mg/m³ |
| | 5 ppm |
| Korttidsverdi (OEL STEL) | 14 mg/m³ |
| | 10 ppm |
| **Switzerland - Occupational exposure limit values** | |
| MAK (OEL TWA) | 7,1 mg/m³ |
| | 5 ppm |
| KZGW (OEL STEL) | 14,2 mg/m³ |
| | 10 ppm |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| **USA - ACGIH - Occupational Exposure Limit Values** | |
| ACGIH® TLV® TWA | 1 ppm (ACGIH 2021) |
| ACGIH® TLV® STEL | 5 ppm (ACGIH 2021) |

#### 8.1.2. Recommended monitoring procedures

| Monitoring methods | |
|---|---|
| Monitoring methods | Monitoring procedures must be selected on the basis of indications established by the competent local authorities or national employment contracts. Refer to Legislative Decree 81/2008 and good industrial hygiene practices. UNI EN 482:2021: Exposure in the workplace - Procedures for determining the concentration of chemical agents - Basic performance requirements. UNI EN 689:2019: Exposure in the workplace - Measurement of exposure by inhalation to chemical agents - Strategy for verifying compliance with occupational exposure limit values. |

#### 8.1.3. Formation of Air Contaminants

Applicable OEL and BLV for air contaminants : May release : Hydrogen sulphide.
This substance is a constituent of the product, and can be emitted as a pollutant.

#### 8.1.4. DNEL e PNEC

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| **DNEL/DMEL (Workers)** | |
| Acute - systemic effects, inhalation | 4716,8 mg/m³ (DNEL, 15 min) |
| Long-term - systemic effects, cutaneous | 0,065 mg/kg body weight/day (DNEL, 8h) |
| Long-term - systemic effects, inhalation | 0,18 mg/m³ (DNEL, 8h, aerosol inalabile) |
| **DNEL/DMEL (General Population)** | |
| Long-term - systemic effects, oral | 0,015 mg/kg bw/day (DNEL, 24h) |
| **PNEC (Oral)** | |
| Oral PNEC (secondary poisoning) | 66,7 mg/kg food |
| **NECP (additional indications)** | |
| Further information | The substance is a UVCB complex. Not applicable |

Note : The derived no-effect level (DNEL) is a safe level of exposure derived from toxicological data in accordance with specific indications contained in the European REACH legislation. DNEL may differ from an occupational exposure limit value (OEL) for the same chemical. OELs may be recommended by an individual society, a state control body or an expert organisation such as the Scientific Committee on Occupational Exposure Limit Values (SCOEL) or the American Conference of Governmental Industrial Hygienists (ACGIH). OELs are considered safe levels of exposure for a typical worker in a work environment for an 8-hour shift, with a 40-hour workweek, as either a time-weighted average concentration (TWA) or a short-term (15-minute) exposure limit (STEL). Although OELs are also considered to be health protection indicators, they are derived through a different process than REACH.

#### 8.1.5. Control Belt

Control band : No stability

## 8.2. Exposure Controls

### 8.2.1. Appropriate roadworthiness tests

**Suitable roadworthiness tests:**
Ensure good ventilation of the workplace. Before accessing storage tanks and starting any type of intervention in a confined space, perform adequate remediation, check the atmosphere and check the oxygen content, the degree of flammability, and the presence of sulfur compounds. Minimize exposure to mists/vapors/aerosols. When handling hot product in confined spaces, ensure effective ventilation. See also Sec. 16, "Other Information."

### 8.2.2. Personal protective equipment

**Personal protective equipment:**
Protective visor. Gloves. Protective clothing. Safety glasses. Safety shoes.
**Personal Protective Equipment symbol(s):**

### 8.2.2.1. Eye and face protection

**Eye Protection:**
Chemical goggles or face protection shield. ISO 16321-1. Implement good personal hygiene practices

### 8.2.2.2. Skin protection

**Skin and body protection:**
Wear protective clothing when operating hot material: heat-resistant clothing (with trousers over boots and sleeves over the cuff of gloves), heavy heat-resistant and non-slip boots (e.g.: leather) (EN 943-13034-14605), resistant to chemicals. Replace and clean the protective suits at the end of your shift to avoid any product transfers to clothing or underwear.

**Hand protection:**
Protective gloves. Presumably suitable materials: nitrile (NBR) or PVC with a protection index of at least 5 (permeation time ≥240 min). If contact with the hot product is possible or foreseeable, the gloves must be heat-resistant and thermally insulated. Use gloves in accordance with the conditions and limits set by the manufacturer. Replace gloves immediately if they show cuts, holes, or other signs of degradation. If necessary, refer to the UNI EN 374 standard. The choice of glove material must take into account absorption over time, the rate of permeation and degradation. Personal hygiene is a fundamental element for effective hand care. Gloves should only be worn with clean hands. After using gloves, hands should be washed and dried perfectly.

### 8.2.2.3. Respiratory protection

**Respiratory protection:**
Regardless of other possible actions (plant adjustments, operating procedures and other means to reduce workers' exposure), the personal protective equipment that can be adopted as needed is indicated. In ventilated or outdoor environments: in the presence of mists and in case of handling of the product in the absence of suitable mist containment systems, use masks or half-masks with mist/aerosol filter (P). In case of significant presence of vapours (e.g. in case of high-temperature handling), use masks or half-masks with an organic vapour filter (A) and H2S (B), if applicable. (EN 136/140/145). In confined spaces (e.g. inside tanks): the adoption of respiratory protective devices (half masks, masks, respiratory devices) must be evaluated according to the work activity, the duration and the foreseeable intensity of exposure. For the characteristics, refer to the Ministerial Decree 02/05/2001. Combined gas/dust respirator with filter type: EN 14387. If exposure levels cannot be determined or estimated with good certainty, or if oxygen deficiency may occur, use only a stand-alone respirator. In places where hydrogen sulfide may accumulate, use approved respiratory protective equipment: full face masks equipped with a Type B filter cartridge (gray for organic vapors, including H2S), or stand-alone respirators. (EN 136/140/145)

### 8.2.2.4. Thermal hazards

**Protection against thermal hazards:**
If contact with the hot product is possible or foreseeable, the gloves must be heat-resistant and thermally insulated.

### 8.2.3. Environmental exposure controls

**Environmental exposure controls:**
Do not dispose of the product in the environment. Storage facilities/areas must be equipped with appropriate systems to prevent soil and water contamination in the event of leaks or spills. On-site wastewater treatment is required. Prevent the release of undissolved substances into or recover from wastewater. Do not distribute the sludge generated by industrial water treatment on natural soils. Sludge generated by industrial water treatment must be incinerated, kept under containment or treated.
**Limitation and control of consumer exposure:**
Not applicable.

## SECTION 9: Physical and Chemical Properties

### 9.1. Information on fundamental physical and chemical properties

| | | |
|---|---|---|
| Physical state | : | Liquid |
| Color | : | Dark brown - blackish. |
| Aspect | : | Viscous. |
| Molecular mass | : | Not applicable (UVCB) |
| Smell | : | Similar to oil. |
| Olfactory threshold | : | Lack of data in the literature - Data not available |
| Melting Point | : | Unavailable |
| Freezing point | : | < 30 °C (ISO 3016) |
| Softening point | : | -2 – 35 °C (CONCAWE, 1998) |
| Boiling point | : | 150 – 750 °C (API, 1987) (CONCAWE, 2010a) |
| Inflammability | : | Not applicable |
| Explosive properties | : | None. |
| Oxidizing properties | : | None. |
| Lower explosive limit | : | Unavailable |
| Upper explosive limit | : | Unavailable |
| Flash point | : | 64 – 310 °C (CONCAWE, 2010a) |
| Auto-ignition temperature | : | 220 – 550 °C (ASTM E 659) (CONCAWE, 2010a) |
| Decomposition Temperature | : | Unavailable |
| ph | : | Not applicable |
| Viscosity, kinematics | : | > 7 (< 20,5) mm²/s (40°C) (ISO 3104) |
| Dynamic viscosity | : | Lack of data in the literature - Data not available |
| Solubility | : | Water: Non-miscible and insoluble |
| Partition coefficient n-octanol/water (Log Kow) | : | Unavailable |
| N-octanol/water partition coefficient (Log Pow) | : | 1,99 – 18,02 |
| Vapour pressure | : | 0.02 – 0.791 kPa (120°C - ASTM D 2878) (CONCAWE 2010a) |
| Vapour pressure at 50°C | : | Lack of data in the literature - Data not available |
| Density | : | 840 – 1200 kg/m³ (15°C, EN ISO 12185, ASTM, D 4052 and/or EN ISO 3675, ASTM 1298) (CONCAWE 2010a) |
| Relative Density | : | Lack of data in the literature - Data not available |
| Relative vapor density at 20°C | : | Lack of data in the literature - Data not available |
| Particle characteristics | : | Not applicable |

### 9.2. Other information

#### 9.2.1. Information on classes of physical hazards

Explosive limits : ≥ 45 g/m³ (Mineral oil mists)

#### 9.2.2. Other security features

Relative evaporation rate (butylacetate=1) : Negligible.

## SECTION 10: Stability and Responsiveness

### 10.1. Responsiveness

This substance does not present any additional reactivity hazards than those listed in the following subheadings.

### 10.2. Chemical Stability

Stable product in relation to its intrinsic characteristics.

### 10.3. Possibility of dangerous reactions

Dangerous reactions (under normal storage and handling conditions) are not to be expected. Contact with strong oxidants (such as peroxides and chromates) may cause a fire hazard. Sensitivity to heat, friction and shock cannot be assessed in advance.

### 10.4. Conditions to be avoided

Store away from open flames, hot surfaces and ignition sources.

### 10.5. Incompatible Materials

Oxidizing agents.

### 10.6. Hazardous decomposition products

Under normal storage and use conditions, no hazardous decomposition products should be created. Thermal decomposition generates: Toxic fumes. Toxic fumes. A potential risk can be the development of hydrogen sulfide (toxic gas) when the product is stored or handled at high temperatures. Hydrogen sulphide can accumulate in tanks or confined spaces, posing a danger to operators who need to access them. In this case, overexposure can cause respiratory irritation, dizziness, nausea, loss of consciousness and death.

## SECTION 11: Toxicological information

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

Acute toxicity (oral) : Unclassified (Final data but not sufficient for classification)
Acute toxicity (cutaneous) : Unclassified (Final data but not sufficient for classification)
Acute toxicity (inhalation) : Inhalation: Dust, Mist: Harmful if inhaled.
Further information : (Inhalable aerosol)

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| DL50 oral rat | > 5000 mg/kg (OECD 401; CAS 64741-81-7, ARCO, 1992) |
| DL50 Skin Rabbit | ≥ 2000 mg/kg (EU B.3; CAS 64741-81-7; ARCO, 1992) |
| CL50 Inhalation - Rat | 1450 – 4100 mg/m³ (EPA OTS798.1150; CAS 68783-08-4; CAS 64741-62-4 - ARCO) |
| Acute Toxicity, Pharyngeal Probe, Acute, Oral, Rat, Male, Female, Local | 4320 - 5270 mg/kg ((OECD Method 401), (CAS 64741-62-4; API 1982)) |
| Acute toxicity, Acute, inhalation, rat, male, female, local | 4,1 – 4,5 mg/L (4 h, (EPA OTS 798.1150; CAS 64741-62-4; ARCO 1987) |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| CL50 Inhalation - Rat [ppm] | > 350 ppm/4h |
| CL50 Inhalation - Rat (Dust/Mist) | 621 mg/l/4h (Union Carbide, 1981) ECHA Website, 2015) |

Skin corrosion/skin irritation : Unclassified (Final data but not sufficient for classification)
pH: Not applicable
Further information : Repeated and prolonged contact can cause skin redness, irritation and contact dermatitis due to degreasing effect. Based on experimental data: Non-irritating rabbit (CAS 68476-33-5 - ARCO)(EU test B.4)
Severe eye damage/eye irritation : Unclassified (Final data but not sufficient for classification)
pH: Not applicable
Further information : Contact with the eyes may cause temporary redness and irritation. (EU B.5 - CAS 68476-33-5 - ARCO, 1988)Based on experimental data: Non-irritating to the eyes Rabbit (EU Test B.5)
Respiratory or skin sensitization : Unclassified (Final data but not sufficient for classification)
Further information : Experimental tests have yielded negative results. Based on test data. (EU Test B.6) (ARCO 1988)Guinea pig not sensitizing.
Germ cell mutagenicity : The mutagenic activity of different samples of heavy fuel oil components was evaluated both in vitro and in vivo. Ambiguous results were obtained, but modified Ames tests provided positive responses in most cases.
Further information : (OECD 471 - Ames test) (CAS 64741-62-4 - API, 1986)(EU Test B.12) (CAS 64741-62-4 - Przygoda, McKee, Amoroso, Freeman, 1999)Based on experimental data: Suspected of causing genetic alterationsDermal

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| Genotoxicity, In vitro, rat, male, female, Chromosomal aberration test, mammalian | 0; 8; 30; 125 mg/Kg bw/d (5 days per week, (OECD 474) (CAS 64741-81-7) (Mobil), Mutagenicity tests were positive) |
| Further information | Key study |

Carcinogenicity : It can cause cancer.
Further information : Based on experimental data: mouseGuideline: not specified (CAS 64741-62-4 - API, 1989)

Reproductive toxicity : Suspected of harming the fetus.
Further information : Reproductive toxicity(EPA OTS 798.4700) (NOAEL = 50 mg/kg (CAS 64741-62-4 - ARCO, 1992)Developmental toxicity/teratogenicity(EPA OTS 798.4900) (NOAEL 0.05 mg/kg - CAS 64741-62-4 - Hoberman, Christian, Lovre, Roth, Koschier, 1995)
Specific Target Organ Toxicity (STOT) — single exposure : Unclassified (Final data but not sufficient for classification)
Specific Target Organ Toxicity (STOT) — repeated exposure : It can cause damage to organs (blood, liver, thymus) in the event of prolonged or repeated exposure (Dermal).

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| LOAEL (dermal, rat/rabbit, 90 days) | 0,01 – 1 mg/kg body weight/day (Guideline: not specified - CAS 64741-62-4 - ARCO,1993) |
| NOAEL (dermal,rat/rabbit,28 days) | 1 – 10 mg/kg body weight/day |
| NOAEL (dermal, rat/rabbit, 90 days) | 1 – 10 mg/kg body weight/day (Guideline: not specified - CAS 64741-62-4 - ARCO,1993) |
| Specific Target Organ Toxicity (STOT) — repeated exposure, NOAEL, chronic, dermal, rat, male, female, systemic | 1 - 10 mg/Kg (4 weeks, (CAS 64741-62-4; ARCO 1993)) |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| LOAEC (inhalation, rat, gas, 90 days) | 30,5 – 80 ppmv/6h/day |
| NOAEC (inhalation, rat, gas, 90 days) | 10,1 – 30,5 ppmv/6h/day |

Danger in the event of suction : It can be fatal if swallowed and penetrated into the respiratory tract.
Further information : For all petroleum products with a viscosity of less than 20.5 mm2/s at 40 °C, a specific risk is related to the aspiration of the liquid into the lungs, which can occur directly following ingestion, or subsequently in the event of vomiting, spontaneous or provoked. In this case, chemical pneumonia can occur, a condition that requires medical treatment and can be fatal.
Aspiration into the lungs can cause chemical pneumonia

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| Viscosity, kinematics | > 7 (< 20,5) mm²/s (40°C) (ISO 3104) |

## 11.2. Information on other hazards

### 11.2.1. Endocrine Disrupting Properties

Adverse Health Effects Caused by Endocrine-Disrupting Properties : Nobody. The substance is not included in the list established in accordance with Article 59(1) of REACH for possession of endocrine disrupting properties, or is not identified as having endocrine disrupting properties according to the criteria established by Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

### 11.2.2. Other information

Possible harmful effects on humans and possible symptoms : Harmful if inhaled. It can cause cancer. Suspected of harming the fetus. Suspected of causing genetic alterations. It can cause damage to organs with prolonged or repeated exposure. Injury of the liver, blood, thymus.
Other information : None

# SECTION 12: Ecological Information

## 12.1. Toxicity

Ecology - general : Very toxic to aquatic organisms with long-lasting effects. Dispersion in the environment can lead to contamination of environmental matrices (soil, subsoil, surface water and groundwater). Use according to good working practice, avoiding dispersing the product into the environment. Inform the authorities if the product is discharged into the sewer system or public waters.
Ecology - air : The product has a low vapor pressure. Exposure is only possible in special cases (use at high temperatures, or for operations that cause splashes or mists).
Ecology - water : The product is not soluble in water. It floats and forms a film on the surface. The damage to aquatic organisms is mechanical (immobilization and entrapment).

Ecology - water : Very toxic to aquatic organisms.
Hazardous to the aquatic environment, short-term (acute) : Very toxic to aquatic organisms.
Hazardous to the aquatic environment, long-term (chronic) : Very toxic to aquatic organisms with long-lasting effects.

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| CL50 - Fish [1] | 79 mg/l (LL50 / 96 h) (OECD 203; Oncorhynchus mykiss - CAS 68476-33-5 - EMBSI, 2008) |
| EC50 - Crustaceans [1] | 0,22 – 2 mg/l (EL50 / 48 h) (OECD 202; Daphnia magna - CAS 64741-61-3 - EMBSI, 2012) |
| CE50 72h - Algae [1] | 0,28 – 0,37 mg/l (OECD 201 - Pseudokirchneriella subcapitata - CAS 64741-61-3 - EMBSI 2012) |
| ErC50 algae | 0,75 – 6,3 mg/l (ErL50 / 72 h) (OECD 201; Pseudokirchnerella subcapitata - EMBSI, 2008)) |
| NOEC (chronic) | 0,27 mg/l (21d - QSAR, Daphnia magna, Redman et al, 2010) |
| NOEC Chronic Fish | 0,1 mg/l (28d; QSAR, Oncorhynchus mykiss - Redman et al, 2010) |
| NOEC chronic crustaceans | 0.27 mg/L (21d, QSAR, Redman, et al. 2010) |
| NOEC chronic algae | 0,32 mg/l (NOELR, EMBSI 2012b) |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| CL50 - Fish [1] | 0,019 – 0,037 mg/l (Lepomis macrochirus) |
| EC50 - Crustaceans [1] | 0,12 mg/l (Küster E, Dorusch F and Altenburger R) |
| ErC50 algae | 1,87 mg/l (24h, Küster E, Dorusch F and Altenburger R) |

## 12.2. Persistence and degradability

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| Persistence and degradability | The substance is a UVCB complex. The main constituents of the product are to be considered "inherently" biodegradable, but not "readily" biodegradable: therefore they can be moderately persistent, particularly in anaerobic conditions. The test methods for this endpoint are not applicable to UVCB substances. |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| Persistence and degradability | Easily biodegradable. |
| Biodegradation | 76 % (48h) |

## 12.3. Bioaccumulation potential

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| BCF - Fish [1] | 0,6 – 71100 l/kg (QSAR 2012) |
| N-octanol/water partition coefficient (Log Pow) | 1,99 – 18,02 |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| N-octanol/water partition coefficient (Log Pow) | 0,45 |
| Bioaccumulation potential | Unavailable. |

## 12.4. Mobility in soil

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| Normalized absorption coefficient of organic carbon (Log Koc) | 1,71 – 14,7 (20°C, Reference Schüürmann et al 2006) |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| Ecology - soil | Unavailable. |

### 12.5. Results of the PBT and vPvB assessment

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) |
|---|
| This substance/mixture does not meet the PBT criteria of the REACH Regulation, Annex XIII |
| This substance/mixture does not meet the vPvB criteria of the REACH Regulation, Annex XIII |

| Component | |
|---|---|
| Substance(s) that does not meet the PBT criteria of the REACH Regulation, in accordance with Annex XIII | Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5), Hydrogen Sulfide (7783-06-4)(1) |
| Substance(s) that does not meet the vPvB criteria of REACH, in accordance with Annex XIII | Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5), Hydrogen Sulfide (7783-06-4)(1) |

(1) Substance(s) in a concentration of less than 0,1% and indicated on a voluntary basis

### 12.6. Endocrine Disrupting Properties

Adverse effects on the environment caused by endocrine-disrupting properties : No one is known. The substance is not included in the list established in accordance with Article 59(1) of REACH for possession of endocrine disrupting properties, or is not identified as having endocrine disrupting properties according to the criteria established by Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

### 12.7. Other adverse effects

Other adverse effects : Nobody.

| Fuel Oil, Residue - Heavy Fuel Oil (68476-33-5) | |
|---|---|
| Other information | This product has no specific characteristics of inhibition of bacterial cultures. In any case, the water contaminated by the product must be treated in purification plants suitable for the purpose. |

| hydrogen sulfide (7783-06-4) | |
|---|---|
| Other information | This product has no specific characteristics of inhibition of bacterial cultures. In any case, the water contaminated by the product must be treated in purification plants suitable for the purpose. |

## SECTION 13: Disposal Considerations

### 13.1. Waste treatment methods

Waste treatment methods : Do not dump the product, whether new or used, into sewers, tunnels or waterways. Collect and deliver to authorized collectors (Legislative Decree 152/2006 and related regulations).

Recommendations for disposal in sewers : Do not distribute the sludge generated by industrial water treatment on natural soils. Sludge generated by industrial water treatment must be incinerated, kept under containment or treated. Dispose of safely in accordance with Legislative Decree 152/06 and subsequent amendments and additions.

Advice for the disposal of the Product/Packaging : European Waste Catalogue (Decision 2001/118/EC) code(s): 13 07 01* ("fuel oil and diesel fuel"). The EWC code indicated is only a general indication, based on the original composition of the product and its intended use. The user has the final responsibility to choose the most appropriate EWC code, based on the actual use of the product and any alterations or contamination.

Further information : Empty containers may contain combustible product residues. Do not puncture, cut, grind, weld, braze, burn, or incinerate unreclaimed empty containers or drums.

About Green Waste : The product as such does not contain halogenated compounds.

European List of Wastes (LoW, EC 2150/2002) : 13 07 01* - Fuel oil and diesel fuel

## SECTION 14: Transportation Information

In accordance with: ADR / IMDG / IATA / ADN / RID

| ADR | IMDG | IATA | DNA | RID |
|---|---|---|---|---|
| **14.1. UN number or ID number** | | | | |
| UN 3082 | UN 3082 | UN 3082 | UN 3082 | UN 3082 |
| **14.2. Official UN transport designation** | | | | |
| ENVIRONMENTALLY HAZARDOUS MATTER, LIQUID, N.O.S. (Fuel oil, residue) | ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuel oil, residual) | Environmentally hazardous substance, liquid, n.o.s. (Fuel oil, residual) | ENVIRONMENTALLY HAZARDOUS MATTER, LIQUID, N.O.S. (Fuel oil, residue) | ENVIRONMENTALLY HAZARDOUS MATTER, LIQUID, N.A.S.. (Fuel oil, residue) |
| **Description of the transport document** | | | | |
| UN 3082 ENVIRONMENTALLY HAZARDOUS MATTER, LIQUID, N.O.S. (Fuel oil, residue), 9, III, (-) | UN 3082 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Fuel oil, residual), 9, III, MARINE POLLUTANT | UN 3082 Environmentally hazardous substance, liquid, n.o.s. (Fuel oil, residual), 9, III | UN 3082 ENVIRONMENTALLY HAZARDOUS MATTER, LIQUID, N.O.S. (Fuel oil, residue), 9, III | A 3082 ENVIRONMENTALLY HAZARDOUS MATTER, LIQUID, N.O.S.. (Fuel oil, residue), 9, III |
| **14.3. Transport hazard classes** | | | | |
| 9 | 9 | 9 | 9 | 9 |
|  |  |  |  |  |
| **14.4. Packaging group** | | | | |
| III | III | III | III | III |
| **14.5. Hazards to the environment** | | | | |
| Hazardous to the environment: Yes | Hazardous to the environment: Yes<br>Marine pollutant: Yes<br>EmS (Fire) No.: F-A<br>N° EmS (Spillage): S-F | Hazardous to the environment: Yes | Hazardous to the environment: Yes | Hazardous to the environment: Yes |
| None. | | | | |

### 14.6. Special precautions for users

**Ground transport**

Transport Regulations (ADR) : Subject to the provisions
Classification Code (ADR) : M6
Special Provisions (ADR) : 274, 335, 375, 601, 650
Limited quantities (ADR) : 5L
Exempt quantities (ADR) : E1
Transport category (ADR) : 3
Hazard identification number (n°. Kemler) : 90
Orange panel :


Tunnel Restriction Code (ADR) : -

**Sea transport**

Transport Regulations (IMDG) : Subject to the provisions

| | | |
|---|---|---|
| Special Provisions (IMDG) | : | 274, 335, 375, 969 |
| Limited quantities (IMDG) | : | 5 L |
| Exempt quantities (IMDG) | : | E1 |
| IBC Packaging Instructions (IMDG) | : | IBC03 |
| Stowage category (IMDG) | : | At |

### Air transport

| | | |
|---|---|---|
| Transport Regulations (IATA) | : | Subject to the provisions |
| Exempt passenger and cargo aircraft quantities (IATA) | : | E1 |
| Max. net quantities of limited passenger and cargo aircraft (IATA) | : | 30kgG |
| Max. net quantities per passenger and cargo aircraft (IATA) | : | 450L |
| Max. net cargo air quantity (IATA) | : | 450L |
| Special Provisions (IATA) | : | A97, A158, A197, A215 |
| ERG Code (IATA) | : | 9L |

### River transport

| | | |
|---|---|---|
| Transport Regulations (ADN) | : | Subject to the provisions |
| Classification Code (ADN) | : | M6 |
| Limited quantities (ADN) | : | 5 L |
| Exempt quantities (ADN) | : | E1 |
| Required Equipment (ADN) | : | PP |

### Transport by rail

| | | |
|---|---|---|
| Transport Regulations (RID) | : | Subject to the provisions |
| Classification Code (RID) | : | M6 |
| Special Provisions (RID) | : | 274, 335, 375, 601, 650 |
| Limited quantities (RID) | : | 5L |
| Exempt quantities (RID) | : | E1 |
| Transport category (RID) | : | 3 |
| Hazard Identification Number (RID) | : | 90 |

## 14.7. Bulk shipping in accordance with IMO acts

IBC Code : Not applicable (refer to Annex I to MARPOL).

# SECTION 15: Regulatory Information

## 15.1. Laws and regulations on health, safety and the environment specific to the substance or mixture

### 15.1.1. EU Regulations

Additional Rules, Restrictions and Legal Requirements : 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). (et sequens). Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (et sequens). Substances that deplete the ozone layer (1005/2009) - Annex I substances (ODP). POP (2019/1021) - Persistent organic pollutants. EU Regulation (649/2012) - Export and Import of Hazardous Chemicals (PIC). Commission Delegated Regulation (EU) 2017/2100. Commission Regulation (EU) 2018/605.

### REACH Annex XVII (List of Restrictions)

**List of EU restrictions (Annex XVII of REACH)**

| Reference code | Applicable on | Entity title or description |
|---|---|---|
| 3(b) | Fuel Oil, Residue - Heavy Fuel Oil | Substances or mixtures that meet the criteria for one of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or development, 3.8 effects other than narcotic effects, 3.9 and 3.10 |

| List of EU restrictions (Annex XVII of REACH) | | |
|---|---|---|
| **Reference code** | **Applicable on** | **Entity title or description** |
| 3(c) | Fuel Oil, Residue - Heavy Fuel Oil | Substances or mixtures that meet the criteria for one of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: Hazard class 4.1 |
| 28. | Fuel Oil, Residue - Heavy Fuel Oil | Substances classified as carcinogenic category 1A or 1B in Part 3 of Annex VI to Regulation (EC) No 1272/2008 and listed in Appendix 1 or Appendix 2 respectively. |

### Annex XIV REACH (List of authorisations)

Not listed in Annex XIV of REACH (list of authorisations)

### List of substances included in the "Candidate List" of the REACH Regulation (SVHC)

Does not contain any substances listed on the REACH Candidate List

### PIC Regulation (Subject to Informed Consent)

Not included in the PIC list (EU Regulation 649/2012)

### Regulation on POPs (Persistent Organic Pollutants)

Not on the POP list (EU Regulation 2019/1021)

### Ozone Regulation (2024/590)

Not listed on the ozone depletion list (EU Regulation 2024/590)

### Council Regulation (EC) on the control of dual-use items

Does not contain a substance subject to the COUNCIL REGULATION (EC) for the control of dual-use items

### Seveso Directive (disaster risk reduction)

Seveso Further information : Seveso Category: E1

### Explosives Precursors Regulation (2019/1148)

It does not contain any substances listed in the list of explosives precursors (Regulation EU 2019/1148 as regards the marketing and use of explosives precursors)

### Drug Precursors Regulation (273/2004)

Does not contain substances listed in the list of drug precursors (Regulation (EC) 273/2004 on the manufacture and placing on the market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

### 15.1.2. National rules

Legislative Decree 81/2008, relating to the "Implementation of art. 1 of the law of 3 August 2007, on the protection of health and safety in the workplace." Legislative Decree 105/2015 (adoption of Directive 2012/18/EC for the control of major-accident hazards related to certain dangerous substances). Legislative Decree 152/06 : "Environmental regulations", and subsequent amendments and additionsD. Lgs 151/2001 (Consolidated Law on the protection and support of maternity and paternity)

### France

| Occupational diseases | |
|---|---|
| Code | Description |
| RG 36 | Diseases caused by oils and fats of mineral or synthetic origin |

### Germany

Employment restrictions : Employment bans or restrictions for the protection of young people in the workplace in accordance with § 22 JArbSchG in the case of the formation of dangerous substances must be observed.
The prohibitions and restrictions in accordance with § 4 and §5 MuSchArbV must be observed.

National Laws and Recommendations : TRGS 400: Risk assessment for activities with hazardous substances.
TRGS 401: Risks arising from skin contact - identification, evaluation, measurements.
TRGS 402: Identification and Risk Assessment from Hazardous Substance Activities: Inhalation Exposure.
TRGS 500: Protective measures.
TRGS 510: Storage of hazardous substances in non-fixed tanks.
TRGS 526: Laboratories.
TRGS 555: Work instructions and information for workers.
TRGS 559: Mineral powder.
TRGS 560: Air recirculation in activities involving carcinogenic, mutagenic and toxic dusts for fertility.
TRGS 900: Occupational exposure limits.
TRGS 903: Biological limit values.
TRGS 905: List of mutagenic, carcinogenic or teratogenic substances.
TRGS 910: Measures of the Related Risk Concept for Activities Involving Carcinogenic Hazardous Substances.

Water hazard class (WGK) (D) : WGK 3, Highly hazardous to water (Classification according to AwSV, Annex 1; ID No. 443).

WGK note : The classification is carried out on the basis of the Ordinance on Structures for the Handling of Substances Hazardous to Water (Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV)) of 18 April 2017 (BGBl 2017, Teil I, Nr. 22, Seite 905).

Storage class (LGK, TRGS 510) : LGK 10 - Combustible liquids.

Joint Storage Table :

| | | | | |
|---|---|---|---|---|
| LGK 1 | LGK 2A | LGK 2B | LGK 3 | LGK 4.1A |
| LGK 4.1B | LGK 4.2 | LGK 4.3 | LGK 5.1A | LGK 5.1B |
| LGK 5.1C | LGK 5.2 | LGK 6.1A | LGK 6.1B | LGK 6.1C |
| LGK 6.1D | LGK 6.2 | LGK 7 | LGK 8A | LGK 8B |
| LGK 10 | LGK 11 | LGK 12 | LGK 13 | LGK 10-13 |

Joint storage not allowed for : LGK 1, LGK 2A, LGK 5.1A, LGK 6.2, LGK 7.

Joint storage with restrictions allowed for : LGK 4.1A, LGK 4.2, LGK 4.3, LGK 5.1B, LGK 5.1C, LGK 5.2.

Joint storage allowed for : LGK 2B, LGK 3, LGK 4.1B, LGK 6.1A, LGK 6.1B, LGK 6.1C, LGK 6.1D, LGK 8A, LGK 8B, LGK 10, LGK 11, LGK 12, LGK 13, LGK 10-13.

Chemical Ban Ordinance (ChemVerbotsV) : This product is subject to Annex 2 of ChemVerbotsV, entry 1. The following requirements must be observed: authorization requirement (according to § 6 paragraph 1 sentence 1), basic requirements for the execution of the delivery (according to § 8 paragraphs 1, 3 and 4), identification and documentation (according to § 9 paragraphs 1 to 3) and exclusion of the shipping route (according to § 10).

Ordinance on Dangerous Accidents (12. BImSchV) : It is not subject to the Ordinance on Dangerous Accidents (12. BImSchV)

### Holland

ABM Category : Z(2) - biodegradable substances with properties hazardous to humans and the environment (carcinogenicity/mutagenicity/reprotoxicity/potential for bioaccumulation or toxicity)

SZW list of carcinogens : Fuel Oil, Residue - Heavy Fuel Oil is listed

SZW list of mutagens : Fuel Oil, Residue - Heavy Fuel Oil is listed

SZW list of reprotoxic substances – Breastfeeding : The substance is not listed

SZW list of reprotoxic substances – Fertility : The substance is not listed

SZW list of reprotoxic substances – Development : The substance is not listed

### Denmark

Comments on classification : For storage of flammable liquids follow emergency management guidelines

Danish National Regulations : Pregnant/breastfeeding women working with the product should not be in direct contact with it

### Switzerland

Storage class (LK) : LK 6.1 - Toxic Materials

Chemicals Ordinance (ChemO, SR 813.11) : Group 1

## 15.2. Chemical Safety Assessment

A chemical safety assessment was carried out.

## SECTION 16: Other Information

**Indications of changes:**
EU SDS format according to COMMISSION REGULATION (EU) 2020/878. All sections.

| Abbreviations and acronyms: | |
|---|---|
| | N/A = not available |
| | N/A = not applicable |
| ADN | European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways |
| ADR | European Agreement concerning the International Carriage of Dangerous Goods by Road |
| STA | Estimation of acute toxicity |
| BCF | Bioconcentration factor |
| CAS Number | Chemical Abstract Service (CAS) Number |
| CLP | Regulation on classification, labelling and packaging; Regulation (EC) No 1272/2008 |
| DMEL | Derived level with minimal effects |
| DNEL | Derived level with no effect |
| EC number | EC Number (European Community) |
| EC50 | Effective concentration for 50% of the population tested (median effective concentration) |
| AND | Endocrine Disruptor |
| IARC | International Agency for Research on Cancer |
| IATA | International Air Transport Association |
| IMDG | International Maritime Dangerous Goods Code |
| IOELV | Indicative Occupational Exposure Limit Value |
| LC50 | Lethal concentration for 50% of the tested population (median lethal concentration) |
| LD50 | Lethal dose resulting in the death of 50% of the tested population (median lethal dose) |
| LOAEC | Lowest concentration at which an adverse effect is observed |
| LOAEL | Lowest level at which an adverse effect is observed |
| NOAEC | Concentration free of observed adverse effects |
| NOAEL | Dose free of observed adverse effects |
| NOEC | Concentration with no observed effects |
| N.A.S. | Not otherwise specified |
| OECD | Organisation for Economic Co-operation and Development |
| OEL | Occupational Exposure Limit |
| PBT | Persistent, bioaccumulative and toxic |
| NECP | Predicted concentration with no effect |
| REACH | Registration, Evaluation, Authorisation and Restriction of Chemicals, Regulation (EC) No 1907/2006 |
| RID | Regulation on the International Carriage of Dangerous Goods by Rail |
| SDS | Safety Data Sheet |
| STP | Wastewater Treatment Plant |
| TRGS | Technical Rules for Hazardous Substances |
| COV | Volatile organic compounds |

| Abbreviations and acronyms: | |
|---|---|
| vPvB | Very persistent and very bioaccumulative |
| WGK | Water Hazard Class |

Data Sources : Chemical safety assessment. 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). (et sequens). Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (et sequens).

Training tips : Provide appropriate training to professional operators in the use of Personal Protective Equipment (PPE), based on the information contained in this Safety Data Sheet.

Other information : Do not use the product for any purpose that has not been indicated by the manufacturer. In exceptional cases (prolonged storage in tanks contaminated with water, presence of anaerobic sulphur-reducing bacteria), the product may degrade by developing small amounts of sulphur compounds, including H2S. This situation is particularly relevant for confined space entry operations involving direct exposure to vapours in the tank. If this possibility is suspected, carry out a specific assessment of the inhalation risks deriving from the presence of hydrogen sulphide in confined spaces, to determine which are the best means of prevention and control (e.g. PPE) to be adopted according to local conditions, and any emergency procedures. This situation is particularly relevant for operations involving direct exposure to vapors inside tanks or other confined spaces. Therefore, the need to adopt the precautions for use mentioned above is also emphasized with waste oils.

| Full text of the H and EUH hazard statements: | |
|---|---|
| Acute Tox. 2 (by inhalation) | Acute toxicity (by inhalation), category 2 |
| Acute Tox. 4 (for inhalation: dust, mist) | Acute toxicity (by inhalation: dust, mist) Category 4 |
| Aquatic Acute 1 | Hazardous to the aquatic environment – Acute hazard, category 1 |
| Aquatic Chronic 1 | Hazardous to the aquatic environment – Chronic hazard, category 1 |
| Asp. Tox. 1 | Aspiration hazard, category 1 |
| Carc. 1B | Carcinogenicity, category 1B |
| Flam. Gas 1A | Flammable gases, category 1A |
| Moulting. 2 | Germ cell mutagenicity, category 2 |
| Press. Gas | Gas under pressure |
| Repr. 2 | Reproductive toxicity, category 2 |
| STOT RE 2 | Specific Target Organ Toxicity – Repeated Exposure, Category 2 |
| H220 | Highly flammable gas. |
| H304 | It can be fatal if swallowed and penetrated into the respiratory tract. |
| H330 | The planes were inflated. |
| H332 | The night was intruding. |
| H341 | Suspected of causing genetic alterations (Dermal). |
| H350 | It can cause cancer. |
| H361d | Suspected of harming the fetus. |
| H373 | It can cause damage to organs (blood, liver, thymus) in the event of prolonged or repeated exposure (Dermal). |
| H400 | Very toxic to aquatic organisms. |

| Full text of the H and EUH hazard statements: | |
|---|---|
| H410 | Very toxic to aquatic organisms with long-lasting effects. |
| EUH066 | Repeated exposure may result in dryness or cracking of the skin. |

| Full text of the descriptors of use | |
|---|---|
| ERC1 | Substance Manufacture |
| ERC2 | Formulation of mixtures |
| ERC3 | Solid matrix formulation |
| ERC4 | Industrial use of non-reactive processing aids (without inclusion inside or on the surface of the article) |
| ERC5 | Industrial use resulting in inclusion in or on the surface of an item |
| ERC6a | Use of intermediates |
| ERC6b | Industrial use of reactive processing aids (without inclusion inside or on the surface of the article) |
| ERC6c | Industrial use of monomers in polymerization processes (with or without inclusion inside or on the surface of the article) |
| ERC6d | Industrial use of reaction process regulators in polymerization (with or without inclusion in or on the surface of an article) |
| ERC7 | Industrial use of functional fluids |
| ERC8a | Generalized use of non-reactive processing aids (without inside or on the surface of an article, indoor use) |
| ERC8d | Generalized use of non-reactive processing aids (without inclusion inside or on the surface of an article, outdoor use) |
| ERC8f | Generalized use resulting in inclusion on the inside or surface of an item (outdoor use) |
| ERC9a | Generalized use of functional fluids (indoor use) |
| ERC9b | Generalized use of functional fluids (outdoors) |
| ESVOC SPERC 1.1b.v1 | Distribution: Industrial (SU3) |
| ESVOC SPERC 2.2.v1 | Formulation and packaging of preparations and mixtures: industrial (SU10) |
| ESVOC SPERC 7.12a.v1 | Use as fuel: industrial (SU3) |
| ESVOC SPERC 8.15.v1 | Road and Construction applications: Professional (SU22) |
| ESVOC SPERC 8.3b.v1 | Uses in coatings: professional (SU22) |
| ESVOC SPERC 9.12b.v1 | Fuel usage: Professional (SU22) |
| PROC1 | Production or refining of chemicals in closed processes, without the possibility of exposure, or in processes with equivalent containment conditions |
| PROC15 | Use as laboratory reagents |
| PROC16 | Use of fuels |
| PROC2 | Production or refining of chemicals in a closed, continuous process, with occasional controlled exposure or processes with equivalent containment conditions |
| PROC3 | Manufacture or formulation of chemicals in closed batch processes, with occasional controlled exposure, or processes with equivalent containment conditions |
| PROC8a | Transfer of a substance or preparation (filling/emptying) to non-dedicated facilities |
| PROC8b | Transfer of a substance or mixture (filling/emptying) at dedicated facilities |
| SU10 | Formulation [mixing] of preparations and/or repackaging (except alloys) |
| SU22 | Professional uses: public sector (administration, education, entertainment, services, crafts) |
| SU3 | Industrial uses: uses of substances on their own or in preparations at industrial sites |

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# ATTACHMENT

# EXPOSURE SCENARIOS

# Related to the component RESIDUAL FUEL OIL

| Identified use name | Sector | Area of use SU | PROC Process Categories | ERC Environmental Release Categories | Specific ERC environmental release categories |
|---|---|---|---|---|---|
| 01a- Distribution of the substance (GEST1A_I) | Industrial (G26) | 3 | 1, 2, 3., 8a, 8b. 15 | 1,2,3,4,5,6a,6b,6c,6d,7 | ESVOC SpERC 1.1b.v1 |
| 02- Formulation and (re)packaging of substances and mixtures (GEST2_I) | Industrial (G26) | 3,10 | 1, 2, 3., 8a, 8b. 15 | 2 | ESVOC SpERC 2.2.v1 |
| 12a-Fuel Use (GEST12_I): Industrial (G26) | Industrial (G26) | 3 | 1, 2, 3., 8a, 8b. 16 | 7 | ESVOC SpERC 7.12a.v1 |
| 12b- Fuel use (GEST12_I): Professional | Professional (G27) | 22 | 1, 2, 3., 8a, 8b. 16 | 9a,9b | ESVOC SpERC 9.12b.v1 |

# Index

# 1. Fuel Oil Distribution – Industrial

| | |
|---|---|
| **Section 1** | |
| **Title** | |
| Fuel Oil Distribution – Industrial | |
| **Usage descriptors** | |
| Areas of use | 3 |
| Process Categories | 1, 2, 3, 8a, 8b, 15 |
| Environmental Release Categories | 1, 2, 3, 4, 5, 6a, 6b, 6c, 6d, 7 |
| Specific Environmental Release Categories | ESVOC SpERC 1.1b v1 |
| **Processes, tasks, activities covered** | |
| Loading of bulk substances (on vessels/barges, wheeled or rail tank cars and IBCs) within closed systems or under containment, including accidental exposure during sampling, storage, unloading, maintenance and associated laboratory activities (CGES1A_I). | |
| **Valuation method** | |
| See section 3. | |
| **Section 2 Operating Conditions and Risk Management Measures** | |
| | |
| **Section 2.1 Control of workers' exposure** | |
| **Product features** | |
| Physical state | Liquid |
| Vapor Pressure (kPa) | Liquid, vapor pressure < 0,5 kPa under standard conditions (OC3). |
| Concentration of the substance in the product | Covers a percentage of substance in the product up to 100% (unless otherwise stated) (G13). |
| Frequency and duration of use/exposure | Covers a daily exposure of up to 8 hours (unless otherwise specified) (G2). |
| Other operating conditions affecting exposure | It assumes that the product is used at a temperature not exceeding 20° C above the ambient temperature, unless otherwise specified (G15).<br>It presupposes the application of an appropriate basic standard for hygiene in the workplace (G1). |
| **Scenario characteristics** | **Specific risk management measures and operating conditions** |
| General measures (carcinogens) (G18) | Consider technical advances and process upgrades (including automation) to eliminate leakage. Limit exposure by adopting measures such as closed systems, dedicated systems and special general/localized exhaust air extraction systems. Drain systems and clean transfer lines before disrupting containment. Clean/purge equipment where possible prior to servicing.<br>Where there is a possibility of exposure: limit access to authorized personnel only, ensure operators are trained specifically on the activities and operations to be carried out in order to minimize the risk of exposure, wear protective gloves and overalls to prevent skin contamination, use respiratory protective equipment when required for certain exposure scenarios, Immediately eliminate any spills and dispose of waste safely.<br>Ensure the adoption of safe work systems or equivalent solutions for risk management. Inspect, control, and regularly maintain all control devices and measures.<br>Consider the need for a risk-based health surveillance system (G20). |
| Sampling Process (CS2) + External (OC9) | Sample via a closed loop or other system to avoid exposure (E8).<br>Do not engage in activities that involve exposure for more than 15 minutes (OC26).<br>Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |

| | |
|---|---|
| General Exposures (Closed System) (CS15) | Manipulate the substance in a closed system (E47).<br>Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28).<br>Sampling via a closed cycle or other system to avoid exposure (E8)<br>Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Bulk Gun Storage (CS85) | Store the substance within a closed system (E84).<br>Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28).<br>Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Product Sampling (CS137) | Sample via a closed loop or other system to avoid exposure (E8).<br>Do not engage in activities that involve exposure for more than 15 minutes (OC26).<br>Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Laboratory activities (CS36) | Handle only under a fume hood or use equivalent methods to minimize exposure risks (E12).<br>Wear protective gloves that comply with the EN374 (PPE15) standard. |
| Loading or unloading on and from Boats/Barges (CS510) | Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Transfer through closed lines (E52). Empty the transfer lines before decoupling (E39). Store drains in leak-proof containers for disposal or recycling (ENVT4). Wear chemical protective gloves (EN374 compliant), along with a basic training course. (PPE16). |
| Loading on tank wagons on road or rail (CS511) | Ensure that material transfer occurs under containment or extraction ventilation (E66) conditions.<br>Wear chemical protective gloves (EN374 compliant), along with a basic training course. (PPE16). |
| Equipment Cleaning and Maintenance (CS39) | Drain and purge the system before opening or servicing equipment (E55).<br>Wear chemical protective gloves (EN374 compliant), along with specific task training (PPE17).<br>Store drains in leak-proof containers for disposal or recycling (ENVT4). |

| **Section 2.2 Environmental Exposure Control (1276)** | |
|---|---|
| **Product features** | |
| The substance is a UVCB complex (PrC3). Predominantly hydrophobic (PrC4a) | |
| **Quantities used** | |
| Fraction of EU tonnage used locally (A1) | 0.1 |
| Regional tonnage (tonnes/year) (A2) | 1.1e7 |
| Fraction of regional tonnage used locally (A3) | 2.0e-3 |
| Annual tonnage of the site (tonnes/year) (A5) | 2.3e4 |
| Maximum Daily Site Tonnage (kg/day) (A4) | 7.7e4 |
| **Frequency and duration of use** | |
| Continuous release (FD2) | |
| Issuing Days (days/year) (FD4) | 300 |
| **Environmental factors not affected by management risks** | |
| | |
| Local dilution factor in fresh water (EF1) | 10 |
| Local dilution factor in seawater (EF2) | 100 |
| **Other operating conditions affecting environmental exposure** | |
| | |
| Fraction released into the air by the process (initial release before application of risk management measures) (OOC4) | 1.0e-4 |

| | |
|---|---|
| Fraction released into wastewater from the process (initial release before application of risk management measures) (OOC5) | 1.0e-7 |
| Fraction released in the soil by the process (initial release before the application of risk management measures) (OOC6) | 0.00001 |
| **Process-level (source) measures and technical conditions to prevent releases** | |
| Procedures vary from site to site, so conservative process emission estimates (TCS1) are used. | |
| **Technical conditions on site and measures to reduce or limit discharges, air emissions and releases into the soil** | |
| Environmental risk is related to indirect exposure of humans via ingestion (TCR1j).<br>No wastewater treatment required (TCR6) | |
| Treat emissions in such a way as to ensure a typical removal effectiveness of (%) (TCR7) | 90 |
| Treat wastewater on-site (before starting the discharge operation) to ensure the required removal effectiveness ≥ (%) | 0 |
| In case of discharge through an urban treatment plant, ensure the required effectiveness of on-site removal ≥ (%) | 0 |
| **Organizational measures to prevent/limit release from the site** | |
| Do not distribute the sludge generated by industrial water treatment on natural soils (WHO2).<br>Sludge generated by industrial water treatment must be incinerated, kept under containment or treated (WHO3). | |
| **Conditions and measures relating to the municipal waste water treatment plant** | |
| | |
| Estimated removal of wastewater substance by means of an urban treatment plant (%) (STP3). | 88.8 |
| Total effectiveness of wastewater removal, after the adoption of on-site and offsite (urban-type treatment plant) RMMs (%) (STP4) | 88.8 |
| Maximum allowable tonnage for the site (MSafe) based on release after total wastewater removal treatment (kg/d) (STP6). | 3.8e5 |
| Assumed flow rate for the urban wastewater treatment plant (m3/d) (STP5) | 2000 |
| **Conditions and measures relating to the external treatment of waste for the purpose of** | |
| No waste related to the substance is generated during production and must be disposed of (ETW4) | |
| **Conditions and measures relating to external waste recovery** | |
| External waste collection and recycling must comply with applicable local and/or national legislation (ERW1). | |
| **Section 3 Estimating Exposures** | |
| **3.1 Health** | |
| For the purpose of assessing the level of exposure in the workplace, where not expressly indicated, the ECETOC TRA (G21) method was used. | |
| **3.2 Environment** | |
| The HBM (Hydrocarbon Block Method) method was used to calculate environmental exposure with the Petrorisk model (EE2) | |
| **Section 4** | |
| **4.1 Health** | |
| Exposures are expected not to exceed DN(M)EL when the Risk Management Measures/Operating Conditions described in Section 3 (G22) are applied<br>Where different Risk Management Measures/Operating Conditions are in place, users are required to ensure that risks are managed at least at an equivalent level (G23).<br>The available data on hazard characteristics do not allow the derivation of a DNEL for carcinogenic effects (G33).<br>The available data on hazard characteristics do not support the need to establish a DNEL for other health effects (G36).<br>Risk Management Measures are based on the qualitative characterization of risk (G37). | |
| **4.2 Environment** | |
| The guideline is based on assumptions of use that may not apply to all sites; therefore, a scaling operation may be required to define appropriate site-specific risk management measures (DSU1). | |

The required efficiency of wastewater removal can be achieved using onsite/offsite technologies, either individually or in combination (DSU2).
The required efficiency of air removal can be achieved by using onsite technologies, either individually or in combination (DSU3).
Further information on scaling activities and control technologies is provided by the SpERC (http://cefic.org/en/reach-for-industries-libraries.html) datasheets (DSU4).
For refineries where scaling activities identify hazardous conditions of use (i.e. RCR>1), a site-specific chemical safety assessment is required. As a result, in some specific cases, a Tier2 assessment has been developed showing that there are no refineries characterized by an RCR>1 parameter.

# 2. Formulation and (Re)packaging of Fuel Oil – Industrial

| | |
|---|---|
| **Section 1 Exposure to the Heavy Fuel Oil Scenario** | |
| **Title** | |
| Formulation and (Re)packaging of Fuel Oil – Industrial | |
| **Usage descriptors** | |
| Areas of use | 3, 10 |
| Process Categories | 1, 2, 3, 8a, 8b, 15 |
| Environmental Release Categories | 2 |
| Specific Environmental Release Categories | ESVOC SpERC 2.2 v1 |
| **Processes, tasks, activities covered** | |
| Formulation of the substance and its mixtures in continuous and discontinuous operations within closed systems or under containment, including accidental exposure during storage, material transfer, mixing, maintenance, sampling and associated laboratory activities (E14). | |
| **Valuation method** | |
| See section 3. | |
| **Section 2 Operating Conditions and Risk Management Measures** | |
| | |
| **Section 2.1 Control of workers' exposure** | |
| **Product features** | |
| Physical state of the product | Liquid |
| Vapor Pressure (kPa) | Liquid, vapor pressure < 0,5 kPa under standard conditions (OC3). |
| Concentration of the substance in the product | Covers a percentage of substance in the product up to 100% (unless otherwise stated) (G13). |
| Frequency and duration of use/exposure | Covers a daily exposure of up to 8 hours (unless otherwise specified) (G2). |
| Other operating conditions affecting exposure | It assumes that the product is used at a temperature not exceeding 20° C above the ambient temperature, unless otherwise specified (G15).<br>It assumes the application of one (G1). |
| **Scenario characteristics** | **Specific risk management measures and operating conditions** |
| General measures (carcinogens) (G18) | Consider technical advances and process upgrades (including automation) to eliminate leakage. Limit exposure by adopting measures such as closed systems, dedicated systems and special general/localized exhaust air extraction systems. Drain systems and clean transfer lines before disrupting containment. Clean/purge equipment where possible prior to servicing.<br>Where there is a possibility of exposure: limit access to authorized personnel only, ensure operators are trained specifically on the activities and operations to be carried out in order to minimize the risk of exposure, wear protective gloves and overalls to prevent skin contamination, use respiratory protective equipment when required for certain exposure scenarios, Immediately eliminate any spills and dispose of waste safely.<br>Ensure the adoption of safe work systems or equivalent solutions for risk management. Inspect, control, and regularly maintain all control devices and measures.<br>Consider the need for a risk-based health surveillance system (G20). |
| General Exposures (Closed Systems) (CS15) + In-Process Sampling (CS2) | Manipulate the substance in a closed system (E47). Sample via a closed loop or other system to avoid exposure (E8). Do not engage in activities that involve exposure for more than 15 minutes (OC26). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |

| | |
|---|---|
| General Exposures (Closed Systems) (CS15) | Manipulate the substance in a closed system (E47). Sample via a closed loop or other system to avoid exposure (E8). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Bulk Gun Storage (CS85) | Store the substance within a closed system (E84). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Product Sampling (CS137) | Sample via a closed loop or other system to avoid exposure (E8). Do not engage in activities that involve exposure for more than 15 minutes (OC26). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Laboratory activities (CS36) | Handle only under a fume hood or use equivalent methods to minimize exposure hazards. (E12). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Loading or unloading on and from Boats/Barges (CS510) | Transfer through closed lines (E52). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Empty the transfer lines before decoupling (E39). Store drains in leak-proof containers for disposal or recycling (ENTV4). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Loading on tank wagons on road or rail (CS511) | Ensure that material transfer occurs under containment or extraction ventilation (E66) conditions. Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Drum/batch transfers (CS8) | Ensure that material transfer occurs under containment or extraction ventilation (E66) conditions. Ensure an adequate standard of general ventilation (no less than 3-5 air changes per hour) (E11) or (G9) ensure that the operation is carried out outside (E69). Do not carry out activities that involve the possibility of exposure for a period of more than 1 hour (OC27). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Equipment Cleaning and Maintenance (CS39) | Drain and purge the system before opening or servicing equipment (E55). Wear chemical protective gloves (EN374 compliant), along with specific task training (PPE17).<br>Store drains in leak-proof containers for disposal or recycling (ENVT4). |

| **Section 2.2 Environmental Exposure Control** | |
|---|---|
| **Product features** | |
| The substance is a UVCB complex (PrC3). Predominantly hydrophobic (PrC4a) | |
| **Quantities used** | |
| Fraction of EU tonnage used locally (A1) | 0.1 |
| Regional tonnage (tonnes/year) (A2) | .1e7 |
| Fraction of regional tonnage used locally (A3) | 2.6e3 |
| Annual tonnage of the site (tonnes/year) (A5) | 3.0e4 |
| Maximum Daily Site Tonnage (kg/day) (A4) | 1.0e5 |
| **Frequency and duration of use** | |
| Continuous release (FD2) | |
| Issuing Days (days/year) (FD4) | 300 |
| **Environmental factors not affected by risk management** | |
| Local dilution factor in fresh water (EF1) | 10 |
| Local dilution factor in seawater (EF2) | 100 |
| **Other operability conditions affecting environmental exposure** | |
| Fraction released into the air by the process (initial release before application of risk management measures) (OOC4) | 2.2e-3 |

| | |
|---|---|
| Fraction released into wastewater from the process (initial release before application of risk management measures) (OOC5) | 5.0e-6 |
| Fraction released in the soil by the process (initial release before the application of risk management measures) (OOC6) | 0.0001 |
| **Process-level (source) measures and technical conditions to prevent releases** | |
| Procedures vary from site to site, so conservative process emission estimates (TCS1) are used. | |
| **Technical conditions on site and measures to reduce or limit discharges, air emissions and releases into the soil** | |
| Environmental risk is related to indirect exposure of humans via ingestion (TCR1j).<br>In the case of discharge to an urban wastewater treatment plant, no treatment is required (TCR9).<br>Prevent the release of undissolved substances or recover them from wastewater. (TRC14). | |
| Treat air emissions to ensure the required removal effectiveness of (%) (TCR17) | 0.0 |
| Treat wastewater on-site (before starting the discharge operation) to ensure the required removal effectiveness ≥ (%) | 54.0 |
| In case of discharge to an urban wastewater treatment plant, ensure the required on-site removal effectiveness ≥ (%) | 0.0 |
| **Organizational measures to prevent/limit release from the site** | |
| Do not distribute the sludge generated by industrial water treatment on natural soils (WHO2).<br>Sludge generated by industrial water treatment must be incinerated, kept under containment or treated (WHO3). | |

| | |
|---|---|
| **Conditions and measures relating to the municipal waste water treatment plant** | |
| | |
| Estimated removal of wastewater substance by means of an urban treatment plant (%) (STP3). | 88.8 |
| Total effectiveness of wastewater removal, after the adoption of on-site and offsite (urban-type treatment plant) RMMs (%) (STP4) | 88.8 |
| Maximum allowable tonnage for the site (MSafe) based on release after total wastewater removal treatment (kg/d) (STP6). | 1.1e5 |
| Assumed flow rate for the urban wastewater treatment plant (m3/d) (STP5) | 2000 |
| **Conditions and measures relating to the external treatment of waste for the purpose of** | |
| External waste treatment and disposal must comply with applicable local and/or national legislation (ETW3). | |
| **Conditions and measures relating to external waste recovery** | |
| External waste collection and recycling must comply with applicable local and/or national legislation (ERW1). | |
| **Section 3 Estimating Exposures** | |
| **3.1 Health** | |
| For the purpose of assessing the level of exposure in the workplace, where not expressly indicated, the ECETOC TRA (G21) method was used. | |
| **3.2 Environment** | |
| The HBM (Hydrocarbon Block Method) method was used to calculate environmental exposure with the Petrorisk model (EE2) | |
| **Section 4** | |
| **4.1 Health** | |
| Exposures are expected not to exceed DN(M)EL when the Risk Management Measures/Operating Conditions described in Section 3 (G22) are applied<br>Where different Risk Management Measures/Operating Conditions are in place, users are required to ensure that risks are managed at least at an equivalent level (G23).<br>The available data on hazard characteristics do not allow the derivation of a DNEL for carcinogenic effects (G33).<br>The available data on hazard characteristics do not support the need to establish a DNEL for other health effects (G36).<br>Risk Management Measures are based on the qualitative characterization of risk (G37). | |
| **4.2 Environment** | |
| The guideline is based on assumptions of use that may not apply to all sites; therefore, a scaling operation may be required to define appropriate site-specific risk management measures (DSU1).<br>The required efficiency of wastewater removal can be achieved using onsite/offsite technologies, either individually or in combination (DSU2).<br>The required efficiency of air removal can be achieved by using onsite technologies, either individually or in combination (DSU3).<br>Further information on scaling activities and control technologies is provided by the SpERC (http://cefic.org/en/reach-for-industries-libraries.html) datasheets (DSU4). | |

# 3. Using Fuel Oil as a Fuel – Industrial

| | |
|---|---|
| **Section 1 Exposure to the Heavy Fuel Oil Scenario** | |
| **Title** | |
| Using Fuel Oil as a Fuel – Industrial | |
| **Usage descriptors** | |
| Areas of use | 3 |
| Process Categories | 1, 2, 3, 8a, 8b, 16 |
| Environmental Release Categories | 7 |
| Specific Environmental Release Categories | ESVOC SpERC 7.12a.v1 |
| **Processes, tasks, activities covered** | |
| It covers use as a fuel (or fuel additive and additive component) within closed systems or under containment, including accidental exposures during activities associated with the transfer, use, maintenance of equipment and handling of waste products (CGES12_I). | |
| **Valuation method** | |
| See section 3 | |
| **Section 2 Operating Conditions and Risk Management Measures** | |
| | |
| **Section 2.1 Control of workers' exposure** | |
| **Product features** | |
| Physical state of the product | Liquid |
| Vapor Pressure (kPa) | Liquid, vapor pressure < 0,5 kPa under standard conditions (OC3). |
| Concentration of the substance in the product | Covers a percentage of substance in the product up to 100% (unless otherwise stated) (G13). |
| Frequency and duration of use/exposure | Covers a daily exposure of up to 8 hours (unless otherwise specified) (G2). |
| Other operating conditions affecting exposure | It assumes that the product is used at a temperature not exceeding 20° C above the ambient temperature, unless otherwise specified (G15).<br>It presupposes the application of an appropriate basic standard for hygiene in the workplace (G1). |
| **Scenario characteristics** | **Specific risk management measures and operating conditions** |
| General measures (carcinogens) (G18) | Consider technical advances and process upgrades (including automation) to eliminate leakage. Limit exposure by adopting measures such as closed systems, dedicated systems and special general/localized exhaust air extraction systems. Drain systems and clean transfer lines before disrupting containment. Clean/purge equipment where possible prior to servicing. Where there is a possibility of exposure: limit access to authorized personnel only, ensure operators are trained specifically on the activities and operations to be carried out in order to minimize the risk of exposure, wear protective gloves and overalls to prevent skin contamination, use respiratory protective equipment when required for certain exposure scenarios, Immediately eliminate any spills and dispose of waste safely. Ensure the adoption of safe work systems or equivalent solutions for risk management. Inspect, control, and regularly maintain all control devices and measures. Consider the need for a risk-based health surveillance system (G20). |
| General Exposures (Closed Systems) (CS15) | Manipulate the substance in a closed system (E47). Sample via a closed loop or other system to avoid exposure (E8). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Wear chemical protective gloves (EN374 compliant), along with a basic training course. (PPE16). |

| | |
|---|---|
| General Exposures (Closed Systems) (CS15)+ Product Sampling (CS137) | Manipulate the substance in a closed system (E47). Sample via a closed loop or other system to avoid exposure (E8). Do not carry out activities that involve the possibility of exposure for a period of more than 1 hour (OC27). Ensure an adequate standard of controlled ventilation (10 to 15 air changes per hour) (E40). Wear chemical protective gloves (EN374 compliant), along with a basic training course. (PPE16) |
| Closed Bulk Discharge (CS502)+ Outdoors (OC9) | Transfer through closed lines (E52). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Drum/batch transfers (CS8) | Ensure that material transfer takes place under containment or extraction ventilation conditions (E66) or (G9) Ensure an adequate standard of general ventilation (no less than 3-5 air changes per hour) (E11). Do not carry out activities that involve the possibility of exposure for a period of more than 1 hour (OC27). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Operation of Solids Filtration Equipment (CS117) | Ensure an adequate standard of general ventilation (no less than 3-5 air changes per hour) (E11). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Bulk Gun Storage (CS85) | Store the substance within a closed system (E84). Ensure an adequate standard of general ventilation (no less than 3-5 air changes per hour) (E11). Do not carry out activities that involve the possibility of exposure for a period of more than 4 hours (OC28). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Use as fuel (GEST_12l)- (closed systems) (CS107) | Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Equipment Cleaning and Maintenance (CS39) | Drain and purge the system before opening or servicing equipment (E55). Wear chemical protective gloves (EN374 compliant), along with specific task training (PPE17). Store drains in leak-proof containers for disposal or recycling (ENVT4). |

| **Section 2.2 Environmental Exposure Control** | |
|---|---|
| **Product features** | |
| The substance is a UVCB complex [PrC3] (580). Mostly hydrophobic [PrC4a] (581) | |
| **Quantities used** | |
| Fraction of EU tonnage used locally (A1) | 0.1 |
| Regional tonnage (tonnes/year) (A2) | 1.1e7 |
| Fraction of regional tonnage used locally (A3) | 1.4e-1 |
| Annual tonnage of the site (tonnes/year) (A5) | 1.5e6 |
| Maximum Daily Site Tonnage (kg/day) (A4) | 5.0e6 |
| **Frequency and duration of use** | |
| Continuous release (FD2) | |
| Issuing Days (days/year) (FD4) | 300 |
| **Environmental factors not affected by risk management** | |
| Local dilution factor in fresh water (EF1) | 10 |
| Local dilution factor in seawater (EF2) | 100 |
| **Other operating conditions affecting environmental exposure** | |
| | |
| Fraction released into the air by the process (initial release before application of risk management measures) (OOC4) | 7.0e-4 |
| Fraction released into wastewater from the process (initial release before application of risk management measures) (OOC5) | 4.4e-7 |

| | |
|---|---|
| Fraction released in the soil by the process (initial release before the application of risk management measures) (OOC6) | 0 |
| **Process-level (source) measures and technical conditions to prevent releases** | |
| Procedures vary from site to site, so conservative process emission estimates (TCS1) are used. | |
| **Technical conditions on site and measures to reduce or limit discharges, air emissions and releases into the soil** | |
| The risk associated with environmental exposure is induced by the freshwater sediment compartment (TCR1b).<br>On-site wastewater treatment (TCR13) is required.<br>Prevent the release of undissolved substances or recover them from wastewater. (TRC14). | |
| Treat emissions in such a way as to ensure a typical removal effectiveness of (%) (TCR27). | 95 |
| Treat wastewater on-site (before starting the discharge operation) to ensure the required removal effectiveness ≥ (%): | 87.7 |
| In case of discharge to an urban wastewater treatment plant, ensure the required on-site removal effectiveness ≥ (%) | 0.0 |
| **Organizational measures to prevent/limit release from the site** | |
| Do not distribute the sludge generated by industrial water treatment on natural soils (WHO2).<br>Sludge generated by industrial water treatment must be incinerated, kept under containment or treated (WHO3). | |
| **Conditions and measures relating to the municipal waste water treatment plant** | |
| | |
| Estimated removal of wastewater substance by means of an urban treatment plant (%) (STP3). | 88.8 |
| Total effectiveness of wastewater removal, after the adoption of on-site and offsite (urban-type treatment plant) RMMs (%) (STP4) | 88.8 |
| Maximum allowable tonnage for the site (MSafe) based on release after total wastewater removal treatment (kg/d) (STP6). | 5.2e 6 |
| Assumed flow rate for the urban wastewater treatment plant (m3/d) (STP5) | 2000 |
| **Conditions and measures relating to the external treatment of waste for the purpose of** | |
| Combustion emissions are regulated by the current control measures (ETW1). Combustion emissions are taken into account in the regional impact assessment (ETW2). | |
| **Conditions and measures relating to external waste recovery** | |
| External waste treatment and disposal must comply with applicable local and/or national legislation (ETW3). | |
| **Section 3 Estimating Exposures** | |
| **3.1 Health** | |
| For the purpose of assessing the level of exposure in the workplace, where not expressly indicated, the ECETOC TRA (G21) method was used. | |
| **3.2 Environment** | |
| The HBM (Hydrocarbon Block Method) method was used to calculate environmental exposure with the Petrorisk model (EE2) | |
| **Section 4** | |
| **4.1 Health** | |
| Exposures are expected not to exceed DN(M)EL when the Risk Management Measures/Operating Conditions described in Section 3 (G22) are applied<br>Where different Risk Management Measures/Operating Conditions are in place, users are required to ensure that risks are managed at least at an equivalent level (G23).<br>The available data on hazard characteristics do not allow the derivation of a DNEL for carcinogenic effects (G33).<br>The available data on hazard characteristics do not support the need to establish a DNEL for other health effects (G36).<br>Risk Management Measures are based on the qualitative characterization of risk (G37). | |
| **4.2 Environment** | |
| The guideline is based on assumptions of use that may not apply to all sites; therefore, a scaling operation may be required to define appropriate site-specific risk management measures (DSU1).<br>The required efficiency of wastewater removal can be achieved using onsite/offsite technologies, either individually or in combination (DSU2). | |

The required efficiency of air removal can be achieved by using onsite technologies, either individually or in combination (DSU3).
Further information on scaling activities and control technologies is provided by the SpERC (http://cefic.org/en/reach-for-industries-libraries.html) datasheets (DSU4).

# 4. Using Fuel Oil as a Fuel – Professional

| **Section 1 Exposure to the Heavy Fuel Oil Scenario** | |
|---|---|
| **Title** | |
| Using Fuel Oil as a Fuel – Professional | |
| **Usage descriptors** | |
| Areas of use | 22 |
| Process Categories | 1, 2, 3, 8a, 8b, 16 |
| Environmental Release Categories | 9a, 9b |
| Specific Environmental Release Categories | ESVOC SpERC 7.12a.v1 |
| **Processes, tasks, activities covered** | |
| It covers use as a fuel (or fuel additive and additive component) within closed systems or under containment, including accidental exposures during activities associated with the transfer, use, maintenance of equipment and handling of waste products (CGES12_I). | |
| **Valuation method** | |
| See section 3 | |
| **Section 2 Operating Conditions and Risk Management Measures** | |
| | |
| **Section 2.1 Control of workers' exposure** | |
| **Product features** | |
| Physical state of the product | Liquid |
| Vapor Pressure (kPa) | Liquid, vapor pressure < 0,5 kPa under standard conditions (OC3). |
| Concentration of the substance in the product | Covers a percentage of substance in the product up to 100% (unless otherwise stated) (G13). |
| Frequency and duration of use/exposure | Covers a daily exposure of up to 8 hours (unless otherwise specified) (G2). |
| Other operating conditions affecting exposure | It assumes that the product is used at a temperature not exceeding 20° C above the ambient temperature, unless otherwise specified (G15).<br>It presupposes the application of an appropriate basic standard for hygiene in the workplace (G1). |
| **Scenario characteristics** | **Specific risk management measures and operating conditions** |
| General measures (carcinogens) (G18) | Consider technical advances and process upgrades (including automation) to eliminate leakage. Limit exposure by adopting measures such as closed systems, dedicated systems and special general/localized exhaust air extraction systems. Drain systems and clean transfer lines before disrupting containment. Clean/purge equipment where possible prior to servicing. Where there is a possibility of exposure: limit access to authorized personnel only, ensure operators are trained specifically on the activities and operations to be carried out in order to minimize the risk of exposure, wear protective gloves and overalls to prevent skin contamination, use respiratory protective equipment when required for certain exposure scenarios, Immediately eliminate any spills and dispose of waste safely. Ensure the adoption of safe work systems or equivalent solutions for risk management. Inspect, control, and regularly maintain all control devices and measures. Consider the need for a risk-based health surveillance system (G20). |
| General Exposures (Closed Systems) (CS15 )+ Product Sampling (CS137) | Manipulate the substance in a closed system (E47). Sample via a closed loop or other system to avoid exposure (E8). Do not carry out activities that involve the possibility of exposure for a period of more than 1 hour (OC27). Ensure an adequate standard of controlled ventilation (10 to 15 air changes per hour) (E40). Wear chemical protective gloves (EN374 compliant), along with specific task training (PPE17). |

| | |
|---|---|
| General Exposures (Closed Systems) (CS15) | Manipulate the substance in a closed system (E47). Sample via a closed loop or other system to avoid exposure (E8). Do not carry out activities that involve the possibility of exposure for a period of more than 1 hour (OC27). Ensure an adequate standard of controlled ventilation (10 to 15 air changes per hour) (E40). Wear chemical protective gloves (EN374 compliant), along with specific task training (PPE17). |
| Closed Bulk Unloading (CS502) | Ensure an adequate standard of controlled ventilation (10 to 15 air changes per hour) (E40). Wear chemical protective gloves (EN374 compliant), along with a basic training course. (PPE16). Do not engage in activities that involve the possibility of exposure for more than 1 hour (OC27) or (G9) Ensure that material transfer takes place under conditions of containment or extraction ventilation (E66). |
| Drum/batch transfers (CS8) | Ensure an adequate standard of controlled ventilation (10 to 15 air changes per hour) (E40). Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). Do not engage in activities that involve the possibility of exposure for more than 1 hour (OC27) or (G9) Ensure that material transfer takes place under conditions of containment or extraction ventilation (E66). |
| Supply (CS507) | Ensure that material transfer occurs under containment or extraction ventilation (E66) conditions. Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). Do not carry out activities that involve the possibility of exposure for a period of more than 1 hour (OC27). |
| Use as fuel (GEST_12l)-closed systems (CS107) | Wear chemical protective gloves (EN374 compliant), along with a basic training course (PPE16). |
| Equipment Cleaning and Maintenance (CS39) | Ensure an adequate standard of general ventilation (no less than 3-5 air changes per hour) (E11). Wear chemical protective gloves (EN374 compliant), along with specific task training (PPE17).<br>Drain the system before opening or servicing equipment (E65). Store drains in leak-proof containers for disposal or recycling (ENVT4). Remove spills immediately (C&H13). |

| **Section 2.2 Environmental Exposure Control** | |
|---|---|
| **Product features** | |
| The substance is a UVCB complex (PrC3). Predominantly hydrophobic (PrC4a) | |
| **Quantities used** | |
| Fraction of EU tonnage used locally (A1) | 0.1 |
| Regional tonnage (tonnes/year) (A2) | 3.3e5 |
| Fraction of regional tonnage used locally (A3) | 5.0e-4 |
| Annual tonnage of the site (tonnes/year) (A5) | 1.7e2 |
| Maximum Daily Site Tonnage (kg/day) (A4) | 4.6e2 |
| **Frequency and duration of use** | |
| Continuous release (FD2) | |
| Issuing Days (days/year) (FD4) | 365 |
| **Environmental factors not affected by risk management** | |
| Local dilution factor in fresh water (EF1) | 10 |
| Local dilution factor in seawater (EF2) | 100 |
| **Other operating conditions affecting environmental exposure** | |
| | |
| Fraction released into the air by highly dispersive use (regional only) (OOC7): | 1.0e-4 |
| Fraction released into wastewater by highly dispersive use (OOC8): | 0.00001 |
| Fraction released into the soil by highly dispersive use (regional only) (OOC9): | 0.00001 |
| **Process-level (source) measures and technical conditions to prevent releases** | |
| Procedures vary from site to site, so conservative process emission estimates (TCS1) are used. | |

| | |
|---|---|
| **Technical conditions on site and measures to reduce or limit discharges, air emissions and releases into the soil** | |
| Environmental risk is related to indirect exposure of humans via ingestion (TCR1j).<br>No wastewater treatment required (TCR6). | |
| Treat emissions in such a way as to ensure a typical removal effectiveness of (%) (TCR7). | N/A |
| Treat wastewater on-site (before starting the discharge operation) to ensure the required removal effectiveness ≥ (%): | 0.0 |
| In case of discharge to an urban wastewater treatment plant, ensure the required on-site removal effectiveness ≥ (%) | 0.0 |
| **Organizational measures to prevent/limit release from the site** | |
| Do not distribute the sludge generated by industrial water treatment on natural soils (WHO2).<br>Sludge generated by industrial water treatment must be incinerated, kept under containment or treated (WHO3). | |
| **Conditions and measures relating to the municipal waste water treatment plant (1273)** | |
| | |
| Estimated removal of wastewater substance by means of an urban treatment plant (%) (STP3). | 88.8 |
| Total effectiveness of wastewater removal, after the adoption of on-site and offsite (urban-type treatment plant) RMMs (%) (STP4) | 88.8 |
| Maximum allowable tonnage for the site (MSafe) based on release after total wastewater removal treatment (kg/d) (STP6). | 2.3e3 |
| Assumed flow rate for the urban wastewater treatment plant (m3/d) (STP5) | 2000 |

| |
|---|
| **Conditions and measures relating to the external treatment of waste for the purpose of** |
| Combustion emissions are regulated by the current control measures (ETW1).<br>Combustion emissions are taken into account in the regional impact assessment (ETW2). |
| **Conditions and measures relating to external waste recovery** |
| External waste treatment and disposal must comply with applicable local and/or national legislation (ETW3). |
| **Section 3 Estimating Exposures** |
| **3.1 Health** |
| For the purpose of assessing the level of exposure in the workplace, where not expressly indicated, the ECETOC TRA (G21) method was used. |
| **3.2 Environment** |
| **Section 4** |
| **4.1 Health** |
| Exposures are expected not to exceed DN(M)EL when the Risk Management Measures/Operating Conditions described in Section 3 (G22) are applied<br>Where different Risk Management Measures/Operating Conditions are in place, users are required to ensure that risks are managed at least at an equivalent level (G23).<br>The available data on hazard characteristics do not allow the derivation of a DNEL for carcinogenic effects (G33).<br>The available data on hazard characteristics do not support the need to establish a DNEL for other health effects (G36).<br>Risk Management Measures are based on the qualitative characterization of risk (G37). |
| **4.2 Environment** |
| The guideline is based on assumptions of use that may not apply to all sites; therefore, a scaling operation may be required to define appropriate site-specific risk management measures (DSU1).<br>The required efficiency of wastewater removal can be achieved using onsite/offsite technologies, either individually or in combination (DSU2).<br>The required efficiency of air removal can be achieved by using onsite technologies, either individually or in combination (DSU3).<br>Further information on scaling activities and control technologies is provided by the SpERC (http://cefic.org/en/reach-for-industries-libraries.html) datasheets (DSU4). |