



Appendix U Hazardous Substances Regulatory Assessment

Fast-Track Approvals Act 2024 Substantive Application

Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

19 August 2026

To: Christina Walker, Planning Director **From:** Lindsay Lutes

Company: Harmony Energy NZ #6 Limited **SLR Consulting New Zealand**

Date: 19 June 2026

Project No. 880.016894.00005

**RE: Hazardous Substance District Plan Regulatory Assessment
Hinuera Solar Farm Fast Track Approval Application**

Confidentiality

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1.0 Introduction

SLR Consulting Limited (SLR) has been engaged by Harmony Energy New Zealand #6 Limited (the Client) to prepare a district plan level regulatory assessment of hazardous substance storage and use in support of the proposal to construct and operate a solar farm located at the corner of State Highway 29 and State Highway 27, Hinuera (the site).

The assessment is intended to support a Substantive Application under the Fast-Track Approvals Act 2024 and the assessment of environmental effects. The purpose of this assessment is to:

- Summarise the proposed use and storage of hazardous substances at the site, and the risks/hazards that these pose to human health and the environment.
- Present a summary of measures proposed by the Client to manage and mitigate the risk posed by the use and storage of hazardous substances at the site.
- Confirm district plan hazardous substance resource consent requirements with respect to the proposal.

This assessment has been developed based on an indicative construction plan, particularly regarding the general electrical equipment proposed to be used, the 'brand', and volumes of hazardous substances used. Given this lack of surety, we have adopted a conservative approach to hazardous substance volumes, classification, and hazard management. In addition, given the scale of the proposal, the final selection of equipment should not materially influence the findings of this assessment with respect to resource consent requirements, nor the management/mitigation measures proposed.

2.0 Proposal Summary

The Client proposes to develop a solar farm that will consist of approximately 170,000 photovoltaic (PV) modules mounted on either fixed-tilt or single-axis tracking systems, arranged in rows across the site.

Electricity generated by the PV arrays will be converted from direct current (DC) to alternating current (AC) via either a central inverter or string inverter configuration. The AC output will be stepped up to 33 kV and exported to the Powerco substation located at the corner of Lake Road and State Highway 27 via underground cabling.

The BESS component will be DC-coupled and comprise up to 90 containerised battery units; each connected via DC-to-DC converters to the central inverter stations, or connected to the transformers in the case of a string inverter configuration.

Supporting infrastructure will include a switching station (up to 80 m²), an operations and maintenance (O&M) building (180 m²), a storage building (180 m²), and up to five storage containers (28 m² each). The site will be enclosed by a 2.4 m high security fence. Refer to **Attachment A** for a Site layout plan.

The overall proposed project indicatively comprises the following components:

- a) Solar:
 - i. Solar tracker motors.
 - ii. Either central inverter (31) or string inverter (350) units.
- b) BESS:
 - i. 90 Battery Banks, the make/model is yet to be selected, and values are based on the Tesla Megapack 1 has been selected as they are at the higher end of the range. Refer to **Attachment B** for product components. Each battery bank will take the form of a sealed container similar to a shipping container.
 - ii. 30 Power Control System Units.
 - iii. 30 medium voltage oil type transformers and associated switchgear.

3.0 Environmental Setting

The site is located across four Records of Title, covering a total area of approximately 150 hectares. The site is situated at the intersection of State Highway 29 and State Highway 27, approximately 10 km south of Matamata. The land is currently used for dairy farming and comprises two separately operating farms. The Site is zoned 'Rural' under the Matamata-Piako District Plan (2020).

The northern farm (Titles SA69A/179, SA292/111, and SA308/1) contains three dwellings, two adjacent to State Highway 27 and one adjacent to State Highway 29. There is a dairy shed located adjacent to State Highway 27 and multiple implement/farm sheds, generally located in the southern portion of the farm. A woodlot comprising of exotic trees over an area of approximately 1.2 ha is present adjacent to the southern boundary of the 8270 State Highway 27, Okoroire, Tirau property.

The southern farm is comprised in 647047 and contains one dwelling and a dairy shed, both accessed via State Highway 27. Two implement sheds are located adjacent to the main race.

4.0 Summary of Proposed Hazardous Substance Storage and Use

4.1 Preface

Hazardous substance storage and use at the site will be associated with the following:

- The central inverter units and transformers will contain transformer oil.
- Battery banks comprising lithium-ion batteries, for which their cells contain a wide range of hazardous substances.
- Battery banks which will utilise ethylene glycol as a coolant.



- A self-bunded above ground storage tank and refuelling station containing diesel will be stored outside of the warehouse.

We also note:

- Small volumes of ancillary substances (unleaded petrol cans, aerosol paint cans, and galvanizing sprays) will also be stored at the site. The quantities of these substances are anticipated to be under the permitted activity volumes and have not been included in this assessment.
- Fire suppression aerosols within each battery bank are not considered to be hazardous and have not been included in this assessment.
- No vehicle or equipment washdown will be completed at the site.

4.2 Transformer Oil

4.2.1 Use

Transformer oils insulate, cool, and protect transformers from damage. The oil is integral to the safe operation of the units.

4.2.2 Volume

The volume of transformer oil to be used within each auxiliary transformer is approximately 5,000 L per transformer. With 31 central inverter transformers, a volume of approximately 155,000 L of transformer oil will be stored within and utilised by the inverter units and transformers. Adopting a specific gravity of 0.88, approximately 136 T of transformer oil will be stored and utilised at the site.

4.2.3 Hazard Properties

The Client has not confirmed the transformer oil brand that will be selected; therefore, this assessment is based on Sinopec Super Insulated Transformer Oil as a typical example. The final Safety Plan will be updated once the specific brand has been selected.. Refer to **Attachment C** for a safety data sheet (SDS). In summary, transformer oil is:

- A clear colourless liquid.
- Stable under normal ambient temperatures.
- Not expected to be toxic unless swallowed.
- Is persistent in the environment if released and will spread in waterways as it is not soluble.

For transformer oil, a risk/hazard to human health and the environment may occur because of:

- Leaks or spills:
 - During topping up or replacement of the transformer oil.
 - As a consequence of corrosion of the transformer.
- Uncontrolled surface run-off during:
 - Heavy rainfall events.
 - Firefighting during an emergency event.



4.2.4 Hazard Classification

Under the Hazardous Substances and New Organisms Act 1996 (HSNO) the hazardous properties of a substance classify how a risk should be managed. Refer to **Table 1** for a summary of the applicable hazard classes for transformer oil under both HSNO and the Globally Harmonised System (GHS 7)¹.

Table 1 – Transformer Oil Hazard Classification

Hazard	HSNO Classification		GHS 7 Classification
Human Health	Acute Toxicity, Inhalation; Aspiration Hazard	6.1E	Aspiration Hazard Category 1
Environmental	Hazardous to the Aquatic Environment, Persistence	9.1C	Hazardous to the Aquatic Environment Chronic Category 3

4.3 Lithium-Ion Batteries

4.3.1 Purpose and Number

Lithium-ion batteries within battery banks will be used to store energy from the solar panels for release when necessary.

Table 2 presents the proposed total number of lithium-ion battery cells proposed for use at the site.

Table 2 – Number of Lithium-ion Batteries Proposed for Use

Location	Number of Units	Number of Battery Cells Per Bank	Total Number of Battery Cells
Battery Banks	90	104	6,864

4.3.2 Hazard Properties

Refer to **Attachment B** for a copy of the manufacturer specification sheet for the Tesla Megapack 1 lithium-ion batteries, which has been assessed for this report.

Under recommended use conditions the batteries are considered stable and non-reactive and do not pose a hazard to human health or the environment. The potential for human health or environmental risk exists when they are exposed to high temperatures, or are mechanically, electrically, or physically damaged. The hazard is only associated with the contents of the battery cell upon rupture.

Lithium-ion batteries are classified as a hazardous article, not a hazardous substance, when used in accordance with the manufacturer's recommendations. While they contain hazardous substances, these are contained within a sealed, containerised system that is not intended to be accessed and is not open to human or environmental exposure under normal operating conditions. As a result, lithium-ion batteries are not subject to hazardous substance regulatory controls and have not been included in the hazardous substance regulatory assessment in **Section 6**.

¹ The HSNO Classification system was replaced by GHS 7 on 30 April 2021. However, as many district council planning documents were developed prior to 2021, these reference the historical HSNO classification system. Therefore, for the purpose of this assessment both classification systems have been included in Table C.



4.3.3 Hazard Classification

Lithium-ion batteries contain a range of hazardous substances including heavy metals, hydrogen compounds, and organic chemicals. Refer to **Table 3** for a summary of the compounds within the lithium-ion batteries which are classified as hazardous including the percentage weight of the battery cell which they comprise as well as their HSNO and GHS 7 classification.

Table 3 – Lithium-Ion Batteries Hazard Classification

Component Identifier	Chemical Name	Weight (% of total cell)	HSNO Classification		GHS 7 Classification
Anode (including carbon / graphite)	Graphite	23	Carcinogenicity	6.7A	Carcinogenicity Category 1
	Carbon Black		No Classification		
	Carbon		No Classification		
Cathode (including lithium transition metal oxides or lithium iron phosphate)	Lithium Nickel Cobalt Aluminium Oxide	35	Acute Toxicity - Oral	6.1A	Category 4
			Skin corrosion/irritation	6.3A	Category 2
			Serious eye damage/eye irritation	8.3A	Category 1
			Carcinogenicity	6.7A	Category 1A
			Specific target organ toxicity (repeated exposure)	6.9A	Category 1
	Lithium Nickel Manganese Cobalt Oxide		Skin Sensitisation 8.2A		Category 1
	Lithium Iron Phosphate		No Classification		
	Lithium Nickel Manganese Oxide		Acute Toxicity - Oral	6.1D	Category 4
			Skin corrosion/irritation	6.3A	Category 2



			Serious eye damage/eye irritation	6.4A	Category 2A
			Specific target organ toxicity (single exposure; respiratory tract irritation)	6.9B	Category 3
	Lithium Cobalt Oxide		Carcinogenicity	6.7B	Category 2
			Reproductive toxicity	6.8A	Category 1
			Acute aquatic environment hazard	9.1A	Category 1
			Chronic aquatic environment hazard	9.1A	Category 1
Electrolyte (including lithium salts and carbonates esters)	Dimethyl carbonate	11	Flammable liquids	3.1B	Category 2
	Lithium Hexafluorophosphate		Acute toxicity - Oral	6.1C	Category 3
			Skin corrosion	8.2A	Category 1A
	Serious eye damage		8.3A	Category 1	
	Specific target organ toxicity (inhalation, bone, teeth)		6.9A	Category 1	
	Ethylene Carbonate		Acute toxicity - Oral	6.1D	Category 4
			Serious eye damage / eye irritation	8.3A	Category 1
			Specific target organ toxicity (repeated exposure - kidney)	6.9B	Category 2
	Ethyl Methyl Carbonate		Flammable liquids	3.1B	Category 2
	Diethyl Carbonate		Flammable liquids	3.1C	Category 3
	Note: Only chemicals within lithium-ion batteries considered to be hazardous substances have been included above.				



4.4 Ethylene Glycol Coolant

4.4.1 Purpose and Volume

Each of the battery banks will contain ethylene glycol coolant, a liquid that absorbs and transfers heat away from the cells i.e., heat transfer fluid.

4.4.2 Volume

The volume of ethylene glycol coolant that will be used within each battery bank is 540 L and will be mixed 50/50 with water. This equates to approximately 48,600 L total storage at the site, split between battery banks. Adopting an assumed specific gravity of 1.11, approximately 54 T of ethylene glycol coolant mixed 50/50 with water will be utilised within the battery banks.

4.4.3 Hazardous Properties

Refer to **Attachment C** for a copy for an SDS which presents a summary of relevant hazard properties for ethylene glycol. In summary, ethylene glycol coolant is:

- A clear colourless liquid.
- Not considered to be flammable or explosive.
- Stable under normal ambient temperatures.
- Not expected to be toxic unless swallowed repeatedly.
- Not considered hazardous to the aquatic environment.

For ethylene glycol coolant, a risk to human health and the environment may occur as a consequence of leaks or spills:

- During topping up or replacement of the coolant within the battery banks.
- Due to vandalism of the battery bank.
- Uncontrolled surface run-off during firefighting.

4.4.4 Hazard Classification

Refer to **Table 4** for a summary of the applicable hazard classes for ethylene glycol coolant under both HSNO and the GHS 7.

Table 4 – Ethyl Glycol Coolant Hazard Classification

Hazard	HSNO Classification		GHS 7 Classification
Human Health	Acute Toxicity	6.1D	Acute Oral Toxicity Category 4
	Specific Target Organ Toxicity	6.9B	Specific Target Organ Toxicity – Repeated Exposure Category 2

4.5 Diesel Fuel

4.5.1 Purpose and Volume

One above ground self-bunded storage tank and a refuelling station will be established outside of the warehouse for the purpose of refuelling equipment at the site.



4.5.2 Volume

The volume of diesel fuel that will be stored within the storage tank is 1,500 L. Adopting a specific gravity of 0.85, approximately 1.28 T of diesel fuel will be stored and utilised at the site.

4.5.3 Hazardous Properties

Refer to **Attachment C** for a copy for an SDS which presents a summary of relevant hazard properties for diesel fuel. In summary, diesel fuel is:

- A yellow combustible liquid.
- Stable under normal ambient temperatures.
- Not expected to be toxic unless swallowed or the vapours are inhaled.
- Is persistent in the environment if released and will spread in waterways as it is not soluble.
- Toxic to aquatic life with long lasting effects.

For diesel fuel, a risk to human health and the environment may occur as a consequence of leaks or spills:

- During topping up or replacement of the diesel fuel.
- As a consequence of corrosion of the storage tank.
- Uncontrolled surface run-off during:
 - Heavy rainfall events.
 - Firefighting during an emergency event.

4.5.4 Hazard Classification

Refer to **Table 5** for a summary of the applicable hazard classes for diesel fuel under both HSNO and the GHS 7.

Table 5 – Diesel Fuel Hazard Classification

Hazard	HSNO Classification		GHS 7 Classification
Human Health	Oral, dermal, inhalation. Aspiration hazard, respiratory tract irritant.	3.1D; 6.1E; 6.3B; 6.7B;	Aspiration hazard Category 1. Flammable liquid Category 4 Specific target organ toxicity – single exposure Category 3, respiratory tract irritant. Carcinogenicity Category 2.
Environment	Hazardous to the Aquatic Environment, Persistence	9.1B	Hazardous to the Aquatic Environment Chronic Category 2 hazardous to terrestrial vertebrates.

5.0 District Plan Regulatory Assessment

The Matamata-Piako Operative District Plan 2015 (the District Plan) contains objectives, policies, and rules for managing land use and development in the district. The rules of the District Plan set out what activities can be completed as of right (permitted activities) and what activities will require a resource consent.



The Land and development (Part A 3.3.2), assessment criteria (Part B 1.4.18) and hazardous substances (Part B 5.7) sections of the District Plan include objectives, policies, performance standards and assessment criteria relating to the use and storage of hazardous substances (relative to HSNO Classifications) across various zonings.

Rule 5.7.2 (ii) and 5.7.2 (iv) of the District Plan states that an activity will be considered discretionary if the storage of hazardous substances exceeds those specified in the discretionary column identified in Part B: Rules Section 5.7: Table v. Consent Status Matrix – Effects ratio for discretionary activities in a Rural Zone.

As illustrated in Table 6, the proposed volume of transformer oil and ethylene glycol coolant exceeds the maximum volume limits in the discretionary column of Table v. Consent Status Matrix for the Rural Zone. We therefore conclude that a Discretionary Activity resource consent is required under the District Plan to authorise the proposal.

Table 6 – Summary of Proposed Hazardous Substance Calculated Effects Ratio against the Rural Zone Effects Ratio Consent Status Matrix of the District Plan

Hazardous Substance	District Plan Applicable HSNO Classification		Effects Ratio for Permitted Activities (Rural Zone)	Effects Ratio for Discretionary Activities (Rural Zone)	Calculated Effects Ratio		
					Fire/ Explosion	Human Health	Environment
Transformer Oil	Hazardous to the Aquatic Environment	9.1C (liquid, over 20 metres from a watercourse)	≤0.75	> 0.75	NA	NA	4.55
Ethylene Glycol Coolant	Acute Toxicity	6.1D (liquid)			NA	2.00	NA
Diesel Fuel	Oral, dermal, inhalation. Aspiration hazard, respiratory tract irritant.	3.1D; 6.1E; 6.3B; 6.7B			0.004	0.014	0.043
	Hazardous to the Aquatic Environment , Persistence	9.1B					
Total Quantity Ratio					0.004	2.014	4.543

6.0 Hazard Management

Given the potential hazards presented by the storage, handling, and emergency event control of the hazardous substances at the site, several management strategies are proposed and covered under a separate Hazardous Substance Management Plan for the site. These are proposed to ensure that the storage and handling of hazardous substances at the site does not adversely affect human health or the environment. **Table 5** below highlights the minimum conditions that apply to all hazardous facilities under the District Plan, to address the potential discharge of hazardous liquids or solids. The risks associated



with the storage and management of hazardous substances at the site are considered to be appropriately addressed through this regulatory assessment and subsequent Hazardous Substance Management Plan.

Table 5 – Hazard Management Strategies

Item Number	Management Strategy
Design Controls	
1A	Transformer oil, ethylene glycol coolant and diesel fuel utilised at the site will be stored in a manner that prevents the entry or discharge into stormwater drains or sewerage systems.
2A	Transformer oil, ethylene glycol coolant and diesel fuel utilised at the site will be used, stored, mixed, packaged, loaded, unloaded or otherwise handled will be designed, constructed and managed in a manner that prevents the contamination to any land and/or water, entry into stormwater systems in the event of a spill or accidental release, or accidental discharge, spill or entry into the Council's sewerage system.
3A	The facilities used to store hazardous substances at the site will be designed, constructed and managed in a manner that manages any potential contaminated stormwater originating or collected at the site does not contaminate any land and/or water, discharge into the stormwater drainage system, or discharge into sewerage systems, unless permitted by the sewerage utility operator.
3.1A	Spill containment systems will: • be constructed from impervious materials resistant to hazard substance use, • be able to contain the maximum volume of hazard substance in accordance with requirements of the Toxic Substances Regulations 1983 (regulation 17A (3)), is • be able to prevent any spill or unintentional release, unless permitted by a resource consent.
3.2A	All stormwater drains and gates at the site will be clearly and appropriately labelled to ensure no hazardous substances enter stormwater systems.
3.3A	All washdown areas will be designed in a manner that will prevent effluent from entering stormwater drainage systems, sewerage systems, or discharge onto/into land and/or water, unless permitted by a resource consent.
Administrative Controls	
B	No underground storage tanks for petroleum products are proposed to be constructed at the site.
C	Warning signs for premises storing hazardous substances will be signposted to indicate the nature of the substances stored, used or otherwise handled at the site.
1D	Any process waste or waste containing hazardous substances will be managed to prevent waste from entering or discharging into stormwater drainage, sewerage systems or onto/into land and/or water, unless permitted by a resource consent.
2D	The storage of any process waste or waste containing hazardous materials will have the proper warning signs for premises storing hazardous substances signposts.



3D	Storage of any waste containing hazardous substances will be in a manner that prevents the exposure of flammable substances to ignition sources; corrosion or alteration of containers used for storage; the unintentional release of waste.
4D	Any waste containing hazardous substances generated at the site will be disposed of to the appropriate permitted facility or serviced by a reputable waste disposal contractor.

7.0 Limitations

This technical memorandum has been prepared by SLR Consulting New Zealand Limited (SLR) on the instructions of our Client, in accordance with the agreed scope of work. It is intended to support the Client's application under the Fast Track Approvals Act 2024 and may be relied upon by the Expert Panel and relevant administering agencies for the purposes of assessing the application. While SLR has exercised due care in preparing this technical memorandum, it does not accept liability for any use of the technical memorandum beyond its intended purpose. Where information has been supplied by the Client or obtained from external sources, it has been assumed to be accurate unless otherwise stated.

8.0 Conclusion

Harmony Energy New Zealand #6 Limited proposes to construct and operate a solar farm located at the corner of State Highway 29 and State Highway 27, Hinuera. As part of site operations, the hazardous substances that will be used include:

- Inverter units and transformers that will contain transformer oil.
- Battery banks comprising lithium-ion batteries (for which their cells contain a wide range of hazardous substances) that will be cooled using an ethylene glycol product.
- A diesel fuel above ground self-bunded storage tank and refuelling station for the purpose of refuelling equipment at the site.
- Small volumes of ancillary substances (unleaded petrol cans, aerosol cans, and galvanizing sprays) will stored at the site. The quantities of these substances are anticipated to be under the permitted activity volumes.

With respect to regulatory requirements a Discretionary Activity resource consent is required under the District Plan to authorise the storage and use of hazardous substances associated with the proposal (Rule 5.7.2 [ii] and 5.7.2 [iv]).

The hazard posed to human health and the environment will be managed and mitigated through a Hazardous Substance Management Plan containing detailed measures for the storage, handling and management of hazardous substance use and storage at the site.



9.0 Closure

Should you require any further clarification please contact the undersigned.

Regards,

SLR Consulting New Zealand



Lindsay Lutes

Senior Contaminated Lands Consultant
Land Quality and Remediation

I confirm that, in my capacity of author of this memo, I have read and abide by the Environment Court of New Zealand Practice Note 2023, and in particular section 9 the Code of Conduct for Expert Witnesses.



Nigel Mather

Technical Discipline Manager
Environmental Services

I confirm that, in my capacity as reviewer of this memo, I have read and abide by the Environment Court of New Zealand Practice Note 2023, and in particular section 9 the Code of Conduct for Expert Witnesses.

- Attachment A Site Layout Plan
- Attachment B Specification Sheets
- Attachment C Safety Data Sheets
- Attachment D Effects Ratio Calculations





Attachment A: Site Layout Plan



Attachment B: Specifications Sheets

e-STORAGE

A subsidiary of Canadian Solar

UTILITY-SCALE ENERGY STORAGE



SolBank 3.0

ENERGY STORAGE SYSTEM

S-5016-2H-EU | S-5016-4H-EU

Capacity: 5.0 MWh



e-STORAGE, a subsidiary of **Canadian Solar**, is a world-class energy storage solution provider, specializing in storage system design, manufacturing, and integration of battery energy storage systems for utility-scale applications.

The company offers value-added system consulting and turnkey EPC services, in addition, we provide customers with our proprietary LFP battery solution SolBank.

Together, we are building a brighter, greener future for all.

SolBank 3.0 Highlights

- **Cutting-Edge Technology:** SolBank 3.0 features high-density LFP cells, an active balancing BMS, and an innovative liquid cooling TMS, ensuring optimal safety.
- **Compliance and Certifications:** SolBank 3.0 adheres to all industry standards: IEC 62619, IEC 63056, IEC 62477-1, IEC 62933-5-2, IEC 61000-6-2, UL 9540A, NFPA 855, NFPA69, and optional NFPA68, UN38.3/UN3536, ensuring rigorous safety and performance criteria.

Key Features

Enhanced Energy Density

- Utilizes 314 Ah battery cells and compact integration, increases single container energy density up to 45%
- Reduces land cost by up to 35% in a 100MWh project

Safety

- IP67-rated pack design
- Up to 20% faster detection of abnormal and automatic protection
- Advanced pack thermal isolation, electrical redundancy protection, and multi-level fire protection, effectively minimize potential issues
- Tested and passed large-scale fire testing with verified, no enclosure level propagation

Intelligent Control

- Liquid cooling cuts auxiliary consumption up to 30%
- Active balance and string-level management, guarantee high efficiency and availability

Compatibility & Installation

- Supports various PCS topologies
- Turn-key integration and stationery certification, reduce project schedule risks by up to 40%
- Plug-and-play setup for streamlined commissioning

SolBank 3.0 System Parameter

e-STORAGE
A subsidiary of Canadian Solar

General	
Product Model	CSI-SolBank-S-5016-2h-EU CSI-SolBank-S-5016-4h-EU
Battery Chemistry	Lithium Iron Phosphate (LFP)
Pack Configuration	1P104S (104 Cells)
Rack Configuration	1P416S (4 Packs)
System Configuration	12P416S (12 Racks)
Nominal Capacity*	5016 kWh
Nominal DC Voltage	1331.2 V
Operation DC Voltage Range ⁽¹⁾	1164.8 V ~ 1497.6 V

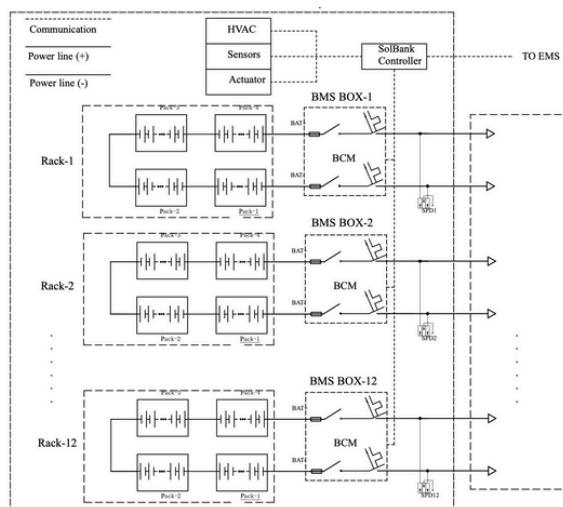
Performance		
Charging/Discharging Mode	0.5 P / 0.5 P	0.25 P / 0.25 P
Rated DC Power ⁽²⁾	2350 kW	1200 kW
Rated DC Capacity ⁽³⁾	4700 kWh	4800 kWh
Duration @Rated DC Power	2hrs	4hrs
Round Trip Efficiency (RTE) ⁽⁴⁾	93%	94%
Auxiliary Load (Standby/Peak)	1.5 kVA / 50 kVA	1.5 kVA / 22 kVA
Max. Short Circuit Current	10 kA*12	10 kA*12
Operating Temperature (Ambient) ⁽⁵⁾	-30 °C to 55 °C (derating from 45°C to 55°C)	
Relative Humidity ⁽⁵⁾	≤95% (non-condensing)	
Altitude	≤4000 m (derating from 2000 m to 4000 m)	
Noise Sound Pressure Level (LPA) at 1 meter distance	≤75 dB(A)	

Auxiliary Systems

Auxiliary Power Interface	AC 400V / 50 Hz, 3P5W
Thermal Management System	Smart liquid cooling/heating
External Communication Interface	Ethernet connection, Modbus TCP/IP protocol

Mechanical	
Enclosure	20ft. high-cube container
Dimensions (L*W*H)	6058*2438*2896 mm (238.50*95.98*114.02 in)
Weight (Battery Included)	43,000 kg (94,800 lbs)
Enclosure Ingress Rating	IP55 / NEMA 3R
Painting/Coating	RAL9003 / C4 Coating
Seismic Parameter	Zone 4

Safety	
Fire Detection and Alarm	Fire alarm panel, heat and smoke detection, alarm bell and strobe
Explosion Prevention	Combustible gas detector with active ventilation
Uninterrupted Power Reserve	Container level UPS for 2-hr control system backup; dedicated fire safety UPS for 24-hr fire alarm backup
Emergency Stop/Automatic Shut-off	Local and Remote
Fire Suppression Options	Aerosol-based suppression system. Dry pipe sprinkler system.



Notes

- * Nominal capacity is a calculated number using the entire summation of the cells and their specified capacities.
- (1). The unit is rated at 1164.8V~1497.6V for optimized product performance, the maximum voltage range for the battery system is 1060.8V~1497.6V.
- (2). Rated DC Power is measured at the product DC terminal, the Rated DC Power and Capacity is limited to the use of two SolBank 3.0 units connected in parallel.
- (3). Rated DC Capacity represents the baseline capacity for specification and performance guarantees. The product's actual usable capacity may exceed this value to support long-term performance.
- (4). DC RTE is measured during capacity test at Rated DC Power, refer to the product warranty document for the complete procedure.
- (5). Options need to be selected to fully meet the 55°C, 95% RH.

Due to ongoing innovation, improvements, and product enhancements, the technical specifications in this document are subject to change and are not guaranteed. Canadian Solar reserves the right to update or change its products or this technical data without prior notice and customers should not rely upon these or any technical specifications which are not made part of a definitive binding agreement.



Attachment C: Safety Data Sheets

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: **9516**

Version: **7.0 en**

Replaces version of: 2024-04-08

Version: (6)

date of compilation: 2015-08-27

Revision: 2024-09-18

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

1.1 Product identifier

Identification of the substance	Ethylene glycol $\geq 99\%$, for synthesis
Article number	9516
Registration number (REACH)	01-2119456816-28-xxxx
Index number in CLP Annex VI	603-027-00-1
EC number	203-473-3
CAS number	107-21-1
Alternative name(s)	Ethanediol

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

Relevant identified uses:	Laboratory chemical Laboratory and analytical use Formulation [mixing] of preparations and/or re-packaging (excluding alloys) Industrial uses Professional uses
Uses advised against:	Do not use for products which come into contact with foodstuffs. Do not use for private purposes (household). Food, drink and animal feeding-stuffs.

1.3 Details of the supplier of the safety data sheet

Carl Roth GmbH + Co. KG
Schoemperlenstr. 3-5
D-76185 Karlsruhe
Germany

Telephone: +49 (0) 721 - 56 06 0

Telefax: +49 (0) 721 - 56 06 149

e-mail: sicherheit@carlroth.de

Website: www.carlroth.de

Competent person responsible for the safety data sheet: Department Health, Safety and Environment

e-mail (competent person): sicherheit@carlroth.de

1.4 Emergency telephone number

Name	Street	Postal code/city	Telephone	Website
National Poisons Information Centre Beaumont Hospital	Beaumont Road	Dublin 9	+353 1 809 2166	https://www.poisons.ie/

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

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

Section	Hazard class	Cat-egory	Hazard class and category	Hazard statement
3.10	Acute toxicity (oral)	4	Acute Tox. 4	H302
3.9	Specific target organ toxicity - repeated exposure	2	STOT RE 2	H373

For full text of abbreviations: see SECTION 16

The most important adverse physicochemical, human health and environmental effects

Delayed or immediate effects can be expected after short or long-term exposure.

2.2 Label elements

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

Signal word

Warning

Pictograms

GHS07, GHS08



Hazard statements

H302

Harmful if swallowed

H373

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

Precautionary statements

Precautionary statements - prevention

P260

Do not breathe mist/vapours

P270

Do not eat, drink or smoke when using this product

Precautionary statements - response

P301+P312

IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell

Labelling of packages where the contents do not exceed 125 ml

Signal word: **Warning**

Hazard pictogram(s):



Labelling of packages where the contents do not exceed 10 ml

Signal word:

Not required

Hazard pictogram(s):



Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

Hazard statements: Not required
Precautionary statements: Not required

2.3 Other hazards

Results of PBT and vPvB assessment

According to the results of its assessment, this substance is not a PBT or a vPvB.

Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

SECTION 3: Composition/information on ingredients

3.1 Substances

Name of substance	Ethylene glycol
Molecular formula	$C_2H_6O_2$
Molar mass	62,07 g/mol
REACH Reg. No	01-2119456816-28-xxxx
CAS No	107-21-1
EC No	203-473-3
Index No	603-027-00-1

Substance, Specific Conc. Limits, M-factors, ATE

Specific Conc. Limits	M-Factors	ATE	Exposure route
-	-	500 mg/kg	oral

SECTION 4: First aid measures

4.1 Description of first aid measures



General notes

Take off contaminated clothing.

Following inhalation

Provide fresh air. In all cases of doubt, or when symptoms persist, seek medical advice.

Following skin contact

Rinse skin with water/shower. In all cases of doubt, or when symptoms persist, seek medical advice.

Following eye contact

Rinse cautiously with water for several minutes. In all cases of doubt, or when symptoms persist, seek medical advice.

Following ingestion

Rinse mouth with water (only if the person is conscious). Call a doctor.

4.2 Most important symptoms and effects, both acute and delayed

Fatigue, Vertigo, Agitation, Diarrhoea, Vomiting, Nausea, Unconsciousness

4.3 Indication of any immediate medical attention and special treatment needed

none

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

SECTION 5: Firefighting measures

5.1 Extinguishing media



Suitable extinguishing media

co-ordinate firefighting measures to the fire surroundings!

water spray, alcohol resistant foam, dry extinguishing powder, BC-powder, carbon dioxide (CO₂)

Unsuitable extinguishing media

water jet

5.2 Special hazards arising from the substance or mixture

Combustible. Vapours are heavier than air, spread along floors and form explosive mixtures with air.

Hazardous combustion products

In case of fire may be liberated: Carbon monoxide (CO), Carbon dioxide (CO₂)

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures



For non-emergency personnel

Avoid contact with skin, eyes and clothes. Do not breathe vapour/spray.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains.

Advice on how to clean up a spill

Absorb with liquid-binding material (sand, diatomaceous earth, acid- or universal binding agents).

Other information relating to spills and releases

Place in appropriate containers for disposal.

6.4 Reference to other sections

Hazardous combustion products: see section 5. Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Provision of sufficient ventilation.

Advice on general occupational hygiene

Wash hands before breaks and after work. Keep away from food, drink and animal feedingstuffs.

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol ≥99 %, for synthesis

article number: 9516

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed. Store in a dry place. Hygroscopic.

Incompatible substances or mixtures

Observe hints for combined storage. Incompatible materials: see section 10.

Protect against external exposure, such as

humidity

Consideration of other advice:

Specific designs for storage rooms or vessels

Recommended storage temperature: 15 – 25 °C

7.3 Specific end use(s)

No information available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

National limit values

Occupational exposure limit values (Workplace Exposure Limits)

Cou ntr y	Name of agent	CAS No	Identi- fier	TW A [pp m]	TWA [mg/ m ³]	STE L [pp m]	STEL [mg/ m ³]	Ceil ing- C [pp m]	Ceil- ing-C [mg/ m ³]	Nota- tion	Source
EU	ethylene glycol	107-21-1	IOELV	20	52	40	104			H	2000/39/ EC
IE	ethane-1,2-diol	107-21-1	OELV	20	40	52	104			H	S.I. No. 619 of 2001

Notation

Ceiling-C Ceiling value is a limit value above which exposure should not occur

H Absorbed through the skin

STEL Short-term exposure limit: a limit value above which exposure should not occur and which is related to a 15-minute period (unless otherwise specified)

TWA Time-weighted average (long-term exposure limit): measured or calculated in relation to a reference period of 8 hours time-weighted average (unless otherwise specified)

Human health values

Relevant DNELs and other threshold levels				
Endpoint	Threshold level	Protection goal, route of exposure	Used in	Exposure time
DNEL	35 mg/m ³	human, inhalatory	worker (industry)	chronic - local effects
DNEL	106 mg/kg bw/day	human, dermal	worker (industry)	chronic - systemic effects

Environmental values

Relevant PNECs and other threshold levels				
End-point	Threshold level	Organism	Environmental compartment	Exposure time
PNEC	10 mg/l	aquatic organisms	freshwater	short-term (single instance)
PNEC	1 mg/l	aquatic organisms	marine water	short-term (single instance)

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

Relevant PNECs and other threshold levels				
End-point	Threshold level	Organism	Environmental compartment	Exposure time
PNEC	199,5 mg/l	aquatic organisms	sewage treatment plant (STP)	short-term (single instance)
PNEC	37 mg/kg	aquatic organisms	freshwater sediment	short-term (single instance)
PNEC	3,7 mg/kg	aquatic organisms	marine sediment	short-term (single instance)
PNEC	1,53 mg/kg	terrestrial organisms	soil	short-term (single instance)

8.2 Exposure controls

Individual protection measures (personal protective equipment)

Eye/face protection



Use safety goggle with side protection.

Skin protection



• hand protection

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves. The times are approximate values from measurements at 22 ° C and permanent contact. Increased temperatures due to heated substances, body heat etc. and a reduction of the effective layer thickness by stretching can lead to a considerable reduction of the breakthrough time. If in doubt, contact manufacturer. At an approx. 1.5 times larger / smaller layer thickness, the respective breakthrough time is doubled / halved. The data apply only to the pure substance. When transferred to substance mixtures, they may only be considered as a guide.

• type of material

NBR (Nitrile rubber)

• material thickness

>0,3 mm

• breakthrough times of the glove material

>480 minutes (permeation: level 6)

• other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended.

Respiratory protection



Respiratory protection necessary at: Aerosol or mist formation. Type: A (against organic gases and vapours with a boiling point of > 65 °C, colour code: Brown).

Environmental exposure controls

Keep away from drains, surface and ground water.

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	liquid
Colour	colourless - light yellow
Odour	odourless
Melting point/freezing point	-14 – -12 °C at 1.013 hPa
Boiling point or initial boiling point and boiling range	197 – 198 °C at 1.013 hPa
Flammability	this material is combustible, but will not ignite readily
Lower and upper explosion limit	3,2 vol% (LEL) - 43 vol% (UEL)
Flash point	111 °C at 1.013 hPa (ECHA)
Auto-ignition temperature	412 °C at 1.013 hPa (ECHA)
Decomposition temperature	not relevant
pH (value)	6 – 7,5 (in aqueous solution: 100 g/l, 20 °C)
Kinematic viscosity	not determined
Dynamic viscosity	16 – 18 mPa s at 25 °C

Solubility(ies)

Water solubility	1.000 g/l at 20 °C (ECHA)
------------------	---------------------------

Partition coefficient

Partition coefficient n-octanol/water (log value):	-1,36 (ECHA)
Soil organic carbon/water (log KOC)	0 (ECHA)

Vapour pressure	0,12 hPa at 25 °C
-----------------	-------------------

Density and/or relative density

Density	1,11 g/cm ³ at 20 °C (ECHA)
Relative vapour density	2,14 (air = 1)

Particle characteristics	not relevant (liquid)
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Other safety parameters

Oxidising properties	none
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9.2 Other information

Information with regard to physical hazard classes:	hazard classes acc. to GHS (physical hazards): not relevant
Other safety characteristics:	

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

Temperature class (EU, acc. to ATEX)

T2
Maximum permissible surface temperature on the equipment: 300°C

SECTION 10: Stability and reactivity

10.1 Reactivity

This material is not reactive under normal ambient conditions.

If heated

Vapours may form explosive mixtures with air.

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

Exothermic reaction with: Sulphuric acid, Alkali hydroxide (caustic alkali), Aluminium, Nitric acid,

Risk of ignition: Chlorates, Permanganates, Peroxides, strong oxidiser

10.4 Conditions to avoid

Protect from moisture. Keep away from heat.

10.5 Incompatible materials

aluminium, zinc

10.6 Hazardous decomposition products

Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

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

Classification according to GHS (1272/2008/EC, CLP)

Acute toxicity

Harmful if swallowed.

Acute toxicity					
Exposure route	Endpoint	Value	Species	Method	Source
dermal	LD50	>3.500 mg/kg	mouse		ECHA
oral	LD50	4.700 mg/kg	rat		TOXNET

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

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

Hazard category	Target organ	Exposure route
2	kidney	if swallowed

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

Symptoms related to the physical, chemical and toxicological characteristics

- **If swallowed**

diarrhoea, vomiting, nausea, Liver and kidney damage

- **If in eyes**

essentially non-irritating

- **If inhaled**

Data are not available.

- **If on skin**

essentially non-irritating

- **Other information**

Other adverse effects: Loss of righting reflex, and ataxia, Unconsciousness, Drowsiness, Agitation

11.2 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

11.3 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

Aquatic toxicity (acute)				
Endpoint	Value	Species	Source	Exposure time
LC50	$>72.860 \text{ mg/l}$	fish	ECHA	96 h
EC50	$>100 \text{ mg/l}$	daphnia magna	ECHA	48 h
ErC50	$<13.000 \text{ mg/l}$	algae	ECHA	96 h

Aquatic toxicity (chronic)				
Endpoint	Value	Species	Source	Exposure time
LC50	$>1.500 \text{ mg/l}$	fish	ECHA	28 d
EC50	$>15.000 \text{ mg/l}$	aquatic invertebrates	ECHA	21 d
NOEC	$\geq 1.000 \text{ mg/l}$	aquatic invertebrates	ECHA	23 d

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

12.2 Persistence and degradability

Theoretical Oxygen Demand: 1,29 g/g
Theoretical Carbon Dioxide: 1,418 mg/mg

Biodegradation

The substance is readily biodegradable.

Process of degradability		
Process	Degradation rate	Time
biotic/abiotic	83 – 96 %	14 d
DOC removal	90 – 100 %	10 d

12.3 Bioaccumulative potential

Does not significantly accumulate in organisms.

n-octanol/water (log KOW)	-1,36 (ECHA)
---------------------------	--------------

12.4 Mobility in soil

Henry's law constant	0,013 Pa m ³ /mol at 25 °C (ECHA)
The Organic Carbon normalised adsorption coefficient	0 (ECHA)

12.5 Results of PBT and vPvB assessment

Data are not available.

12.6 Endocrine disrupting properties

Does not contain an endocrine disruptor (ED) at a concentration of $\geq 0,1\%$.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods



This material and its container must be disposed of as hazardous waste. Dispose of contents/container in accordance with local/regional/national/international regulations.

Sewage disposal-relevant information

Do not empty into drains.

Waste treatment of containers/packagings

Handle contaminated packages in the same way as the substance itself. Completely emptied packages can be recycled.

13.2 Relevant provisions relating to waste

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.

Properties of waste which render it hazardous

HP 5 specific target organ toxicity (STOT)/aspiration toxicity
HP 6 acute toxicity

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol ≥99 %, for synthesis

article number: 9516

13.3 Remarks

Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities. Please consider the relevant national or regional provisions. Non-contaminated packages may be recycled.

SECTION 14: Transport information

- 14.1 UN number or ID number** not subject to transport regulations
- 14.2 UN proper shipping name** not assigned
- 14.3 Transport hazard class(es)** none
- 14.4 Packing group** not assigned
- 14.5 Environmental hazards** non-environmentally hazardous acc. to the dangerous goods regulations
- 14.6 Special precautions for user**
There is no additional information.
- 14.7 Maritime transport in bulk according to IMO instruments**
The cargo is not intended to be carried in bulk.

14.8 Information for each of the UN Model Regulations

International Maritime Dangerous Goods Code (IMDG) - Additional information

Not subject to IMDG.

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Not subject to ICAO-IATA.

SECTION 15: Regulatory information

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

Relevant provisions of the European Union (EU)

Restrictions according to REACH, Annex XVII

Dangerous substances with restrictions (REACH, Annex XVII)				
Name of substance	Name acc. to inventory	CAS No	Restriction	No
Ethylene glycol	this product meets the criteria for classification in accordance with Regulation No 1272/2008/EC		R3	3

Legend

- R3
1. Shall not be used in:
 - ornamental articles intended to produce light or colour effects by means of different phases, for example in ornamental lamps and ashtrays,
 - tricks and jokes,
 - games for one or more participants, or any article intended to be used as such, even with ornamental aspects,
 2. Articles not complying with paragraph 1 shall not be placed on the market.
 3. Shall not be placed on the market if they contain a colouring agent, unless required for fiscal reasons, or perfume, or both, if they:
 - can be used as fuel in decorative oil lamps for supply to the general public, and
 - present an aspiration hazard and are labelled with H304.
 4. Decorative oil lamps for supply to the general public shall not be placed on the market unless they conform to the European Standard on Decorative oil lamps (EN 14059) adopted by the European Committee for Standardisation (CEN).
 5. Without prejudice to the implementation of other Union provisions relating to the classification, labelling and packaging of substances and mixtures, suppliers shall ensure, before the placing on the market, that the following requirements are met:
 - (a) lamp oils, labelled with H304, intended for supply to the general public are visibly, legibly and indelibly marked as follows: "Keep lamps filled with this liquid out of the reach of children"; and, by 1 December 2010, "Just a sip of lamp oil – or even sucking the wick of lamps – may lead to life-threatening lung damage";

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

Legend

- (b) grill lighter fluids, labelled with H304, intended for supply to the general public are legibly and indelibly marked by 1 December 2010 as follows: 'Just a sip of grill lighter fluid may lead to life threatening lung damage';
(c) lamps oils and grill lighters, labelled with H304, intended for supply to the general public are packaged in black opaque containers not exceeding 1 litre by 1 December 2010.;

List of substances subject to authorisation (REACH, Annex XIV)/SVHC - candidate list

not listed

Seveso Directive

2012/18/EU (Seveso III)			
No	Dangerous substance/hazard categories	Qualifying quantity (tonnes) for the application of lower and upper-tier requirements	Notes
	not assigned		

Deco-Paint Directive

VOC content	100 %
VOC content	1.110 g/l

Industrial Emissions Directive (IED)

VOC content	100 %
VOC content	1.110 g/l

Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

not listed

Regulation concerning the establishment of a European Pollutant Release and Transfer Register (PRTR)

not listed

Water Framework Directive (WFD)

not listed

Regulation on the marketing and use of explosives precursors

not listed

Regulation on drug precursors

not listed

Regulation on substances that deplete the ozone layer (ODS)

not listed

Regulation concerning the export and import of hazardous chemicals (PIC)

not listed

Regulation on persistent organic pollutants (POP)

not listed

Other information

Directive 94/33/EC on the protection of young people at work. Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol ≥99 %, for synthesis

article number: 9516

National inventories

Country	Inventory	Status
AU	AIIC	substance is listed
CA	DSL	substance is listed
CN	IECSC	substance is listed
EU	ECSI	substance is listed
EU	REACH Reg.	substance is listed
JP	CSCL-ENCS	substance is listed
KR	KECI	substance is listed
MX	INSQ	substance is listed
NZ	NZIoC	substance is listed
PH	PICCS	substance is listed
TR	CICR	substance is listed
TW	TCSI	substance is listed
US	TSCA	substance is listed (ACTIVE)
VN	NCI	substance is listed

Legend

AIIC	Australian Inventory of Industrial Chemicals
CICR	Chemical Inventory and Control Regulation
CSCL-ENCS	List of Existing and New Chemical Substances (CSCL-ENCS)
DSL	Domestic Substances List (DSL)
ECSI	EC Substance Inventory (EINECS, ELINCS, NLP)
IECSC	Inventory of Existing Chemical Substances Produced or Imported in China
INSQ	National Inventory of Chemical Substances
KECI	Korea Existing Chemicals Inventory
NCI	National Chemical Inventory
NZIoC	New Zealand Inventory of Chemicals
PICCS	Philippine Inventory of Chemicals and Chemical Substances (PICCS)
REACH Reg.	REACH registered substances
TCSI	Taiwan Chemical Substance Inventory
TSCA	Toxic Substance Control Act

15.2 Chemical safety assessment

According to REACH, Article 14 (1) a chemical safety assessment has been carried out for this substance or components of this mixture when the substance has been registered in quantities of 10 tonnes or more per year per registrant.

SECTION 16: Other information

Indication of changes (revised safety data sheet)

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
2.2		Labelling of packages where the contents do not exceed 125 ml: change in the listing (table)	yes
2.2		Labelling of packages where the contents do not exceed 125 ml: change in the listing (table)	yes
2.2		Hazard pictogram(s):	yes
2.2		Hazard pictogram(s): change in the listing (table)	yes
2.2		Labelling of packages where the contents do	yes

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol ≥99 %, for synthesis

article number: 9516

Section	Former entry (text/value)	Actual entry (text/value)	Safety-relevant
		not exceed 10 ml	
2.2		Signal word: Not required	yes
2.2		Hazard pictogram(s):	yes
2.2		Hazard pictogram(s):: change in the listing (table)	yes
2.2		Hazard statements: Not required	yes
2.2		Precautionary statements: Not required	yes

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
2000/39/EC	Commission Directive establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
ATE	Acute Toxicity Estimate
CAS	Chemical Abstracts Service (service that maintains the most comprehensive list of chemical substances)
Ceiling-C	Ceiling value
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
DGR	Dangerous Goods Regulations (see IATA/DGR)
DNEL	Derived No-Effect Level
EC50	Effective Concentration 50 %. The EC50 corresponds to the concentration of a tested substance causing 50 % changes in response (e.g. on growth) during a specified time interval
EC No	The EC Inventory (EINECS, ELINCS and the NLP-list) is the source for the seven-digit EC number, an identifier of substances commercially available within the EU (European Union)
ED	Endocrine disruptor
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
ErC50	≡ EC50: in this method, that concentration of test substance which results in a 50 % reduction in either growth (EbC50) or growth rate (ErC50) relative to the control
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
index No	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008
IOELV	Indicative occupational exposure limit value
LC50	Lethal Concentration 50%: the LC50 corresponds to the concentration of a tested substance causing 50 % lethality during a specified time interval
LD50	Lethal Dose 50 %: the LD50 corresponds to the dose of a tested substance causing 50 % lethality during a

Safety data sheet

according to Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU



Ethylene glycol $\geq 99\%$, for synthesis

article number: 9516

Abbr.	Descriptions of used abbreviations
	specified time interval
LEL	Lower explosion limit (LEL)
NLP	No-Longer Polymer
NOEC	No Observed Effect Concentration
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No-Effect Concentration
ppm	Parts per million
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire des marchandises Dangereuses (Regulations concerning the International carriage of Dangerous goods by Rail)
S.I. No. 619 of 2001	Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001
STEL	Short-term exposure limit
SVHC	Substance of Very High Concern
TWA	Time-weighted average
UEL	Upper explosion limit (UEL)
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures.

Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU.

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). Regulations concerning the International Carriage of Dangerous Goods by Rail (RID). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

List of relevant phrases (code and full text as stated in section 2 and 3)

Code	Text
H302	Harmful if swallowed.
H373	May cause damage to organs (kidney) through prolonged or repeated exposure (if swallowed).

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.

SAFETY DATA SHEET



DIESEL FUEL

Section 1. Identification

Product name : DIESEL FUEL
Product description : Hydrocarbons and Additives
Other means of identification : DIESEL; DIESEL KC; EXTRA DIESEL; MARINE GAS OIL; MOBIL DIESEL EFFICIENT

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

Identified uses : Diesel engine fuel
Uses advised against : This product is not recommended for any industrial, professional or consumer use other than the Identified Uses above.

Supplier : Mobil Oil New Zealand Limited
c/o Russell McVeagh
Vero Centre
48 Shortland Street
Auckland 1140 New Zealand
24 Hour Emergency Telephone : +64 9-801 0034/ 0800 425 459 (CHEMTREC)
National Poison Information Center : +64 3 479 7227/ Freephone 0800 764 766
Supplier General Contact : +64 4 568 0400

SDS Internet Address : www.sds.exxonmobil.com

Section 2. Hazards identification

HSNO Classification : FLAMMABLE LIQUIDS - Category 4
CARCINOGENICITY - Category 2
ASPIRATION HAZARD - Category 1
LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 2

This material is classified as hazardous according to criteria in the Hazardous Substances (Hazard Classification) Notice 2020.

This material is classified as DANGEROUS GOODS according to criteria in New Zealand Standard 5433:2012 Transport of Dangerous Goods on Land.

GHS label elements

Signal word : Danger
Hazard statements : H227 - Combustible liquid.
H304 - May be fatal if swallowed and enters airways.
H351 - Suspected of causing cancer.
H411 - Toxic to aquatic life with long lasting effects.

Precautionary statements

General : P101 - If medical advice is needed, have product container or label at hand.
P102 - Keep out of reach of children.
P103 - Read label before use.
Do not apply directly into or onto water.
Take all reasonable steps to ensure that the substance does not cause any significant adverse effects to the environment beyond the application area.

Section 2. Hazards identification

- Prevention** : P202 - Do not handle until all safety precautions have been read and understood.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P273 - Avoid release to the environment.
P280 - Wear protective gloves, protective clothing, eye protection, face protection, or hearing protection.
- Response** : P301 + P310, P331 - IF SWALLOWED: Immediately call a POISON CENTER or doctor. Do NOT induce vomiting.
P308 + P313 - IF exposed or concerned: Get medical advice or attention.
P370 + P378 - In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.
P391 - Collect spillage.
- Storage** : P403 - Store in a well-ventilated place.
P405 - Store locked up.
- Disposal** : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Symbol** :



- Contains** : fuels, diesel
- Other hazards which do not result in classification** : None known.
- Nota** : This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

Section 3. Composition/information on ingredients

- Substance/mixture** : Mixture

Ingredient name	% (w/w)	CAS number
fuels, diesel	>99	68334-30-5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Nota :

Composition may contain up to 0.5% performance additives and / or dyes.

Section 4. First-aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Section 4. First-aid measures

- Skin contact** : Remove contaminated clothing. Dry wipe exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself or others. Wear impervious gloves. Launder contaminated clothing separately before reuse. Discard contaminated articles that cannot be laundered. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury. Wash clothing before reuse. Clean shoes thoroughly before reuse. Continue to rinse for at least 10 minutes. Get medical attention.
- Ingestion** : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : No known significant effects or critical hazards.
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : No specific data.
- Skin contact** : Local necrosis as evidenced by delayed onset of pain and tissue damage a few hours after injection.
- Ingestion** : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Firefighting measures

Extinguishing media

- Suitable extinguishing media** : Use dry chemical, CO₂, water spray (fog) or foam.
- Unsuitable extinguishing media** : Do not use water jet.

Section 5. Firefighting measures

- Specific hazards arising from the chemical** : Combustible liquid. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapour/gas is heavier than air and will spread along the ground. Vapours may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
- Hazardous combustion products** : Aldehydes, Incomplete combustion products, Oxides of carbon, Smoke, Fume, sulfur oxides
- Special protective actions for fire-fighters** : Use standard firefighting procedures and consider the hazards of other involved materials. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. Assure an extended cooling down period to prevent re-ignition. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply. No action shall be taken involving any personal risk or without suitable training.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Put on appropriate personal protective equipment. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and material for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Confine the spill immediately with booms. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants. Warn other shipping. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 6. Accidental release measures

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

Section 7. Handling and storage

Precautions for safe handling

Protective measures

: Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not swallow. Avoid breathing vapour or mist. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container. It is dangerous and/or unlawful to put petrol into unapproved containers. Do not fill container while it is in or on a vehicle. Static electricity may ignite vapour and cause fire. Place container on ground when filling and keep nozzle in contact with container. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers or other electronic devices, etc.) during safety critical tasks, such as bulk fuel loading or unloading operations, or in storage areas where vapours may be present, unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. For use as a motor fuel only. Do not siphon by mouth.

Advice on general occupational hygiene

: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Static Accumulator

: This material is a static accumulator. A liquid is typically considered a nonconductive, static accumulator if its conductivity is below 100 pS/m (100×10^{-12} Siemens per meter) and is considered a semiconductive, static accumulator 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, anti-static additives and filtration can greatly influence the conductivity of a liquid.

Conditions for safe storage, including any incompatibilities

: Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidising materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
DIESEL FUEL fuels, diesel	ExxonMobil (Company). TWA: 5 mg/m ³ Form: Stable Aerosol. TWA: 100 ppm 8 hours. Form: Total vapour and aerosol. TWA: 500 mg/m ³ 8 hours. Form: Total vapour and aerosol. HSWA 2015 - HSW (GRWM) 2016. Workplace exposure standards (WES) (New Zealand, 4/2022). Absorbed through skin. WES-TWA: 100 mg/m ³ 8 hours. ACGIH TLV (United States, 1/2023). [Diesel Fuel] Absorbed through skin. TWA: 100 mg/m ³ , (measured as total hydrocarbons) 8 hours. Form: Inhalable fraction and vapor ExxonMobil (Company). Absorbed through skin. TWA: 5 mg/m ³ 8 hours. Form: Stable Aerosol. TWA: 200 mg/m ³ 8 hours. Form: Vapour.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. < 1 hour (breakthrough time): Nitrile, minimum 0.38 mm thickness or comparable protective barrier material

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8. Exposure controls/personal protection

- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Recommended: organic vapour filter (Type A)

Section 9. Physical and chemical properties and safety characteristics

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

- Physical state** : Liquid.
- Colour** : Yellow
- Odour** : Petroleum/Solvent
- Odour threshold** : Not available.
- pH** : Not applicable.
- Melting point/freezing point** : Not available.
- Boiling point, initial boiling point, and boiling range** : >148.89°C (>300°F)
- Flash point** : Closed cup: >61°C (>141.8°F) [ASTM D-93]
- Evaporation rate** : Not available.
- Flammability** : Flammable liquids - Category 4
- Lower and upper explosion limit/flammability limit** : Lower: 0.6%
Upper: 7%
- Vapour pressure** : 0.5 mm Hg [20 °C]
- Relative vapour density** : >2 [Air = 1]
- Relative density** : 0.82 to 0.86
- Solubility in water** : Negligible
- Partition coefficient: n-octanol/water** : >3.5
- Auto-ignition temperature** : >250°C (>482°F)
- Decomposition temperature** : Not available.
- Viscosity** : <4.5 cSt [40 °C]
- Particle characteristics**
- Median particle size** : Not applicable.
- Pour point** : <12.22°C

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.

Section 10. Stability and reactivity

- Conditions to avoid** : Avoid all possible sources of ignition (spark or flame). Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapour to accumulate in low or confined areas.
- Incompatible materials** : Reactive or incompatible with the following materials: oxidising materials, Halogens, Strong oxidisers, Strong Acids, Strong Bases
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Test	Species	Result	Duration
DIESEL FUEL	LC50 Inhalation Dusts and mists	Rat	4100 mg/m ³	4 hours
	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-

Conclusion/Summary

- Inhalation** : Minimally Toxic. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 403
- Dermal** : Minimally Toxic. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 402 434
- Oral** : Minimally Toxic. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 401

Irritation/Corrosion

Conclusion/Summary

- Skin** : Negligible irritation to skin at ambient temperatures. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 404
- Eyes** : May cause mild, short-lasting discomfort to eyes. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 405
- Respiratory** : Negligible hazard at ambient/normal handling temperatures. No end point data for material. Elevated temperatures or mechanical action may form vapours, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs.

Sensitisation

Conclusion/Summary

- Skin** : Not expected to be a skin sensitizer. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 406
- Respiratory** : Not expected to be a respiratory sensitizer. No end point data for material.

Mutagenicity

Conclusion/Summary

- : Not expected to be a germ cell mutagen. Data available. Based on test data for structurally similar materials. Test method unavailable. Test(s) equivalent or similar to OECD Guideline 471 475

Carcinogenicity

Conclusion/Summary

- : May cause cancer. Data available. Based on test data for structurally similar materials. Test(s) equivalent or similar to OECD Guideline 451

Reproductive toxicity

Conclusion/Summary

- : Not expected to be a reproductive toxicant. No end point data for material.

Specific target organ toxicity (single exposure)

Conclusion/Summary

- : Not expected to cause organ damage from a single exposure. No end point data for material.

Specific target organ toxicity (repeated exposure)

Section 11. Toxicological information

Conclusion/Summary : Not expected to cause organ damage from prolonged or repeated exposure. Data available. Based on test data for structurally similar materials. Test method unavailable. Test(s) equivalent or similar to OECD Guideline 410 413

Aspiration hazard

Conclusion/Summary : May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material. Data available.

Other information

Product : Vapour concentrations above recommended exposure levels are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anaesthetic and may have other central nervous system effects. Diesel exhaust fumes: Carcinogenic in animal tests. Inhalation exposures to exhaust for 2 years in test animals resulted in lung tumours and lymphoma. Extract of particulate produced skin tumours in test animals. Caused mutations in-vitro. Diesel fuel: Carcinogenic in animal tests. Caused mutations in-vitro. Repeated dermal exposures to high concentrations in test animals resulted in reduced litter size and litter weight, and increased fetal resorptions at maternally toxic doses. Dermal exposure to high concentrations resulted in severe skin irritation with weight loss and some mortality. Inhalation exposure to high concentrations resulted in respiratory tract irritation, lung changes/ infiltration/accumulation, and reduction in lung function. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

Section 12. Ecological information

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

Toxicity

Product/ingredient name	Duration	Species	Result
DIESEL FUEL	72 hours	Algae - Pseudokirchneriella subcapitata	Acute EL50 1 to 100 mg/l data for similar materials
	48 hours	daphnia - Daphnia magna	Acute EL50 1 to 1000 mg/l data for similar materials
	96 hours	Fish - Fish	Acute LL50 1 to 100 mg/l data for similar materials
	72 hours	Algae - Pseudokirchneriella subcapitata	Chronic NOEL 1 to 10 mg/l data for similar materials

Conclusion/Summary

Acute toxicity : Not expected to be harmful to aquatic organisms.

Chronic toxicity : Toxic to aquatic life with long lasting effects.

Persistence and degradability

Product/ingredient name	Test	Result	Qualifier	Media
DIESEL FUEL	Ready Biodegradability	<60 % - 28 days	data for similar materials	water

Biodegradability : Material -- Expected to be inherently biodegradable

Atmospheric Oxidation : More volatile component -- Expected to degrade rapidly in air

Bioaccumulative potential

Conclusion/Summary : Material -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

Section 12. Ecological information

Mobility in soil

Mobility

- : High molecular wt. component -- Expected to partition to sediment and wastewater solids. Low solubility and floats and is expected to migrate from water to the land.
- More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Other ecological information

Other adverse effects

- : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods

- : The generation of waste should be avoided or minimised wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

Section 14. Transport information

	New Zealand	IMDG	IATA
UN number	UN3082	UN3082	UN3082
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (fuels, diesel)	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (fuels, diesel)	Environmentally hazardous substance, liquid, n.o.s. (fuels, diesel)
Transport hazard class(es)	9	9	9
Label(s) / Mark(s)			
Packing group	III	III	III
Environmental hazards	Yes.	Yes.	Yes.

Additional information

New Zealand

- : **Hazchem code** 3Z
- Special provisions** 274, 331, 335, 363

IMDG

- : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.
- Emergency schedules** F-A, S-F
- Special provisions** 274, 335, 969

Section 14. Transport information

- IATA** : This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1.1 and 5.0.2.8.
- Quantity limitation** Passenger and Cargo Aircraft: 450 L. Packaging instructions: 964. Cargo Aircraft Only: 450 L. Packaging instructions: 964. Limited Quantities - Passenger Aircraft: 30 kg. Packaging instructions: Y964.
- Special provisions** A97, A158, A197, A215

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not applicable.

Section 15. Regulatory information

- HSNO Approval Number** : HSR001441
- HSNO Group Standard** : Not available.
- HSNO Classification** : FLAMMABLE LIQUIDS - Category 4
CARCINOGENICITY - Category 2
ASPIRATION HAZARD - Category 1
LONG-TERM (CHRONIC) AQUATIC HAZARD - Category 2

Inventory list

- Australia inventory (AIIC)** : At least one component is not listed.
- Canada inventory (DSL-NDSL)** : At least one component is not listed.
- China inventory (IECSC)** : At least one component is not listed.
- Japan inventory (CSCL)** : Not determined.
- Japan inventory (Industrial Safety and Health Act)** : Not determined.
- New Zealand Inventory of Chemicals (NZIoC)** : At least one component is not listed.
- Philippines inventory (PICCS)** : All components are listed or exempted.
- Korea inventory (KECI)** : At least one component is not listed.
- Taiwan Chemical Substances Inventory (TCSI)** : Not determined.
- United States inventory (TSCA 8b)** : All components are active or exempted.

Section 16. Other information

History

- Date of issue/Date of revision** : 13 February 2024
- Date of previous issue** : 13 February 2024
- Version** : 1

- Key to abbreviations** : ADG = Australian Dangerous Goods
ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient

Section 16. Other information

MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
RID = The Regulations concerning the International Carriage of Dangerous Goods by Rail
SGG = Segregation Group
UN = United Nations

References : Not available.

Indicates information that has changed from previously issued version.

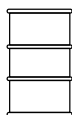
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Notice to reader

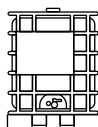
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Product	Sinopec Super Insulated Transformer Oil
Summary	Product description Sinopec Super Insulated Transformer Oil is blended with highly refined mineral oil and a selected antioxidant. It is designed for insulating and cooling transformers, oil-immersed switch-gear and other electrical insulating applications. There are three kinds of transformer oil, I-10°C super insulated transformer oil, I-20°C super insulated transformer oil and I-40°C super insulated transformer oil, which meet the requirements of IEC60296:2012. Sinopec transformer oil IEC don't contain polychlorinated biphenyls (PCBs).

Available sizes



DRUM – 200L



IBC – 1000L

Also
available
in bulk

Applications

Sinopec Super Insulated Transformer Oil is suitable for use in:

- Oil-filled transformers, where it acts as a non-conducting insulating and cooling medium.
- Oil-immersed switch-gear.
- Other electrical insulating applications.

Features and benefits

- Excellent dielectric (insulating) properties, effectively prevent discharge in an electric field.
- Low viscosity and low density lead to the oils having good cooling properties and good heat transfer characteristics at room temperature and below, and so ensure effective cooling of transformer core and coils.
- Even at very low temperatures the oil viscosity remains low, and therefore allows the transformer to be started up under very cold conditions without problem.
- Excellent oxidation stability characteristics are provided by the stable base oil together with the high-performance oxidation inhibitor system, and prevent the formation of acidic material and sludge in service, extending the life of the oil.

Sinopec Super Insulated transformer oil meets the requirements of IEC60296: 2012.

- For the special application requirements (high oxidative stability and low sulfur content) of transformer oil , the oil comply with IEC 60296:2012, including clause 7.1 requirements.

Product Data Sheet

Typical Data

Grade	SPECIFICATION LIMITS of IEC60296:2012	Sinopec Super Insulated Transformer oil		
		I-10℃	I-20℃	I-40℃
Kinematic viscosity, mm ² /s				
cSt @ 40℃, ISO 3104	≤12	9.66	10.85	9.68
cSt @ -10℃, ISO 3104	≤1800	106.54	—	—
cSt @ -20℃, ISO 3104	≤1800	—	283	—
cSt @ -40℃, IEC 61868	≤2500	—	—	2091
Pour point, °C, ISO 3016	*	-42	-45	-57
Water Content, mg/kg, IEC60814	< 30	29	14	13
Dielectric Breakdown (as received) , kV, IEC 60156	30	54	75	87
Dielectric dissipation factor @ 90℃, IEC 60247	0.005	0.0006	0.0001	0.0002
Density @ 20℃, g/mL, ISO 3675	0.895	0.836	0.847	0.840
Particle Content ,IEC60970	No requirement	ISO Code: 15/13/11	ISO Code: 13/12/10	ISO Code: 15/14/11
Appearance, IEC 60296	Clear & bright	Clear & bright	Clear & bright	Clear & bright
Acidity, mg KOH/g, IEC 62021	≤0.01	0.009	<0.01	<0.01
Interfacial tension, mN/m, ISO6295	40	47.98	52	48
Total Sulfur content, %, ISO 14596**	No requirement	0.0031	0.00482	0.006
Corrosive sulfur, DIN51353	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive
Potentially corrosive sulfur, IEC 62535	Non-corrosive	Non-corrosive	Non-corrosive	Non-corrosive
DBDS ,mg/kg, IEC 62697	Non-detectable (<5 mg/kg)	<1	<1	<1
Inhibitors ,%, IEC 60666	(I) inhibited: (0.08 – 0.40%)	0.33	0.32	0.34
Metal passivator additives , mg/kg, IEC 60666	Non-detectable (<5 mg/kg)	BTA: <1 Irgamet 39: <5	BTA: <1 Irgamet 39: 2	BTA: <1 Irgamet 39: <5
2-Furfural & related compounds, mg/kg, IEC 61198	Non-detectable (<0.05 mg/kg) for each	<0.05	<0.05	<0.05
Oxidation stability, 500 h @ 120℃, IEC 61125C***				
total acidity, mg KOH/g	≤1.2	0.039	0.19	0.24
sludge, wt%	≤0.8	0.0318	<0.01	<0.01
DDF at 90℃	≤0.500	0.0021	0.0088	0.0110
Flash point (PMCC), °C, ISO 2719	135	168	138	166
PCA Content , %, IP 346	≤ 3	0.15	0.92	0.70
PCB Content, mg/kg , IEC 61619	Not detectable (< 2 mg/kg)	< 2	< 2	< 2
Note: * Pour point , °C I -10℃ Transformer oil ≤-20 I -20℃ Transformer oil ≤-30 I -40℃ Transformer oil ≤-50 ** The specification limits of Total Sulfur content in this sheet is General grade transformer oil .The Special grade transformer oil is ≤0.05. ***The specification limits of Oxidation stability in this sheet is General grade transformer oil .The Special grade transformer oil is more strict: total acidity≤0.3mg KOH/g, sludge≤0.05%, DDF at 90℃≤0.050.				

These data are given as an indication of typical values and not as exact specifications.

Product Data Sheet

Industry and OEM specifications

Sinopec Transformer Oil meets the performance requirements of the following industry specifications:	
IEC	60296:2012

Sinopec Transformer Oil holds the following formal OEM approvals:	
ABB	Specification 1ZBA117001-1: HI-B (Sinopec 25 Transformer Oil ¹) HI-A (Sinopec 45 Transformer Oil ¹)
Siemens	TUN 901 293 (2007) (Sinopec 25 and 45 Transformer Oil ¹)

¹Note: Sinopec 25 and 45 Transformer oil is now changed the name as Sinopec I-10°C and I-40°C general Transformer Oil, the process and properties are the same.

Accuracy of information

Data provided in this PDS is typical and subject to change as a result of continuing product research and development. The information given was correct at the time of printing. The typical values given are subject to variations in the testing procedures and the manufacturing process may also result in slight variations. Sinopec guarantees that its lubricants meet any industry and OEM specifications referred to on this data sheet.

Sinopec cannot be held responsible for any deterioration in the product due to incorrect storage or handling. Information on best practice is available from your local distributor.

Product and environmental safety

This product should not cause any health problems when used in the applications suggested and when the guidance provided in the Material Safety Data Sheet (MSDS) is followed. Please consult the MSDS for more detailed advice on handling; MSDSs are available from your local distributor. Do not use the product in applications other than those suggested.

As with all products, please take care to avoid environmental contamination when disposing of this product. Used oil should be sent for reclamation/recycling or, if not possible, must be disposed of according to relevant government/authority regulations.

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Sinopec Super Insulated Transformer Oil

Attachment D: Effects Ratio Calculations

HFSP Effects Ratio Calculations

Facility Name: Hineura Solar Farm
Address: Corner of State Highway 29 and State Highway 27, Hinuera
Client: Harmony Energy New Zealand #06 Limited
Description of Activity: Solar farm with battery energy storage system, providing electrical energy to the National Grid.
Nature of Adjoining Land Use: Primarily rural with agricultural activities (largely dairy farming). Site is zoned Rural.
Proximity to Potable Water Sources: Resource¹: Based on a review of the Wells Aotearoa New Zealand online portal, five bores are identified onsite and several within 25 m north, west and south of the site. Very limited details provided and bore use was not recorded.
Proximity to Aquatic Receptor¹: Waihu River is approximately 12 km southwest of Hinuera. An unnamed tributary of the Waihu River is intersecting the northwest area of the Site.

¹ Aquatic receptor includes streams, springs, lakes, wetlands, sea and estuaries, but does not include aquifers and entry points to the stormwater drainage network.

General Details

Substance	UN No.	HSNO Classification	Substance Form	Specific Gravity	Proposed Quantity	Converted Quantity (Tonnes)	Proposed Storage
Transformer Oil	1202	6.1E; 9.1C	Liquid	0.88	220,000 L	193.6	Within AUX transformers (x30)
Ethylene Glycol	3082	6.1D; 6.9B	Liquid	1.11	45,000 L	49.95	Within the BESS battery banks (x90)

Effects Ratio Calculation Summary

Effect Type	Hazard Rating ²	Base Quantity ² (tonnes)	Substance Form	Distance to Site Boundary <30 m? Yes/No	Adjacent to Water? Yes/No	Type of Activity ²	Adjustment Factors			Product of Adjustment Factors	Adjusted Quantity (tonnes)	Proposed Quantity (tonnes)	Fire/Explosion Quantity Ratio FQ	Human Health Quantity Ratio HQ	Environment Quantity Ratio EQ
							Form	Separation Distance	Activity Type						
Fire/Explosion	-	-	Liquid	No	No	Use ³	1	3	0.3	0.9	-	194	n/a		
Human Health	-	-					1	3	0.3	0.9	-				
Environment	Low	100					1	1	0.3	0.3	30				
Fire/Explosion	-	-	Liquid	No	No	Use ³	1	3	0.3	0.9	-	49.95	n/a	1.8500	
Human Health	Low	30					1	3	0.3	0.9	27				
Environment	-	-					1	1	0.3	0.3	-				
Total Quantity Ratio											N/A	1.8500	6.4667		

² Type of Activity either: Above ground storage (A/Ground), Below ground storage (B/Ground), or Use.

³ Substances stored/used within closed equipment as insulators/coolants. Handling of substances only occurs during occasional maintenance activities. Have selected activity type as Use as a conservative approach.

N/A - Not applicable, no hazard rating.