



Green Energy Limited
MATERIAL SAFETY DATA SHEET
LiFePO₄ - Lithium Iron Phosphate Batteries

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name	GREEN MARINE LITHIUM BATTERIES [LIFEPO₄]
Part Number	GML12100CRANK;GML12105AH;GML12200CRANK;GML12165CRANK;GML12120AH;GML12200AH;GML1280AH;GML24105AH;GML24120AH;GMLBCDC24-20;GML2450AH;GML2480AH; GML36105AH; GML36120AH;GML3650AH;GML3680AH;GML48V105ah;GML48V50AH;GML48V80AH;GML1250AH
Synonyms	12V1000CCA 100AH MARINE LITHIUM STARTER CRANKING BATTERY; 12V100AH LITHIUM DEEP CYCLE BATTERY; 12V1200CCA-1600CC 200AH LITHIUM STARTER CRANKING BATTERY; 12V1200CCA-1600CCA 165AH SLIM LINE LITHIUM STARTER CRANKING BATTERY; 12V120AH LITHIUM DEEP CYCLE BATTERY; 12V200AH LITHIUM DEEP CYCLE BATTERY; 12V80AH LITHIUM DEEP CYCLE BATTERY; 24V105AH LITHIUM DEEP CYCLE BATTERY; 24V120AH LITHIUM DEEP CYCLE BATTERY; 24V50AH LITHIUM DEEP CYCLE BATTERY; 24V80AH LITHIUM DEEP CYCLE BATTERY; 36V105AH LITHIUM DEEP CYCLE BATTERY; 36V120AH LITHIUM DEEP CYCLE BATTERY; 36V50AH LITHIUM DEEP CYCLE BATTERY; 36V80AH LITHIUM DEEP CYCLE BATTERY; 48V105AH LITHIUM DEEP CYCLE BATTERY; 48V50AH LITHIUM DEEP CYCLE BATTERY 48V80AH LITHIUM DEEP CYCLE BATTERY; 12V50AH LITHIUM DEEP CYCLE BATTERY

1.2 Uses and uses advised against

Uses BATTERIES

1.3 Details of the supplier of the product

Supplier name	Green Energy Limited
Address	Suite 10990 Level 1, 6 Johnsonville Road Johnsonville Wellington 6037 New Zealand 1300
Email	info@greenmarinelithium.com
Website	www.greenmarinelithium.com

1.4 Emergency telephone numbers

Poisons Information Centre: 13 1126 from anywhere in Australia, (0800 764 766 in New Zealand)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Product is stable under handling and storage conditions described in Section 7. Not classified as an irritant unless the battery ruptures. Contact with contents may cause irritation; eye, skin, respiratory. Ingestion is considered unlikely due to product form.

2.2 GHS Label elements

No signal word, pictograms, hazard or precautionary statements have been allocated.

2.3 Other hazards

For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. This product is a Lithium Iron Phosphate Battery with certified compliance under the UN Manual of Tests and Criteria, Part III, sub-section 38.3. The information below is for repeated and prolonged contact in an occupational setting. It is not likely to apply to normal product use. Risk of fire, explosion, or burns if battery is misused. Do not short circuit the (+) and (-) terminals with any other metals. Do not disassemble or modify the battery. Do not solder a battery directly. Keep away from fire or open flame.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

Ingredient	CAS Number	EC Number	Content
LITHIUM IRON PHOSPHATE	15365-14-7	-	36 to 49%
COPPER	7440-50-8	231-159-6	12 to 13%

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ALUMINIUM	7429-90-5	231-072-3	6 to 8.5%
POLYPROPYLENE	9003-07-0	-	5%
GRAPHITE	7782-42-5	231-955-3	20 to 24%
LITHIUM HEXAFLUOROPHOSPHATE(1-)	21324-40-3	244-334-7	3 to 21.5%
POLYETHYLENE WAX	9002-88-4	-	2%

Ingredient Notes The materials contained in this product may only represent a hazard if the integrity of the cell or battery is compromised; physically or electrically abused. Non-hazardous product make up the remainder of ingredients.

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye Exposure is considered unlikely unless casing is damaged. Flush gently with running water. Seek medical attention if irritation develops.

Inhalation Exposure is considered unlikely. Due to product form / nature of use, an inhalation hazard is not anticipated.

Skin Exposure is considered unlikely unless casing is damaged. Gently flush affected areas with water. Seek medical attention if irritation develops.

Ingestion For advice, contact a Poisons Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting. Ingestion is considered unlikely due to product form.

First aid facilities Eye wash facilities should be available.

4.2 Most important symptoms and effects, both acute and delayed

Adverse effects not expected from this product. Exposure to battery contents may cause irritation and potential burns.

4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media

Extinguishing media: dry chemical, CO₂, water spray or regular foam. Large Fires - Water spray fog or regular foam. Wear liquid-tight chemical protective clothing and breathing apparatus. Contain spill and run-off.

5.2 Special hazards arising from the substance or mixture

Contents react with water. May explode if exposed to high temperatures due to pressure build up in battery casing. Lithium may burn in a fire situation and may be ejected from the battery. Damaged cells may evolve toxic and flammable vapours.

5.3 Advice for firefighters

Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS.

6.2 Environmental precautions

Prevent product from entering drains and waterways.

6.3 Methods of cleaning up

If spill, collect and reuse where possible. If battery is broken or damaged, absorb liquid with sand or similar. Contain spillage, then collect and place in suitable containers for disposal. CAUTION: Avoid exposure to contents.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Before use carefully read the product label. Take measures to prevent exposure to electrostatic discharge. Keep away from naked flames. CHARGING/DISCHARGING: Cells and batteries are designed to be rechargeable. However, abnormal charging may cause batteries to flame, and abnormal discharging may result in damaging batteries. Use approved chargers and procedure only. BATTERY DISASSEMBLE: Do not disassemble a battery in any case. If a battery was unintentionally crushed or damaged, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of vapors that may be omitted. BATTERY SHORT CIRCUIT: The battery is an energy source that converts electric power into the chemical form of energy. Therefore, short circuiting the battery may cause the chemical reaction to occur too intensively and provide an ignition source. MIXED BATTERIES AND TYPES: Do not assemble batteries with series or parallel connection. The use of old and new cells of varying capacity or different electrochemical battery systems should be avoided.

7.2 Conditions for safe storage, including any incompatibilities

Store tightly sealed in a cool, dry, well ventilated area, removed from water, incompatible substances, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Fix positive and negative terminals properly to avoid short circuit. Elevated temperatures can result in reduced battery service life.

7.3 Specific end uses

No information provided.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

Ingredient	Reference	TWA		STEL	
		ppm	mg/m ³	ppm	mg/m ³
Aluminium & compounds	SWA [Proposed]	--	1	--	--
Aluminium (metal dust)	SWA [AUS]	--	10	--	--
Copper (fume)	SWA [AUS]	--	0.2	--	--
Copper (fume, dusts & mists)	SWA [Proposed]	--	0.01	--	--
Copper, dusts & mists (as Cu)	SWA [AUS]	--	1	--	--
Fluorides (as F)	SWA [AUS]	--	2.5	--	--
Graphite (all forms except fibres)	SWA [AUS]	--	3	--	--
Hydrogen fluoride (as F)	SWA [AUS]	3 (Peak)	2.6 (Peak)	--	--
Iron oxide fume (Fe ₂ O ₃) (as Fe)	SWA [AUS]	--	5	--	--
Iron salts, soluble, as Fe	SWA [AUS]	--	1	--	--

Biological limits

No biological limit values have been entered for this product.

8.2 Exposure controls

Engineering controls No special precautions are normally required when handling this product.

PPE

Eye / Face	Not required under normal conditions of use.
Hands	Wear PVC or rubber gloves.
Body	Not required under normal conditions of use.
Respiratory	Not required under normal conditions of use.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	NOT AVAILABLE
Odour	ODOURLESS
Flammability	NON FLAMMABLE
Flash point	NOT RELEVANT NOT
Boiling point	AVAILABLE NOT
Melting point	AVAILABLE

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9.1 Information on basic physical and chemical properties

Evaporation rate	NOT AVAILABLE
pH	NOT AVAILABLE
Vapour density	NOT AVAILABLE
Relative density	NOT AVAILABLE
Solubility (water)	INSOLUBLE
Vapour pressure	NOT AVAILABLE
Upper explosion limit	NOT RELEVANT
Lower explosion limit	NOT RELEVANT
Partition coefficient	NOT AVAILABLE
Autoignition temperature	NOT AVAILABLE
Decomposition temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Explosive properties	NOT AVAILABLE
Oxidising properties	NOT AVAILABLE
Odour threshold	NOT AVAILABLE

10. STABILITY AND REACTIVITY

10.1 Reactivity

Carefully review all information provided in sections 10.2 to 10.6.

10.2 Chemical stability

Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions

Polymerization will not occur.

10.4 Conditions to avoid

Heat above 70°C or incinerate. Deform. Mutilate. Crush. Pierce. Disassemble. Recharge. Short circuit. Expose over a long period to humid conditions.

10.5 Incompatible materials

Battery contents could be incompatible with water (evolving flammable gas), oxidising agents (e.g. hypochlorites), acids (e.g. nitric acid), alkalis (e.g. sodium hydroxide), heat and ignition sources.

10.6 Hazardous decomposition products

May evolve toxic gases if heated to decomposition.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity No specific acute toxicity data exists for this product. Batteries consist of a hermetically sealed metallic container containing a number of chemicals and materials of construction that may be hazardous upon release. Over exposure considered unlikely unless battery ruptures and contact with contents occurs. Contents may be harmful.

Information available for the ingredients:

Ingredient	Oral LD50	Dermal LD50	Inhalation LC50
COPPER	--	> 2000 mg/kg (rat)	--
LITHIUM HEXAFLUOROPHOSPHATE(1-)	> 50 - 300 mg/kg (rat)	--	--

Skin Not classified as a skin irritant unless the battery ruptures. Contact with contents may cause irritation, redness, dermatitis and possible burns with prolonged contact.

Eye Not classified as an eye irritant unless the battery ruptures. Contact with contents may cause irritation, redness and possible burns with prolonged contact.

Sensitisation Not classified as causing skin or respiratory sensitisation.

Mutagenicity No evidence of mutagenic effects.

Carcinogenicity No evidence of carcinogenic effects.

Reproductive No relevant or reliable studies were identified.

STOT - single Not classified as causing organ damage from single exposure. Due to the product form and nature of use,

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exposure	exposure to internal contents is not anticipated unless the battery ruptures. Exposure to contents may cause respiratory irritation.
STOT - repeated exposure	Not expected to cause organ effects from repeated exposure. Due to the product form and nature of use, exposure to internal contents is not anticipated unless the battery ruptures.
Aspiration	Not relevant.

12. ECOLOGICAL INFORMATION**12.1 Toxicity**

This product may be hazardous to the environment if not properly used or disposed of. Do not let internal components enter the marine environment. Avoid release to waterways, wastewater or ground water.

12.2 Persistence and degradability

This product is not readily biodegradable.

12.3 Bioaccumulative potential

Limited information was available at the time of this review.

12.4 Mobility in soil

This product has low mobility in soil.

12.5 Other adverse effects

No information provided.

13. DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods**

Waste disposal	Reuse or recycle where possible. Return to manufacturer/supplier. Contact your state EPA or the manufacturer for additional information.
Legislation	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE



	LAND TRANSPORT (ADG)	SEA TRANSPORT (IMDG / IMO)	AIR TRANSPORT (IATA / ICAO)
14.1 UN Number	3480	3480	3480
14.2 Proper Shipping Name	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	LITHIUM ION BATTERIES (including lithium ion polymer batteries)
14.3 Transport hazard class	9A	9A	9A
14.4 Packing Group	None allocated.	None allocated.	None allocated.

14.5 Environmental hazards

Not a Marine Pollutant.

14.6 Special precautions for user

EmS	F-A, S-I
Other information	Batteries are designed in compliance with the UN Recommendations on the Transport of Dangerous Goods; IATA Dangerous Goods Regulations and the International Maritime Dangerous Goods Code. This battery has passed the UN Manual of Tests and Criteria Part III Subsection 38.3. Batteries packed in or with equipment may be transported under UN 3480-3481.

15. REGULATORY INFORMATION

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

Poison schedule	A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).
Classifications	Safework Australia criteria is based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals.
Inventory listings	AUSTRALIA: AIIC (Australian Inventory of Industrial Chemicals) All components are listed on AIIC, or are exempt.

16. OTHER INFORMATION

Additional information EXPOSURE STANDARDS - TIME WEIGHTED AVERAGES: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: Strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

WORKPLACE CONTROLS AND PRACTICES: Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:

The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as form of product, method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:

It should be noted that the effects from exposure to this product will depend on several factors including: form of product; frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations	ACGIH	American Conference of Governmental Industrial Hygienists
	CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
	CNS	Central Nervous System
	EC No.	EC No - European Community Number
	EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
	GHS	Globally Harmonized System
	GTEPG	Group Text Emergency Procedure Guide
	IARC	International Agency for Research on Cancer
	LC50	Lethal Concentration, 50% / Median Lethal Concentration
	LD50	Lethal Dose, 50% / Median Lethal Dose
	mg/m ³	Milligrams per Cubic Metre
	OEL	Occupational Exposure Limit
	pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
	ppm	Parts Per Million
	STEL	Short-Term Exposure Limit
	STOT-RE	Specific target organ toxicity (repeated exposure)
	STOT-SE	Specific target organ toxicity (single exposure)
	SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
	SWA	Safe Work Australia
	TLV	Threshold Limit Value
	TWA	Time Weighted Average

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Report status Classification of the preparation and its individual components has drawn on official and authoritative sources using available literature references. The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Revision status Version 0.4 20/05/2024

[End of SDS]