

G08 – Supplier Data Sheet

181367- ALFEN-QHSE-ESS-GEN-SP-5011

23-Sep-22 | Revision C0

Document data

Rev.	Issue Purpose	Date	Initiated	Checked	Verified	Approved
C0	Issue for comments	23-Sep-22	[redacted]	n/a	n/a	[redacted]

Project Document Reference	181367- ALFEN-QHSE-ESS-GEN-SP-5011
Client Document Reference	G08 – Supplier Data Sheet
Client Revision Code	

Revision history

Revision	Section	Change
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Hold register

Hold no.	Description of HOLD	Action Party

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1 Introduction

This document presents the list of safety datasheets for the hazard materials that can be found in Aggreko Mobile 2B system. Special materials are considered the ones that need to be handled in a special way when spill or replacement occurs.

The purpose of this document is to identify the materials and its technical description as indicated in Table 1

Table 1 File name and description for material safety datasheets

File	Description file
Material Safety-01-Lithium battery	Lithium ion battery
Material Safety-02-Back up batteries	Lead-Acid Battery
Material Safety-03-Refrigerant	R134a Refrigerant
Material Safety-04-Refrigerant Oil	Reniso Triton SE 55

2 Specifications MSDS

2.1 Lithium – Ion battery

Installation	Mobile 2B
Equipment	94Ah Battery module
Quantity	10 battery Modules
Location	See *Figure 1*
Use	Electrolyte in the Battery
Type of fluid	Lithium ion metal oxide (NMC/LMO blend)
Fill Volume	213L*10 = 2130L
Document	Material Safety-01-Lithium battery

2.2 Lead acid batteries

Installation	Mobile 2B
Equipment	System control cabinet - 60Ah battery
Quantity	2 Batteries units
Location	See *Figure 2*
Use	Electrolyte in the back-up Battery
Type of fluid	Lead acid
Document	Material Safety-01-Lithium battery

2.3 R134a refrigerant

Installation	Mobile 2B
Equipment	Close circuit cooling system (Evaporator (Outside the unit), condenser (Battery modules), coolant pump.
Location	See *figure 2 – Coolant pump.*
Use	Refrigerant fluid
Type of fluid	R134a refrigerant
Fill weight	3.45 kg
Document	Material Safety-02-Refrigerant

2.4 Reniso Triton SE 55

Installation	Mobile 2B
Equipment	Coolant pump
Location	See *figure 2 – Coolant pump.*
Use	Synthetic refrigeration oil
Type of fluid	Reniso Triton SE 55
Fill volume	0.8 L
Document	Material Safety-02-Refrigerant

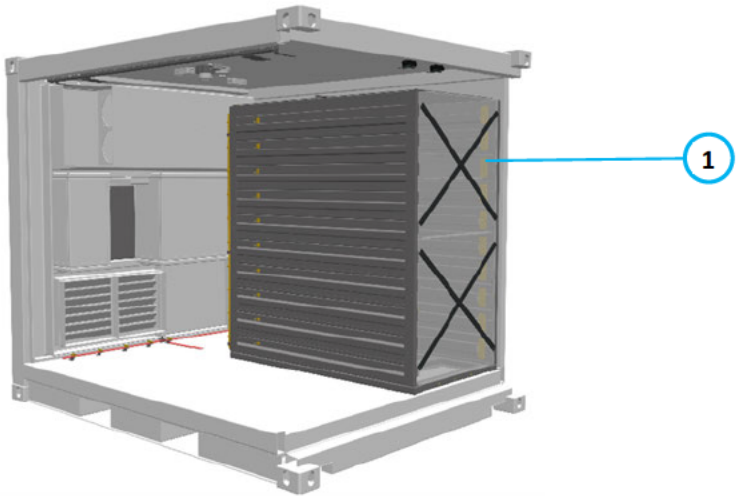


Figure 1. Location of battery rack in Mobile 2b

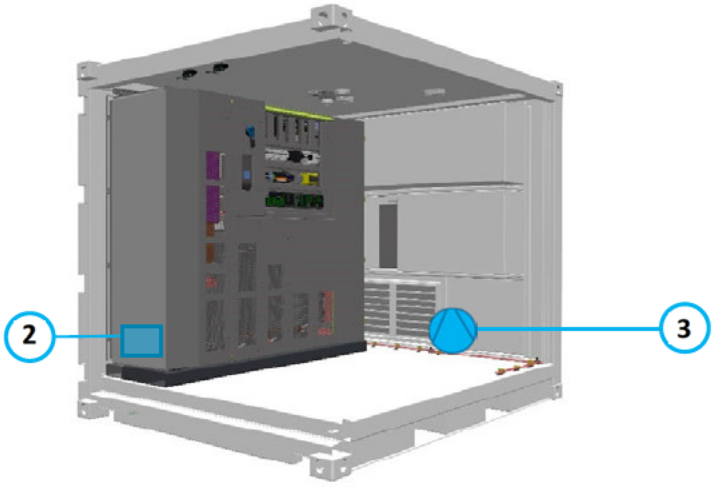


Figure 2. Location of back-up battery and coolant pump in Mobile 2b

File	Description file
1	Lithium batteries
2	Back up batteries
3	Refrigerant (Coolant pump) Lubricating oil (Coolant pump)

Appendix A – Lithium – ion Cells

BMW GROUP

Rolls-Royce Motor Cars Limited

Safety information

Creation date: 10.05.2016

1. Section 1: Substance / preparation and company name

1.1 Product identifier

Product name: electrical energy storage system

Mounted cell-modules:

Capacity [Ah]	Calculated mass [g]	Max. Energy [Wh]
120	31160	5328

Synonyms: High-capacity battery, made of lithium ion cells based on lithium metal oxide

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

Product applications: Electronic applications

1.3 Details of the supplier of the safety information

Manufacturer: BMW AG
80788 Munich
GERMANY

Telephone number: [redacted]

1.4 Emergency number

Emergency telephone number [redacted]

2. Section 2: Possible hazards

2.1 Classification of the substance or mixture

Hazards caused by the product:

At proper use nonhazardous. The product has a barrier to prevent contact of the substances of content to contact with the user and the environment. The battery and the cell must not be opened or burned. At a use not in accordance with the regulations, hazards may occur by electric shock and chemical substances of content or combustion products of the cell. The battery may only be opened internally/externally by the manufacturer.

Main exposure route(s):

The chemicals are contained in a sealed encapsulation. A risk of exposition exists only if the cell is used wrongly in terms of mechanical, thermal or electrical use, damaging the encapsulation. In such a case inhalation, swallowing, eye and skin contact may lead to an exposition with the therein contained solution.

Possible health risks:

If the battery would get damaged, the electrolyte solution contained in the cell would be corrosively toxic, may cause severe skin injuries and/or burns by an electric shock.

Inhalation:

The inhalation of materials of a sealed off cell is not a mode of exposure to be expected. Vapors or mists escaping a damaged battery may lead to an irritation of the respiratory system, especially in combination with humidity (water) up to profound respiratory diseases.

Swallowing:

Swallowing of materials of a sealed off cell is not a mode of exposure to be expected. Swallowing of the contents of an open cell may lead to profound chemical burns of the mouth, of the esophagus and the gastrointestinal system.

Skin:

Skin contact with the battery does not lead to injuries. Skin contact with the contents of an open battery or cell may lead to severe skin injuries, burns by electric shock.

Eyes: A contact between battery and cell and eyes does not lead to injuries. Eye contact with the contents of the open cell may lead to severe eye injuries.

2.2 Labeling elements

Pictogram/hazard symbol:

Normal use:



Improper use (damaged encapsulation):



2.3 Other hazards

In current state of knowledge not detected.

3. Section 3: Composition/specifications regarding the constituent parts

3.1 Substances

The battery and the cells are solid factory-made goods. At normal use an exposure with hazardous substances of content may not be expected. Due to the classification as a solid factory-made good the complete battery characterization does not need to be given. From the contained lithium ion cell following characterization of hazardous components can be derived as additional information:

Hazardous components				
EC-No.	**CAS-No.**	**Chemical name**	**Quantity**	**EU-Classification**
215-154-6	1307-96-6	Cobalt oxide	< 15 %	Xn, N R22435053
215-202-6	1313-13-9	Manganese dioxide	< 15 %	Xn R20/22
215-215-7	1313-99-1	Nickel oxide	< 70 %	Carc. Cat. 1, T R49-43-48/23-53
231-153-3	7440-44-0	Carbon	10 - 30 %	
		Electrolyte (*)	10 - 20 %	Carc. Cat. 3, C, R10-34-40-43
	24937-79-9	Polyvinylidene fluoride (PVdF)	< 10 %	
231-072-3	7429-90-5	Aluminium foil	2 - 10 %	
231-159-6	7440-50-8	Copper foil	2 - 10 %	
		Aluminium and inert materials	5 - 10 %	

3.2 Mixtures

Chemical characterization: Lithium ion cells contain a mixture of organic solvents. See components of mixture in table of section 3.1.

4. Section 4: First-aid measures

4.1 Description of first-aid measures

Inhalation: At the inhalation of the content of an opened cell, remove the contamination source or bring the affected person to the fresh air. Contact the emergency medical services immediately!

Eye contact: In case of eye contact with the contents of the opened cell rinse the contaminated eye(s) immediately with lukewarm, weakly running water jet for at least 30 minutes. Contact the emergency medical services immediately!

Skin exposure: In case of skin exposure with the content of the opened cell, remove the contaminated clothes, shoes and leather parts. Rinse immediately with lukewarm, weakly running water for at least 30 minutes. Contact the emergency medical services immediately! In case of electrical contact, separate person, without endangering oneself, by means of non-conductive aids from the voltage-conducting parts. Contact the emergency medical services with reference to an electric shock.

Swallowing: If the contents of an opened cell have been swallowed, DO NOT supply anything over the mouth if the affected person becomes unconscious easily; is unconscious or has cramps. Rinse the mouth thoroughly with water. DO NOT INDUCE VOMITING. Contact the emergency medical services immediately!

4.2 Most important symptoms and effects, both acute or delayed

See section 2 in case of exposition to battery content / electrolyte solution.

4.3 Indications of any immediate medical attention and special treatment

Treatment according to symptoms (see also section 4.1).

5. Section 5: Measures for fire-fighting

Fire properties: If a simultaneous crack in the battery and the therein contained cells may occur, the contained electrolyte solution would be inflammable. Like every sealed container, batteries may tear at extreme influences of heat; leading to the discharge of inflammable or corrosive materials. Caused by a short circuit the battery may burn down. In case of a fire keep in mind that due to extinguishing there is a high dilution of leaked compounds

5.1 Extinguishing agents

Suitable: In case of fires in connection with batteries use mainly water or CO_2. The usage of water is uncritical, it is highly recommended to use much water due to its cooling effect. Depending on the availability other extinguishing agents (fire extinguishing foam, extinguishing powder) may be used also.

Unsuitable: No unsuitable extinguishing agent known. Please observe the safety indications.

5.2 Special hazards by substance or mixture

Risk at vehicle: No additional hazards from fire of electric vehicle compared to conventional vehicle. Depending on built-in battery an electric vehicle burns longer than a conventional vehicle in some circumstances without fire-fighting operation. During fire of electric or hybrid vehicle harmful smoke arises which is comparable typically in composition and concentration to smoke of fire of conventional vehicles.

Risk at mechanical influence: Mechanical influences may in extreme conditions lead to a tearing of the battery.

Risk at static discharge: Not applicable.

Specific risks formed by chemicals: In general the decomposition products of electrolyte (after thermal event) consists of CO_2, CO, H_2 and HC (hydrocarbons) as main products. Humidity/water in reaction with released electrolyte containing lithium hexafluorophosphate may lead to the formation of hydrogen fluoride (HF) and other by-products.

5.3 Advise for firefighting

Special protective equipment: As common in firefighting, the complete personal protective equipment incl. breathing protection must be used. Required adjustments must be made according to the situation.

6. Section 6: Measures in case of unintentional release

6.1 Personal precautions, protective equipment and emergency procedures

Until completion of the cleaning work the access to the affected area must be closed. Do not contact trapped materials. Wear appropriate protective equipment according to the specifications in section 8.

6.2 Environmental protection measures

Soil contamination and penetration of material into sewage system and waterway must be avoided.

6.3 Methods and material for containment and cleaning

Containment: The release of the substance must be stopped, if this is safely possible. Leaked fluids must be contained with dry sand, soil or chemicals binding agents. Clean the affected area immediately.

Cleaning: Absorb spilled material with an inert, absorptive sorbent (dry sand or soil). Put contaminated sorbent into a suitable waste bin. Collect all contaminated sorbent and dispose it in compliance with section 13. Scrub the affected area with cleaning agents and water; collect contaminated cleaning water and dispose in accordance with the regulations.

7. Section 7: Handling and storage

7.1 Protection measures for safe handling

Do not open, dismantle, squash or burn the cell. Do not expose battery to extreme heat or fire.

7.2 Conditions for safe storage including any incompatibilities

Store the battery at a dry place at room temperature. Increased temperatures may reduce the service life of the battery. Keep out of reach of children.

7.3 Specific end uses

Branch and sector specific guidelines. See product application in section 1.2.

8. Section 8: Limitation and monitoring of exposure/ personal protective equipment

8.1 Control parameters

Not relevant.

8.2 Exposure controls

Technical protection measures: For storing and disposal see regulations regarding storage and transport of HV batteries.

Personal security:

Breathing protection: Not required under normal conditions.

Skin protection: Not required under normal conditions. In case of handling of an open or leaky cell, wear gloves made of neoprene or natural rubber.



Eye protection: Not required under normal conditions. At handling of an open or leaky cell wear protective goggles.



Other protective equipment: In the immediate working area an eye wash should be accessible.



Hygienic measures: Do not eat, drink or smoke in the work areas. Mind order and cleanliness.

9. Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical properties and conditions:	Solid.
Relative density (water = 1):	Product is a manufactured item, thus no specification possible.
Water solubility:	Insoluble.
Odor:	Odorless.

9.2 Other information

Not available.

10. Section 10: Stability and reactivity

10.1 Reactivity

At proper use no specification.

10.2 Chemical stability

In normal ambient conditions stable.

10.3 Possibility of hazardous reactions

At proper use no specification.

10.4 Conditions to avoid

Contact of battery with fire or high temperatures must be avoided. Do not dismantle, squash, short-out or connect with twisted polarity. Avoid mechanical and electrical misuse.

10.5 Incompatible materials

At proper use no specification.

10.6 Hazardous decomposition products

At proper use no specification.

11. Section 11: Toxicological information

11.1 Information on toxicological effects

Product is a manufactured item, thus no specification possible.

12. Section 12: Ecological information

12.1 Toxicity

At proper use nontoxic. The product has a barrier to prevent contact of the substances of content to contact with the environment. A risk of exposition exists only if the sealed encapsulation is damaged or broken. Escaped electrolyte will react with water and potentially cause damage to flora and fauna if not disposed of properly. See section 13 for proper disposal considerations.

12.2 Persistence and degradability

No data available.

12.3 Bioaccumulation potential

No data available.

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

Not applicable.

12.6 Other adverse effects

Not available.

13. Section 13: Disposal considerations

13.1 Waste treatment methods

Disposal processes:	Recycling according to the national battery regulations required (see section 15). Prevent that the substances of content reach the earth or waters.
EU	At the disposal within the EU, Code 160605 of the European Waste Register must be applied.

14. Section 14: Transport information

In accordance with ADR/RID (road/rail), IMDG (sea) and ICAO/IATA (air freight). Subsections have been subsumed.

14.1 UN number(s)

UN 3480	Lithium ion batteries

14.2 UN proper shipping name

Lithium ion batteries

14.3 Transport hazard class (-es)

Class 9

14.4 Packing group

Not applicable.

14.5 Environmental hazards

None.

14.6 Special precautions for user

Please read safety instructions, safety information and emergency procedures before handling.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

15. Section 15: Regulatory information

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

EU	This battery is an article acc. to EU regulation 1907/2006 and is not subject to the mandatory identification for chemical substances and mixtures.
USA	This battery is an article acc. to 29 CFR 1910.1200 and is not subject to the obligations of the OSHA Hazard Communication Standard. These safety information contain important specifications for the secure use and thus the proper handling with the product. These security information should be retained and be accessible for employees and other users of the product.
Canada	This product is not governed by the WHIMS-regulations. It fulfills the definition of a "factory-made article" and is thus not subject to the regulations of the Hazardous Product Act.
Australia	The listed substances are according to the List of Designated Hazardous Substances (NOHSC).

15.2 Chemical safety assessment

Not applicable.

16. Section 16: Other information

Change history:

REVISION DATE	CHANGES
16.04.2013	Creation
29.10.2015	Update

List of abbreviations:

ABBREVIATION	MEANING
EES	Electrical energy storage
HV	High voltage

References and data sources:

REFERENCE	TITLE
EU code 160605	European Waste List: other batteries and accumulators
UN 38.3	UN Manual of tests and criteria, part III, subsection 38.3
ADR/RID	Accord européen relatif au transport international des marchandises Dangereuses par Route / Règlement concernant le transport international ferroviaire de marchandises dangereuses
IMDG-CODE	International Maritime Code for Dangerous Goods
IATA-DGR	International Air Transport Association – Dangerous Goods Regulations
ICAO	International Civil Aviation Organization

Disclaimer of the manufacturer

The specifications and recommendations made in this document are provided in good faith and are considered correct at the day of creation.

Appendix B – Lead acid batteries

Victron Energy VRLA Battery
MATERIAL SAFETY DATA SHEET

SECTION 1 - GENERAL INFORMATION

MANUFACTURER'S NAME: Victron Energy B.V	EMERGENCY TELEPHONE NO.: +[redacted]
ADDRESS: De Paal 35 1351 JG Almere-Haven The Netherlands	OTHER INFORMATION CALLS: [redacted]
Chemical / Trade Name (as used on label) Lead-Acid Battery	**Chemical Family / Classification** Electric Storage Battery
PERSON RESPONSIBLE FOR PREPARATION [redacted] Managing Director	Revised Date: July 31, 2014

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

C.A.S.	PRINCIPAL HAZARDOUS COMPONENT(S) (chemical & common name(s)	Hazard Category	% Weight	ACGIH TLV - mg/m3	OSHA PEL/TWA - mg/m3
7439-92-1	Lead/Lead Oxide (Litharge)/Lead Sulfate	Acute-Chronic	60-70	0.05 mg/m3	0.05 mg/m3
7440-70-2	Calcium (lead calcium alloy)	Reactive	<0.15	Not Established	Not Established
7440-31-5	Tin	Chronic	<1	2	2
7440-38-2	Arsenic (inorganic)	Acute-Chronic	<1	0.01	0.01
7664-93-9	Sulfuric Acid (Battery Electrolyte)	Reactive-Oxidizer Acute -Chronic	10-15	1.0	1.0
Not applicable	Inert Ingredients	Not applicable	<6	Not Applicable	Not Applicable

COMMON NAME: (Used on label) Valve Regulated Lead-Acid Battery
(Trade Name & Synonyms) VRLA, Recombinant lead acid: AGM Deep Cycle, GEL Deep cycle, AGM Telecommunications, GEL OPzV tubular plate
Chemical Family: Toxic and Corrosive Material Mixture
Chemical Formula: Lead/Acid
Name: Battery, Storage, Lead Acid, Valve Regulated

SECTION 3 -- HAZARD IDENTIFICATION

Signs and Symptoms of Exposure	1. Acute Hazards	Do not open battery. Avoid contact with internal components. Internal components include lead and absorbed electrolyte. Electrolyte - Electrolyte is corrosive and contact may cause skin irritation and chemical burns. Electrolyte causes severe irritation and burns of eyes, nose and throat. Ingestion can cause severe burns and vomiting. Lead - Direct skin or eye contact may cause local irritation. Inhalation or ingestion of lead dust or fumes may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm and joint pain.			
	2. Sub-chronic and Chronic Health Effects	Electrolyte - Repeated contact with electrolyte causes irritation and skin burns. Repeated exposure to mist may cause erosion of teeth, chronic eye irritation and/or chronic inflammation of the nose, throat and lungs. Lead - Prolonged exposure may cause central nervous system damage, gastrointestinal disturbances, anemia, irritability, metallic, taste, insomnia, wrist-drop, kidney dysfunction and reproductive system disturbances. Pregnant women should be protected from excessive exposure to prevent lead from crossing the placental barrier and causing infant neurological disorders. California Proposition 65 Warning: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm, and during charging, strong inorganic acid mists containing sulfuric acid are evolved, a chemical Known to the State of California to cause cancer. Wash hands after handling.			
Medical Conditions Generally Aggravated by Exposure	Contact with internal components if battery is broken or opened, then persons with the following medical conditions must take precautions: pulmonary edema, bronchitis, emphysema, dental erosion and tracheobronchitis.				
Routes of Entry	Inhalation - YES Ingestion – YES	Eye Contact- YES			
Chemical(s) Listed as Carcinogen or potential Carcinogen	Proposition 65 - YES	National Toxicology Program - YES	I.A.R.C. Monographs - YES	O.S.H.A. - NO	

SECTION 4 - FIRST AID MEASURES

Emergency and First Aid Procedures	Contact with internal components if battery is opened/broken.
1. Inhalation	Remove to fresh air and provide medical oxygen/CPR if needed. Obtain medical attention.
2. Eyes	Immediately flush with water for at least 15 minutes, hold eyelids open. Obtain medical attention.
3. Skin	Flush contacted area with large amounts of water for at least 15 minutes. Remove contaminated clothing and obtain medical attention if necessary.
4. Ingestion	Do not induce vomiting. If conscious drink large amounts of water/milk. Obtain medical attention. Never give anything by mouth to an unconscious person.

SECTION 5 - FIREFIGHTING MEASURES

Flash Point – Not Applicable	Flammable Limits in Air % by Volume: Not Applicable	Extinguishing Media – Class ABC, Co2, Halon	Auto-Ignition 675°F (polypropylene) Temperature
Special Fire Fighting Procedures	Lead/acid batteries do not burn, or burn with difficulty. Do not use water on fires where molten metal is present. Extinguish fire with agent suitable for surrounding combustible materials. Cool exterior of battery if exposed to fire to prevent rupture. The acid mist and vapors generated by heat or fire are corrosive. Use NIOSH approved self-contained breathing apparatus (SCBA) and full protective equipment operated in positive-pressure mode.		
Unusual Fire and Explosion Hazards	Sulfuric acid vapors are generated upon overcharge and polypropylene case failure. Use adequate ventilation. Avoid open flames/sparks/other sources of ignition near battery.		

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Procedures for cleanup. Avoid contact with any spilled material. Contain spill, isolate hazard area, and deny entry. Limit site access to emergency responders. Neutralize spilled electrolyte with sodium bicarbonate, soda ash, lime or other neutralizing agent. Place battery in suitable container for disposal. Dispose of contaminated material in accordance with applicable local, state and federal regulations. Sodium bicarbonate, soda ash, sand, lime or other neutralizing agent should be kept on-site for spill remediation.

Personal precautions: Acid resistant aprons, boots and protective clothing. ANSI approved safety glasses with side shields/face shield recommended.

Environmental precautions: Lead and its compounds and sulfuric acid can pose a severe threat to the environment. Contamination of water, soil and air should be prevented.

SECTION 7 - HANDLING AND STORAGE

Precautions to be Taken in Handling and Storage	Store away from reactive materials, open flames and sources of ignition as defined in Section 10 – Stability and Reactivity Data. Store batteries in cool, dry, well-ventilated areas. Batteries should be stored under roof for protection against adverse weather conditions. Avoid damage to containers.
Other Precautions	GOOD PERSONAL HYGIENE AND WORK PRACTICES ARE MANDATORY. Refrain from eating, drinking or smoking in work areas. Thoroughly wash hands, face, neck and arms, before eating, drinking and smoking. Work clothes and equipment should remain in designated lead contaminated areas, and never taken home or landered with personal clothing. Wash soiled clothing, work clothes and equipment before reuse.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION

Respiratory Protection (Specify Type)	None required under normal conditions. Acid/gas NIOSH approved respirator is required when the PEL is exceeded or employee experiences respiratory irritation.				
Ventilation	Store and handle in dry ventilated area.	Local Exhaust	When PEL is exceeded.	Mechanical (General)	Not Applicable
Protective Gloves	Wear rubber or plastic acid resistant gloves.	Eye Protection	ANSI approved safety glasses with side shields/face shield recommended.		
Other Protective Clothing or Equipment	Safety shower and eyewash.				

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: Not Applicable	Vapor Pressure: Not Applicable	Specific Gravity: 1.250 – 1320 pH<2	Melting Point: >320°F (polypropylene)
Percent Volatile By Volume: Not Applicable	Vapor Density: Hydrogen: 0.069 (Air =1) Electrolyte: 3.4 @ STP (Air =1)	Evaporation Rate: Not applicable	
Solubility in water: 100% soluble (electrolyte)		Reactivity in Water: Electrolyte – Water Reactive (1)	
Appearance and Odor:	Battery: co-polymer polypropylene, solid; may be contained within an outer casing of aluminum or steel. Case has metal terminals. Lead: Gray, metalic, solid; brown/grey oxide Electrolyte: Odorless, liquid absorbed in glass mat material or GEL No apparent odor.		

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable	Conditions to Avoid: Avoid overcharging and smoking, or sparks near battery surface. High temperatures-cases decompose at >320°F.
Incompatibility (Materials to Avoid)	Sparks, open flames, keep battery away from strong oxidizers.
Hazardous Decoposition Products	Combustion can produce carbon dioxide and carbon monoxide.
Hazardous Polymerization	Hazardous Polymerization has not been reported.

SECTION 11 - TOXICOLOGICAL INFORMATION

GENERAL: The primary routes of exposure to lead are ingestion or inhalation of dust and fumes.

ACUTE:
INHALATION/INGESTION: Exposure to lead and its compounds may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in the legs, arms and joints. Kidney damage, as well as anemia, can occur from acute exposure.

CHRONIC:
INHALATION/INGESTION: Prolonged exposure to lead and its compounds may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and wrist drop. Symptoms of central nervous system damage include fatigue, headaches, tremors, hypertension, hallucination, convulsions and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity, but there is at present, no substantiation of the implication. Pregnant women should be protected from excessive exposure. Lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure in pregnant women.

SECTION 12 - ECOLOGICAL INFORMATION

In most surface water and groundwater, lead forms compounds with anions such as hydroxides, carbonates, sulfates, and phosphates, and precipitates out of the water column. Lead may occur as sorbed ions or surface coatings on sediment mineral particles or may be carried in colloidal particles in surface water. Most lead is strongly retained in soil, resulting in little mobility. Lead may be immoblized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in the soil. Lead (dissolved phase) is bioaccumulated by plants and animals, both aquatic and terrestrial.

SECTION 13 - DISPOSAL CONSIDERATIONS

Lead – acid batteries are completely recyclable. Return whole scrap batteries to distributor, manufacturer or lead smelter for recycling. For information on returning batteries to Victron Battery for recycling call 626-813-1234. For neutralized spills, place residue in acid-resistant containers with sorbent material, sand or earth and dispose of in accordance with local, state and federal regulations for acid and lead compounds. Contact local and/or state environmental officials regarding disposal information.

SECTION 14 – TRANSPORT INFORMATION

All Victron AGM Deep Cycle, AGM Telecommunications, GEL Deep Cycle and GEL OPzV tubular plate 2V cell batteries are valve regulated lead acid (VRLA) batteries.
Victron's VRLA batteries have passed vibration, pressure differential and free flowing acid tests under 49 CFR173.159a, meet IATA Special Provisions A48, A67, A164 & A183, and IMDG Special Provisions 238.1 & 238.2.
The batteries are securely packaged, protected from short circuits and labeled "Non-Spillable".
Victron's VRLA batteries are exempt from DOT Hazardous Material Regulations, IATA Dangerous Goods Regulations, and IMDG Code.

US DOT
Excepted from the requirements because batteries have passed the vibration and pressure differential performance tests, and ruptured case test for non-spillable designation.

IMO
Excepted from the requirements because batteries have passed the vibration and pressure differential performance tests, and ruptured case test for non-spillable designation.
And, when packaged for transport, the terminals are protected from short circuit.

IATA
Excepted from the requirements because batteries have passed the vibration and pressure differential performance tests, and ruptured case test for non-spillable designation.
And, when packaged for transport, the terminals are protected from short circuit.

SECTION 15 – REGULATORY INFORMATION

U.S. HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD:		LEAD – YES ARSENIC – YES SULFURIC ACID – YES
INGREDIENTS LISTED ON TSCA INVENTORY:	YES	
CERCLA SECTION 304 HAZARDOUS SUBSTANCES:	LEAD – YES ARSENIC – YES SULFURIC ACID – YES	RQ: N/A* RQ: 1 POUND RQ: 1000 POUNDS

* RQ: REPORTING NOT REQUIRED WHEN DIAMTER OF THE PIECES OF SOLID METAL RELEASED IS EQUAL TO OR EXCEEDS 100 µM (micrometers).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE:	SULFURIC ACID – YES
EPCRA SECTION 313 TOXIC RELEASE INVENTORY:	LEAD – CAS NO: 7439-92-1 ARSENIC – CAS NO: 7440-38-2 SULFURIC ACID – CAS NO: 7664-93-9

SECTION 16 – OTHER INFORMATION

THE INFORMATION ABOVE IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, VICTRON BATTERY MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES. ALTHOUG REASONABLE PRECAUTIONS HAVE BEEN TAKEN IN THE PREPARATION OF THE DATA CONTAINED HEREIN, IT IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION. THIS MATERIAL SAFETY DATA SHEET PROVIDES GUIDELINES FOR THE SAFE HANDLING AND USE OF THIS PRODUCT; IT DOES NOT AND CANNOT ADVICE ON ALL POSSIBLE SITUATIONS, THEREFORE, YOUR SPECIFIC USE OF THIS PRODUCT SHOULD BE EVALUATED TO DETERMINE IF ADDITIONAL PRECAUTIONS ARE REQUIRED.

Appendix C – R134a refrigerant

REf. : FF.58 /03.15/V7/ EN

R-134a

1,1,1,2 – TETRAFLUOROETHANE CF_3-CH_2F

GUARANTEED COMMERCIAL SPECIFICATIONS

STANDARD SPECIFICATIONS	LIMIT VALUE
Purity	≥ 99.5% weight
Water content	≤ 10 ppm weight
Non-condensable content (gas phase)	≤ 1,5 % volume
Chlorine ion test	Negative
High boiling residues	≤ 0.01 % volume
Acitity (HCl)	≤ 1 ppm weight

MAIN APPLICATIONS

R-134a is a hydrofluorocarbon (HFC) which can be used for domestic, commercial and industrial refrigerated applications, as well as for air conditioning, fluid cooling and heat pump applications.

R-134a is the fluid of choice of automotive and agricultural air-conditioning system manufacturers.

This fluid can also replace R-12 in existing systems by following the correct conversion procedure.

OILS

Use a polyol ester (POE).

Check with **Climalife** regarding the viscosity of the oil selected for your application and the miscibility with the fluid under consideration.

For automotive air conditioning, please refer to the constructor's advice: PAG oils are generally the recommended type.

PRECAUTIONS OF USE

Refer to the Safety Data Sheet*.

REGULATION

The use and implementation of R-134a are governed by EU Regulation n° 517/2014.

The recovery of R-134a is mandatory under EU Regulation n° 517/2014.

(Refer to regulations enforced in each country.)

Find the Safety Data Sheet (SDS) directly on our website **www.climalife.dehon.com*

R-134a PHYSICAL PROPERTIES

Molar mass	g/mol	102,03
Melting point	°C	- 103,3
Boiling point (at 1.013 bar)	°C	- 26,08
Temperature glide at 1.013 bar	K	0
Saturated liquid density at 25°C	kg/m^3	1207
Saturated vapour density at boiling point	kg/m^3	5,257
Vapour pressure at : 25°C 50°C	 bar bar	 6,654 13,18
Critical temperature Critical pressure Critical density	°C bar kg/m^3	101,06 40,59 512
Latent heat of vapourisation at boiling point	kJ/kg	217
Thermal conductivity of liquid at 25°C Thermal conductivity of vapour at 1.013 bar	W/(m.K) W/(m.K)	0,08113 0,01339
Surface tension at 25°C	10^{-3}N/m	8,08
Solubility of the fluid in water at 25°C Solubility of water in the fluid at 1.013 bar	% weight % weight	0,09 0,097
Viscosity of liquid at 25°C Viscosity of vapour at 1.013 bar	10^{-3}Pa-s 10^{-3}Pa-s	0,198 0,012
Specific heat of liquid at25°C Specific heat of vapour at 1.013 bar	kJ/(kg.K) kJ/(kg.K)	1,425 0,8512
Cp/Cv ratio at 25°C at 1.013 bar		1,119
Flammability in air		Non-flammable
Flash point	°C	None
NF-EN 378 classification		L1
Ozone Depletion Potential	(R11 = 1)	0
GWP	(CO_2 = 1)	1430

Please contact your distributor or our **Climalife** sales department for more information. In addition, if the refrigeration system you want to install, or are working on, does not appear to be a typical installation, please do not hesitate to contact us for advice and information.

The information contained in this product sheet is the result of our studies and experience. It is provided in good faith, but should not, under any circumstance, be taken to constitute a guarantee on our part or an assumption of our responsibility. This is particularly the case when third party rights are at stake or in situations where a user of one of our products fails to observe applicable regulations.

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Appendix D – Reniso Triton SE 55

Safety Data Sheet

1. MATERIAL AND SUPPLY COMPANY IDENTIFICATION

Product name: RENISO TRITON SE 55

Recommended use: Refrigeration lubricant.

Supplier:	Fuchs Lubricants (Australasia) Pty Ltd	Fuchs Lubricants (New Zealand) Pty Ltd
Street Address:	Head Office 49 McIntyre Road Sunshine VIC 3020 Australia	Harbourside Business Park 485C Rosebank Road Avondale, Auckland New Zealand
Telephone:	**+[redacted] (Australia)** **[redacted] New[redacted]**	[redacted]
[redacted] **Email:**	[redacted]	

Emergency Telephone number: **Australia 1800 638 556 (24hr)**
New Zealand 0800 154 166 (24hr)

2. HAZARDS IDENTIFICATION

Based on available information, this material is not classified as hazardous according to criteria of Safe Work Australia.

Signal Word
-

Hazard Classification
Chronic Hazard to the Aquatic Environment - Category 3

Hazard Statement
H412 Harmful to aquatic life with long lasting effects.

Prevention Precautionary Statement
P273 Avoid release to the environment.

Response Precautionary Statement
Not allocated

Storage Precautionary Statement
Not allocated

Disposal Precautionary Statement
P501 Dispose of contents/container in accordance with local, regional, national and international regulations.

Poison Schedule: Not Applicable

DANGEROUS GOOD CLASSIFICATION

Not classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

3. COMPOSITION INFORMATION

CHEMICAL ENTITY	CAS NO	PROPORTION
Mixture of synthetic base oils with additives.		
Triaryl phosphate, alkylated	68937-40-6	1-2.5 %

4. FIRST AID MEASURES

If poisoning [redacted]

Inhalation: Remove victim from exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. Seek medical advice if effects persist.

Skin Contact: If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. If swelling, redness, blistering or irritation occurs seek medical assistance.

Eye contact: If in eyes wash out immediately with water. In all cases of eye contamination it is a sensible precaution to seek medical advice.

Ingestion: Rinse mouth with water. If swallowed, do NOT induce vomiting. Give a glass of water to drink. Never give anything by the mouth to an unconscious patient. If vomiting occurs give further water. Seek medical advice.

Notes to physician: Treat symptomatically.

5. FIRE FIGHTING MEASURES

Hazchem Code: Not applicable.

Suitable extinguishing media: If material is involved in a fire use water fog (or if unavailable fine water spray), alcohol resistant foam, standard foam, dry agent (carbon dioxide, dry chemical powder).

Specific hazards: Combustible material.

Fire fighting further advice: On burning or decomposing may emit toxic fumes. Fire fighters to wear self-contained breathing apparatus and suitable protective clothing if risk of exposure to vapour or products of combustion or decomposition.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILLS
Wear protective equipment to prevent skin and eye contamination. Avoid inhalation of vapours or dust. Wipe up with absorbent (clean rag or paper towels). Collect and seal in properly labelled containers or drums for disposal.

LARGE SPILLS
Clear area of all unprotected personnel. Slippery when spilt. Avoid accidents, clean up immediately. Wear protective equipment to prevent skin and eye contamination and the inhalation of vapours. Work up wind or increase ventilation. Contain - prevent run off into drains and waterways. Use absorbent (soil, sand or other inert material). Collect and seal in properly labelled containers or drums for disposal. If contamination of crops, sewers or waterways has occurred advise local emergency services.

Dangerous Goods – Initial Emergency Response Guide No: Not applicable

7. HANDLING AND STORAGE

Handling: Avoid eye contact and repeated or prolonged skin contact. Avoid inhalation of vapour, mist or aerosols.

Storage: Store in a cool, dry, well-ventilated place and out of direct sunlight. Store away from foodstuffs. Store away from incompatible materials described in Section 10. Store away from sources of heat and/or ignition. Keep container standing upright. Keep containers closed when not in use - check regularly for leaks.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

National occupational exposure limits:

	TWA		STEL		NOTICES
	ppm	mg/m3	ppm	mg/m3	
Oil mist, refined mineral	-	5	-	-	-

As published by Safe Work Australia.

TWA - The time-weighted average airborne concentration over an eight-hour working day, for a five-day working week over an entire working life.

STEL (Short Term Exposure Limit) - the average airborne concentration over a 15 minute period which should not be exceeded at any time during a normal eight-hour workday.

These Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept too as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

If the directions for use on the product label are followed, exposure of individuals using the product should not exceed the above standard. The standard was created for workers who are routinely, potentially exposed during product manufacture.

Biological Limit Values: As per the "National Model Regulations for the Control of Workplace Hazardous Substances (Safe Work Australia)" the ingredients in this material do not have a Biological Limit Allocated.

Engineering Measures: Ensure ventilation is adequate to maintain air concentrations below Exposure Standards. Use only in well ventilated areas. Use with local exhaust ventilation or while wearing appropriate respirator.

Personal Protection Equipment: SAFETY SHOES, OVERALLS, GLOVES, SAFETY GLASSES.

Wear safety shoes, overalls, gloves, safety glasses. Available information suggests that gloves made from nitrile rubber should be suitable for intermittent contact. However, due to variations in glove construction and local conditions, the user should make a final assessment. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

Hygiene measures: Keep away from food, drink and animal feeding stuffs. When using do not eat, drink or smoke. Wash hands prior to eating, drinking or smoking. Avoid contact with clothing. Avoid eye contact and repeated or prolonged skin contact. Avoid inhalation of vapour, mist or aerosols. Ensure that eyewash stations and safety showers are close to the workstation location.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Liquid
Colour: Pale yellow

Odour:	Characteristic
Solubility in water:	Insoluble
Density:	1.0 g/cm3 @ 15°C
Relative Vapour Density (air=1):	N Av
Vapour Pressure (20 °C):	N Av
Flash Point (°C):	286
Flammability Limits (%):	N Av
Pour Point/Range (°C):	N Av
Boiling Point/Range (°C):	N Av
Freezing Point/Range (°C):	-48
pH:	N App
Viscosity:	55 mm2/s @ 40°C
Total VOC (g/Litre):	N Av

(Typical values only - consult specification sheet)
N Av = Not available, N App = Not applicable

10. STABILITY AND REACTIVITY

Chemical stability: This material is thermally stable when stored and used as directed.

Conditions to avoid: Elevated temperatures and sources of ignition.

Incompatible materials: Strong oxidizing substances. Strong acids. Strong bases.

Hazardous decomposition products: Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours.

Hazardous reactions: No known hazardous reactions.

11. TOXICOLOGICAL INFORMATION

No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label. Symptoms or effects that may arise if the product is mishandled and overexposure occurs are:

Acute Effects

Inhalation: Material may be an irritant to mucous membranes and respiratory tract.

Skin contact: Contact with skin may result in irritation.

Ingestion: Swallowing can result in nausea, vomiting and irritation of the gastrointestinal tract.

Eye contact: May be an eye irritant.

Acute toxicity

Inhalation: This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): >20 mg/L

Skin contact: This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): >2,000 mg/Kg

Ingestion: This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): >2,000 mg/Kg

Specified substance(s):
Triaryl phosphate, alkylated - LD 50 (Rat): > 5001 mg/kg

Corrosion/Irritancy: Eye: this material has been classified as not corrosive or irritating to eyes. Skin: this material has been classified as not corrosive or irritating to skin.

Sensitisation: Inhalation: this material has been classified as not a respiratory sensitiser. Skin: this material has been classified as not a skin sensitiser.

Aspiration hazard: This material has been classified as non-hazardous.

Specific target organ toxicity (single exposure): This material has been classified as non-hazardous.

Chronic Toxicity

Mutagenicity: This material has been classified as non-hazardous.

Carcinogenicity: This material has been classified as non-hazardous.

Reproductive toxicity (including via lactation): This material has been classified as non-hazardous.

Specific target organ toxicity (repeat exposure): This material has been classified as non-hazardous.

12. ECOLOGICAL INFORMATION

Avoid contaminating waterways.

Acute aquatic hazard: This material has been classified as non-hazardous. Acute toxicity estimate (based on ingredients): >100 mg/L

Long-term aquatic hazard: This material has been classified as a Category Chronic 3 Hazard. Non-rapidly or rapidly degradable substance for which there are adequate chronic toxicity data available OR in the absence of chronic toxicity data, Acute toxicity estimate (based on ingredients): 10 - 100 mg/L, where the substance is not rapidly degradable and/or BCF ≥ 500 and/or log K_{ow} ≥ 4.

Ecotoxicity: No information available.

Specified substance(s):
Acute toxicity
Fish
Triaryl phosphate, alkylated - LC 50 (Fish, 96 h): 0.8 mg/l
Aquatic Invertebrates
Triaryl phosphate, alkylated - EC 50 (Water Flea, 48 h): 0.202 mg/l

Chronic Toxicity
Fish
Triaryl phosphate, alkylated - NOEC (Fish, 90 d): 0.093 mg/l
Aquatic Invertebrates
Triaryl phosphate, alkylated - NOEC (Water Flea, 21 d): 0.0399 mg/l

Persistence and degradability: No information available.

Specified substance(s):
Biodegradation
Triaryl phosphate, alkylated - 61 % (28 d) Readily biodegradable

Bioaccumulative potential: No information available.

Mobility: No information available.

13. DISPOSAL CONSIDERATIONS

Persons conducting disposal, recycling or reclamation activities should ensure that appropriate personal protection equipment is used, see "Section 8. Exposure Controls and Personal Protection" of this SDS.

If possible material and its container should be recycled. If material or container cannot be recycled, dispose in accordance with local, regional, national and international Regulations.

14. TRANSPORT INFORMATION

ROAD AND RAIL TRANSPORT
Not classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

MARINE TRANSPORT
Not classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea.

AIR TRANSPORT
Not classified as Dangerous Goods by the criteria of the International Air Transport Association (IATA) Dangerous Goods Regulations for transport by air.

15. REGULATORY INFORMATION

This material/constituent(s) is covered by the following requirements:
- All components of this product are listed on or exempt from the Australian Inventory of Industrial Chemicals (AIIC).
- All components of this product are listed on or exempt from the New Zealand Inventory of Chemical (NZIoC).

HSNO Group Standard: HSR002605 - Lubricants (Low Hazard) Group Standard

16. OTHER INFORMATION

Reason for issue: First Issue

This information was prepared in good faith from the best information available at the time of issue. It is based on the present level of research and to this extent we believe it is accurate. However, no guarantee of accuracy is made or implied and since conditions of use are beyond our control, all information relevant to usage is offered without warranty. The manufacturer will not be held responsible for any unauthorised use of this information or for any modified or altered versions.

If you are an employer it is your duty to tell your employees, and any others that may be affected, of any hazards described in this sheet and of any precautions that should be taken.

Safety Data Sheets are updated frequently. Please ensure you have a current copy.