INFORMATION FOR FIRST AND SECOND RESPONDERS.

EMERGENCY RESPONSE GUIDE FOR VEHICLE

Alexander Dennis Enviro200

Diesel Engine Vehicle

Enviro200

Document Ref: 2996-1 Enviro200 ERG **Doc Standard: ISO 17840-3** **Date: September 2024**

Contents

Download this, and other safety documents, from *https://www.ad24.direct/emergency-response*

Rescue Sheet

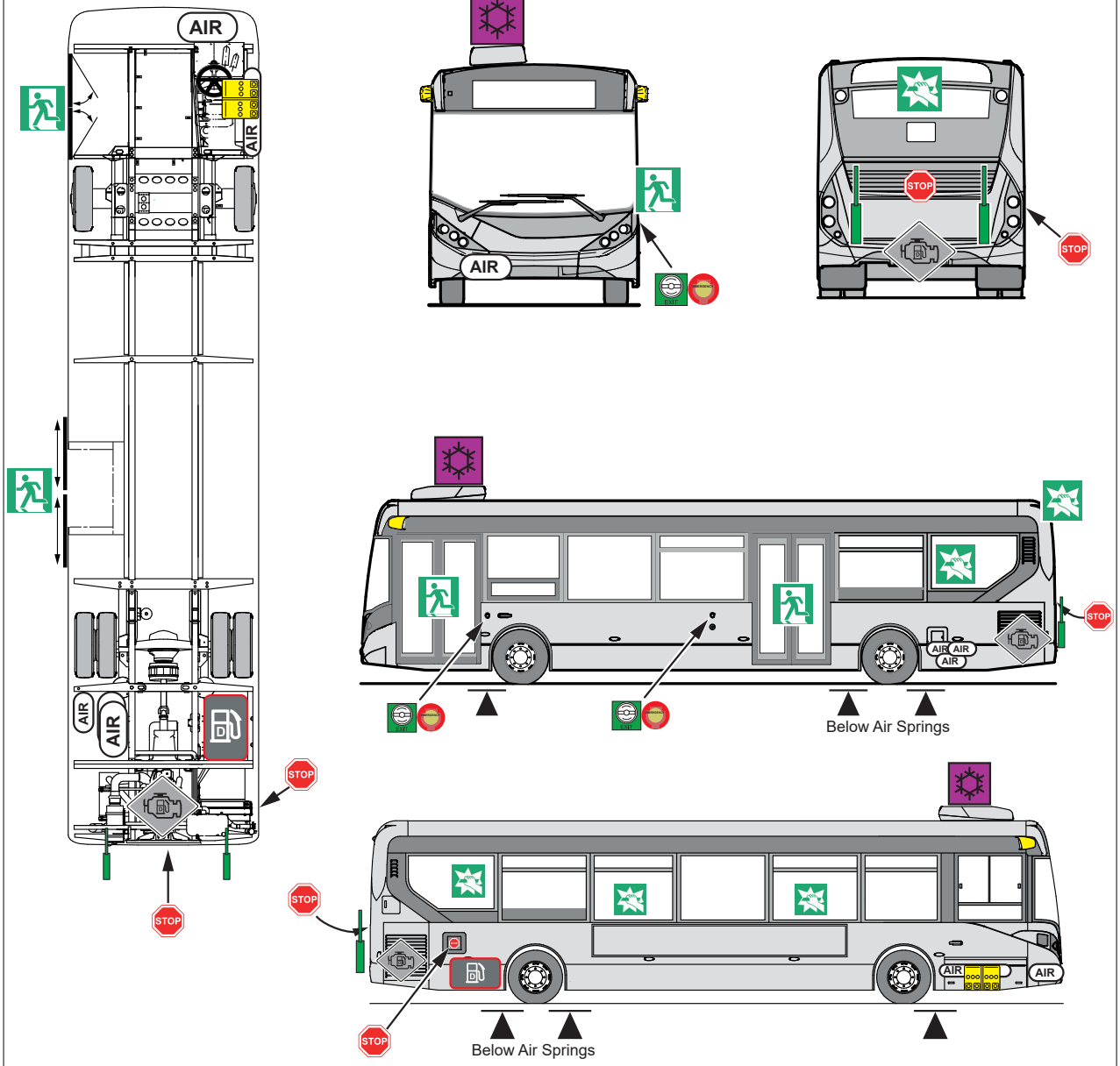
This provides necessary and useful information about a vehicle involved in an accident/incident to support the rescue team in rescuing the vehicle occupants as quickly and safely as possible. It should be used by first responders to assist in making a safe rescue plan. The full version is available as a separate document.

Enviro200

Alexander Dennis Enviro200 Single-deck Midibus 2017/-

NOTE: Vehicle wheelbase may vary

RHD



Low Voltage Battery	Emergency Stop Switch	Diesel Engine	Diesel Tank	Compressed Air Tank	High Pressure Gas Struts	Lifting Point	Emergency Exit	Break Glass Exit
Door Control	Air Conditioning							

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1. Propulsion Identification

Diesel powered double-deck bus

CAUTION: Stop-Start Vehicle. Lack of noise does not mean vehicle is off:
Instant restart capability exists until vehicle is fully shut down

Vehicle Description

The Enviro200 is a, two axle, one or two door, single deck midibus.
The vehicle is fitted with a diesel engine that has an emissions-reduction pack fitted to enable it to comply with Euro6 regulations. Some models may have air-conditioning fitted, depending on customer requirements.

If there is a model badge on the vehicle it may look like one of the following pictures.

Not all models will display all the badges

Enviro200

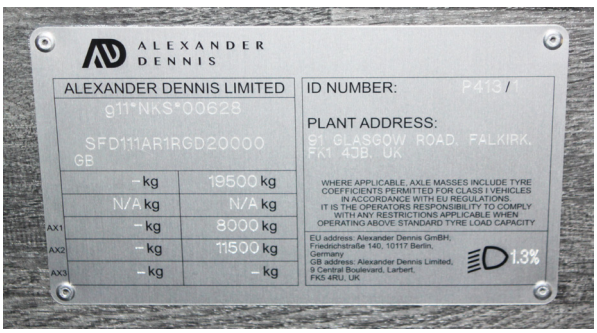
ALEXANDER DENNIS

OR

Vehicle Identification

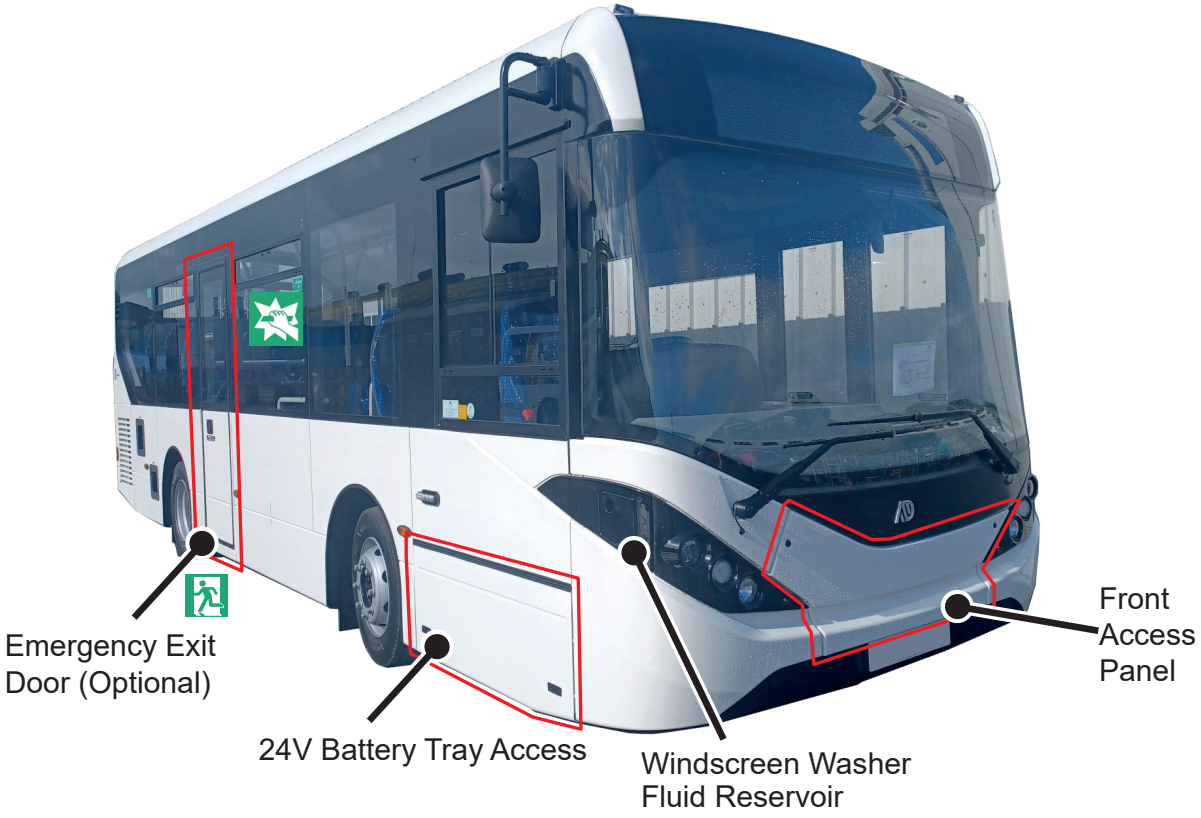
There is an identification plate located inside the front door on the right hand bulkhead.
This plate gives details of:

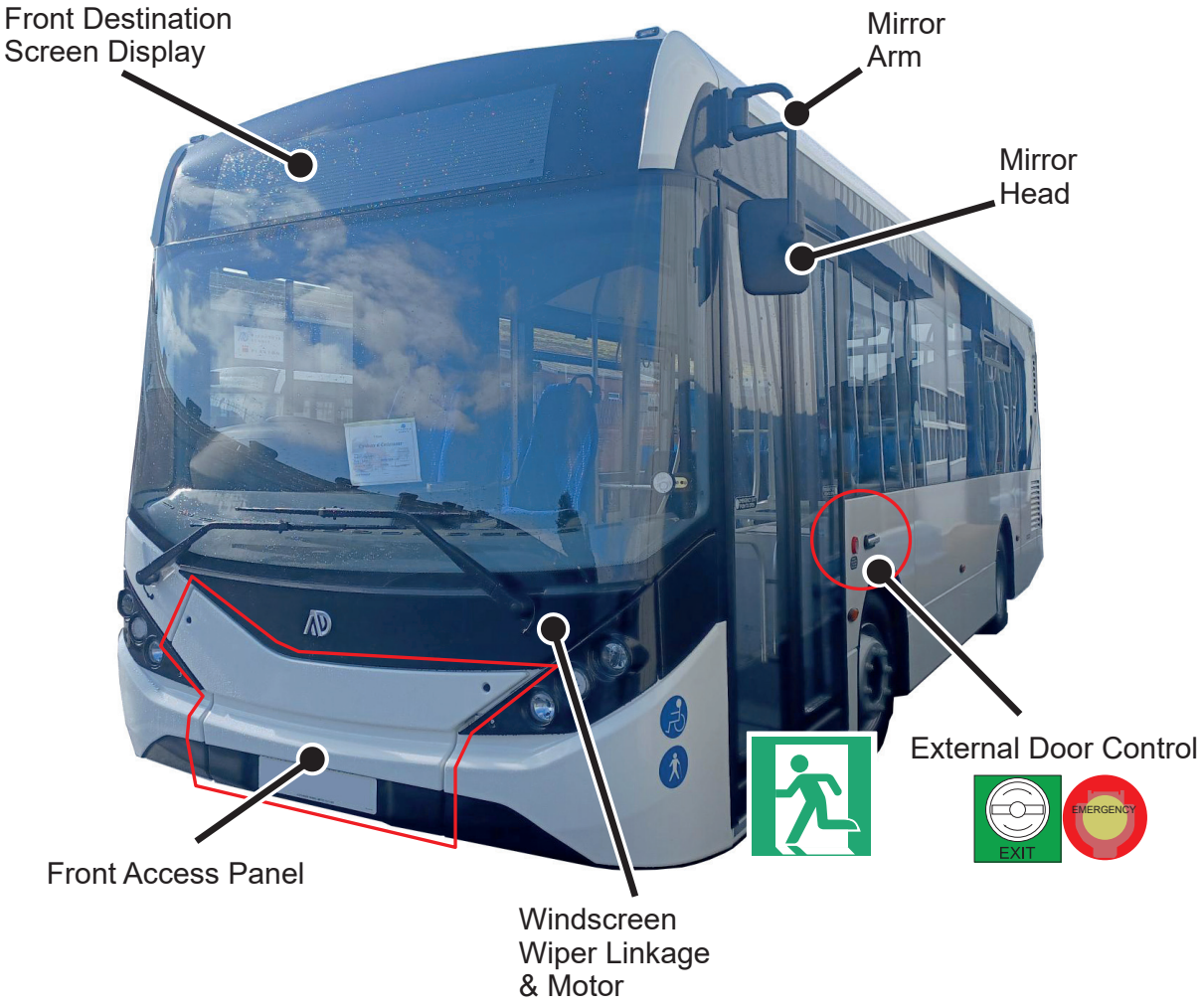
- Manufacturer
- Model
- Permitted Weights
- VIN number



1. Propulsion Identification

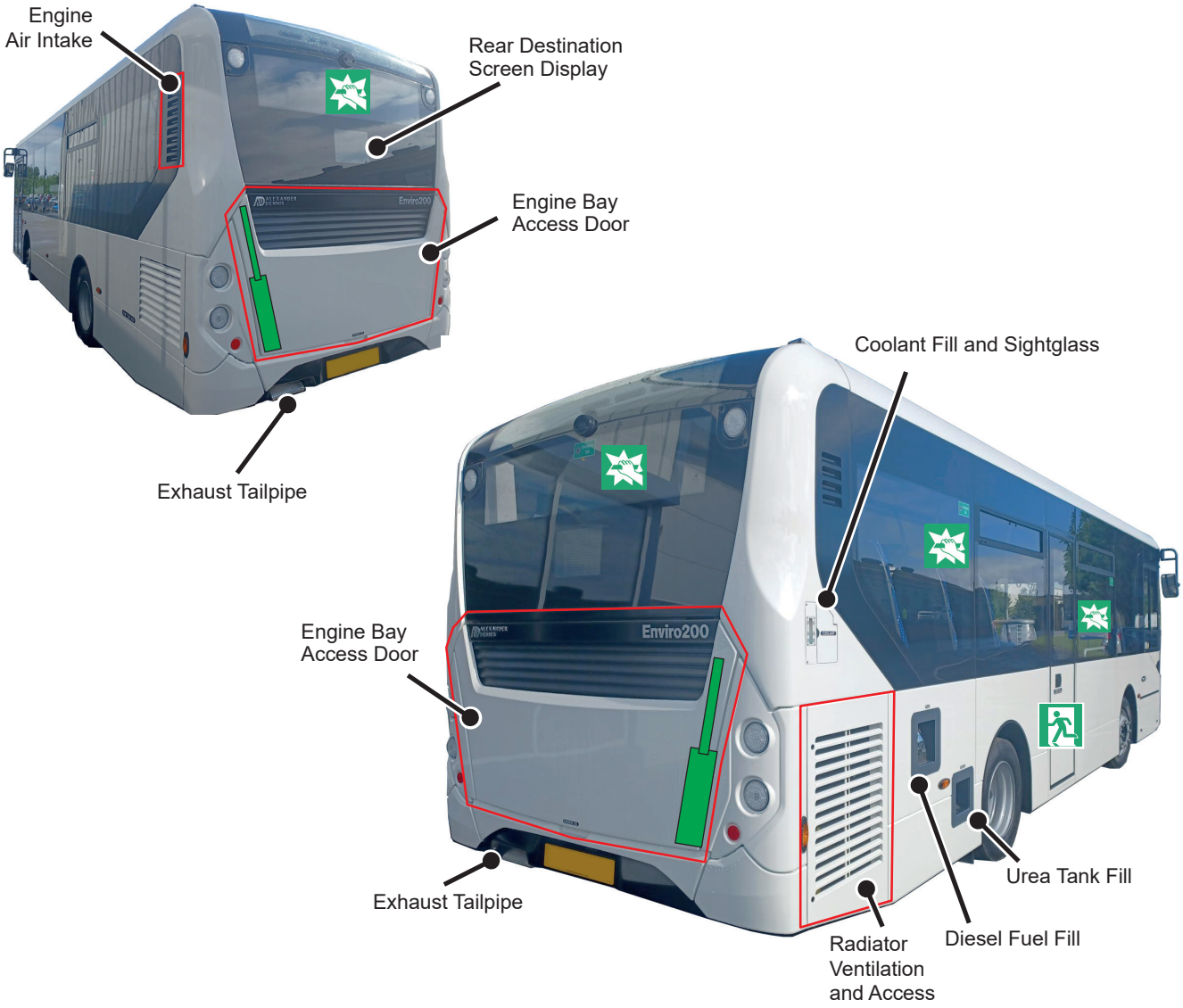
Critical Component Locations (Vehicle Exterior).

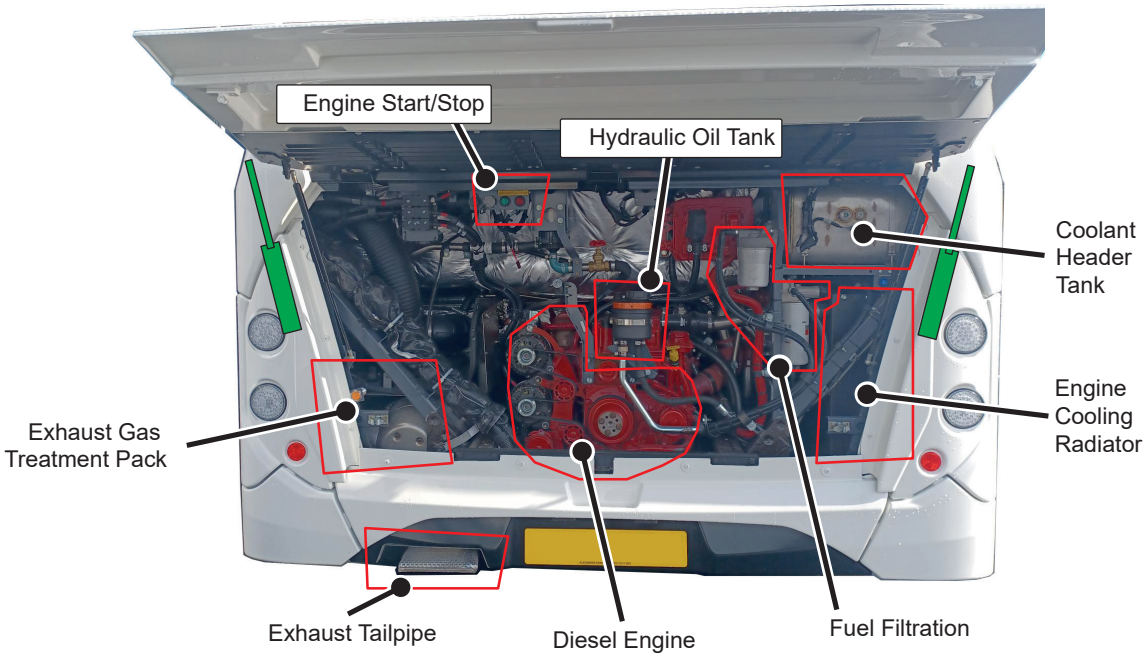




1. Propulsion Identification

Critical Component Locations (Vehicle Exterior).





2. Immobilisation / Stabilisation / Lifting

Suspension height controls are located on the right hand side of the driver's switch console

Suspension Controls.

Access to the suspension control is from within the driver's cab.
NOTE: These controls only operate when the vehicle is fully powered on.

For front kneeling:
Press and hold the lower switch until lowering reaches required level.
Press the upper switch once and the vehicle will return to normal ride height.

For full kneel:
Press and hold the lower switch until the vehicle is fully lowered.
Press the upper front kneel switch once and the vehicle will return to normal ride height.

Preventing Vehicle Motion.

Ensure the parking brake is applied before leaving the vehicle.
Where this is not possible, the wheels should be chocked to prevent any unwanted movement.

⚠ WARNING:
In the event of electrical failure, the Electronic Parking Brake will not respond and wheel chocks MUST be used to prevent runaway.

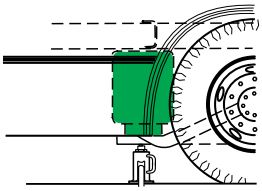
2. Immobilisation / Stabilisation / Lifting

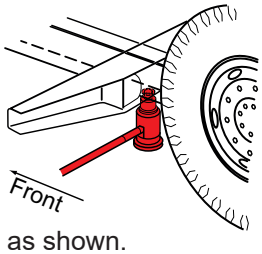
Lifting points.

Lift on the front axle beam only.
Lift the rear axle directly under the base of the air springs or under the chassis frame, where the crossmember forward of the rear axle crosses the frame longitudinal.
Attempting a lift elsewhere carries a high risk of damage.

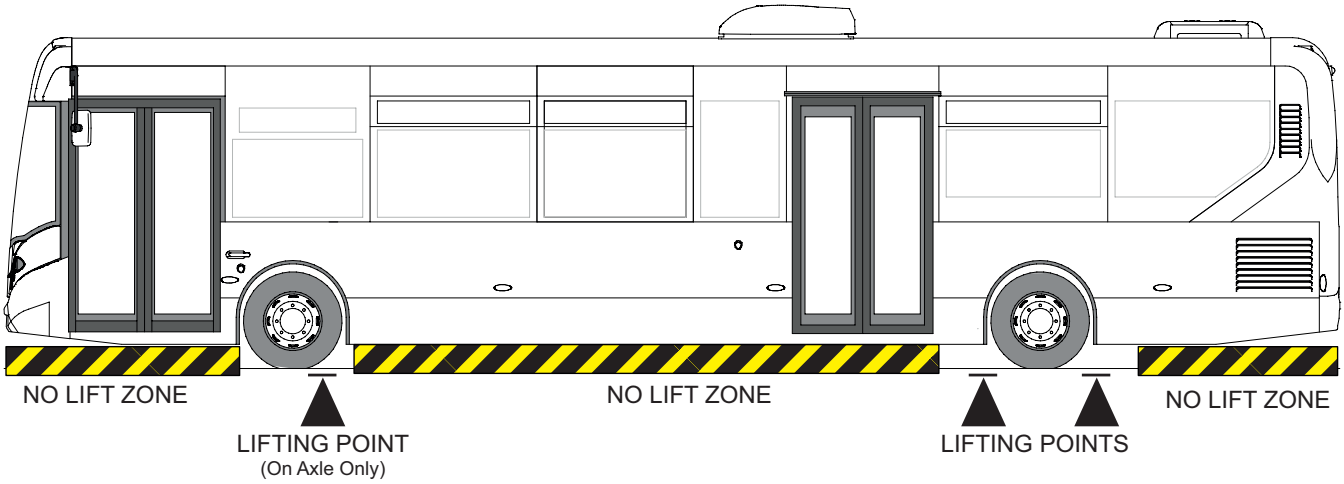
When it is necessary to elevate the vehicle to carry out maintenance it is strongly recommended that the wheel type lifts are used and that they remain in position to provide a stable and safe platform whilst carrying out repair tasks beneath the vehicle.
Only under certain circumstances, such as axle removal / replacement which require the wheel type lifts to be removed to gain access to components, should the vehicle be supported on stands. Adaptors may be required to support the chassis from the top of the axle stands

Rear Axle Lifting points.

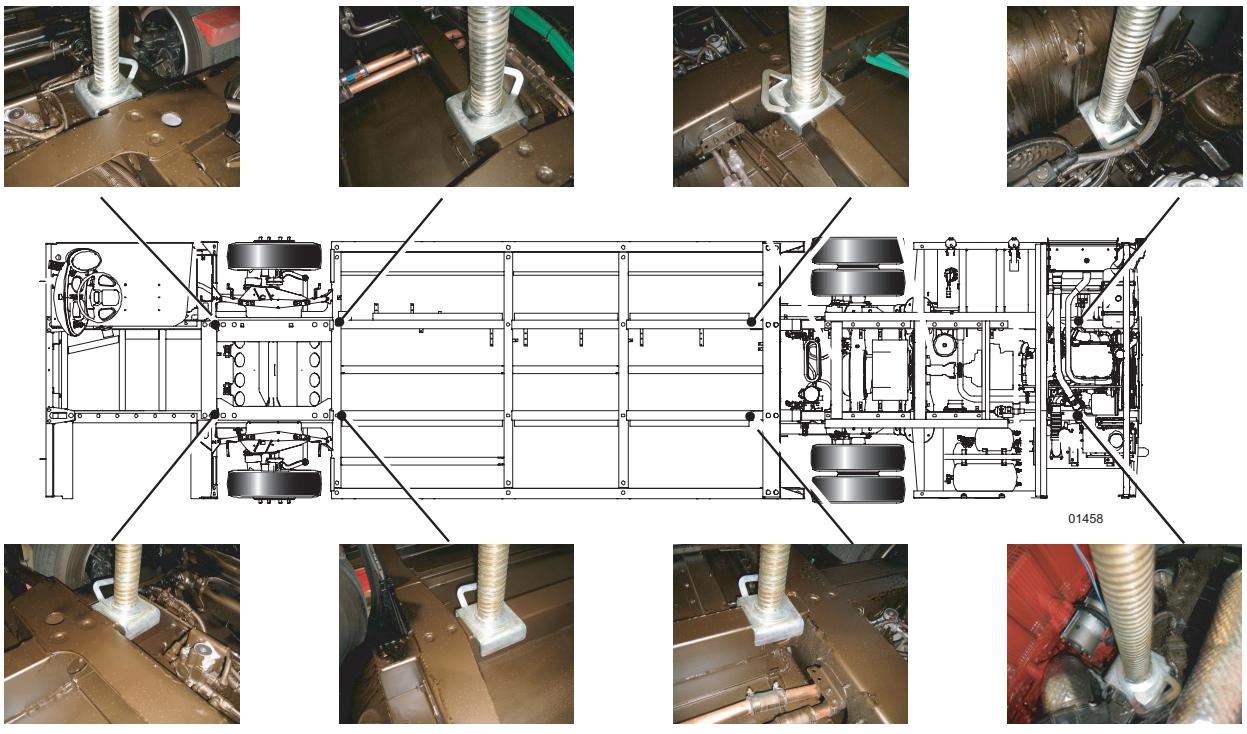




Lift on the axle, directly below the air springs or on the chassis frame as shown.



Chassis Frame Support Points.



3. Disable Direct Hazards (Immobilise vehicle)

CAUTION: Always engage the parking brake before leaving the cab OR chock the wheels to prevent movement.

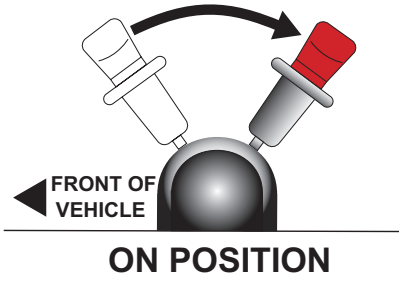
Vehicle Safe Shutdown Procedure.

1 **Select Neutral.**

2 **Apply the Parking Brake.**

Access to the parking brake control is from within the driver's cab.
The parking brake is applied by pulling back the lever until it locks into position.

If the parking brake control will not function, suitable precautions should be taken in order to prevent unintended movement. Wheel chocks should be applied to at least one wheel.

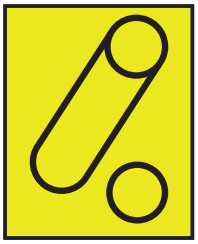


Use wheel chocks when park brake is not operational

3 **Turn off Ignition:**
To shut down the bus, press the lower part of the Start/Stop switch.
Switch will flash during power-down, wait 10 seconds before proceeding.

4 **Turn off Master Switch:**
Press and release the bottom of the switch to turn off the master switch.
Switch will flash during power-off.

To confirm that vehicle is powered off:
- No illumination on instrument cluster
- No lights on master or Ignition switches

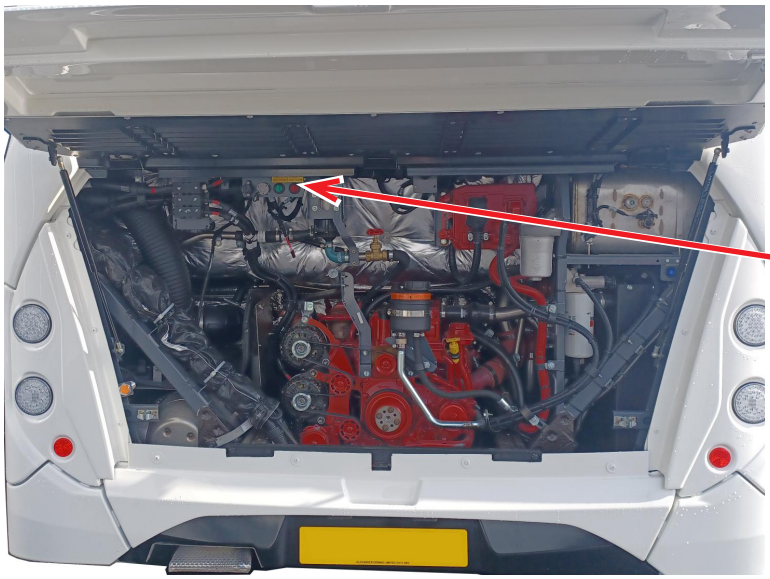


3. Disable Direct Hazards

Emergency Vehicle Shutdown.

Emergency Stop: Rear Drive Bay.

If possible, switch off vehicle before operating.
Lift cover: CAUTION: gas struts on lid.
Push stop button to activate the emergency stop.



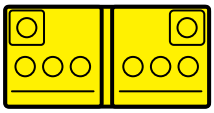
Emergency Stop: Rear External.

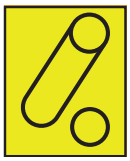
If possible, switch off vehicle before operating.
Open coolant fill access door.
Push & hold (or twist) stop button to activate the emergency stop.

Push and hold until engine stops fully

3. Disable Direct Hazards / Safety Regulations

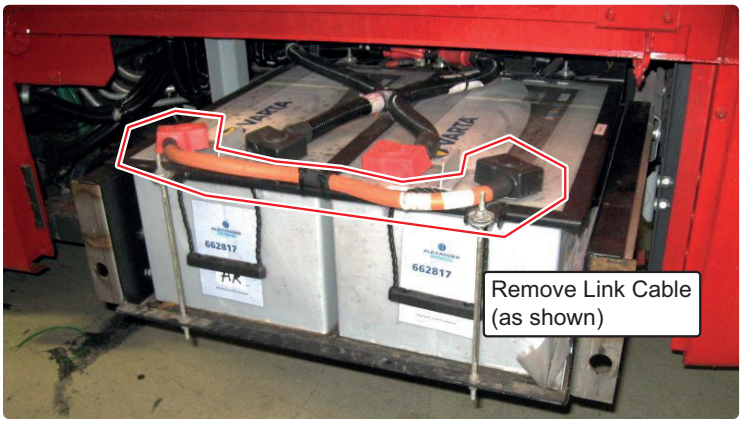
24V Disconnection.





Battery access is via an access door at the front, below the driver's cab.
Lift the access door and secure to access the 24v batteries.

Lift and secure the access door, release the antiluce fasteners,
then slide the tray out to access the battery connectors and remove
the negative connection. Secure cable to prevent accidental re-connection.

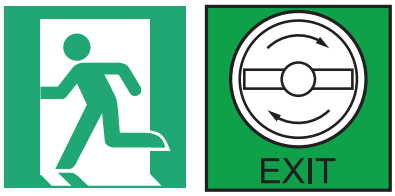


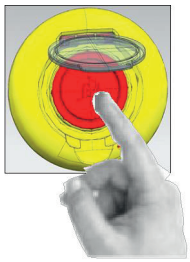
4. Access to the Occupants

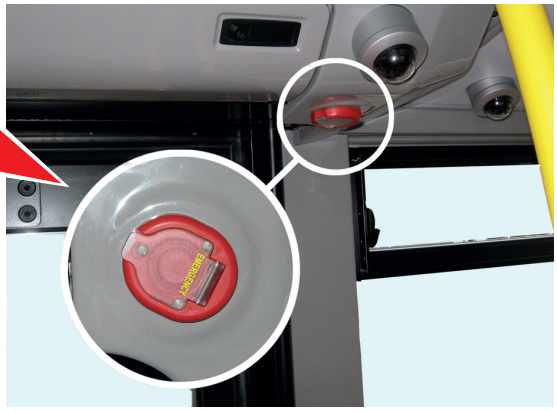
1 Emergency Door Operation.

To open the door from outside, push the emergency button located near the edge of the doors.

Lift the flap and push the button to release the doors.







To open the door from inside, push the emergency button located near the top edge of the doors.

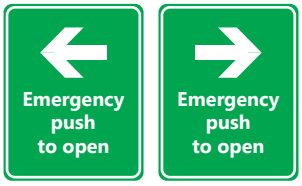
Lift the flap and push the button to release the doors.

Door Operation Failure.

If the doors do not operate they can be pushed open manually.
It may be necessary to exhaust any remaining air in the auxiliary system.

2 Centre / Exit doors:

Pull the door outwards using the handle at the bottom then slide the doors open.



3 Front/entrance doors:

Push the outer edge inwards, then pivot the door into the bus.

4. Access to the Occupants

Driver's Cab Door.

To open the driver's door, where possible, reach in and lift the handle to release the door.
Where this is impractical or not available, insert a T-key into the hole on the outside of the cab door and twist to release the door lock

Door Controls in Driver's Cab.

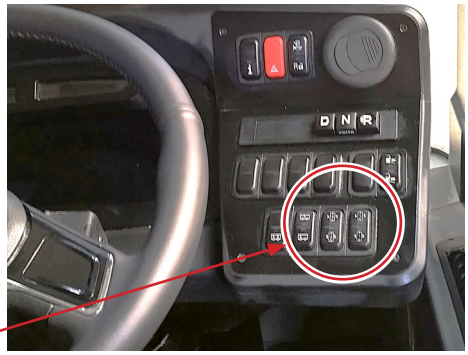
The door control switches are on the right hand side of the instrument panel.

The buttons are not operative if:

- The vehicle is switched off.
- The vehicle is moving.
- The park brake is OFF.
- The system air pressure is too low.

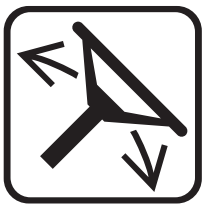
Press the lower switch to open the doors.
Press the upper switch to close the doors.
The switch will flash during opening and closing and remain illuminated while the door is open.

Entrance Door



Instrument Panel Switch Location

Steering Column Adjustment.



The vehicle is fitted with an air adjustable steering column.
The foot operated column adjustment switch is mounted in the floor plate directly behind the column.

To adjust the column position, the park brake must be applied.
Grasp the steering wheel and depress the foot button, move the steering wheel as required for either driving or access.

If there is no air in the system, the adjustment mechanism will not release.

Break Glass Escape windows.

Twist and remove the yellow seal and strike the red button to cause the window to shatter (safety glass) to assist in an emergency exit from inside the vehicle.

The breakable windows are identified from outside the vehicle by the visible break glass sticker in the top of each breakable window.

Rescue personnel may break these windows when required to gain access to the interior of the vehicle.

5. Stored Energy

Diesel Fuel.

The tank may contain up to 300 of litres of diesel.
Plastic fuel lines run within the chassis to the engine bay.
Fuel is flammable as per SDS.

If this fluid is involved in a fire, extinguish with dry chemical, CO^2, water spray (fog) or foam, do not use water jet.

Engine Coolant:
After the bus has been running, the coolant will be hot and under pressure. Do not open any caps or breach any hoses, as this poses a risk of scalding liquid or steam being released.

Transmission Oil:
ATF in hydraulic steering and transmission will be hot and under mild pressure.
If ATF is involved in a fire, extinguish with CO2, fire extinguishing powder or fog like water spraying. Extinguish larger fires with alcohol resistant foam or spray water with suitable surfactant added

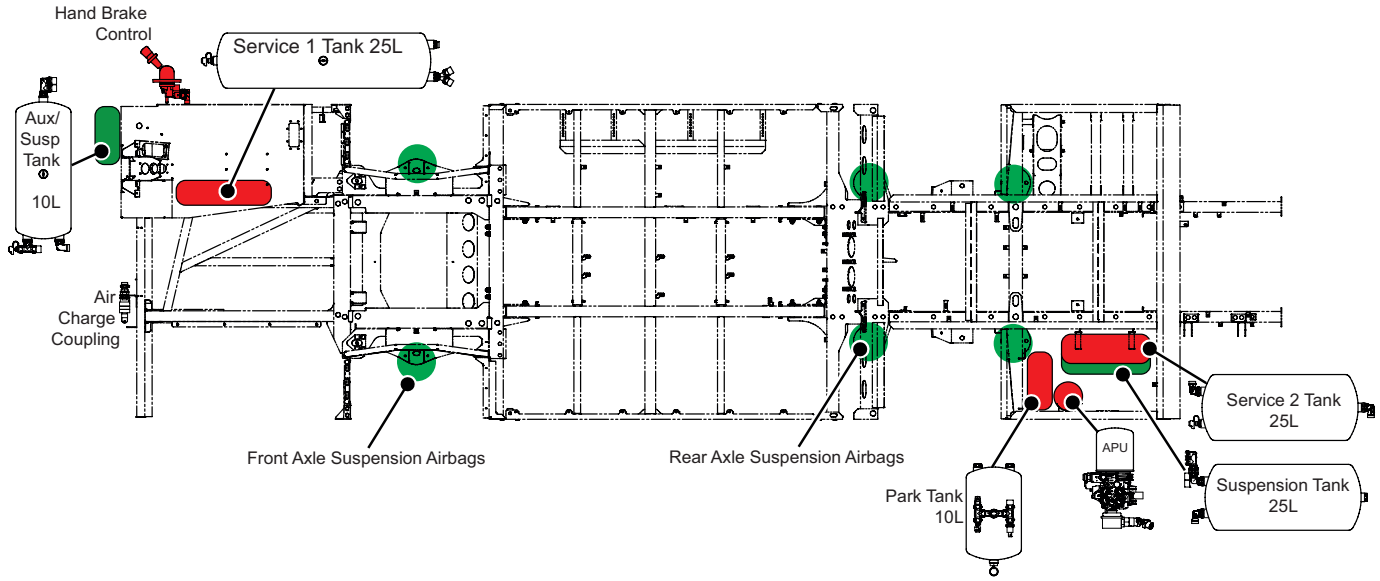
5. Stored Energy

Compressed Air.

AIR

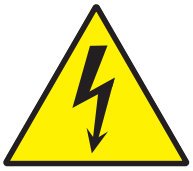
The vehicle uses compressed air for braking, suspension and assorted accessory tasks.
Air is supplied by a High-Voltage air compressor, through a drier and is stored in steel reservoirs distributed around the vehicle.
The air looms are made from PVC which is not fire-resistant and will deform and fail in the event of a fire, possibly resulting in the loss of air pressure.

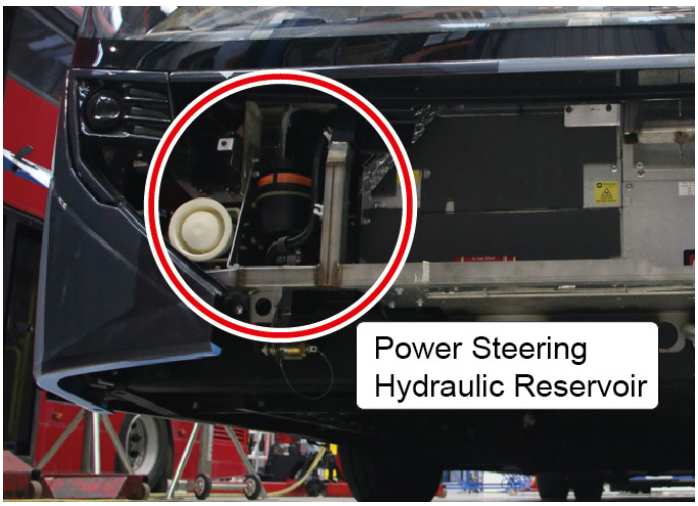
The Air system runs at a maximum pressure of 10Bar / 130PSIG.



Power Steering.

The vehicle may be equipped with an electro-hydraulic power steering system. There is a HV pump below the driver's foot plate and a hydraulic reservoir mounted at the front of the vehicle.
In the event of a front impact, the hydraulic fluid may escape if the system is ruptured.





6. In Case of Fire

Do not submerge to extinguish fire

DO NOT SPRAY WATER DIRECTLY INTO THE DRIVE BAY.

Use dry chemical, CO^2, water fog spray or foam, do not use direct water jet.

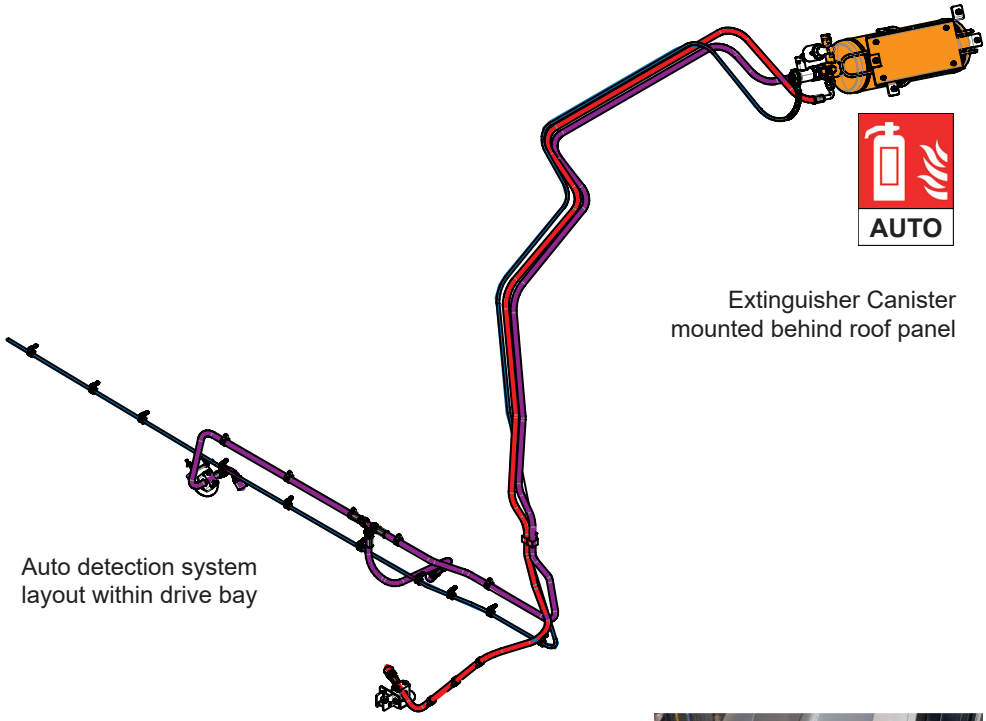
Drive Bay Fire Warning Light.
This dashboard light illuminates when one or more rear drive bay fire sensors or system is triggered.

Auto Fire Suppression System.

The fire suppression canister is located in the upper rear saloon above the back right hand roof panels. Access is via a removable panel.

Drive Bay Fire Suppression.

The detection and auto hoses and nozzles in the drive bay will activate in the event of a fire or extreme temperature spike to suppress the fire long enough to allow the bus to be safely stopped and evacuated. The hoses surround the rear drive bay mounted batteries.



Extinguisher Canister mounted behind roof panel

Auto detection system layout within drive bay

Hand-held Fire Extinguisher.

There is a hand-operated dry powder fire extinguisher mounted behind the driver in the cab.

This can be used to assist safe exit of passengers from the bus in the event of an internal fire.

Infra-red Thermal Monitoring

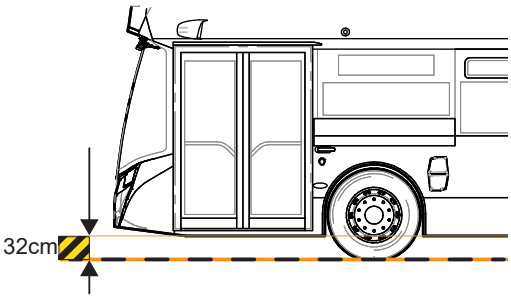
The hashed area highlights where a thermal imaging monitor may be able to detect a potential thermal incident risk area.

At the rear of the bus, both sides have a grille where escaping heat may help identify areas at risk of thermal damage.

From the rear, the engine bay area can be monitored.

7. In case of Submersion

Floodwater or Fording.
Maximum wading depth under normal usage should not exceed 32cm.



Deeper Immersion. (Depths greater than 33cm)
If the depth of water exceeds 33cm or is unable to be determined, seek an alternative route.
Travel in deeper water can cause damage to critical systems and could lead to dangerous conditions as well as causing breakdowns.

If the vehicle has been fully immersed in water for longer periods (in excess of 30 minutes), contact Alexander Dennis for further details on how to deal with a flooded vehicle.

The vehicle should be retrieved from the water before other work is performed. Water levels below the bottom of the vehicle (less than 30cm) should not pose any significant risk.

1. Assess vehicle for risks.
2. Shutdown the vehicle by pushing an emergency stop switch
3. If accessible and where fitted, turn OFF the 24 VDC Battery Disconnect switch, located behind the battery access door below the driver's cab.
4. Attend to any first aid needs.
5. Access to passengers can be gained through the entrance and exit doors, or side windows.

Storage following immersion:
The vehicle should be stored in a safe, covered location.
The bus should be locked out to prevent it being powered-up until all systems have been checked and certified safe to use by a qualified and approved engineer.
All water should be allowed to drain away and the vehicle dried thoroughly before any attempt is made to restore power to any system.

8. Towing / Transportation / Storage

When towing the vehicle, always follow the correct towing procedure as detailed below.

Towing Preparation : Preparing the bus

⚠ WARNING: There is no provision for rear towing on the bus.
Any recovery action that requires towing must be connected to the front of the vehicle only. Rearward recovery must only be undertaken by specialist personnel with equipment suitable for lifting the rear wheels in order to prevent damage to the vehicle.

When towing, the following functions are not available:

1. Power assisted steering
2. Compressed air supply
3. Recharging of the 24Volt vehicle battery

Turning off the bus

1: Press the lower part of the ignition switch to turn off the bus. Switch will flash.

2: Press and release the master switch to turn off the main power. Switch will flash while the bus shuts down.

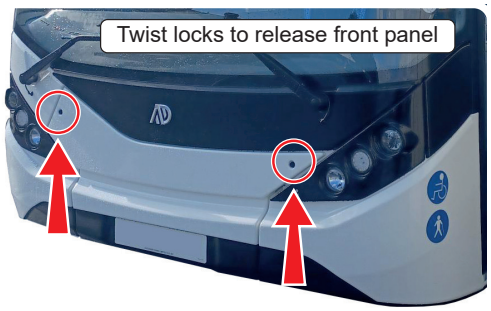
Preparations before towing the vehicle

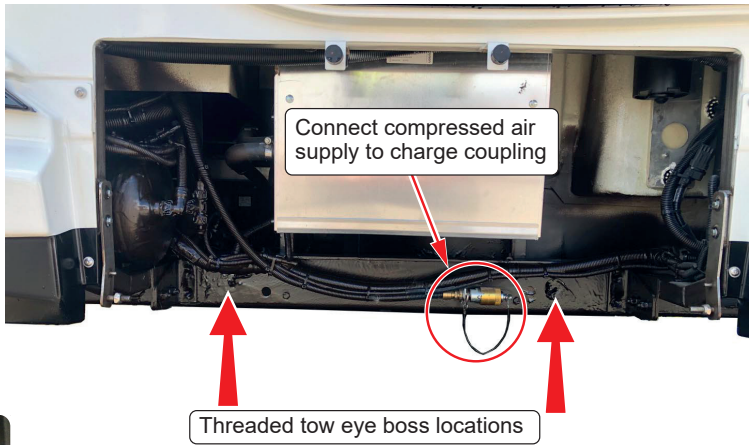
1. Select neutral gear and apply parking brake.
2. Remove both half shafts (see over for details).
3. Attach vehicle to tow truck.
4. Release parking brake.
5. Turn off the ignition and master switches to power-off the bus.
6. Turn off the 24V battery disconnect switch within the front battery compartment.
7. Vehicle tow can now proceed.

Only tow in a forward direction, always keep road speed as low as possible and do not exceed 25MPH maximum speed at any time.

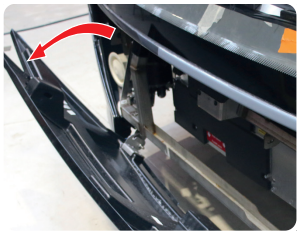
Accessing Towing Connections

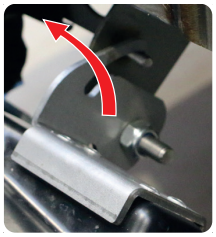
To access the towing eye socket and compressed air charge coupling, open and remove the front panel.
Store the panel safely inside the bus.





Open and lift panel out and away from the clips





For rigid bar towing, only the OFFSIDE eye must be used, as indicated, to prevent damage to the front components.

The vehicle may be towed using both front towing points and an A-Frame.

The towing eye should be screwed into the tapped sockets in the front crossmember.
An air coupling is located on the front of the vehicle to provide air to the braking system during the tow.

Towing Preparation: Releasing the park brake

⚠WARNING:
In this condition the parking brakes are completely inoperative.
Wheels **MUST** be chocked to prevent the vehicle from rolling.

The electronic parking brake will NOT be disengaged with an external air supply to the air charge point, so manual release of the spring brake actuators will be necessary

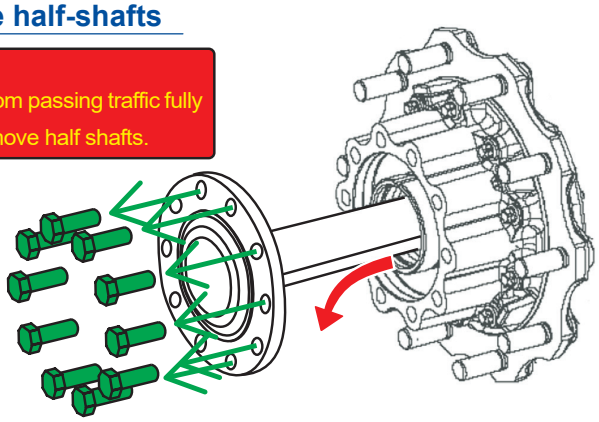
Internal access to the drive axle actuators is via access panels between the rear seats over the rear axle. Use an allen wrench to remove the outer panel. This gives access to an inner panel that is also retained with allen screws that then allows access to the top of the brake actuator.

Use a 24mm spanner to wind the actuators off to release the brakes.

When the vehicle is towed, the rear half-shafts must be removed to prevent damage to the axle or drive motor. Alternatively the propshaft may be removed or the rear axle lifted off the road

Removing drive axle half-shafts

⚠WARNING:
Proper consideration must be given to traffic conditions and the danger from passing traffic fully assessed and any necessary precautions taken before attempting to remove half shafts.



When towing, **both** axle half-shafts MUST be removed to prevent any damage to the axle or drive motor.

When half-shafts are removed, the open axle ends must be temporarily plugged to prevent loss of oil.

The removed shafts should be stored safely inside the bus.

For towing purposes, there is no need to remove the wheels. Instructions here show wheels removed for clarity. Loosen screws on the flange shaft and pull out the half shaft. Be prepared to catch any outfall of oil from the axle during this process.

Note: When the half shafts are removed, plug or cover both hubs.

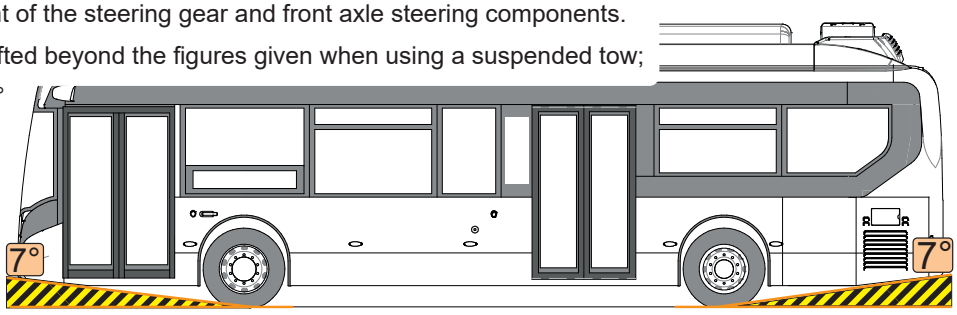
Suspended Towing

When carrying out a suspended tow in reverse, it is important to lock the steering in the “straight-ahead” position to prevent uncontrolled movement of the steering gear and front axle steering components.

The vehicle should be not be lifted beyond the figures given when using a suspended tow;

Front lift angle not to exceed 7°

Rear lift angle not to exceed 7°



After Towing

⚠WARNING:
When the tow procedure is complete, the parking brakes must be wound back on or the wheels chocked to prevent the bus from rolling away.

See the service manual for correct procedures and torques when refitting the half-shafts to the axle.
It is important to check the oil level of the axle after any towing procedure where the hubs are disturbed.

8. Towing / Transportation / Storage

Vehicle Storage.

When storing the vehicle following a fire or crash follow the below instructions.

Procedure following a fire:
The vehicle should be quarantined in a safe, covered location, away from other vehicles.
Monitor the vehicle with thermal equipment for up to 12 hours to ensure there is no spontaneous reignition
All systems should remain disconnected and locked off until fully inspected by a qualified and approved engineer.
Any powder residue should be cleaned off to prevent any corrosion or other issues.
If water has been used to fight any fire, all affected systems must be thoroughly dried before any power is turned on.

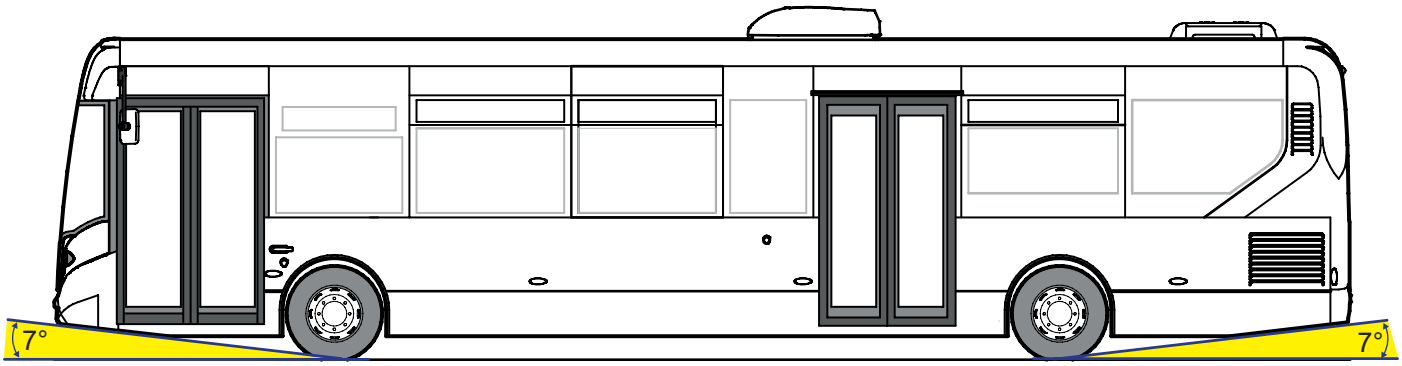
Procedure following immersion in water: (See also: Section 7)
The vehicle should be stored in a safe, covered location.
Do not power-up the bus until all systems have been checked and certified safe to use by a qualified and approved engineer.
All water should be allowed to drain away and the vehicle dried thoroughly before any attempt is made to restore power to any system.

Suspended tow:

The vehicle should be not be lifted beyond the figures shown below when using a suspended tow;

Front lift angle not to exceed 7°
Rear lift angle not to exceed 7°

When carrying out a suspended tow in reverse, it is important to lock the steering in the “straight-ahead” position to prevent uncontrolled movement of the steering gear and front axle steering components.



8. Towing / Transportation / Storage

When storing the vehicle, always follow the correct storage disconnection procedure as detailed below.

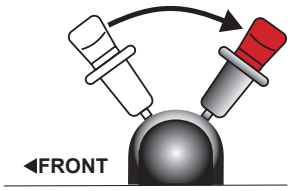
Shutdown Procedure

ALWAYS engage the parking brake before leaving the cab.

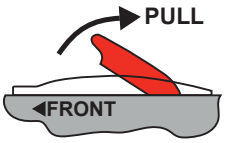
After operation remember to:

- Select 'Neutral'

- Apply the parking brake.



Park Brake Application



EPB Application

Turning off the Bus:

1: Press the lower part of the ignition switch to turn off the Bus. Switch will flash.

2: Press and release the master switch to turn off the main power. Switch will flash and the bus will shut down.

Vehicle Storage

24V battery testing

Alexander Dennis recommend regular testing of the 24v battery system in order to maintain optimum battery performance and to reduce vehicle downtime. It is recommended that an industry suitable tester be used to determine the condition of the batteries on a regular basis.

The tester must be correctly suited to the task of testing an SLI lead-acid battery with up to 230Ah and 1200A CCA.

A suggested example is the Midtronics inTELLECT EXP-1000 FHD Expandable Electronic Diagnostic Platform

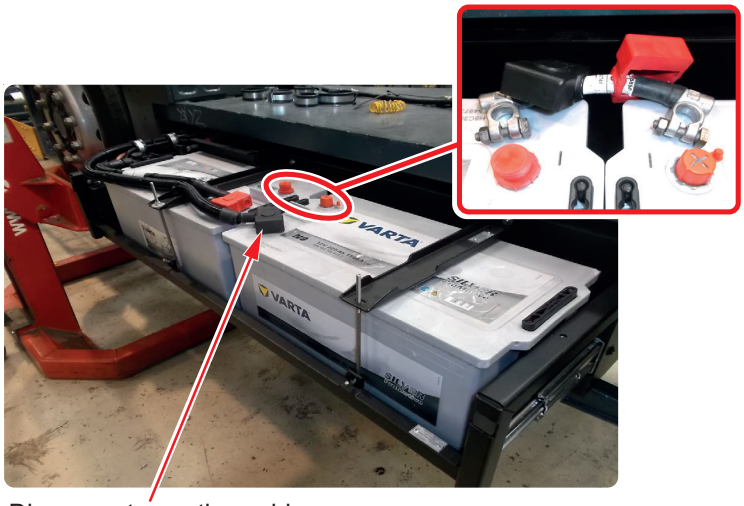
Storing Vehicle for long periods

Storage for longer than a few days can leave the battery in a discharged state.

In order to protect the 24v batteries from being discharged too far, it is recommended they be disconnected.

Remove the battery link cable and the negative terminal connection. Store the link cable safely and secure the negative cable in such a way as to prevent accidental reconnection.

Place a warning notice on the steering wheel to prevent any attempt at starting the vehicle until it is ready to return to service.



Remove link cable

Disconnect negative cable

Example steering wheel cover

Safety Notes

Storage area should be equipped with fire extinguisher (CO2 or Dry Powder type)

9. Important Additional Information

10. Pictograms Used

1. Propulsion Identification

Diesel (Euro6) bus.

Model designation display not guaranteed.

2. Immobilisation / stabilisation / lifting

Suspension controls in driver's switch area.

Safe lifting points.

3. Disable direct hazards / safety regulations

Disconnect Low Voltage.

Shut off engine by driver's controls or emergency stop.

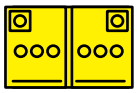
4. Access to the occupants

Door access control - two exit doors.

Fire break glass exits in upper and lower saloon.

Steering wheel control on driver's footplate.

5. Stored energy



24V Batteries

BS EN 590
Ultra-low Sulphur
Diesel Fuel

R407C Refrigerant

Coolant is **BLUE**

Ethylene Glycol

6. In case of fire

BS EN 590 Ultra-low Sulphur Diesel Fuel

7. In case of submersion

As for Section 3: Disable Direct Hazards

Follow all recommended safety routines once out of the water.

8. Towing / transportation / storage

Disconnect Low Voltage.

Isolate 24V batteries

Extra information.

The appendix to this document contains extra information (as Safety Data Sheets) as follows:

1. Commercial Diesel (Shell)
2. Hydraulic steering oil (Fuchs Titan ATF 4000)
3. R407C refrigerant (BOC gasses)
4. Valvoline coolant (Valvoline OEM ADV48)
5. Flooded Lead acid 12V battery (Varta)

This document covers only those models listed on the front cover. It should be regarded as part of the product and retained with the vehicle. At the time of resale it should be passed on to any subsequent owner. Where the manual lists the specifications for several models, some of the items covered may not apply to your vehicle.

If any doubt exists please do not hesitate to contact Alexander Dennis who will be pleased to offer technical assistance.

We would like to point out that non-Alexander Dennis parts have not been approved by Alexander Dennis and we cannot certify the suitability nor the safety of such parts Alexander Dennis is not liable for any damage caused by the use of non-Alexander Dennis parts.

Appendix of extra information.

SDS information sheets

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

Commercial Diesel

Version	Revision Date:	SDS Number:	Date of last issue: 18.11.2022
7.1	12.04.2023	800001001882	Print Date 13.06.2023

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

1.1 Product identifier

Trade name	:	Commercial Diesel
Product code	:	002D0082

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

Use of the Sub-stance/Mixture	:	Fuel for on-road diesel-powered engines. Please refer to section 16 and/or the annexes for the registered uses under REACH.
Uses advised against	:	This product must not be used in applications other than those listed in Section 1 without first seeking the advice of the supplier., This product is not to be used as a solvent or cleaning agent; for lighting or brightening fires; as a skin cleanser.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier	:	**Shell UK Oil Products Limited** Shell Centre London SE1 7NA United Kingdom
Telephone	:	(+44) 08007318888
Telefax	:	
Contact for Safety Data Sheet	:	If you have any enquiries about the content of this SDS please email fuelSDS@shell.com

1.4 Emergency telephone number

: +44 (0) 20 7934 7778 (This telephone number is available 24 hours per day, 7 days per week)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Flammable liquids, Category 3	H226: Flammable liquid and vapour.
Aspiration hazard, Category 1	H304: May be fatal if swallowed and enters airways.
Skin irritation, Category 2	H315: Causes skin irritation.

Acute toxicity, Category 4, Inhalation	H332: Harmful if inhaled.
Carcinogenicity, Category 2	H351: Suspected of causing cancer.
Specific target organ toxicity - repeated exposure, Category 2, Blood , thymus , Liver	H373: May cause damage to organs through prolonged or repeated exposure.
Long-term (chronic) aquatic hazard, Category 2	H411: Toxic to aquatic life with long lasting effects.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

Hazard statements :

PHYSICAL HAZARDS:
H226 Flammable liquid and vapour.
HEALTH HAZARDS:
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H332 Harmful if inhaled.
H351 Suspected of causing cancer.
H373 May cause damage to organs (Blood, Liver, thymus) through prolonged or repeated exposure.
ENVIRONMENTAL HAZARDS:
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements :

Prevention:

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

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

Storage:

P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards

This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

May ignite on surfaces at temperatures above auto-ignition temperature.
Vapour in the headspace of tanks and containers may ignite and explode at temperatures exceeding auto-ignition temperature, where vapour concentrations are within the flammability range.
This material is a static accumulator.
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
This product is intended for use in closed systems only.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical nature : A complex combination of hydrocarbons produced by the distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the range of C9 through C20 and boiling in the range of approximately 163°C to 357°C (325°F to 675°F).
May also contain several additives at <0.1% v/v each.
May contain cetane improver (Ethyl Hexyl Nitrate) at <0.2% v/v.

May contain methyl and ethyl esters from lipid sources

May contain catalytically cracked oils in which polycyclic aromatic compounds, mainly 3-ring but some 4- to 6-ring species are present.

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Fuels, diesel	68334-30-5 269-822-7 649-224-00-6	Flam. Liq. 3; H226 Asp. Tox. 1; H304 Acute Tox. 4; H332	>= 0 - <= 100

	01-2119484664-27-0011	Skin Irrit. 2; H315 Carc. 2; H351 STOT RE 2; H373 Aquatic Chronic 2; H411	
Distillates (Fischer-Tropsch), C8-26 - Branched and Linear	848301-67-7 481-740-5 01-0000020119-75	Asp. Tox. 1; H304	>= 0 - <= 50
Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear)	928771-01-1 618-882-6 01-2119450077-42	Flam. Liq. 3; H226 Asp. Tox. 1; H304	>= 0 - <= 50
Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Bio-diesel)	67762-38-3 267-015-4 01-2119471664-32, UK-01-6078057799-9		>= 0 - <= 7

Remarks : Dyes and markers can be used to indicate tax status and prevent fraud.

For explanation of abbreviations see section 16.

Further information

Contains:

Chemical name	Identification number	Classification	Concentration (% w/w)
Naphthalene	91-20-3, 202-049-5	Acute Tox.4; H302 Carc.2; H351 Aquatic Acute1; H400 Aquatic Chronic1; H410	>= 0 - <= 0.5

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Not expected to be a health hazard when used under normal conditions.

Protection of first-aiders : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.

If inhaled : Call emergency number for your location / facility.
Remove to fresh air. Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has

difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardio-Pulmonary Resuscitation as required and transport to the nearest medical facility.

In case of skin contact : Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.
Obtain medical attention even in the absence of apparent wounds.

In case of eye contact : Flush eye with copious quantities of water.
Remove contact lenses, if present and easy to do. Continue rinsing.
If persistent irritation occurs, obtain medical attention.

If swallowed : Call emergency number for your location / facility.
If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters.
Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.
If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.
Liver damage may be indicated by loss of appetite, jaundice (yellowish skin and eye colour), fatigue, bleeding or easy bruising and sometimes pain and swelling in the upper right abdomen.

Damage to blood-forming organs may be evidenced by: a)

fatigue and anaemia (RBC), b) decreased resistance to infection, and/or excessive bruising and bleeding (platelet effect).

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Call a doctor or poison control center for guidance.
Potential for chemical pneumonitis.
Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

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

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Hazardous combustion products may include:
A complex mixture of airborne solid and liquid particulates and gases (smoke).
Oxides of sulphur.
Unidentified organic and inorganic compounds.
Carbon monoxide may be evolved if incomplete combustion occurs.
Will float and can be reignited on surface water.
Flammable vapours may be present even at temperatures below the flash point.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.

5.3 Advice for firefighters

Special protective equipment for firefighters : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Further information : Clear fire area of all non-emergency personnel.

Keep adjacent containers cool by spraying with water.
If possible remove containers from the danger zone.
If the fire cannot be extinguished the only course of action is to evacuate immediately.

Contain residual material at affected sites to prevent material from entering drains (sewers), ditches, and waterways.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

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

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.
For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely
Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.4 Reference to other sections

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

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols.
Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Prevent spillages.
Never siphon by mouth.
Air-dry contaminated clothing in a well-ventilated area before laundering.
Contaminated leather articles including shoes cannot be decontaminated and should be destroyed to prevent reuse.

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

Advice on safe handling : Ensure that all local regulations regarding handling and storage facilities are followed.
Avoid inhaling vapour and/or mists.
Avoid prolonged or repeated contact with skin.
When using do not eat or drink.
Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks.
Earth all equipment.
Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.
Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols.

The vapour is heavier than air, spreads along the ground and distant ignition is possible.

Product Transfer : Avoid splash filling Wait 2 minutes after tank filling (for tanks such as those on road tanker vehicles) before opening hatches or manholes. Wait 30 minutes after tank filling (for large storage tanks) before opening hatches or manholes. Keep containers closed when not in use. Contamination resulting from product transfer may give rise to light hydrocarbon vapour in the headspace of tanks that have previously contained gasoline. This vapour may explode if there is a source of ignition. Partly filled containers present a greater hazard than those that are full, therefore handling, transfer and sampling activities need special care. Even with proper grounding and bonding, this material can still accumulate an electrostatic

charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations.

Hygiene measures : Exposure to this product should be reduced as low as reasonably practicable. Reference should be made to the Health and Safety Executive's publication "COSHH Essentials".

Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping. Define procedures for safe handling and maintenance of controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or subsequent recycle. Do not ingest. If swallowed, then seek immediate medical assistance. If repeated and/or prolonged skin exposure to the substance is likely, then wear suitable gloves tested to EN374 and provide employee skin care programmes.

7.2 Conditions for safe storage, including any incompatibilities

Further information on storage stability : Drum and small container storage:
Drums should be stacked to a maximum of 3 high.
Use properly labeled and closable containers.
Tank storage:
Tanks must be specifically designed for use with this product.
Bulk storage tanks should be diked (bunded).
Locate tanks away from heat and other sources of ignition.
Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat.
Vapours from tanks should not be released to atmosphere.
Breathing losses during storage should be controlled by a suitable vapour treatment system.
The vapour is heavier than air. Beware of accumulation in pits

and confined spaces.
Keep container tightly closed and in a cool, well-ventilated place.
Keep in a cool place.
Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.
Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.
Keep in a bunded area with a sealed (low permeability) floor, to provide containment against spillage.
Prevent ingress of water.
The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance may be obtained from the local environmental agency office.

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

7.3 Specific end use(s)

Specific use(s) : Please refer to section 16 and/or the annexes for the registered uses under REACH.

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance
Ensure that all local regulations regarding handling and storage facilities are followed.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Fuels, diesel	68334-30-5	TWA (Inhalable fraction and vapor)	100 mg/m3 (total hydrocarbons)	ACGIH
Naphthalene	91-20-3	TWA	10 ppm 50 mg/m3	91/322/EEC
	Further information: Indicative			
Naphthalene		TWA	10 ppm	ACGIH

Biological occupational exposure limits

No biological limit allocated.

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

8.2 Exposure controls

Engineering measures

Read in conjunction with the Exposure Scenario for your specific use contained in the Annex.
The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:
Use sealed systems as far as possible.
Firewater monitors and deluge systems are recommended.
Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Local exhaust ventilation is recommended.
Eye washes and showers for emergency use.

General Information:
Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.
Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or subsequent recycle.
Do not ingest. If swallowed, then seek immediate medical assistance

Personal protective equipment

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

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

PPE suppliers.

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

Eye protection : If material is handled such that it could be splashed into eyes, protective eyewear is recommended.
If a local risk assessment deems it so then chemical splash goggles may not be required and safety glasses may provide adequate eye protection.

Approved to EU Standard EN166.

Hand protection

Remarks : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. When prolonged or frequent repeated contact occurs. Nitrile rubber. For incidental contact/splash protection Neoprene, PVC gloves may be suitable. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Glove thickness should be typically greater than 0.35 mm depending on the glove make and model.

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

Protective clothing approved to EU Standard EN14605.

Respiratory protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation.
Check with respiratory protective equipment suppliers.

Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.
Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.

Select a filter suitable for the combination of organic gases and vapours and particles meeting EN14387 and EN143 [Filter type A/P for use against certain organic gases and vapours with a boiling point >65°C (149°F) and for use against particles].

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	:	liquid
Colour	:	Undyed
Odour	:	Stenched
Odour Threshold	:	Data not available
Melting point/freezing point	:	Data not available
Boiling point/boiling range	:	170 - 390 °CMethod: Unspecified
Flammability		
Flammability (solid, gas)	:	Not applicable
Lower explosion limit and upper explosion limit / flammability limit		
Upper explosion limit / upper flammability limit	:	6 %(V)
Lower explosion limit / Lower flammability limit	:	1 %(V)
Flash point	:	55 - 75 °C Method: Unspecified
Auto-ignition temperature	:	> 220 °C
Decomposition temperature		
Decomposition temperature	:	Data not available
pH	:	Not applicable

Viscosity		
Viscosity, kinematic	:	2 - 4.5 mm2/s (40 °C) Method: Unspecified
Solubility(ies)		
Water solubility	:	Data not available
Solubility in other solvents	:	Data not available
Partition coefficient: n-octanol/water	:	log Pow: ca. 2 - 15
Vapour pressure	:	<= 0.4 kPa (38.0 °C) Method: Unspecified <= 0.6 kPa (50.0 °C) Method: Unspecified
Relative density	:	Data not available
Density	:	820 - 845 kg/m3 (15.0 °C) Method: Unspecified
Relative vapour density	:	> 4
Particle characteristics		
Particle size	:	Data not available

9.2 Other information

Explosives	:	Classification Code: Not classified
Oxidizing properties	:	Not applicable
Evaporation rate	:	Data not available
Conductivity	:	Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semiconductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid

SECTION 10: Stability and reactivity

10.1 Reactivity

The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.

10.2 Chemical stability

Stable under normal use conditions.

10.3 Possibility of hazardous reactions

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

10.4 Conditions to avoid

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

In certain circumstances product can ignite due to static electricity.

10.5 Incompatible materials

Materials to avoid : Strong oxidising agents.

10.6 Hazardous decomposition products

Hazardous decomposition products are not expected to form during normal storage.
Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.

SECTION 11: Toxicological information

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

Information on likely routes of exposure : Skin and eye contact are the primary routes of exposure although exposure may occur through inhalation or following accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity : LD50 (rat): > 5,000 mg/kg
Remarks: Low toxicity

Acute inhalation toxicity : LC 50 (rat): >1-<=5 mg/l
Exposure time: 4 h
Remarks: Harmful if inhaled.

Acute dermal toxicity : LD 50 (Rabbit): > 2,000 mg/kg
Remarks: Low toxicity

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg Remarks: Based on available data, the classification criteria are not met.
Acute inhalation toxicity	:	LC50: > 5 mg/l Exposure time: 4 h Remarks: Based on available data, the classification criteria are not met.
Acute dermal toxicity	:	LD50 (Rat): > 2,000 mg/kg Remarks: Based on available data, the classification criteria are not met.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg Remarks: Based on available data, the classification criteria are not met.
Acute inhalation toxicity	:	LC50: > 5 mg/l Exposure time: 4 h Remarks: Based on available data, the classification criteria are not met.
Acute dermal toxicity	:	LD50 (Rat): > 2,000 mg/kg Remarks: Based on available data, the classification criteria are not met.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Acute oral toxicity	:	Remarks: Low toxicity LD50 > 5000 mg/kg
Acute inhalation toxicity	:	Remarks: Low toxicity if inhaled. Based on available data, the classification criteria are not met.
Acute dermal toxicity	:	Remarks: LD50 > 5000 mg/kg Low toxicity Based on available data, the classification criteria are not met.
Acute toxicity (other routes of administration)	:	Remarks: Not a respiratory irritant

Skin corrosion/irritation

Product:

Remarks	:	Irritating to skin.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Remarks : Not irritating to skin.

Serious eye damage/eye irritation

Product:

Remarks : Slightly irritating to the eye.
Based on available data, the classification criteria are not met.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Remarks : Not irritating to eye.
Based on available data, the classification criteria are not met.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Remarks : Not irritating to eye.
Based on available data, the classification criteria are not met.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Remarks : Not irritating to eye.

Respiratory or skin sensitisation

Product:

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

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Remarks : Not a sensitiser.

Based on available data, the classification criteria are not met.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

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

Germ cell mutagenicity

Product:

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

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

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Genotoxicity in vitro : Remarks: Based on available data, the classification criteria are not met.

Genotoxicity in vivo : Remarks: Not mutagenic.
Based on available data, the classification criteria are not met.

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Genotoxicity in vitro : Remarks: Based on available data, the classification criteria are not met.

Genotoxicity in vivo : Remarks: Not mutagenic.
Based on available data, the classification criteria are not met.

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Genotoxicity in vivo : Remarks: Non mutagenic

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

Carcinogenicity

Product:

Remarks : Limited evidence of carcinogenic effect
Repeated skin contact has resulted in irritation and skin cancer in animals.

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

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

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

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

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

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

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

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

Material	GHS/CLP Carcinogenicity Classification
Fuels, diesel	Carcinogenicity Category 2
Distillates (Fischer-Tropsch), C8-26 - Branched and Linear	No carcinogenicity classification.
Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear)	No carcinogenicity classification.
Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel)	No carcinogenicity classification.
Naphthalene	Carcinogenicity Category 2

Material	Other Carcinogenicity Classification
Naphthalene	IARC: Group 2B: Possibly carcinogenic to humans

Reproductive toxicity

Product:

Effects on fertility : Remarks: Not a developmental toxicant., Based on available data, the classification criteria are not met., Does not impair fertility.

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

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Effects on fertility : Remarks: Does not impair fertility., Not a developmental toxicant., Based on available data, the classification criteria are not met.

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Effects on fertility : Remarks: Does not impair fertility., Not a developmental toxicant., Based on available data, the classification criteria are not met.

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Effects on fertility : Remarks: Not a developmental toxicant., Based on available data, the classification criteria are not met., Does not impair fertility.

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

STOT - single exposure

Product:

Remarks : Not classified.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Remarks : High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea. Based on available data, the classification criteria are not met.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Remarks : High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea. Based on available data, the classification criteria are not met.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

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

STOT - repeated exposure

Product:

Target Organs : Blood, thymus, Liver
Remarks : May cause damage to organs or organ systems through prolonged or repeated exposure.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

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

Aspiration toxicity

Product:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Not an aspiration hazard., Based on available data, the classification criteria are not met.

11.2 Information on other hazards

Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Further information

Product:

Remarks : Classifications by other authorities under varying regulatory frameworks may exist.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Remarks : Classifications by other authorities under varying regulatory frameworks may exist.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Remarks : Classifications by other authorities under varying regulatory frameworks may exist.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Remarks : Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish	:	Remarks: LL/EL/IL50 > 1 <= 10 mg/l Toxic
Toxicity to daphnia and other aquatic invertebrates	:	Remarks: LL/EL/IL50 > 1 <= 10 mg/l Toxic
Toxicity to algae/aquatic plants	:	Remarks: LL/EL/IL50 > 1 <= 10 mg/l Toxic
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to daphnia and other	:	Remarks: Data not available

aquatic invertebrates (Chronic toxicity)

Toxicity to microorganisms :
Remarks: LL/EL/IL50 > 100 mg/l
Practically non toxic:
Based on available data, the classification criteria are not met.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Toxicity to fish : LL50 : > 1,000 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to daphnia and other aquatic invertebrates : LL50 : > 1,000 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to algae/aquatic plants : LL50 : > 1,000 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to microorganisms : LL50 : > 100 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to fish (Chronic toxicity) : NOEC: 100 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: 32 mg/l
Remarks: Based on available data, the classification criteria are not met.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Toxicity to fish : LL50 : > 1,000 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to daphnia and other aquatic invertebrates : LL50 : > 1,000 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to algae/aquatic plants : LL50 : > 1,000 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to microorganisms : LL50 : > 100 mg/l
Remarks: Based on available data, the classification criteria are not met.

Toxicity to fish (Chronic toxicity)	:	NOEC: 100 mg/l Remarks: Based on available data, the classification criteria are not met.
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 32 mg/l Remarks: Based on available data, the classification criteria are not met.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Toxicity to fish	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to daphnia and other aquatic invertebrates	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to algae/aquatic plants	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to microorganisms	:	Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	Remarks: Data not available

12.2 Persistence and degradability

Product:

Biodegradability	:	Remarks: Readily biodegradable. Not Persistent per IMO criteria. International Oil Pollution Compensation (IOPC) Fund definition: "A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Biodegradability	:	Biodegradation: 80 % Exposure time: 28 d Method: OECD Test Guideline 301F Remarks: Readily biodegradable. Oxidises rapidly by photo-chemical reactions in air.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Biodegradability : Remarks: Readily biodegradable.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Biodegradability : Remarks: Readily biodegradable.
Not Persistent per IMO criteria.
International Oil Pollution Compensation (IOPC) Fund definition: "A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Contains constituents with the potential to bioaccumulate.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Bioaccumulation : Remarks: Contains constituents with the potential to bioaccumulate.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Bioaccumulation : Remarks: Contains constituents with the potential to bioaccumulate.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Bioaccumulation : Remarks: Does not have the potential to bioaccumulate significantly.

12.4 Mobility in soil

Product:

Mobility : Remarks: Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day., If product enters soil, one or more constituents will be mobile and may contaminate groundwater., Large volumes may penetrate soil and could contaminate groundwater., Floats on water.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

Mobility : Remarks: Floats on water., Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day., Large volumes may penetrate soil and could contami-

nate groundwater.

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

Mobility : Remarks: Floats on water., Partly evaporates from water or soil surfaces, but a significant proportion will remain after one day., Large volumes may penetrate soil and could contaminate groundwater.

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Mobility : Remarks: If product enters soil, one or more constituents will be highly mobile and may contaminate groundwater.

12.5 Results of PBT and vPvB assessment

Product:

Assessment : This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB..

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

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

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Product:

Additional ecological infor- : Films formed on water may affect oxygen transfer and damage or-

mation ganisms.

Components:

Distillates (Fischer-Tropsch), C8-26 - Branched and Linear:

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

Renewable hydrocarbons, diesel type fraction (Alkanes, C10-20-branched and linear):

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

Fatty acids, C16-18 and C18-unsatd., Me esters (FAME, Biodiesel):

Additional ecological information : Will exert oxygen demand when significant quantities enter watercourses and may cause damage to aquatic life.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Recover or recycle if possible.
It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.
Do not dispose into the environment, in drains or in water courses.
Do not dispose of tank water bottoms by allowing them to drain into the ground. This will result in soil and groundwater contamination.
Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

Contaminated packaging : Residues may cause an explosion hazard if heated above the flash point. Do not puncture, cut or weld uncleaned drums.
Do not pollute the soil, water or environment with the waste container.
Comply with any local recovery or waste disposal regulations.
Dispose in accordance with prevailing regulations, preferably to a recognized collector or contractor. The competence of the collector or contractor should be established beforehand.

Local legislation

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

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

Hazardous Waste (England and Wales) Regulations 2005.

SECTION 14: Transport information

14.1 UN number or ID number

ADR : 1202

RID : 1202

IMDG : 1202

IATA : 1202

14.2 UN proper shipping name

ADR : DIESEL FUEL

RID : DIESEL FUEL

IMDG : DIESEL FUEL

IATA : DIESEL FUEL

14.3 Transport hazard class(es)

ADR : 3

RID : 3

IMDG : 3

IATA : 3

14.4 Packing group

ADR

Packing group : III
Classification Code : F1
Hazard Identification Number : 30
Labels : 3

RID

Packing group : III
Classification Code : F1
Hazard Identification Number : 30
Labels : 3

IMDG
Packing group : III
Labels : 3

IATA
Packing group : III
Labels : 3

14.5 Environmental hazards

ADR
Environmentally hazardous : yes

RID
Environmentally hazardous : yes

IMDG
Marine pollutant : yes

14.6 Special precautions for user

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

14.7 Maritime transport in bulk according to IMO instruments

MARPOL Annex 1 rules apply for bulk shipments by sea.

SECTION 15: Regulatory information

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

Other regulations:

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

Environmental Protection Act 1990 (as amended). Health and Safety at Work etc. Act 1974. Consumers Protection Act 1987. Pollution Prevention and Control Act 1999. Environment Act 1995. Factories Act 1961. The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations 2011. Chemicals (Hazard Information and Packaging for Supply) Regulations 2009. Control of Substances Hazardous to Health Regulations 2002 (as amended). Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (as amended). Personal Protective Equipment Regulations 2002. Personal Protective Equipment at Work Regulations 1992. Hazardous Waste (England and Wales) Regulations 2005(as amended). Control of Major Accident Hazards Regulations 1999 (as amended). Renewable Transport Fuel Obligations Order 2007 (as amended). Energy Act 2011. Environmental Permitting (England and Wales) Regulations 2010 (as amended). Waste (England and Wales) Regulations 2011 (as amended). Planning (Hazardous Substances) Act 1990 and associated regu-

lations. The Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011.

Product is subject to the Control of Major Accident Hazards Regulations 2015 (2015 No. 483) based on Seveso III directive (2012/18/EU).

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

EINECS : All components listed or polymer exempt.

15.2 Chemical safety assessment

A Chemical Safety Assessment was performed for all substances of this product.

SECTION 16: Other information

Full text of H-Statements

H226	:	Flammable liquid and vapour.
H302	:	Harmful if swallowed.
H304	:	May be fatal if swallowed and enters airways.
H315	:	Causes skin irritation.
H332	:	Harmful if inhaled.
H351	:	Suspected of causing cancer.
H373	:	May cause damage to organs through prolonged or repeated exposure.
H400	:	Very toxic to aquatic life.
H410	:	Very toxic to aquatic life with long lasting effects.
H411	:	Toxic to aquatic life with long lasting effects.

Full text of other abbreviations

Acute Tox.	:	Acute toxicity
Aquatic Chronic	:	Long-term (chronic) aquatic hazard
Asp. Tox.	:	Aspiration hazard
Carc.	:	Carcinogenicity
Flam. Liq.	:	Flammable liquids
Skin Irrit.	:	Skin irritation
STOT RE	:	Specific target organ toxicity - repeated exposure
91/322/EEC	:	Europe. Commission Directive 91/322/EEC on establishing indicative limit values
ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
91/322/EEC / TWA	:	Limit Value - eight hours
ACGIH / TWA	:	8-hour, time-weighted average

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration as-

sociated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Training advice : Provide adequate information, instruction and training for operators.

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

This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

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

Classification of the mixture:		**Classification procedure:**
Flam. Liq. 3	H226	On basis of test data.
Asp. Tox. 1	H304	Expert judgement and weight of evidence determination.
Skin Irrit. 2	H315	Expert judgement and weight of evidence determination.
Acute Tox. 4	H332	Expert judgement and weight of evidence determination.
Carc. 2	H351	Expert judgement and weight of evidence determination.
STOT RE 2	H373	Expert judgement and weight of evidence determination.
Aquatic Chronic 2	H411	Expert judgement and weight of evidence determination.

Identified Uses according to the Use Descriptor System
Uses - Worker
Title : Manufacture of substance- Industrial

Uses - Worker
Title : Use as an intermediate- Industrial

Uses - Worker
Title : Distribution of substance- Industrial

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

Uses - Worker
Title : Use as a fuel- Industrial

Uses - Worker
Title : Use as a fuel- Professional

Uses - Worker
Title : Manufacture of substance- Industrial

Uses - Worker
Title : Use as an intermediate- Industrial

Uses - Worker
Title : Distribution of substance- Industrial

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

Uses - Worker
Title : Use as a fuel- Industrial

Uses - Worker
Title : Use as a fuel- Professional
Identified Uses according to the Use Descriptor System
Uses - Consumer
Title : Use as a fuel
- Consumer

Uses - Consumer
Title : Use as a fuel
- Consumer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guid-

ance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

GB / EN

Exposure Scenario - Worker

300000000042	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Manufacture of substance- Industrial
Use Descriptor	**Sector of Use**: SU3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC1, ERC4, ESVOC SpERC 1.1.v1
Scope of process	Manufacture of the substance or use as a process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems

	that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Bulk closed loading and unloading.	Wear suitable gloves tested to EN374.
Bulk open loading and unloading.	Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Laboratory activities	No other specific measures identified.
Bulk product storage	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	2.8E+07
Fraction of Regional tonnage used locally:	0.021
Annual site tonnage (tonnes/year):	6.0E+05
Maximum daily site tonnage (kg/day):	2.0E+06
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-02
Release fraction to wastewater from process (initial release prior to RMM):	3.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Treat air emission to provide a typical removal efficiency of (%)	90

Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	90.3
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3.3E+06
Assumed domestic sewage treatment plant flow (m3/d)	10,000
Conditions and Measures related to external treatment of waste for disposal	
During manufacturing no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	
During manufacturing no waste of the substance is generated.	

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

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

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

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000043	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as an intermediate- Industrial
Use Descriptor	**Sector of Use**: SU3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC6a, ESVOC SpERC 6.1a.v1
Scope of process	Use of substance as an intermediate (not related to Strictly Controlled Conditions). Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems

	that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Bulk closed loading and unloading.	Wear suitable gloves tested to EN374.
Bulk open loading and unloading.	Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Laboratory activities	No other specific measures identified.
Bulk product storage	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	3.5E+05
Fraction of Regional tonnage used locally:	0.043
Annual site tonnage (tonnes/year):	1.5E+04
Maximum daily site tonnage (kg/day):	5.0E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	3.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-03
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no secondary	

wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	80
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	51.7
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	4.1E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
This substance is consumed during use and no waste of substance is generated.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of substance is generated.	

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

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

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

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all

sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000044	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Distribution of substance- Industrial
Use Descriptor	**Sector of Use**: SU3 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 8a, PROC 8b, PROC 9, PROC 15 **Environmental Release Categories**: ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC 6C,, ERC7, ESVOC SpERC 1.1b.v1
Scope of process	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems

	that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Laboratory activities	No other specific measures identified.
Bulk closed loading and unloading.	Wear suitable gloves tested to EN374.
Bulk open loading and unloading.	Wear suitable gloves tested to EN374.
Drum and small package filling	Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	2.8E+07
Fraction of Regional tonnage used locally:	0.002
Annual site tonnage (tonnes/year):	5.6E+04
Maximum daily site tonnage (kg/day):	1.9E+05
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-06
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite	

wastewater.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	9.6
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	2.9E+06
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or regional regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

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

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

Exposure Scenario - Worker

300000000045	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Formulation & (re)packing of substances and mixtures- Industrial
Use Descriptor	**Sector of Use**: SU3, SU10 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 5, PROC 8a, PROC 8b, PROC 9, PROC 14, PROC 15 **Environmental Release Categories**: ERC2, ESVOC SpERC 2.2.v1
Scope of process	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to pre-

	vent / minimise exposures and to report any skin problems that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Drum/batch transfers	Use drum pumps or carefully pour from container. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Bulk transfers	Handle substance within a closed system. Wear suitable gloves tested to EN374.
Mixing operations (open systems)	Provide extraction ventilation at points where emissions occur. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Production or preparation or articles by tabletting, compression, extrusion or pelletisation	Wear suitable gloves tested to EN374.
Drum/batch transfers	Wear suitable gloves tested to EN374.
Laboratory activities	No other specific measures identified.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	2.8E+07
Fraction of Regional tonnage used locally:	0.0011
Annual site tonnage (tonnes/year):	3.0E+04
Maximum daily site tonnage (kg/day):	1.0E+05
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10

Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (after typical onsite RMMs consistent with EU Solvent Emissions Directive requirements):	1.0E-02
Release fraction to wastewater from process (initial release prior to RMM):	2.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	60.0
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	6.8E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or regional regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

SECTION 4	**GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO**

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

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

Exposure Scenario - Worker

300000000046	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel- Industrial
Use Descriptor	**Sector of Use**: SU3 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 16 **Environmental Release Categories**: ERC7, ESVOC SpERC 7.12a.v1
Scope of process	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Bulk transfers	Wear suitable gloves tested to EN374.
Drum/batch transfers	Wear suitable gloves tested to EN374.
Use as a fuel(closed systems)	No other specific measures identified.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Handle substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	4.5E+06
Fraction of Regional tonnage used locally:	0.34
Annual site tonnage (tonnes/year):	1.5E+06
Maximum daily site tonnage (kg/day):	5.0E+06
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	5.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Onsite waste water treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	95
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	97.7
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	60.4
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	

Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.7
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5.5E+06
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

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

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

Exposure Scenario - Worker

300000000047	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel- Professional
Use Descriptor	**Sector of Use**: SU22 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 16 **Environmental Release Categories**: ERC9a, ERC9b, ESVOC SpERC 9.12b.v1
Scope of process	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Bulk transfers	Wear suitable gloves tested to EN374.
Drum/batch transfers	Wear suitable gloves tested to EN374.
Refueling.	Wear suitable gloves tested to EN374.
Use as a fuel(closed systems)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). , or: Ensure operation is undertaken outdoors.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	6.7E+06
Fraction of Regional tonnage used locally:	0.0005
Annual site tonnage (tonnes/year):	3.3E+03
Maximum daily site tonnage (kg/day):	9.2E+03
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-04
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	8.3
If discharging to domestic sewage treatment plant, no secondary	0

wastewater treatment required.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1.4E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

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

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Required removal efficiency for wastewater can be achieved using onsite/offsite technolo-

gies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000042	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Manufacture of substance- Industrial
Use Descriptor	**Sector of Use**: SU3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC1, ERC4, ESVOC SpERC 1.1.v1
Scope of process	Manufacture of the substance or use as a process chemical or extraction agent. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems

	that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Bulk closed loading and unloading.	Wear suitable gloves tested to EN374.
Bulk open loading and unloading.	Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Laboratory activities	No other specific measures identified.
Bulk product storage	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	2.8E+07
Fraction of Regional tonnage used locally:	0.021
Annual site tonnage (tonnes/year):	6.0E+05
Maximum daily site tonnage (kg/day):	2.0E+06
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-02
Release fraction to wastewater from process (initial release prior to RMM):	3.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Treat air emission to provide a typical removal efficiency of (%)	90

Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	90.3
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3.3E+06
Assumed domestic sewage treatment plant flow (m3/d)	10,000
Conditions and Measures related to external treatment of waste for disposal	
During manufacturing no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	
During manufacturing no waste of the substance is generated.	

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

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

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

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000043	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as an intermediate- Industrial
Use Descriptor	**Sector of Use**: SU3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC6a, ESVOC SpERC 6.1a.v1
Scope of process	Use of substance as an intermediate (not related to Strictly Controlled Conditions). Includes recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems

	that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Bulk closed loading and unloading.	Wear suitable gloves tested to EN374.
Bulk open loading and unloading.	Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Laboratory activities	No other specific measures identified.
Bulk product storage	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	3.5E+05
Fraction of Regional tonnage used locally:	0.043
Annual site tonnage (tonnes/year):	1.5E+04
Maximum daily site tonnage (kg/day):	5.0E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	3.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-03
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no secondary	

wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	80
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	51.7
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	4.1E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
This substance is consumed during use and no waste of substance is generated.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of substance is generated.	

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

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

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

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all

sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000044	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Distribution of substance- Industrial
Use Descriptor	**Sector of Use**: SU3 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 8a, PROC 8b, PROC 9, PROC 15 **Environmental Release Categories**: ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC 6C,, ERC7, ESVOC SpERC 1.1b.v1
Scope of process	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems

	that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Laboratory activities	No other specific measures identified.
Bulk closed loading and unloading.	Wear suitable gloves tested to EN374.
Bulk open loading and unloading.	Wear suitable gloves tested to EN374.
Drum and small package filling	Wear suitable gloves tested to EN374.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	2.8E+07
Fraction of Regional tonnage used locally:	0.002
Annual site tonnage (tonnes/year):	5.6E+04
Maximum daily site tonnage (kg/day):	1.9E+05
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-06
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite	

wastewater.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	9.6
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	2.9E+06
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or regional regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

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

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

Exposure Scenario - Worker

300000000045	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Formulation & (re)packing of substances and mixtures- Industrial
Use Descriptor	**Sector of Use**: SU3, SU10 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 4, PROC 5, PROC 8a, PROC 8b, PROC 9, PROC 14, PROC 15 **Environmental Release Categories**: ERC2, ESVOC SpERC 2.2.v1
Scope of process	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to pre-

	vent / minimise exposures and to report any skin problems that may develop.
General exposures (closed systems)	No other specific measures identified.
General exposures (open systems)	Wear suitable gloves tested to EN374.
Process sampling	No other specific measures identified.
Drum/batch transfers	Use drum pumps or carefully pour from container. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Bulk transfers	Handle substance within a closed system. Wear suitable gloves tested to EN374.
Mixing operations (open systems)	Provide extraction ventilation at points where emissions occur. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Production or preparation or articles by tabletting, compression, extrusion or pelletisation	Wear suitable gloves tested to EN374.
Drum/batch transfers	Wear suitable gloves tested to EN374.
Laboratory activities	No other specific measures identified.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	2.8E+07
Fraction of Regional tonnage used locally:	0.0011
Annual site tonnage (tonnes/year):	3.0E+04
Maximum daily site tonnage (kg/day):	1.0E+05
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10

Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (after typical onsite RMMs consistent with EU Solvent Emissions Directive requirements):	1.0E-02
Release fraction to wastewater from process (initial release prior to RMM):	2.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	0
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	60.0
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	6.8E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or regional regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

SECTION 4	**GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO**

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

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

Exposure Scenario - Worker

300000000046	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel- Industrial
Use Descriptor	**Sector of Use**: SU3 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 16 **Environmental Release Categories**: ERC7, ESVOC SpERC 7.12a.v1
Scope of process	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Bulk transfers	Wear suitable gloves tested to EN374.
Drum/batch transfers	Wear suitable gloves tested to EN374.
Use as a fuel(closed systems)	No other specific measures identified.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Handle substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	4.5E+06
Fraction of Regional tonnage used locally:	0.34
Annual site tonnage (tonnes/year):	1.5E+06
Maximum daily site tonnage (kg/day):	5.0E+06
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	5.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	0
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
Onsite waste water treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	95
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	97.7
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	60.4
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	

Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	97.7
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	5.5E+06
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

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

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

Exposure Scenario - Worker

300000000047	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel- Professional
Use Descriptor	**Sector of Use**: SU22 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 16 **Environmental Release Categories**: ERC9a, ERC9b, ESVOC SpERC 9.12b.v1
Scope of process	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

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

Contributing Scenarios	**Risk Management Measures**
General risk management measures applicable to all activities	Ensure relevant staff are informed of exposure potential and aware of basic actions to minimise exposures; ensure suitable personal protective equipment is available; clear up spills and dispose of waste in accordance with regulatory requirements; monitor effectiveness of control measures; provide regular health surveillance as appropriate; identify and implement corrective actions.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.

Bulk transfers	Wear suitable gloves tested to EN374.
Drum/batch transfers	Wear suitable gloves tested to EN374.
Refueling.	Wear suitable gloves tested to EN374.
Use as a fuel(closed systems)	Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). , or: Ensure operation is undertaken outdoors.
Equipment cleaning and maintenance	Drain down system prior to equipment opening or maintenance. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.
Storage.	Store substance within a closed system.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	6.7E+06
Fraction of Regional tonnage used locally:	0.0005
Annual site tonnage (tonnes/year):	3.3E+03
Maximum daily site tonnage (kg/day):	9.2E+03
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1.0E-04
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	8.3
If discharging to domestic sewage treatment plant, no secondary	0

wastewater treatment required.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1.4E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

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

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

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

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Required removal efficiency for wastewater can be achieved using onsite/offsite technolo-

gies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Consumer

300000000211	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel - Consumer
Use Descriptor	**Sector of Use**: SU21 **Product Categories**: PC13 **Environmental Release Categories**: ERC9a, ERC9b, ESVOC SpERC 9.12c.v1
Scope of process	Covers consumer uses in liquid fuels.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

Section 2.1	**Control of Consumer Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 Pa
Concentration of the Sub-stance in Mixture/Article	Unless stated otherwise.
	Covers concentrations up to 100 %
Amounts Used	
Unless stated otherwise.	
for each use event, covers amount up to (g):	37,500
covers skin contact area (cm2):	420
Frequency and Duration of Use	
Unless stated otherwise.	
covers use up to (times/day of use):	0.143
Covers use up to (hours/event):	2

Product Categories	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Fuels Liquid: Automotive Refuelling.	Covers concentration up to (%): 100 %
	Covers use up to (days/year): 52 day/year
	Covers use up to 1 times/day of use
	covers skin contact area up to (cm2): 210 cm2
	For each use event, covers amount up to 37,500 g
	Covers outdoor use.
	Covers use in room size of 100 m3
	Covers exposure up to 0.05 hours/event
Fuels Liquid, Garden Equipment - Use.	Covers concentrations up to 100 %
	covers use up to 26 day/year
	Covers use up to 1 times/day of use
	For each use event, covers amount up to 750 g
	Covers outdoor use.

	Covers use in room size of 100 m3
	Covers exposure up to 2.00 hours/event
Fuels Liquid: Garden Equipment - Refuelling.	Covers concentrations up to 100 %
	covers use up to 26 day/year
	Covers use up to 1 times/day of use
	covers skin contact area up to (cm2): 420 cm2
	For each use event, covers amount up to 750 g
	Covers use in a one car garage (34 m3) under typical ventilation.
	Covers use in room size of 34 m3
	Covers exposure up to 0.03 hours/event

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	1.6E+07
Fraction of Regional tonnage used locally:	0.0005
Annual site tonnage (tonnes/year):	8.2E+03
Maximum daily site tonnage (kg/day):	2.3E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from wide dispersive use (regional only):	1.0E-04
Release fraction to wastewater from wide dispersive use:	1.0E-05
Release fraction to soil from wide dispersive use (regional only):	1.0E-05
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3.5E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

SECTION 3	**EXPOSURE ESTIMATION**
Section 3.1 - Health	
The ECETOC TRA tool has been used to estimate consumer exposures unless otherwise	

indicated.

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

SECTION 4	**GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO**
Section 4.1 - Health	
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.	

Section 4.2 -Environment
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Consumer

300000000211	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel - Consumer
Use Descriptor	**Sector of Use**: SU21 **Product Categories**: PC13 **Environmental Release Categories**: ERC9a, ERC9b, ESVOC SpERC 9.12c.v1
Scope of process	Covers consumer uses in liquid fuels.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**

Section 2.1	**Control of Consumer Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 Pa
Concentration of the Substance in Mixture/Article	Unless stated otherwise.
	Covers concentrations up to 100 %
Amounts Used	
Unless stated otherwise.	
for each use event, covers amount up to (g):	37,500
covers skin contact area (cm2):	420
Frequency and Duration of Use	
Unless stated otherwise.	
covers use up to (times/day of use):	0.143
Covers use up to (hours/event):	2

Product Categories	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Fuels Liquid: Automotive Refuelling.	Covers concentration up to (%): 100 %
	Covers use up to (days/year): 52 day/year
	Covers use up to 1 times/day of use
	covers skin contact area up to (cm2): 210 cm2
	For each use event, covers amount up to 37,500 g
	Covers outdoor use.
	Covers use in room size of 100 m3
	Covers exposure up to 0.05 hours/event
Fuels Liquid, Garden Equipment - Use.	Covers concentrations up to 100 %
	covers use up to 26 day/year
	Covers use up to 1 times/day of use
	For each use event, covers amount up to 750 g
	Covers outdoor use.

	Covers use in room size of 100 m3
	Covers exposure up to 2.00 hours/event
Fuels Liquid: Garden Equipment - Refuelling.	Covers concentrations up to 100 %
	covers use up to 26 day/year
	Covers use up to 1 times/day of use
	covers skin contact area up to (cm2): 420 cm2
	For each use event, covers amount up to 750 g
	Covers use in a one car garage (34 m3) under typical ventilation.
	Covers use in room size of 34 m3
	Covers exposure up to 0.03 hours/event

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Amounts Used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tonnes/year):	1.6E+07
Fraction of Regional tonnage used locally:	0.0005
Annual site tonnage (tonnes/year):	8.2E+03
Maximum daily site tonnage (kg/day):	2.3E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	365
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from wide dispersive use (regional only):	1.0E-04
Release fraction to wastewater from wide dispersive use:	1.0E-05
Release fraction to soil from wide dispersive use (regional only):	1.0E-05
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	94.1
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3.5E+05
Assumed domestic sewage treatment plant flow (m3/d)	2,000
Conditions and Measures related to external treatment of waste for disposal	
Combustion emissions limited by required exhaust emission controls. Waste combustion emissions considered in regional exposure assessment.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

SECTION 3	**EXPOSURE ESTIMATION**
Section 3.1 - Health	
The ECETOC TRA tool has been used to estimate consumer exposures unless otherwise	

indicated.

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

SECTION 4	**GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO**
Section 4.1 - Health	
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.	

Section 4.2 -Environment
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended.

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

1.1 Product identifier

Product name: TITAN ATF 4000

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

Identified uses: Lubricant
Uses advised against: No uses advised against identified.

1.3 Details of the supplier of the safety data sheet

Manufacturer / Supplier

FUCHS LUBRICANTS GERMANY GmbH
Friesenheimer Str. 19
68169 Mannheim

Telephone: +49 621 3701-0 (ZENTRALE)
Fax: +49 621 3701-570

Contact for request of safety data sheets

E-mail:	Automotive lubricants	automotive-FLG@fuchs.com
	Industrial lubricants	industrie-FLG@fuchs.com
Telephone:	+49 621 3701-0 (ZENTRALE)	

Informing department for safety data sheets

E-mail: produktsicherheit-FLG@fuchs.com

1.4 Emergency telephone number:

+49 621 3701-0 (Mo - Fr 08:00 - 16:00 Uhr)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

The product has been classified and labelled as hazardous according to regulation (EU) 1272/2008 (CLP).

Classification according to Regulation (EC) No 1272/2008 as amended.

Environmental Hazards

Chronic hazards to the aquatic environment	Category 3	H412: Harmful to aquatic life with long lasting effects.

Hazard summary

Physical Hazards: No data available.

2.2 Label Elements

Hazard Statement(s): H412: Harmful to aquatic life with long lasting effects.

Precautionary Statements

Prevention: P273: Avoid release to the environment.

Disposal: P501: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards: By handling of mineral oil products and chemical products no particular hazard is known when normal precautions (item 7) and personal protective equipment (item 8) are kept. The product may not be released into the environment without control.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

General information: Mixture containing severely refined base oils and additives.

Chemical name	Identifier	Concentration *	REACH Registration No.	Notes
Methacrylate copolymer	Confidential	1,00% - <5,00%	Confidential	
Base oil, low viscous	EINECS: 265-158-7	1,00% - <10,00%	01-2119487077-29	
Alkyl amine	EC: 620-540-6	0,25% - <1,00%	01-2119510877-33	
prim. alkanolamine ether	EC: 939-485-7	0,001% - <0,10%	01-2119974116-35	

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

Classification

Chemical name	Identifier	Classification	
Methacrylate copolymer	Confidential	CLP:	Eye Irrit. 2;H319
Base oil, low viscous	EINECS: 265-158-7	CLP:	Asp. Tox. 1;H304
Alkyl amine	EC: 620-540-6	CLP:	Skin Corr. 1C;H314, Eye Dam. 1;H318, Aquatic Acute 1;H400, Aquatic Chronic 1;H410, Acute Tox. 4;H302; M-Factor (aquatic acute): 10; M-Factor (aquatic chronic): 1
prim. alkanolamine ether	EC: 939-485-7	CLP:	Acute Tox. 4;H302, Skin Corr. 1B;H314, Eye Dam. 1;H318, Aquatic Acute 1;H400, Aquatic Chronic 1;H410; M-Factor (aquatic acute): 100; M-Factor (aquatic chronic): 1

CLP: Regulation No. 1272/2008.

specific concentration limit

Chemical name	Identifier	specific concentration limit	Hazard class	Hazard Category	Hazard statements
Methacrylate copolymer	Confidential	>= 75 %	Serious eye irritation	2	H319

For the wording of the listed hazard statements refer to section 16.

Please note that the mineral oils and petroleum distillates used in our products are severely refined and have a DMSO extract < 3% as measured by method IP 346 and are not classified as carcinogenic according to Note L of Annex VI of Regulation EC 1272/2008."

SECTION 4: First aid measures

General: Instantly remove any clothing soiled by the product.

4.1 Description of first aid measures

Inhalation: Supply fresh air; consult doctor in case of symptoms.

Eye contact: Promptly wash eyes with plenty of water while lifting the eye lids.

Skin Contact: Wash with soap and water.

Ingestion: Rinse mouth thoroughly.

4.2 Most important symptoms and effects, both acute and delayed: May cause skin and eye irritation.

4.3 Indication of any immediate medical attention and special treatment needed Get medical attention if symptoms occur.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: CO2, fire extinguishing powder or fog like water spraying. Extinguish larger fires with alcohol resistant foam or spray water with suitable surfactant added

Unsuitable extinguishing media: Water with a full water jet.

5.2 Special hazards arising from the substance or mixture: During fire, gases hazardous to health may be formed.

5.3 Advice for firefighters

Special fire-fighting procedures: Move container from fire area if it can be done without risk. Dispose of fire debris and contaminated fire fighting water inaccordance with official regulations. Collect contaminated fire fighting water separately. It must not enter drains.

Special protective equipment for fire-fighters: Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures: In case of spills, beware of slippery floors and surfaces.

6.2 Environmental Precautions: Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Prevent from spreading (e.g. by binding or oil barriers). Environmental manager must be informed of all major spillages. Do not allow to enter drainage system, surface or ground water.

6.3 Methods and material for containment and cleaning up: Absorb with liquid-binding material (sand, diatomite, acidbinders, universal binders, sawdust). Dispose of the material collected according to regulations. Stop the flow of material, if this is without risk.

6.4 Reference to other sections: See Section 8 of the SDS for Personal Protective Equipment. See Section 7 for information on safe handling See Section 13 for information on disposal.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling: Prevent formation of aerosols. Do not eat, drink or smoke when working with the product. Take usual precautions when handling mineral oil products or chemical products. Observe good industrial hygiene practices. Provide adequate ventilation.

7.2 Conditions for safe storage, including any incompatibilities: Local regulations concerning handling and storage of waterpolluting products have to be followed. Do not heat up to temperatures close to the flash point.

7.3 Specific end use(s): Not applicable

Storage Class: 10, Combustible liquids

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values	Source
Base oil, low viscous - Respirable fraction.	MAK	5 mg/m3	Germany. DFG MAK List (advisory OELs). Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (DFG), as amended (2017)

8.2 Exposure controls

Appropriate engineering controls: Provide adequate ventilation. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

General information:	Wash hands before breaks and after work. Use personal protective equipment as required. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. The usual precautionary measures should be adhered to inhandling the chemicals or the mineral oil products.
Eye/face protection:	Safety glasses (EN 166) recommended during refilling. Avoid contact with skin and eyes. Goggles/face shield are recommended. If risk of splashing, wear safety goggles or face shield.
Skin protection	
Hand Protection:	Material: Nitrile butyl rubber (NBR). Min. Breakthrough time: >= 480 min Recommended thickness of the material: >= 0,38 mm Avoid long-term and repeated skin contact. Suitable gloves can be recommended by the glove supplier. Use skin protection cream for preventive skin protection. Protective gloves, where permitted in acc. to safety directions. The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
Other:	Do not carry cleaning cloths impregnated with the product in trouser pockets. Wear suitable protective clothing.
Respiratory Protection:	Ensure good ventilation/exhaustion at the workplace. Avoid breathing vapour/ aerosol.
Thermal hazards:	Not known.
Hygiene measures:	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.
Environmental Controls:	No data available.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	liquid
Form:	liquid
Color:	Red
Odor:	Characteristic
pH:	substance/mixture is non-soluble (in water)
Freezing point:	not determined
Boiling Point:	Not applicable
Flash Point:	190 °C
Evaporation Rate:	Not applicable for mixtures
Flammability (solid, gas):	not determined
Flammability Limit - Upper (%)–:	Not applicable for mixtures

Flammability Limit - Lower (%)–:	Not applicable for mixtures
Vapor pressure:	Not applicable for mixtures
Relative vapor density:	Not applicable for mixtures
Density:	0,86 g/ml (15,00 °C)
Solubility(ies)	
Solubility in Water:	Insoluble in water
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	Not applicable for mixtures
Autoignition Temperature:	not determined
Decomposition Temperature:	not determined
Kinematic viscosity:	35,9 mm2/s (40 °C)
Explosive properties:	Value not relevant for classification
Oxidizing properties:	Value not relevant for classification
Particle characteristics:	Not applicable
9.2 Other information	No data available.

SECTION 10: Stability and reactivity

10.1 Reactivity:	Stable under normal use conditions.
10.2 Chemical Stability:	Stable under normal use conditions.
10.3 Possibility of hazardous reactions:	Stable under normal use conditions.
10.4 Conditions to avoid:	Stable under normal use conditions.
10.5 Incompatible Materials:	Strong oxidizing substances. Strong acids. Strong bases.
10.6 Hazardous Decomposition Products:	Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapors.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Oral

Product:	Not classified for acute toxicity based on available data.

Specified substance(s)

Base oil, low viscous	LD 50 (Rat): > 5.000 mg/kg
Alkyl amine	LD 50 (Rat): 1.350 mg/kg (OECD 401)

Dermal

Product: Not classified for acute toxicity based on available data.

Specified substance(s)

Base oil, low viscous — LD 50 (Rabbit): > 5.000 mg/kg

Inhalation

Product: Not classified for acute toxicity based on available data.

Specified substance(s)

Base oil, low viscous — LC 50 (Rat, 4 h): > 5 mg/l

Skin Corrosion/Irritation:

Product: Based on available data, the classification criteria are not met.

Specified substance(s)

Alkyl amine — OECD 404 (Rabbit, 14 d):
Causes severe skin burns.

Serious Eye Damage/Eye Irritation:

Product: Based on available data, the classification criteria are not met.

Respiratory or Skin Sensitization:

Product: Skin sensitizer: Based on available data, the classification criteria are not met.
Respiratory sensitizer: Based on available data, the classification criteria are not met.

Specified substance(s)

Alkyl amine

No sensitizing effect (guinea pig); OECD 406

Germ Cell Mutagenicity

Product: Based on available data, the classification criteria are not met.

Carcinogenicity

Product: Based on available data, the classification criteria are not met.

Reproductive toxicity

Product: Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Single Exposure

Product: Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Repeated Exposure

Product: Based on available data, the classification criteria are not met.

Aspiration Hazard

Product: Based on available data, the classification criteria are not met.

Other adverse effects: No data available.

SECTION 12: Ecological information

12.1 Toxicity

Acute toxicity

Product: Based on available data, the classification criteria are not met.

Fish
Specified substance(s)

Alkyl amine	LC 50 (Fish, 96 h): 0,1 mg/l (OECD 203)

Aquatic Invertebrates
Specified substance(s)

Alkyl amine	EC 50 (Water Flea, 48 h): 0,043 mg/l (OECD 202)

Chronic ToxicityProduct: Based on available data, the classification criteria are met.

Aquatic Invertebrates
Specified substance(s)

Alkyl amine	EC 10 (Water Flea, 21 d): 0,0107 mg/l (OECD 211)

Toxicity to Aquatic Plants
Specified substance(s)

Alkyl amine	EC 50 (Alga, 72 h): 0,0538 mg/l (OECD 201) NOEC (Alga, 72 h): 0,0156 mg/l

12.2 Persistence and Degradability

Biodegradation

Product: Not applicable for mixtures

Specified substance(s)

Alkyl amine	63 % (28 d, OECD 301D) Readily biodegradable

12.3 Bioaccumulative potential

Product: Not applicable for mixtures

12.4 Mobility in soil:

Product: Not applicable for mixtures

12.5 Results of PBT and vPvB assessment: The product does not contain any substances fulfilling the PBT/vPvB criteria.

12.6 Other adverse effects: Harmful to aquatic life with long lasting effects.

Water Hazard Class (WGK): WGK 2: significantly water-endangering.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Dispose in accordance with all applicable regulations.

Disposal methods: Discharge, treatment, or disposal may be subject to national, state, or local laws.

European Waste Codes

13 02 05*: mineral-based non-chlorinated engine, gear and lubricating oils

SECTION 14: Transport information

ADR/RID

14.1 UN number or ID number:	–
14.2 UN Proper Shipping Name:	–
14.3 Transport Hazard Class(es)	
Class:	Non-dangerous goods
Label(s):	–
Hazard No. (ADR):	–
Tunnel restriction code:	–
14.4 Packing Group:	–
14.5 Environmental hazards:	–
14.6 Special precautions for user:	–

IMDG

14.1 UN number or ID number:	–
14.2 UN Proper Shipping Name:	–
14.3 Transport Hazard Class(es)	
Class:	Non-dangerous goods
Label(s):	–
EmS No.:	–
14.3 Packing Group:	–
14.5 Environmental hazards:	–
14.6 Special precautions for user:	–

IATA

14.1 UN number or ID number:	–
14.2 Proper Shipping Name:	–
14.3 Transport Hazard Class(es):	
Class:	Non-dangerous goods
Label(s):	–
14.4 Packing Group:	–
14.5 Environmental hazards:	–
14.6 Special precautions for user:	–

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: Not applicable.

SECTION 15: Regulatory information

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

EU Regulations

EU. Regulation 1005/2009/EC on substances that deplete the ozone layer, Annex I, Controlled Substances: none

EU. Regulation 2019/1021/EU on persistent organic pollutants (POPs) (recast), as amended: none

National Regulations

Water Hazard Class (WGK): WGK 2: significantly water-endangering.

15.2 Chemical safety assessment: No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information: Vertical lines in the margin indicate an amendment.

Wording of the H-statements in section 2 and 3

H302	Harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H412	Harmful to aquatic life with long lasting effects.

Other information: The classification complies with the current EU lists; however, it has been supplemented with expert literature information and information provided by/about our company. The following evaluation methods were used: - On the basis of test data - Calculation Method - Bridging Principle "Substantially similar mixtures" - Expert Judgement

Revision Date: 14.09.2022

Disclaimer: The data contained in this safety data sheet are based on our current knowledge and experience and are given to the best of our knowledge and belief. It characterizes the product only with regard to safety requirements for handling, transport and disposal. The data do not describe the product's properties (tech. product specification). Neither should any agreed property nor the suitability of the product for any specific technical application be deduced from the data contained in this safety data sheet. Modifications on this document are not allowed. The data are not transferable to other products. In the case of mixing the product with other products or in the case of processing, the data in this safety data sheet are not necessarily valid for the new-made material. It is the responsibility of the recipient of the product to observe federal, state and local law. Please contact us to obtain up-to-date safety data sheets. This document was issued electronically and has no signature.

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

1.1 Product identifier

Product name: CH2F2 38,1110 %;C2HF5 17,9557 %;C2H2F4 43,9332 %

Other Name: Refrigerant R407C

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

Identified uses: Industrial and professional. Perform risk assessment prior to use.
Refrigerant.

Uses advised against Consumer use.

1.3 Details of the supplier of the safety data sheet

Supplier
BOC
Priestley Road, Worsley
M28 2UT Manchester

Telephone: 0800 111 333

E-mail: ReachSDS@boc.com

1.4 Emergency telephone number: 0800 111 333

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Physical Hazards

Gases under pressure	Liquefied gas	H280: Contains gas under pressure; may explode if heated.

2.2 Label Elements

Signal Word: Warning

Hazard Statement(s): H280: Contains gas under pressure; may explode if heated.

Precautionary Statements

General None.

Prevention: None.

Response: None.

Storage: P403: Store in a well-ventilated place.

Disposal None.

Supplemental information

EIGA-0783: Contains fluorinated greenhouse gases
EIGA-As: Asphyxiant in high concentrations.

2.3 Other hazards Contact with evaporating liquid may cause frostbite or freezing of skin.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical name	Chemical formula	Concentration	CAS-No.	REACH Registration No.	M-Factor:	Notes
Pentafluoroethane	C2HF5	17.9557%	354-33-6	01-2119485636-25	-	
Difluoromethane	CH2F2	38.1110%	75-10-5	01-2119471312-47	-	
Norflurane	C2H2F4	43.9332%	811-97-2	01-2119459374-33	-	

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements. All concentrations are nominal.

This substance has workplace exposure limit(s).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

Classification

Chemical name	Classification		Notes
Pentafluoroethane	CLP:	Press. Gas Liquef. Gas;H280	
Difluoromethane	CLP:	Flam. Gas 1A;H220, Press. Gas Liquef. Gas;H280	
Norflurane	CLP:	Press. Gas Liquef. Gas;H280	

CLP: Regulation No. 1272/2008.

The full text for all H-statements is displayed in section 16.

SECTION 4: First aid measures

General: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact: Contact with evaporating liquid may cause frostbite or freezing of skin.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Treatment: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

SECTION 5: Firefighting measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media: Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent. Water spray, fog, CO2, dry chemical, or alcohol resistant foam.

Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance or mixture:

Fire or excessive heat may produce hazardous decomposition products.

Hazardous Combustion Products: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Carbon oxides fluorocarbons Hydrogen fluoride ; Carbonyl difluoride

5.3 Advice for firefighters

Special fire-fighting procedures: In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:

Evacuate area. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

6.2 Environmental Precautions: Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up: Provide adequate ventilation.

6.4 Reference to other sections: Refer to sections 8 and 13.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling: Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place.

7.2 Conditions for safe storage, including any incompatibilities: Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material.

7.3 Specific end use(s): None.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

DNEL-Values

Critical component	Type	Value	Remarks
Pentafluoroethane	Workers - Inhalation, Systemic, long-term	16444 mg/m3	Repeated dose toxicity
	Workers - Inhalation, Systemic, short-term		Low hazard (no threshold derived)
	Workers - Inhalation, Local, long-term, Local, short-term		Low hazard (no threshold derived)
	Workers - Oral, Systemic, long-term, Systemic, short-term		Low hazard (no threshold derived)
	Workers - Oral, Local, long-term, Local, short-term		Low hazard (no threshold derived)
	Workers - Eyes, Local effect		Low hazard (no threshold derived)
Difluoromethane	Workers - Inhalation, Systemic, long-term	7035 mg/m3	Repeated dose toxicity
Norflurane	Workers - Inhalation, Systemic, long-term	13936 mg/m3	Repeated dose toxicity

PNEC-Values

Critical component	Type	Value	Remarks
Pentafluoroethane	Aquatic (freshwater)	0.1 mg/l	-
Pentafluoroethane	Sediment (freshwater)	0.6 mg/kg	-
Difluoromethane	Aquatic (freshwater)	0.313 mg/l	-
Difluoromethane	Sediment (freshwater)	1.807 mg/kg	-
Norflurane	Aquatic (marine water)	0.01 mg/l	-
Norflurane	Sewage treatment plant	73 mg/l	-
Norflurane	Sediment (freshwater)	0.75 mg/kg	-
Norflurane	Aquatic (freshwater)	0.1 mg/l	-

8.2 Exposure controls

Appropriate engineering controls: Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Oxygen detectors should be used when asphyxiating gases may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product.

Individual protection measures, such as personal protective equipment

General information: A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Eye/face protection: Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.

Skin protection

Hand Protection: Guideline: EN 388 Protective gloves against mechanical risks.
Additional Information: Wear working gloves while handling containers

Body protection: No special precautions.

Other: Wear safety shoes while handling containers
Guideline: ISO 20345 Personal protective equipment - Safety footwear.

Respiratory Protection: Not required.

Thermal hazards: No precautionary measures are necessary.

Hygiene measures: Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.

Environmental exposure controls: For waste disposal, see section 13 of the SDS.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	Gas
Form:	Liquefied gas
Color:	C2HF5: Colorless CH2F2: Colorless C2H2F4: Colorless
Odor:	C2HF5: faint ethereal CH2F2: Odorless C2H2F4: faint ethereal
Odor Threshold:	Odor threshold is subjective and is inadequate to warn of over exposure.
pH:	Not applicable.
Melting Point:	No data available.
Boiling Point:	-43.6 °C
Sublimation Point:	Not applicable.
Critical Temp. (°C):	86.74 °C
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	Non-Flammable Gas
Flammability Limit - Upper (%):	Not applicable.
Flammability Limit - Lower (%):	45.41 %(V) (Calculated value)
Vapor pressure:	1,190.3 kPa (25 °C)
Relative vapor density:	3.03 (calculated) (15 °C)
Relative density:	No data available.
Solubility(ies)	
Solubility in Water:	No data available.
Partition coefficient (n-octanol/water):	Not known.
Autoignition Temperature:	Not applicable.
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	No data available.
Explosive properties:	Not applicable.
Oxidizing properties:	Not applicable.

9.2 Other information:	Gas/vapour heavier than air. May accumulate in confined

SDS_GB

spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1 Reactivity: No reactivity hazard other than the effects described in sub-section below.

10.2 Chemical Stability: Stable under normal conditions.

10.3 Possibility of hazardous reactions: None.

10.4 Conditions to avoid: Open flames and high energy ignition sources. The product is not flammable in air under ambient conditions of temperature and pressure. When pressurised with air or oxygen, the mixture may become flammable. Certain mixtures of HCFCs or HFCs with chlorine may become flammable or reactive under certain conditions.

10.5 Incompatible Materials: No reaction with any common materials in dry or wet conditions. Alkali metals. Alkali earth metals. Chemically-active metals (such as calcium, powdered aluminum, zinc, and magnesium)

10.6 Hazardous Decomposition Products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

General information: None.

11.1 Information on toxicological effects

Acute toxicity - Oral
Product Based on available data, the classification criteria are not met.

Acute toxicity - Dermal
Product Based on available data, the classification criteria are not met.

Acute toxicity - Inhalation
Product Based on available data, the classification criteria are not met.

Component Information
Pentafluoroethane LC Lo (Sprague-Dawley rat, Female, Male, 4 h): > 800000 ppm (OECD Guideline 403 (Acute Inhalation Toxicity)) Remarks: Experimental result, Key study 1 = reliable without restrictions

	ALC (Sprague-Dawley rat, Male, 4 h): > 709000 ppm Remarks: Experimental result, Supporting study 1 = reliable without restrictions
Difluoromethane	LC 0 (Wistar rat, Female, Male, 4 h): > 520000 ppm (OECD Guideline 403 (Acute Inhalation Toxicity)) Remarks: Inhalation; vapor Experimental result, Key study

Repeated dose toxicity

Component Information

Pentafluoroethane	NOAEL (Rat(Female, Male), Inhalation, 13 Weeks): >= 50,000 ppm(m) Inhalation Experimental result, Key study
Difluoromethane	NOAEL (Wistar-derived rat(Female, Male), Inhalation, 28 d): 49,500 ppm(m) Inhalation Experimental result, Supporting study NOAEL (Wistar-derived rat(Female, Male), Inhalation, 13 Weeks): 49,100 ppm(m) Inhalation Experimental result, Key study
Norflurane	NOAEL (Rat(Female, Male), Inhalation, 2 yr): 50,000 ppm(m) Inhalation Experimental result, Key study

Skin Corrosion/Irritation

Product Based on available data, the classification criteria are not met.

Serious Eye Damage/Eye Irritation

Product Based on available data, the classification criteria are not met.

Respiratory or Skin Sensitization

Product Based on available data, the classification criteria are not met.

Germ Cell Mutagenicity

Product Based on available data, the classification criteria are not met.

In vitro

Component Information

Pentafluoroethane	Chromosome aberration (OECD Guideline 473 (In Vitro Mammalian Chromosome Aberration Test)): Negative. Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Negative.
Difluoromethane	Ames test in vitro: (OECD Guideline 471 (Bacterial Reverse Mutation Test)): Negative. Chromosome aberration (OECD Guideline 473 (In Vitro Mammalian Chromosome Aberration Test)): Negative. In vitro gene mutations test on mammalian cells:: Negative.

In vivo
Component Information

Pentafluoroethane	Micronucleus test in vivo mouse: (OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test)) Inhalation (Mouse): Negative.
Difluoromethane	Micronucleus test in vivo mouse: (OECD Guideline 474 (Mammalian Erythrocyte Micronucleus Test)) (Mouse): Negative.

Carcinogenicity
Product: Based on available data, the classification criteria are not met.

Reproductive toxicity
Product: Based on available data, the classification criteria are not met.

Developmental toxicity (Teratogenicity)
Component Information

Difluoromethane	Rabbit (Female) Inhalation (OECD Guideline 414 (Prenatal Developmental Toxicity Study))

Specific Target Organ Toxicity - Single Exposure
Product: Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Repeated Exposure
Product: Based on available data, the classification criteria are not met.

Aspiration Hazard
Product: Not applicable to gases and gas mixtures..

SECTION 12: Ecological information

General information: Not applicable

12.1 Toxicity

Acute toxicity
Product: No ecological damage caused by this product.

Acute toxicity - Fish
Component Information

Pentafluoroethane	LC 50 (Oncorhynchus mykiss, 96 h): 450 mg/l (semi-static) Remarks: Read-across from supporting substance (structural analogue or surrogate), Weight of Evidence study 1 = reliable without restrictions
Difluoromethane	LC 50 (Fish (freshwater), 96 h): 1,731 mg/l Remarks: QSAR, Key study 2 = reliable with restrictions

Norflurane	LC 50 (Oncorhynchus mykiss, 96 h): 450 mg/l (semi-static) Remarks: Experimental result, Key study

Acute toxicity - Aquatic Invertebrates

Component Information

Pentafluoroethane	EC 50 (Daphnia magna, 48 h): > 200 mg/l (Static) Remarks: Read-across from supporting substance (structural analogue or surrogate), Weight of Evidence study 2 = reliable with restrictions
Difluoromethane	EC 50 (Daphnid, 48 h): 652 mg/l Remarks: QSAR, Key study 2 = reliable with restrictions LC 50 (Daphnid, 48 h): 833 mg/l Remarks: QSAR, Key study 2 = reliable with restrictions
Norflurane	EC 50 (Daphnia magna, 24 h): 960 mg/l (Static) Remarks: Experimental result, Key study

Toxicity to microorganisms

Component Information

Difluoromethane	Static EC 50 (Algae (Pseudokirchneriella subcapitata), 72 h): > 118 mg/l (OECD Guideline 201 (Freshwater Alga and Cyanobacteria, Growth Inhibition Test)) EC 50 (Alga, 96 h): 313 mg/l (estimated)

Chronic Toxicity - Fish

Component Information

Pentafluoroethane	NOEC (30 d): 32 mg/l QSAR
Difluoromethane	NOEC (Danio rerio; Pimephales promelas, 30 d): 169 mg/l QSAR, Supporting study 4 = not assignable

Chronic Toxicity - Aquatic Invertebrates

Component Information

Pentafluoroethane	EC 50 (16 d): 12 mg/l

Toxicity to Aquatic Plants

Component Information

Pentafluoroethane	EC 50 (Green Algae, 72 h): 142 mg/l
Difluoromethane	EC 50 (Alga, 96 h): 142 mg/l

12.2 Persistence and Degradability

Product Not applicable to gases and gas mixtures..

Biodegradation

Component Information

Pentafluoroethane	5 % (28 d) Detected in water. Experimental result, Key study
Difluoromethane	5 % (28 d) Detected in water. Experimental result, Key study
Norflurane	3 % (28 d) Detected in water. Experimental result, Key study

12.3 Bioaccumulative potential

Product The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

12.4 Mobility in soil

Product Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5 Results of PBT and vPvB assessment

Product Not classified as PBT or vPvB.

12.6 Other adverse effects:

Global Warming Potential

Global warming potential: 1,774
Contains fluorinated greenhouse gases When discharged in large quantities may contribute to the greenhouse effect. For GWP value of mixture and quantities, refer to container label.

Component Information

Pentafluoroethane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 3500 Annex 1: Fluorinated greenhouse gases referred to in Point 1 of Article 2; Section 1:Hydrofluorocarbons (HFCs) and its mixtures
Difluoromethane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs - Global warming potential: 675 Annex 1: Fluorinated greenhouse gases referred to in Point 1 of Article 2; Section 1:Hydrofluorocarbons (HFCs) and its mixtures
Norflurane	EU. F-Gases Subject to Emission Limits/Reporting (Annexes I, II), Regulation 517/2014/EU on FGGs

- Global warming potential: 1430 Annex 1: Fluorinated greenhouse gases referred to in Point 1 of Article 2; Section 1:Hydrofluorocarbons (HFCs) and its mixtures

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: Avoid discharges to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Refer to manufacturer or supplier for information on recovery or recycling.

Disposal methods: Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

European Waste Codes
Container: 14 06 01*: chlorofluorocarbons, HCFC, HFC

SECTION 14: Transport information

ADR

14.1 UN number or ID number:	UN 3340
14.2 UN Proper Shipping Name:	REFRIGERANT GAS R 407C(1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.2
Hazard No. (ADR):	20
Tunnel restriction code:	(C/E)
Emergency Action Code:	2TE
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

RID

14.1 UN number or ID number:	UN 3340
14.2 UN Proper Shipping Name	REFRIGERANT GAS R 407C(1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.2
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IMDG

14.1 UN number or ID number:	UN 3340
14.2 UN Proper Shipping Name:	REFRIGERANT GAS R 407C(1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
14.3 Transport Hazard Class(es)	
Class:	2.2
Label(s):	2.2
EmS No.:	F-C, S-V
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IATA

14.1 UN number or ID number:	UN 3340
14.2 Proper Shipping Name:	Refrigerant gas R 407C(1,1,1,2-Tetrafluoroethane, Pentafluoroethane)
14.3 Transport Hazard Class(es):	
Class:	2.2
Label(s):	2.2
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–
Other information	
Passenger and cargo aircraft:	Allowed.
Cargo aircraft only:	Allowed.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: Not applicable

Additional identification:	Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: Regulatory information

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

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I: Not applicable

National Regulations

Dangerous Substances and Explosive Atmospheres Regulations (DSEAR 2002 No. 2776). Management of Health and Safety at Work Regulations (1999 No. 3242). The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541). Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677). Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306). Personal Protective Equipment Regulations (1992 No. 2966). Control of Major Accident Hazards Regulations (COMAH, 2015 No. 483). Pressure Systems Safety Regulations (PSSR, 2000 No. 128). Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives. This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2 Chemical safety assessment: No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Revision Information:	Relevant changes are indicated using two vertical bold lines and red text, the text is also highlighted in grey.

Key literature references and sources for data:

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/).
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances http://apps.echa.europa.eu/registered/registered-sub.aspx#search
European Industrial Gases Association (EIGA) Doc. 169 "Classification and Labelling guide", as amended.
International Programme on Chemical Safety (http://www.inchem.org/)
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
Substance specific information from suppliers.
Details given in this document are believed to be correct at the time of publication.
Code of Practice for the Safety, Health and Welfare at Work (Chemical Agents) Regulations and the Safety, Health and Welfare at Work (Carcinogens) Regulations, as amended

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]

Classification according to Regulation (EC) No 1272/2008 as amended.	Classification procedure
Gases under pressure, Liquefied gas	On basis of test data

Wording of the H-statements in section 2 and 3

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.

Training information:

Users of breathing apparatus must be trained. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the hazards.

Classification according to Regulation (EC) No 1272/2008 as amended.

Press. Gas Liq. Gas, H280

Other information:

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Note: When the Product Name appears in the SDS header the decimal sign and its position comply with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

Last revised date: 09.11.2023

Disclaimer:

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

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

1.1 Product identifier

Trade name	:	Valvoline™ OEM ADVANCED AFC 48 RTU Coolant
Product code	:	892099
Unique Formula Identifier (UFI)	:	P4TD-5JNU-J60W-S17A

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

Use of the substance/mixture	:	Coolant and antifreeze.

1.3 Details of the supplier of the safety data sheet

Company	:	Ellis Enterprises B.V., an affiliate of Valvoline Global Operations Wieldrechtseweg 39 3316 BG Dordrecht Netherlands
Telephone	:	+31 (0)78 654 3500 (in the Netherlands), or contact your local CSR contact person
E-mail address of person responsible for the SDS	:	SDS@valvolineglobal.com

1.4 Emergency telephone number

00-800-825-8654, or contact your local emergency telephone number at 112

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Acute toxicity, Category 4	H302: Harmful if swallowed.

Specific target organ toxicity - repeated exposure, Category 2, Kidney, Liver	H373: May cause damage to organs through prolonged or repeated exposure if swallowed.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008) as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567)

Hazard pictograms :

Signal word : Warning

Hazard statements : H302 Harmful if swallowed.
H373 May cause damage to organs (Kidney, Liver) through prolonged or repeated exposure if swallowed.

Precautionary statements :

Prevention:

P260 Do not breathe mist or vapours.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

Response:

P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P314 Get medical advice/ attention if you feel unwell.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Hazardous components which must be listed on the label:
ETHYLENE GLYCOL

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Components

Chemical name	CAS-No.	Classification	Concentration

	EC-No. Index-No. Registration number		(% w/w)
ETHYLENE GLYCOL	107-21-1 203-473-3 603-027-00-1 01-2119456816-28-xxxx	Acute Tox. 4; H302 STOT RE 2; H373 (Kidney)	>= 40 - < 50
2-ETHYLHEXANOIC ACID	149-57-5 205-743-6 607-230-00-6	Repr. 2; H361d	>= 1 - < 2.5
SODIUM HYDROXIDE	1310-73-2 215-185-5 011-002-00-6 01-2119457892-27-xxxx	Met. Corr. 1; H290 Skin Corr. 1A; H314 Eye Dam. 1; H318 ——————— specific concentration limit Skin Corr. 1A; H314 >= 5 % Skin Corr. 1B; H314 2 - < 5 % Skin Irrit. 2; H315 0.5 - < 2 % Eye Irrit. 2; H319 0.5 - < 2 %	>= 0.5 - < 1
SODIUM BORATE DECAHYDRATE	1303-96-4 215-540-4 005-011-01-1	Eye Irrit. 2; H319 Repr. 1B; H360FD	>= 0.5 - < 1

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Move out of dangerous area.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical

advice.
If symptoms persist, call a physician.

In case of eye contact	:	Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
If swallowed	:	Keep respiratory tract clear. Do NOT induce vomiting. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms	:	No symptoms known or expected.
Risks	:	Harmful if swallowed. May damage fertility. May damage the unborn child. May cause damage to organs through prolonged or repeated exposure if swallowed.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment	:	No hazards which require special first aid measures. Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
Unsuitable extinguishing media	:	High volume water jet

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products	:	No hazardous combustion products are known

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Use personal protective equipment.

6.2 Environmental precautions

Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up	:	Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling	:	Do not breathe vapours/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8.

Smoking, eating and drinking should be prohibited in the application area.
Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Normal measures for preventive fire protection.

Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Keep container tightly closed in a dry and well-ventilated place. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

Further information on storage stability : No decomposition if stored and applied as directed.

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
ETHYLENE GLYCOL	107-21-1	TWA (Vapour)	20 ppm 52 mg/m3	GB EH40
	Further information: Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity.			
		TWA (particles)	10 mg/m3	GB EH40
	Further information: Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity.			
		STEL (Vapour)	40 ppm 104 mg/m3	GB EH40
	Further information: Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity.			
		TWA	20 ppm	2000/39/EC

			52 mg/m3	
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
		STEL	40 ppm 104 mg/m3	2000/39/EC
	Further information: Identifies the possibility of significant uptake through the skin, Indicative			
SODIUM HYDROXIDE	1310-73-2	STEL	2 mg/m3	GB EH40
SODIUM BORATE DECAHYDRATE	1303-96-4	TWA	5 mg/m3	GB EH40

Derived No Effect Level (DNEL):

Substance name	End Use	Exposure routes	Potential health effects	Value
SODIUM HYDROXIDE	Workers	Inhalation	LOCAL LT - Local, long-term	1 mg/m3
	Consumers	Inhalation	LOCAL LT - Local, long-term	1 mg/m3

8.2 Exposure controls

Personal protective equipment

Eye/face protection : Eye wash bottle with pure water
Tightly fitting safety goggles

Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Skin and body protection : Impervious clothing
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Respiratory protection : No personal respiratory protective equipment normally required.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance : liquid
Colour : blue
Odour : No data available
Odour Threshold : No data available

pH : ca. 9.25

Melting point/freezing point	:	ca. -34 °C
Boiling point/boiling range	:	No data available
Flash point	:	Not applicable
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	ca. 1.075 g/cm3 (15 °C)
Solubility(ies)		
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Decomposition temperature	:	No data available
Viscosity		
Viscosity, dynamic	:	No data available
Viscosity, kinematic	:	Not applicable
Oxidizing properties	:	No data available

9.2 Other information

Self-ignition	:	No data available

SECTION 10: Stability and reactivity

10.1 Reactivity

No decomposition if stored and applied as directed.

10.2 Chemical stability

No decomposition if stored and applied as directed.

10.3 Possibility of hazardous reactions

Hazardous reactions : No decomposition if stored and applied as directed.

10.4 Conditions to avoid

Conditions to avoid : excessive heat

10.5 Incompatible materials

Materials to avoid : Aldehydes
Alkali metals
Alkaline earth metals
Amines
Ammonia
Bases
chromium trioxide
Copper
Copper alloys
Reducing agents
Strong acids
strong alkalis
Strong oxidizing agents
Sulphur compounds

10.6 Hazardous decomposition products

No hazardous decomposition products are known.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Harmful if swallowed.

Product:

Acute oral toxicity : Acute toxicity estimate: 1,018 mg/kg

Method: Calculation method

Components:

ETHYLENE GLYCOL:

Acute oral toxicity	:	LD0 (Human): estimated 1.56 g/kg Assessment: The component/mixture is moderately toxic after single ingestion.
Acute inhalation toxicity	:	LC50 (Rat): 10.9 mg/l Exposure time: 1 h Test atmosphere: dust/mist Assessment: The substance or mixture has no acute inhalation toxicity
Acute dermal toxicity	:	LD50 (Rabbit): 9,530 mg/kg
Acute toxicity (other routes of administration)	:	LD50 (Rat): 5,010 mg/kg Application Route: Intraperitoneal LD50 (Rat): 3,260 mg/kg Application Route: Intravenous

2-ETHYLHEXANOIC ACID:

Acute oral toxicity	:	LD50 (Rat, male): 3,000 mg/kg LD50 (Rat, female): 2,043 mg/kg
Acute inhalation toxicity	:	LC0 (Rat): 0.11 mg/l Exposure time: 8 h Test atmosphere: dust/mist Method: OECD Test Guideline 403 Assessment: The substance or mixture has no acute inhalation toxicity
Acute dermal toxicity	:	LD50 (Rat): > 2,000 mg/kg Assessment: The substance or mixture has no acute dermal toxicity Remarks: No mortality observed at this dose.

SODIUM HYDROXIDE:

Acute oral toxicity	:	LDLo (Rabbit): 500 mg/kg

Acute inhalation toxicity	:	Assessment: The substance or mixture has no acute inhalation toxicity Remarks: Moderate respiratory irritant
Acute dermal toxicity	:	Symptoms: Corrosion Assessment: The substance or mixture has no acute dermal toxicity

SODIUM BORATE DECAHYDRATE:

Acute oral toxicity	:	LD50 (Rat): > 2,000 mg/kg Assessment: The substance or mixture has no acute oral toxicity Remarks: The toxicological data has been taken from products of similar composition. No mortality observed at this dose.
Acute inhalation toxicity	:	LC50 (Rat): > 2.04 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: OECD Test Guideline 403 GLP: yes Assessment: The substance or mixture has no acute inhalation toxicity Remarks: The toxicological data has been taken from products of similar composition. No mortality observed at this dose.
Acute dermal toxicity	:	LD50 (Rabbit): > 2,000 mg/kg GLP: yes Assessment: The substance or mixture has no acute dermal toxicity Remarks: The toxicological data has been taken from products of similar composition. No mortality observed at this dose.

Skin corrosion/irritation

Not classified based on available information.

Product:

Result : No skin irritation

Components:

ETHYLENE GLYCOL:

Species	:	Rabbit

Result	:	No skin irritation

2-ETHYLHEXANOIC ACID:

Species	:	Rabbit
Result	:	Slight, transient irritation

SODIUM HYDROXIDE:

Result	:	Corrosive after 3 minutes or less of exposure

SODIUM BORATE DECAHYDRATE:

Species	:	Rabbit
Result	:	Slight, transient irritation

Serious eye damage/eye irritation

Not classified based on available information.

Product:

Result : No eye irritation

Components:

ETHYLENE GLYCOL:

Result	:	Slight, transient irritation

2-ETHYLHEXANOIC ACID:

Species	:	Rabbit
Result	:	Slight, transient irritation

SODIUM HYDROXIDE:

Assessment	:	Corrosive
Result	:	Corrosive

SODIUM BORATE DECAHYDRATE:

Species	:	Rabbit
Result	:	Irritating to eyes.

Respiratory or skin sensitisation

Skin sensitisation

Not classified based on available information.

Respiratory sensitisation

Not classified based on available information.

Components:

ETHYLENE GLYCOL:

Test Type	:	Maximisation Test
Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.

2-ETHYLHEXANOIC ACID:

Test Type	:	Maximisation Test
Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.
Method	:	OECD Test Guideline 406

SODIUM HYDROXIDE:

Exposure routes	:	Skin contact
Species	:	Humans
Result	:	negative

SODIUM BORATE DECAHYDRATE:

Test Type	:	Buehler Test
Species	:	Guinea pig
Assessment	:	Does not cause skin sensitisation.
Remarks	:	The toxicological data has been taken from products of similar composition.

Germ cell mutagenicity

Not classified based on available information.

Components:

ETHYLENE GLYCOL:

Genotoxicity in vitro	:	Test Type: Ames test Test system: Salmonella typhimurium Metabolic activation: with and without metabolic activation

		Result: negative

2-ETHYLHEXANOIC ACID:

Genotoxicity in vitro	:	Test Type: Ames test Test system: Salmonella typhimurium Metabolic activation: with and without metabolic activation Result: negative

Carcinogenicity

Not classified based on available information.

Reproductive toxicity

May damage fertility. May damage the unborn child.

Components:

2-ETHYLHEXANOIC ACID:

Reproductive toxicity - Assessment	:	Some evidence of adverse effects on development, based on animal experiments.

SODIUM BORATE DECAHYDRATE:

Reproductive toxicity - Assessment	:	Clear evidence of adverse effects on sexual function and fertility, and/or on development, based on animal experiments

STOT - single exposure

Not classified based on available information.

STOT - repeated exposure

May cause damage to organs (Kidney) through prolonged or repeated exposure if swallowed.

Components:

ETHYLENE GLYCOL:

Exposure routes	:	Ingestion
Target Organs	:	Kidney
Assessment	:	May cause damage to organs through prolonged or repeated exposure.

Aspiration toxicity

Not classified based on available information.

Experience with human exposure

Components:

ETHYLENE GLYCOL:

Ingestion	:	Target Organs: Kidney

Further information

Product:

Remarks	:	No data available

SECTION 12: Ecological information

12.1 Toxicity

Product:

Ecotoxicology Assessment

Acute aquatic toxicity	:	Not classified based on available information.
Chronic aquatic toxicity	:	Not classified based on available information.

Components:

ETHYLENE GLYCOL:

Toxicity to fish	:	LC50 (Lepomis macrochirus (Bluegill sunfish)): 27,540 mg/l Exposure time: 96 h Test Type: static test LC50 (Pimephales promelas (fathead minnow)): 8,050 mg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	LC50 (Daphnia magna (Water flea)): > 10,000 mg/l Exposure time: 48 h Test Type: static test
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 6,500 - 13,000 mg/l End point: Growth inhibition Exposure time: 7 Days

Toxicity to fish (Chronic toxicity)	:	NOEC: 32,000 mg/l Exposure time: 7 d Species: Pimephales promelas (fathead minnow)
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 24,000 mg/l Exposure time: 7 d Species: Daphnia magna (Water flea)

Ecotoxicology Assessment

Acute aquatic toxicity	:	Not classified based on available information.
Chronic aquatic toxicity	:	Not classified based on available information.

2-ETHYLHEXANOIC ACID:

Toxicity to fish	:	LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l Exposure time: 96 h Test Type: static test
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 85.4 mg/l Exposure time: 48 h Test Type: static test
Toxicity to algae/aquatic plants	:	EC50 (Desmodesmus subspicatus (green algae)): 49.3 mg/l End point: Growth inhibition Exposure time: 72 h Test Type: static test

Ecotoxicology Assessment

Acute aquatic toxicity	:	Harmful to aquatic life.
Chronic aquatic toxicity	:	Not classified based on available information.

SODIUM HYDROXIDE:

Toxicity to fish	:	LC50 (Gambusia affinis (Mosquito fish)): 125 mg/l Exposure time: 96 h Method: Static Remarks: Mortality
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 34.59 - 47.13 mg/l Exposure time: 48 h Remarks: Intoxication
Toxicity to microorganisms	:	

		Remarks: Not applicable

Ecotoxicology Assessment

Acute aquatic toxicity	:	Neutralisation will reduce ecotoxic effects. Not classified based on available information.
Chronic aquatic toxicity	:	This product has no known ecotoxicological effects. Not classified based on available information.

SODIUM BORATE DECAHYDRATE:

Toxicity to fish	:	LC50 (Fish): > 100 mg/l Exposure time: 96 h Remarks: The toxicological data has been taken from products of similar composition.
Toxicity to daphnia and other aquatic invertebrates	:	LC50 (Daphnia magna (Water flea)): 133 mg/l Exposure time: 48 h Test Type: static test Remarks: The toxicological data has been taken from products of similar composition.
Toxicity to algae/aquatic plants	:	NOEC (Dunaliella tertiolecta (marine algae)): 50 mg/l End point: Growth inhibition Exposure time: 240 h Test Type: static test Remarks: Information refers to the main component.
Toxicity to fish (Chronic toxicity)	:	NOEC: 13 mg/l Exposure time: 4 d Species: Danio rerio (zebra fish) Remarks: Information refers to the main component.
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: 16.6 mg/l Exposure time: 28 d Species: Aquatic invertebrates Test Type: flow-through test Remarks: Information refers to the main component.

Ecotoxicology Assessment

Acute aquatic toxicity	:	Not classified based on available information.
Chronic aquatic toxicity	:	Not classified based on available information.

12.2 Persistence and degradability

Components:

ETHYLENE GLYCOL:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 90 - 100 % Exposure time: 10 d Method: OECD Test Guideline 301

2-ETHYLHEXANOIC ACID:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 99 % Exposure time: 28 d

12.3 Bioaccumulative potential

Components:

ETHYLENE GLYCOL:

Bioaccumulation	:	Species: Crayfish (Procambarus) Exposure time: 61 d Concentration: 1000 mg/l Bioconcentration factor (BCF): 0.27 Method: Flow through
Partition coefficient: n-octanol/water	:	log Pow: -1.36

2-ETHYLHEXANOIC ACID:

Partition coefficient: n-octanol/water	:	log Pow: 2.64

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

Product:

Endocrine disrupting potential	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.
Additional ecological information	:	No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product	:	Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

SECTION 14: Transport information

14.1 UN number

ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA_P	:	Not regulated as a dangerous good

14.2 UN proper shipping name

ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA_P	:	Not regulated as a dangerous good

14.3 Transport hazard class(es)

ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA_P	:	Not regulated as a dangerous good

14.4 Packing group

ADR	:	Not regulated as a dangerous good
RID	:	Not regulated as a dangerous good
IMDG	:	Not regulated as a dangerous good
IATA (Cargo)	:	Not regulated as a dangerous good
IATA_P (Passenger)	:	Not regulated as a dangerous good

14.5 Environmental hazards

Not regulated as a dangerous good

14.6 Special precautions for user

Not applicable

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

Not applicable for product as supplied.

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

SECTION 15: Regulatory information

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

Relevant EU provisions transposed through retained EU law

UK REACH List of restrictions (Annex 17)	:	Conditions of restriction for the following entries should be considered: Number on list 3
UK REACH Candidate list of substances of very high concern (SVHC) for Authorisation	:	SODIUM BORATE DECAHYDRATE
The Persistent Organic Pollutants Regulations (retained Regulation (EU) 2019/1021 as amended for Great Britain)	:	Not applicable
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer	:	Not applicable
UK REACH List of substances subject to authorisation	:	Not applicable

(Annex XIV) Control of Major Accident Hazards Regulations 2015 (COMAH)	Not applicable

Other regulations:

Take note of The Management of Health and Safety at Work Regulations 1999 (requirements relating to new and expectant mothers at work contained in Regulation 16 to 18) and of the Pregnant Workers Directive 92/85/EEC.
Take note of The Management of Health and Safety at Work Regulations 1999 (requirements relating to protection of young people at work contained in Regulation 19) and of Directive 94/33/EC on the protection of young people at work.

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

TCSI	:	On the inventory, or in compliance with the inventory
TSCA	:	All substances listed as active on the TSCA inventory
AIIC	:	On the inventory, or in compliance with the inventory
DSL	:	All components of this product are on the Canadian DSL
ENCS	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory
NZIoC	:	Not in compliance with the inventory

15.2 Chemical safety assessment

No data available

Inventories

AIIC (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TECI (Thailand), TSCA (USA)

SECTION 16: Other information

Full text of H-Statements

H290	:	May be corrosive to metals.
H302	:	Harmful if swallowed.

H314	:	Causes severe skin burns and eye damage.
H318	:	Causes serious eye damage.
H319	:	Causes serious eye irritation.
H360FD	:	May damage fertility. May damage the unborn child.
H361d	:	Suspected of damaging the unborn child.
H373	:	May cause damage to organs through prolonged or repeated exposure if swallowed.

Full text of other abbreviations

Acute Tox.	:	Acute toxicity
Eye Dam.	:	Serious eye damage
Eye Irrit.	:	Eye irritation
Met. Corr.	:	Corrosive to metals
Repr.	:	Reproductive toxicity
Skin Corr.	:	Skin corrosion
STOT RE	:	Specific target organ toxicity - repeated exposure
2000/39/EC	:	Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values
GB EH40	:	UK. EH40 WEL - Workplace Exposure Limits
2000/39/EC / TWA	:	Limit Value - eight hours
2000/39/EC / STEL	:	Short term exposure limit
GB EH40 / TWA	:	Long-term exposure limit (8-hour TWA reference period)
GB EH40 / STEL	:	Short-term exposure limit (15-minute reference period)

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and

Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of very high concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Further information

Internal information : 000000276878

Classification of the mixture:		**Classification procedure:**
Acute Tox. 4	H302	Calculation method
STOT RE 2	H373	Calculation method

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

GB / EN

Instructions for the safe handling of lead-acid accumulators (Lead-acid batteries)

1. Identification of the article and the company

Data on the product: Trade name

Lead-acid battery filled with diluted sulphuric acid

Clarios Germany GmbH & Co. KGaA
Am Leineufer 51
D-30419 Hanover

Contact: Dr. Axel Lesch, Director, Environment & Facility Management

Telephone: ++ 49 / 511/975-2690
Fax: ++ 49 / 511/975-2696
Emergency: ++ 49 / 511/975-2680
Email: Axel.Lesch@clarios.com

2. Hazard identification:

No hazards in case of an intact battery and observation of the instructions for use.

Lead acid batteries have two significant characteristics:

- They contain diluted sulphuric acid, which may cause severe acid burns, when the material is touched.
- During the charging process they develop hydrogen gas and oxygen, which under certain circumstances may turn into an explosive mixture.

For this reason, batteries are marked with the following hazard symbols [1)]

No smoking, no naked flames, no sparks

Shield eyes

Corrosive (Battery acid)

Note operating instructions

Explosive gas

Keep away from children's reach

[1)] The hazard symbols on the left side correspond to ISO 7010. The hazard symbols on the right side correspond to the European industry standard EN 50342-1 for starter batteries. In dependence of the respective normative background the hazard symbols shown here are suitable to fulfil the safety-related requirements. A marking of batteries after GHS CLP-regulation is not required.

Note: Do not clean batteries with dry wishers, use only wet wishers, due to electrostatic charge

3. Composition / Information on Ingredients:

EINECS-No.	CAS-No.	Reach Register No.	Description	Content [% of weight][1]	Classification 1272/2008 (CLP)
231-100-4	7439-92-1	01-2119513221-59-0069	Lead and lead alloys	~ 32	GHS 08, Signal word: Danger Repr. 1 A, H 360 FD Lact. H 362 STOT RE 1, H 372 Lead metal is a substances of the Reach Candidate List
231-100-4	7439-92-1	01-2119513221-59-0069	Active mass (battery lead paste)	~ 32	GHS 07, Acute Tox. 4, H 302, H 332 GHS 08, Signal word: Danger Repr. 1 A, H 360 FD, Lact. H 362 STOT RE 1, H 372 Aquatic Chronic 3, H 412
231-639-5	7664-93-9	01-2119458838-20-0122	Diluted sulphuric acid[2]	~ 29	GHS 05, Signal word: Danger H 314
-	-	-	Plastic container[3]	~ 7	-

[1] Content may vary
[2] Concentration of diluted sulphuric acid varies in accordance to the state of charge.
[3] Composition of the plastic may vary due to different customer requirements.

4. First aid measures:

The information below is of relevance only, if the battery is damaged and direct contact to the contained compounds takes places.
According EC 1272/2008 (CLP) the contained compounds are classified as hazardous.

4.1 Diluted sulphuric acid:

Hazard Statement according EC 1272/2008 (CLP):

H314 Causes serve skin burns and eye damages

Precautionary Statements according EC 1272/2008 (CLP):

P264 Wash hands thoroughly after handling.
P301+P330+P331 If swallowed: rinse mouth. Do not induce vomiting.
P280 Wear protective gloves/protective clothing/eye protection.
P260 Due not breath dust/fume/gas/mist/vapors/spray.
P363 Wash contaminated clothing before reuse.
P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

In case of exposure: Seek advice of medical doctor.

4.2 **Battery lead paste:**

Hazard Statements according EC 1272/2008 (CLP):

H302	Harmful if swallowed.
H332	Harmful if inhaled.
H360 FD	May damage the unborn child. Suspected of damaging fertility.
H362	May cause harm to breast-fed children
H372	Causes damage to organs (the central nervous system and system for reproduction) through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements according EC 1272/2008 (CLP):

P101	If medical advice is needed, have product container or label at hand.
P202	Do not handle until all safety precautions have been read and understood.
P263	Avoid contact during pregnancy/while nursing.
P273	Avoid release to the environment.
P308+P313	If exposed or concerned: Get medical advice/attention.
P405	Store locked up.
P501	Dispose of contents/container according to the local waste management regulations.

5. **Fire-fighting measures:**

- Suitable extinguishing agents:
  Water and foam are suitable extinguishing agents. For incipient fire CO2 is most efficient agent

- Special protective equipment:
  Protective goggles, respiratory protective equipment, acid proof clothing

- Hazards which can be caused by a fire.
  Hazardous combustion gases can be generated. Lead vapor, Lead oxides, Sulphur dioxide :

6. **Accidental release measures:**

- Cleaning / take-up procedures:

  Use a bonding agent, such as sand, use lime or sodium carbonate for neutralization; dispose with due regard to the official local regulations. Do not permit penetration into the sewage system, the earth or water bodies.

7. **Handling and storage:**

Store under roof in cool ambiance-charged lead-acid batteries do not freeze up to -50°C; prevent short circuits. Seek agreement with local water authorities in case of larger quantities. If batteries have to be charged in storage rooms, it is imperative that the instructions for use are observed.
Additional Information about the storage of lead-acid batteries can be requested from
Clarios Germany GmbH Co. KGaA.

8. Exposure controls / personal protection:

8.1 No exposure caused by lead, lead containing battery paste and sulphuric acid when handling properly.

8.2 In case of a damaged battery and with direct contact to the contained sulphuric acid.

Dermal: Sulfuric acid is corrosive. DNEL values for local dermal effects are not derived.

Inhalation: 0,1 mg/m³

Personal protective equipment (in case of a damaged battery):

Eye protection: Safety glasses (are necessary during recharging also)

Recommend safety gloves for contact with sulphuric acid. :

Type of material: Rubber, PVC gloves acid proof
Acid proof clothing, safety boots.

9. Physical and chemical properties:

Diluted sulphuric acid (30 to 38.5 %)		**Lead**	
Appearance		**Appearance**	
form:	liquid	form:	solid
colour:	colourless	colour:	grey
odour:	odourless	odour:	odourless
Safety-related data		**Safety-related data**	
pH-value(25°C):	0,3 (49 mg/l water)	pH-value(25°C):	7 – 8 (100 mg/l water)
solidification point:	-35 to -60 °C	solidification point:	327 °C
boiling point:	approx. 108 to 144°C	boiling point:	1.740 °C
solubility in water:	Sulphuric acid is (25°C) miscible with water	solubility in water:	low (0.15 mg/l)(25 °C)
density (20 °C):	(1.2 to 1.3) g/cm³	density (20 °C):	11.35 g/cm³
vapour pressure (20 °C)	14.6 mbar	vapour pressure (20 °C)	-
flash point:	non combustible	flash point:	non combustible
explosive properties:	non explosive	explosive properties:	non explosive

10. Stability and reactivity:

Diluted sulphuric acid:

10.1 Reactivity

Attacks many metals producing extremely flammable hydrogen gas which can form explosive mixtures with air. Destroys organic materials, such as cardboard, wood, textiles.

10.2 Chemical stability

Thermal decomposition at 338 °C

10.3 Possibility of hazardous reactions

Reaction with many metals produced extremely flammable hydrogen gas which can form explosive mixtures with air.

10.4 Incompatible materials

Vigorous reactions with alkalis.

10.5 Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. **Toxicological information:**

11.1 **Diluted Sulphuric acid:**

11.1.1 **Information on toxicological effects**:

Sulphuric acid immediately dissociates to the hydrogen and sulphate ions, with the hydrogen ion being responsible for the local toxicity (irritation and corrosively) of sulphuric acid.

11.1.2 **Acute toxicity:**

Oral, rat, LD50: 2140 mg/kg bw (similar to OECD 401)
Inhalation, rat LC50 : 375 mg/m³ air (OECD Guideline 403)

Dermal: No data on acute dermal toxicity in animals are available. Although this is a potential route of exposure for workers, testing is not justified for scientific reasons and on animal welfare grounds. The effects of acute dermal exposure to sulphuric acid on animals can be readily predicted, and the data from human exposure are sufficient to characterize the effects.

No classification for acute toxicity is proposed according to current EU criteria**.**

11.1.3 **Irritation and corrosion:**

Skin irritation / corrosion: corrosive
Eye irritation: corrosive
Sulphuric acid is listed on Annex I of Directive 1272/2008 (CLP) with classification
Skin Corrosive 1 A > 15 %.
No studies of dermal irritation / corrosion have been performed with the substance and none are proposed, based on scientific considerations and for reasons of animal welfare.

11.1.4 **Sensitization:**

No classification is proposed for skin sensitization or respiratory sensitization based on theoretical considerations and in the absence of any findings in exposed humans following occupational use over a long period of time.

11.1.5 **Subacute, subchronic and prolonged toxicity (Repeated dose toxicity)**

Inhalation (subacute, inhalation: aerosol, nose only), rat NOAEC: 0.3 mg/m³ air (OECD Guideline 412).
Target organs: respiratory: larynx
Classification for severe effects after repeated or prolonged exposure is not proposed.

11.1.6 **Mutagenicity:**

Genetic toxicity: negative. No classification is proposed for genotoxicity

11.1.7 **Carcinogenicity**:

The available animal data do not support the classification of sulphuric acid for carcinogenicity.

11.1.8 **Reproductive toxicity:**

Inhalation, rabbit, mouse: NOAEC: 19.3 mg/m³ air (OECD Guideline 414).
No classification is proposed for reproductive or developmental toxicity

11.1.9 **STOT-single exposure:**

Sulfuric acid is not classified for STOT SE.

11.1.10 **STOT-repeated exposure:**

Sulfuric acid is not classified for STOT RE.

11.1.11 **Aspiration hazard:**

Sulfuric acid is not classified for aspiration hazard.

11.1.12 **Other information on acute toxicity:**

No other information available.

11.2 **Battery lead paste:**

11.2.1 **Information on toxicological effects:**

The toxicity of this product has not been tested. The assessment of the toxicity has been done using the test data with similar inorganic lead compounds.

11.2.2 **Toxicokinetic assessment:**

Inorganic lead compounds are slowly absorbed by ingestion and inhalation and poorly absorbed through the skin. If absorbed, lead will accumulate in the body with low rates of excretion, leading to long-term build up. Part of risk management is to take blood samples from workers for analysis to ensure that exposure levels are acceptable.

11.2.3 **Acute toxicity:**

Sparingly soluble inorganic lead compounds have generally been found to be of relatively low acute toxicity by ingestion, in contact with skin, and by inhalation. Nevertheless current EU regulations require this substance to be classified as harmful by ingestion and inhalation.

11.2.4 **Toxicity data:**

LD50 (oral, rat) > 2000 mg/kg
LD50 (dermal, rat) > 2000 mg/kg
LC50 (4 hr inhalation, rat) > 5 mg/L

No toxicity data available for Lead metal (lead metal powder, particle < 1mm).

11.2.5 **Irritation and corrosion**:

Skin: Studies of similar sparingly soluble inorganic lead compounds have shown that they are not corrosive or irritating to the skin of rabbits. This is supported by the lack of reports of irritant effects from occupational settings.

Eyes: Studies of lead monoxide and similar sparingly soluble inorganic lead compounds have shown that they are not corrosive or irritating to the eyes of rabbits.

Respiratory: No symptoms of respiratory irritation were noted during long-term inhalation studies involving lead monoxide.

11.2.6 **Sensitization:**

There is no evidence that sparingly soluble inorganic lead compounds cause respiratory or skin Sensitization.

11.2.7 **Subacute, subchronic and prolonged toxicity:**

11.2.8 **Germ cell mutagenicity:**

The evidence for genotoxic effects of highly soluble inorganic lead compounds is contradictory, with numerous studies reporting both positive and negative effects. Responses appear to be induced by indirect mechanisms, mostly at very high concentrations that lack physiological relevance.

11.2.9 **Carcinogenicity**:

There is evidence that highly soluble inorganic lead compounds may have a carcinogenic effect, particularly on the kidneys of rats. However, the mechanisms by which this effect occurs are still unclear. Epidemiology studies of workers exposed to inorganic lead compounds have found a limited association with stomach cancer. This has led to the classification by IARC that inorganic lead compounds are probably carcinogenic to humans (Group 2A).

11.2.10 **Reproductive toxicity:**

Exposure to high levels of inorganic lead compounds may cause adverse effects on male and female fertility, including adverse effects on sperm quality. Prenatal exposure to inorganic lead compounds is also associated with adverse effects on neurobehavioral development in children.

11.2.11 **STOT-single exposure:**

Sparingly soluble inorganic lead compounds have generally been found to be of relatively low acute toxicity by ingestion, in contact with skin, and by inhalation, with no evidence of any local or systemic toxicity from such exposures, reproductive function and the central nervous system.

11.2.12 **STOT-repeated exposure:**

Inorganic lead compounds are cumulative poisons and may be absorbed into the body through ingestion or inhalation. Inorganic lead compounds have been documented in observational human studies to produce toxicity in multiple organ systems and body function including the haematopoietic (blood) system, kidney function.

11.2.13 **Aspiration hazard:**

Inorganic lead compounds is not classified for aspiration hazard.

11.2.14 **Other information on acute toxicity:**

No other information available.

12. **Ecological information:**

12.1 **Diluted sulphuric acid:**

12.1.1 **Toxicity:**

Aquatic toxicity:

This substance is not classified as hazardous to the aquatic environment. Results on aquatic toxicity in freshwater:

Short-term toxicity:

Fish, Lepomis macrochirus, LC50 (96 h): > 16-< 28 mg/L. (no information on test methodology)

12.1.2 **Bioaccumulative potential:**

Sulphuric acid is a strong mineral acid (pKa =1.92) that dissociates readily in water to hydrogen ions and sulphate ions (at environmentally relevant pH) and is totally miscible with water. The resulting hydrogen ions and sulphate ions are naturally present in water/sediment and no bioaccumulation of these ions is predicted.

12.1.3 **Mobility in soil:**

Sulphuric acid is a strong mineral acid that dissociates readily in water to hydrogen ions and sulphate ions (at environmentally relevant pH) and is totally miscible with water. The resulting hydrogen ions and sulphate ions are naturally present in water/sediment. The hydrogen ions will contribute to local pH and are potentially mobile; sulphate ions may be incorporated into naturally occurring mineral species.

12.1.4 **Results of PBT and vPvB assessment**:

Sulphuric acid is neither a PBT nor a vPvB substance.

12.1.5 **Other adverse effects**:

No other information available.

12.2 **Battery lead paste:**

12.2.1 **Toxicity**:

Aquatic toxicity:

Battery lead oxide which is comparable to the inorganic lead compounds within a lead acid battery is classified as aquatic chronic 3, H412.

Short term toxicity:

Toxicity for fish 96 h LC 50 > 100 mg/l
Toxicity for daphnia 48 h EC 50 > 100 mg/l
Toxicity for alga 72 h IC 50> 10 mg/l

12.2.2 **Bioaccumulative potential:**

Inorganic lead is considered to be bioaccumulative in the environment, and may accumulate in aquatic and terrestrial plants and animals. The following bioaccumulation/bioconcentration factors have been derived for Pb inorganic compounds:

12.2.3 **Aquatic compartment:**

Bioaccumulation/bioconcentration factors in freshwater: 1,553 L/kg (wet weight)

12.2.4 **Soil compartment:**

Bioaccumulation/bioconcentration factors in soil: 0.39 kg/kg (dry weight).

12.2.5 **Mobility in soil:**

This product contains inorganic lead compounds which are sparingly soluble and are expected to be adsorbed onto soils and sediments. Mobility is expected to be low.

12.2.6 **Results of PBT and vPvB assessment**:

The PBT and vPvB criteria in Annex XIII of the REACH Regulation do not apply to inorganic substances.

12.27 **Other adverse effects:**

No other information available.

13. **Disposal considerations:**

The point of sale, the manufacturers and importers of batteries take back used batteries, and render them to the secondary lead smelters for processing.

Clarios has established a collection system. More information is available on:

http://www.clarios.com

Spent lead-acid batteries (EWC 160601*) are subject to the regulation of EU (Battery Directive) and its adoptions into national legislation on the composition and end-of-life management of batteries. They are marked with the recycling / return symbol and with a crossed-out roller container. Other battery chemistries have to be separated from lead-acid batteries to avoid any risks during collection, transport and recycling.

By no means the electrolyte the diluted sulphuric acid be emptied in an unexpected manner. This process is to be carried out by processing companies.

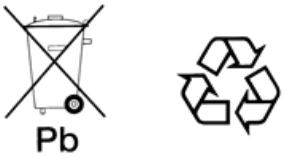
14. **Transport information:**

Land Transport	Land Transport (ADR/RID)	
	UN N°:	UN2794
	Classification ADR/RID:	Class 8
	Proper Shipping Name:	BATTERIES,WET,FILLED WITH ACID electric storage
	Packing Group ADR:	not assigned
	Label required:	Corrosive
	ADR/RID:	Batteries are exempted from all ADR/RID regulations, if requirements of special provision 598 are met. New storage batteries when they are secured in such a way that they cannot slip, fall or be damaged they are provided with carryin devices, unless they are suitably stacked, e.g. on pallets there aren't any dangerous traces or acids on the outside they are protected against shor circuits

Sea Transport	Sea Transport (IMDG Code)	
	UN N°:	UN 2794
	Classification:	Class 8
	Proper Shipping Name:	BATTERIES,WET,FILLED WITH ACID electric storage
	Packing Group:	not assigned
	EmS:	F-A, S-B
	Label required:	Corrosive
Air Transport	Air Transport (IATA-DGR)	
	UN N°:	UN 2794
	Classification:	Class 8
	Proper Shipping Name	BATTERIES,WET,FILLED
	storage	WITH ACID electric
	Packing Group:	not assigned
	Label required:	Corrosive

15. **Regulatory information:**

In accordance with Battery Directive and national laws lead-acid batteries have to be marked by a crossed out refuse bin with the chemical symbol for lead Pb shown below, together with the ISO return/ recycling symbol.



The manufacturer, respectively the importer of the batteries shall be responsible for labelling batteries with the symbols. In addition, a consumer / user information on the significance of the symbols has to be attached.

16. **Other information:**

16.1 **Key or legend to abbreviations and acronyms:**

- AF - Assessment factor
- CLP - 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.
- DNEL - Derived no-effect level
- DSD - Council Directive 67/548/EEC (Dangerous Substances Directive)
- EC50 - Concentration of the substance that causes 50 % reduction of a certain effect on test organisms
- EWC - European Waste Catalogue
- LC50 -Concentration of the substance that causes 50 % mortality of the test population
- NOAEC - No observed adverse effect concentration
- NOAEL- No observed adverse effect level
- OECD - Organisation for Economic Co-operation and Development
- PBT/vPvB - Persistent, bioaccumulative and toxic/ very persistent and very bioaccumulative
- PNEC - Predicted no-effect concentration
- REACH - 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
- STOT RE - Specific Target Organ Toxicity, Repeated Exposure
- STOT SE - Specific Target Organ Toxicity, Single Exposure
- STP - Sewage treatment plant

16.2 **Emergency telephone numbers:**

Europe-wide emergency number: 112
Contact a poison control centre. List of phone numbers:

AUSTRIA (Vienna Wien) +43 1 406 43 43; **BELGIUM** (Brussels Bruxelles) +32 70 245 245; **BULGARIA** (Sofia) +359 2 9154 409; **CZECH REPUBLIC** (Prague Praha) +420 224 919 293; **DENMARK** (Copenhagen) 82 12 12 12; ESTONIA (Tallinn) 112; **FINLAND** (Helsinki) +358 9 471 977; **FRANCE** (Paris) +33 1 40 0548 48; **GERMANY** (Berlin) +49 30 19240; **GREECE** (Athens Athinai) +30 10 779 3777; **HUNGARY** (Budapest) 06 80 20 11 99; **ICELAND** (Reykjavik) +354 525 111, +354 543 2222; **IRELAND** (Dublin) +353 1 8379964; **ITALY** (Rome) +3906 305 4343; **LATVIA** (Riga) +371 704 2468; **LITHUANIA** (Vilnius) +370 5 236 20 52 or +370 687 53378; **MALTA** (Valletta) 2425 0000; **NETHERLANDS** (Bilthoven) +31 30 274 88 88; **NORWAY** (Oslo) 22 591300; **POLAND** (Gdansk) +48 58301 65 16 or +48 58 349 2831; **PORTUGAL** (Lisbon Lisboa) 808 250 143; **ROMANIA** (Bucharest) +40 21 3183606; **SLOVAKIA** (Bratislava) +421 2 54 77 4166; **SLOVENIA** (Ljubljana) + 386 41 650500; **SPAIN** (Barcelona) +34 93 227 98 33 or +34 93 227 54 00 bleep 190; **SWEDEN** (Stockholm) 112 or +46 833 12 31 (mon-fri 9.00-17.00); **UNITED KINGDOM** (London) 112 or 0845 4647 (NHS Direct).

16.3 **Disclaimer of Liability:**

The information in this data sheet for safe handling of lead-acid batteries is provided in good faith based on existing knowledge. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the article are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the article. This data sheet was prepared and is to be used only for this article.

Safety Data Sheets are required for substances and mixtures according REACH (1907/2006/EC). Such a requirement doesn't exist for articles like Lead Acid Batteries.

Clarios Germany GmbH & Co. KGaA is providing customers a "Data Sheet for Save Handing of Lead Acid Batteries" to assure that customers receive sufficient safety information. The content of this Data Sheet is comparable to Safety Data Sheets.

More information is available:

http://www.clarios.com/