DMStechnologies

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Tel: 01794 525 400

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SAFETY DATA SHEET (SDS)

RED TOP 900 LITHIUM MOTORSPORT RECHARGEABLE BATTERY

1) Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier: Red Top 900 Lithium Rechargeable Battery

Trade name: **VARLEY RED TOP 900 LITHIUM MOTORSPORT BATTERY**

1.2 Relevant identified uses of the substance or mixture and uses advised against: Lithium motorsport battery for engine starting

1.3 Details of the supplier of the safety data sheet: DMS technologies,
Belbins Business Park, Cupernham Lane, Romsey, Hampshire, SO51 7JF.

1.4 Emergency telephone number: Tel: 01794 525 400

2) Hazards identification

2.1 Classification of the substance or mixture: (Physical)

The LITHIUM-ION battery is a solid, manufactured article, which is adequately sealed (to avoid exposure to hazardous ingredients) when used according to the manufacturer's recommendations. Under normal conditions of use, electrode materials and liquid electrolyte are contained, and are non-reactive provided the battery integrity is maintained and seals remain intact. Any risk of exposure is only in abuse situations, e.g., Mechanical, Thermal, Electrical, which may lead to the activation of safety vent valves, and/or the rupture of individual cell containers. Flammable electrolyte leakage (or electrode materials reaction with moisture/water), can occur in abuse situations, which could subsequently result in explosion/fire depending upon circumstances.

Electrochemical system:	Negative Electrode:	Carbon (C)	
	Positive Electrode:	Lithium Iron Phosphate ($LiFePO_4$)	
	Electrolyte:	Lithium Hexaflurorphosphate ($LiPF_6$)	
Cell Type:	Pouch	Number of Cells contained	12 Cells
Minimum Cell Capacity:	5333mAh	Minimum Battery Capacity:	16 Ah
Nominal Cell Voltage:	3.2 Volt	Nominal Battery Voltage:	12.8 Volts
Individual Cells:	17.066 Wh (Watt Hours)	Overall Battery:	204.8 Wh (Watt Hours)

2.2 Label elements: (Chemical)

Classification of dangerous substances contained in the product as per Directive

Substance				**Classification**			
CAS N°	**Chemical symbol**	**Melting point**	**Boiling point**	**Exposure limit**	**Indication of danger**	**Special risk (R)**	**Safety advice (S)**
15365-14-7	$LiFePO_4$	> 1000°C	N/A	0.1 mg/m3 OSHA		R22 R43	S2 S22 S24 S26 S36 S37 S43 S45
EC: 96-49-1 DMC: 616-38-6 DEC :105-58-8	Organic solvents (EC-DMC DEC)	EC: 38°C DMC: 4°C DEC: -43°C	EC :243°C DMC :90°C DEC :127°C	None established OSHA	Flammable	R21 R22 R41 R42/43	S2 S24 S26 S36 S37 S45
21324-40-3	$LiPF_6$	N/A (Decomposes at 160°C)	N/A	None established OSHA	Irritant Corrosive	R14 R21 R22 R41 R43	S2 S8 S22 S24 S26 S36 S37 S45

2.3 Other hazards: Hazards listed below are referenced in above table

R14/15	Reacts with water and yields flammable gases
R21	Harmful in contact with skin
R22	Harmful if swallowed
R35	Causes severe burns
R41	Risk of serious damage to the eye
R42/43	May cause sensitization by inhalation and skin contact
R43	May cause sensitization by skin contact

S2	Keep out of reach from children
S8	Keep away from moisture
S22	Do not breathe dust
S24	Avoid contact with skin
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical attention
S36	Wear suitable protective clothing
S37	Wear suitable gloves
S45	In case of incident, seek medical attention

3) Composition/information on ingredients:

3.1 Substances: Although the composition of the various cell manufacturers is proprietary, the following is typical of the chemistry.

Hazardous Components (Specific Chemical Identity; Common Name(s))	**%**	**CAS Number**	**LD50(mg/kg) (Oral-rat)**	**LC (mg/L)**
Graphite Powder	10-20 w/w	7440-44-0	440 (ivn-mouse)	N/AV
Carbon black	0-2 w/w	N/APP	N/APP	N/APP
Linear and Cyclic Carbonic Solvents (See other information)	5 -20 w/w	N/APP	≈11000 (weighted avg)	N/AV
Lithium Iron Phosphate ($LiFePO_4$)	26.5-28 w/w	15365-14-7	N/AV	N/AV
Lithium hexafluorophosphate ($LiPF_6$)	1-5 w/w	21324-40-3	1702	Rat: >20
Poly (vinylidene fluoride) (PVDF)	1 -1.5 w/w	24937-79-9	N/AV	N/AV
Steel, nickel and inert polymer	0.5 -4w/w	N/APP	N/APP	N/APP
Aluminium foil	2-7.5 w/w	7429-90-5	N/AV	A/AV
Copper foil	4 -12 w/w	7440-50-8	3.5(ipr-mouse)	N/AV

3.2 Mixtures: These chemicals and metals are contained in a sealed can forming individual cells.
The cells are further contained within a V0 flame retardant ABS plastic enclosure with brass terminals.

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4) First aid measures:

4.1 Description of first aid measures:	In case of battery rupture or explosion, evacuate personnel from contaminated area and provide maximum ventilation to clear out corrosive fumes/gases and pungent odours. In all cases, seek immediate medical attention.	
4.2 Most important symptoms and effects, both acute and delayed:	**Eye contact:**	Flush with plenty of water (eyelids-held open) for at least 15 minutes.
	Skin contact:	Remove all contaminated clothing and flush affected areas with plenty of water and soap for at least 15 minutes.
	Ingestion:	Dilute by giving plenty of water and get immediate medical attention. Assure that the victim does not aspirate vomited material by use of positional drainage. Assure that mucus does not obstruct the airway. Do not give anything by mouth to an unconscious person.
	Inhalation:	Remove to fresh air and ventilate the contaminated area. Give oxygen or artificial respiration if needed.
4.3 Indication of any immediate medical attention and special treatment needed:	Seek medical attention if exposed to chemical spillage.	

5) Firefighting measures:

Fire and explosion hazard	The batteries can leak and/or spout vaporized or decomposed and combustible electrolyte fumes in case of exposure above 90°C resulting from inappropriate use or from the environment. Possible formation of hydrogen fluoride (HF) and phosphorous oxides during fire. $LiPF_6$ salt contained in the electrolyte releases hydrogen fluoride (HF) in contact with water.	
5.1 Extinguishing media:	Suitable: Class B/C extinguishers: (CO2, Dry chemical or Foam) Do NOT use: Class D extinguishers: (e.g., Graphite, Copper, Sodium Chloride, etc)	
5.2 Special hazards arising from the substance or mixture:	Following cell overheating due to external source or due to improper use, electrolyte leakage or battery container rupture may occur and release inner component/material into the environment.	
	Eye contact:	The electrolyte solution contained in the battery is an irritant to eyes & ocular tissues.
	Skin contact:	The electrolyte solution contained in the battery causes skin irritation.
	Ingestion:	The ingestion of electrolyte solution causes tissue damage to throat and gastro/respiratory tract.
	Inhalation:	Contents of a leaking or ruptured battery can cause respiratory tract, mucus membrane irritation and edema.
5.3 Advice for firefighters:	Use self-contained breathing apparatus (SCBA) to avoid breathing irritant fumes. Wear protective clothing and equipment to prevent body contact with electrolyte solution.	

6) Accidental release measures:

6.1 Personal precautions, protective equipment & emergency procedures:	Restrict access to area until completion of clean-up. Do not touch the spilled material. Wear adequate personal protective equipment as indicated in Section 8.
6.2 Environmental precautions:	Prevent material from contaminating soil and from entering sewers or waterways.
6.3a Methods and material for containment:	Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth. Clean up spills immediately.
6.3b Methods and material for cleaning up:	Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container. Collect all contaminated absorbent and dispose of according to directions in Section 13. Scrub the area with detergent and water; collect all contaminated wash water for proper disposal.
6.4 Reference to other sections:	None

7) Handling and storage:

The batteries should not be opened, destroyed nor incinerated, since they may leak or rupture and release their contents into the environment.

7.1 Precautions for safe handing:	Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e., metal) goods. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types or mix with other hazardous materials. Do not mix new and used batteries. Keep batteries in non-conductive (i.e., plastic) trays.
7.2 Conditions for safe storage, including any incompatibilities:	Store in a cool (preferably below 30°C) and ventilated area away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 90°C may result in battery leakage and rupture. Ensure batteries cannot become short circuited during storage, to avoid causing fire, leakage or rupture hazards. Keeping batteries in original packaging is recommended.
7.3 Specific end use(s):	Observe Manufacturer's recommendations regarding maximum currents and operating temperature range. Do not apply pressure which could deform the battery case, as this may lead to disassembly followed by eye, skin and throat irritation.

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8) Exposure controls/personal protection:

8.1 Control parameters:	8.2 Exposure control:
Respiratory protection:	Not necessary under normal use. In case of battery rupture, use self-contained full-face respiratory equipment, with type ABEK filter.
Hand protection:	Not necessary under normal use. Use rubber gloves if handling a leaking or ruptured battery.
Eye protection:	Not necessary under normal use. Wear safety goggles or glasses with side shields if handling a leaking or ruptured battery.
Skin protection:	Not necessary under normal use. Use rubber apron and protective working in case of handling of a ruptured battery.

9) Physical and chemical properties:

9.1 Information on basic physical and chemical properties: (Physical shape and colour as supplied)	$LiFePO_4$ is a black odourless power; Graphite is a black odourless power; Organic solvent is a colourless liquid; Lithium salt is a white, crystalline, and odourless power.
9.2 Other information:	**Specific gravity** (H_2O=1) $LiFePO_4$: 3.63 Graphite: 2.0-2.2 **Melting point** $LiFePO_4$: > 1000°C Graphite: 3500-3900°C

10) Stability and reactivity:

10.1 Reactivity	If inner cell case is damaged, both $LiFePO_4$ and $LiPF_6$ are highly reactive with water.
10.2 Chemical stability	$LiFePO_4$ cells & batteries are relatively stable when not abused.
10.3 Possibility of hazardous reactions	$LiFePO_4$ cells have additional mechanical protection from the battery case.
10.4 Conditions to avoid	Heat above 90°C or incinerate. Deform, mutilate, crush, pierce, disassemble. Short circuit. Prolonged exposure to humid conditions.
10.5 Incompatible Materials	Do not submerge in water.
10.6 Hazardous decomposition products	Corrosive/Irritant Hydrogen fluoride (HF) is produced in case of reaction of lithium ($LiPF_6$) with water. Combustible vapours and formation of Hydrogen fluoride (HF) and phosphorous oxides during fire.

11) Toxicological information:

11.1 Information on toxicological effects:	The LITHIUM-ION batteries do not contain toxic materials.

12) Ecological information:

12.1 Toxicity:	When properly used or disposed of, the LITHIUM-ION batteries do not present environmental hazards.
12.2 Persistence and degradability:	N/A
12.3 Bio accumulative potential:	N/A
12.4 Mobility in soil	N/A
12.5 Results of PBT and vPvB assessment:	N/A
12.6 Other adverse effects	None

13) Disposal considerations:

- Do NOT mix used batteries with general rubbish.
- Do NOT dump batteries into any sewers, on the ground, or into any body of water.
- Lithium-Ion batteries should have their terminals insulated & preferably wrapped in plastic bags prior to disposal.
- Battery recycling is encouraged. In Europe waste batteries must be disposed of in accordance with relevant EC Directives and national, regional and local environmental control regulations. End-users are invited to dispose them properly, eventually through not-for-profit organizations, mandated by local governments or organized on a voluntary basis by professionals.

13.1 Waste treatment methods:

Recycling:	Send to authorized recycling facilities, eventually through licensed waste carrier.				
Incineration:	Incineration should never be performed by battery users but eventually by trained professionals in authorized facilities with proper gas and fumes treatment.				
Land filling:	Leach ability regulations (mg/l)				
	Component	Leach ability	EC limit	EPA	Other*
	Iron	100			5
	Nickel	500	2		0.5

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14) Transport information:

Under the "United Nations Recommendations on the Transport of Dangerous Goods" these Lithium-ion batteries are classified for international shipment as:

	When packed alone:	When packaged with associated battery charger, or other associated equipment
14.1 UN number:	UN3480	UN3481
14.2 UN proper shipping name:	LITHIUM-ION BATTERIES	LITHIUM-ION BATTERIES PACKED WITH EQUIPMENT or LITHIUM-ION BATTERIES CONTAINED IN EQUIPMENT
14.3 Transport hazard class(es):	"Class 9" Dangerous Goods	"Class 9" Dangerous Goods
14.4 Packing group:	Packing Group II, Tunnel Code E"	Packing Group II, Tunnel Code E"
14.5 Environmental hazards:	Marine pollutant: None	
14.6 Special precautions for user:	Handle with care. Avoid short circuits. Do not immerse in water.	
14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:	These products have not been specifically assessed for the transportation in bulk.	

15) Regulatory information:

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

Each Lithium-ion battery contains cells, which individually are less than 20Wh.
The battery in total provides a Watt-hour rating of more than 100Wh.

These Lithium-ion battery assemblies have passed all applicable tests as defined in the "UN Manual of Tests and Criteria, Part III, sub-section 38.3.
Therefore, comply with appropriate transportation and shipping regulations as prescribed by industry/legal standards.

Packaging for these Lithium-ion batteries (as supplied in manufacturers packaging) has been successfully evaluated and assessed in accordance with ADR/IMDG packing instructions P903, to be sufficiently strong and protect the product from short-circuit.

Road transportation: refer to the European Directives (or other) "International Carriage of Dangerous Goods by Road (ADR)", (ADR is from 'Accord Europeen Relatif au Transport International des Marchandises Dangereuses par Route').

Rail transportation: refer to the European Directives (or other) "International Carriage of Dangerous Goods by Rail (RID)" (RID is from 'Reglement Concernant le Transport International Ferroviaire des Marchandises Dangereuses').

Sea transportation: refer to the "International Maritime Organisation (IMO) Dangerous Goods Transportation".

Air transportation: refer to the "International Air Transport Association (IATA) Dangerous Goods Transportation".

Packaging must also conform as stipulated in Packing Instruction 965 /966 of the IATA DGR (and Special Provisions 188 under the ARD/IMDG code as appropriate).

Other regulative organisations and bodies also cited and considered:

- The International Civil Aviation Organisation (ICAO) Technical Instructions.
- The International Maritime Dangerous Goods (IMDG) Code.
- The US Hazardous Materials Regulation (HMR) pursuant to a final rule issued by RSPA
- The Office of Hazardous Materials Safety within the US Department of Transportations' (DOT)
- Research and Special Programs Administration (RSPA).

15.2 Chemical safety assessment:

A chemical safety assessment has not been conducted by DMS technologies. The component cell manufacturer has completed their evaluations.

16) Other information:

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either expressed or implied) or guaranty is made to the accuracy, reliability or completeness of the information contained herein.

This information relates to the specific materials designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy themself as to the suitability and completeness of this information for their particular use.

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Additional information is available by calling the telephone number above.