VOLTUS BATTERY CORPORATION
352 PARK STREET, SUITE 102W
NORTH READING MA 01864
617-800-0807

Material Safety Data Sheet

Date of Issue: 1-Jan-2013

1. Product and Company Identification

[Product]

1.1 Product Name: Rechargeable Lithium-ion Battery

1.2 System: Rechargeable Lithium-ion Battery

[Company]

1.3 Company Name: VOLTUS BATTERY CORPORATION

1.4 Company Address: 352 PARK STREET, SUITE 102W, NORTH READING MA 01864

1.5 Emergency Telephone Number: 6 1 7 - 8 0 0 - 0 8 0 7

2. Composition Information on Components

Components	Approximate Percent of Total Weight	CAS Number	EINECS#
Aluminum	2-10%	7429-90-5	231-072-3
Aluminum (Various Forms)	5-15%	7429-90-5	231-072-3
Carbon (Various Forms)	10-30%	7440-44-0	231-153-3
Copper	5-15%	7440-50-8	231-159-6
Lithium Cobalt Oxide	20- 40%	12190-79-3	235-362-0
Lithium Salts	1-5%	21324-40-3	244-334-7
Nickel	0.5-5%	7440-02-0	231-111-4
Organic Carbonate	10-25%	102-09-0	203-005-8
Polymer	3-10%	9002-88-4	/

The materials contained in the battery may only become a hazard if the battery or cell is disintegrated or if the battery is physically or electrically abused.

3. Physical and Chemical Properties

3.1 Physical :

The Lithium Polymer Rechargeable Battery described in this Material Safety Data Sheet is sealed units which are not hazardous when used according to the recommendations of the manufacturer. Under normal conditions of use, the solid electrode materials and Gel electrolyte they contain are non-reactive provided the battery integrity is maintained and seals remain intact.

3.2 Chemical :

Classification of dangerous substances contained into the product as per directive 67/548/EEC

Substance		**Melting point**	**Boiling point**	**Classification**			
CAS Number	Chemical symbol			Exposure limit	Indication of danger	Special risk (1)	Safety advices (2)
12190-79-3	LiCoO2	>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
21321-40-3	LiPF6	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

1 – Nature of special risks:

R 14 Reacts with water.

R 21 Harmful in contact with skin.

R 22 Harmful if swallowed.

R 41 Risk of serious damage to the eye.

R 42/43 May cause sensitization by inhalation and skin contact.

R 43 May cause sensitization by skin contact.

2 – Safety advices:

S 2 Keep out of reach from children.

S 8 Keep away from moisture.

S 22 Do not breathe dust.

S 24 Avoid contact with skin.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical attention.

S 36 Wear suitable protective clothing.

S 37 Wear suitable gloves.

S 45 In case of incident seek medical attention.

R 42/43 May cause sensitization by inhalation and skin contact.

R 43 May cause sensitization by skin contact.

4. Emergency and First Aid Measures

In case of contacting the materials from a damaged / ruptured cell or battery:

Eye contact: Rinse eyes with water at least 15 minutes and seek medical attention.

Skin Contact: Wash area thoroughly with soap and water and seek medical attention.

Inhalation of Vented Gas: Leave area immediately and seek medical attention.

Ingestion: Seek medical attention immediately.

5. Fire and Explosion Measures

General Hazard

Battery or cell is not flammable but internal organic material will burn if the battery or cell is incinerated. Combustion product included, but not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

Extinguishing Media:

Use extinguishing media suitable for the materials that are burning.

Fire-Fighting Procedures:

Use self-contained breathing apparatus and protective clothing.

Unusual Fire and Explosion Hazards:

Toxic gases (HF, PF_6) will be formed if cells or battery are involved in a fire. Cells or battery may flame or leak potentially hazardous organic vapors if exposed to excessive heat, fire or over-voltage conditions. Damaged or opened cells or batteries may result in rapid heat and the release of flammable vapors.

6. Accidental Release Measures

The material contained within the batteries would only be expelled under abusive conditions. Using shovel or broom, cover battery or spilled substances with dry sand or vermiculite, place in approved container (after cooling if necessary) and dispose in accordance with local regulations.

7. Storage and Handling / Use

7.1 Do not store batteries in a manner that allows terminals to short circuit.

7.2 Do not place batteries near heating sources, nor exposed to direct sunlight for long periods. Elevated temperatures can result in reduced battery service life.

7.3 Charging Battery

Use only approved chargers and procedures. Improperly charging a cell or battery may cause the cell or battery to flame or damage.

7.4 Battery Disassembly

Never disassemble a battery.

Should a battery unintentionally be crushed, thus releasing its contents, rubber gloves must be used to handle all battery components. Avoid inhalation of any vapors that may be emitted.

7.5 Battery Short Circuit

Do not short-circuit a battery. A short circuit can result in over-heating of the terminals and provide an ignition source.

More than a momentary short circuit will generally reduce the cell or battery service life and can lead to ignition of surrounding materials or materials within the cell or battery if the seal integrity is damaged.

Extended short-circuiting creates high temperature in the cell and at the terminals. Physical contact to

high temperatures can cause skin burns. In addition, extended short-circuit may cause the cell or battery to flame.

Avoid reversing cell polarity within a battery assembly. Reversing cell polarity may cause the cell or battery to flame or to emit gases.

7.6 Mixed Batteries and Types

Avoid using old and new cells or cells of different sizes; different chemistry or types in the same battery assembly.

8. Exposure Controls / Personal Protection

Respiratory Protection:

N*ot necessary under normal use.* In case of battery rupture, use self-contained full-face respiratory equipment.

Hand Protection:

Not necessary under normal use. Use Viton 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 in case of handling of a ruptured battery.

9. Cell Properties

9.1 Appearance: (Physical shape and color as supplied) Metal squares, hermetically sealed and fitted with an external plastic box.

9.2 Temperature Range:

Discharge: -20- + 60°C

Charging: -0- +45°C

Storage: -20- + 45°C (for less than 1 month); -20- + 35°C (for less than 6 month)

9.3 Specific Energy: ≈ 135 Wh/kg

9.4 Specific Pulse Power: ≈ 300 Wh/kg

9.5 Mechanical Resistance: As defined in relevant IEC standard

10. Stability and Reactivity

Conditions to Avoid: Heat above 70°C or incinerate. Deform, mutilate, crush, pierced, disassembled, short circuit and prolonged exposure to humid conditions.

Materials to Avoid : N/A.

Hazardous Decomposition Products: Corrosive/Irritant Hydrogen fluoride (HF) is produced in case of reaction of *lithium hexafluorophosphate (LiPF6)* with water. Combustible vapors and formation of Hydrogen fluoride (HF) and phosphorous oxides during fire.

11. Toxological Information

VOLTUS BATTERY Lithium Polymer Rechargeable Battery does not contain

toxic materials.

12. Ecological Information

When properly used or disposed VOLTUS BATTERY Lithium Polymer Rechargeable batteries do not present environmental hazard.

13. Disposal Procedures

VOLTUS BATTERY lithium polymer rechargeable battery contains no toxic metals, only naturally occurring trace elements. It is advisable to consult with local authorities as disposal regulations may vary dependent on location.

14. Transportation Information

The rechargeable lithium ion battery pack or cells are make in compliance to the requirement stated in the latest edition of the IATA Dangerous Goods Regulations Packing Instruction 965 section I or II (shown table):

Packing Instruction	**965 Section I**		**965 Section II**		
	IA	**IB**			
Standard	Cell: >20Wh Battery : >100Wh	Cell: ≤ 20Wh Battery : ≤ 100Wh	Cell/Battery ≤2.7Wh	2.7Wh<Cell <20Wh	2.7Wh<Battery <100Wh
Packages Requirement	Class 9 label Consignments require DGD UN Specification Package Required: PAX limit: 5kg G/package CAO limit: 35Kg G/package	Class 9 label Lithium battery label Required: 10kg G/package	Lithium battery label Required: 2.5kg G/package	Lithium battery label Required: 8pcs/package	Lithium battery label Required: 2set/package

If Cell: ≤ 20Wh / cell or Battery / pack: ≤ 100Wh， The batteries are also considered to be non-dangerous by the INTERNATIONAL MARITIME DANGEROURS GOODS regulation (IMDG) code. The battery is secured effectively to prevent short circuit and movement leading to short circuit. The battery is also over packed with strong packaging materials.

If Cell: >20Wh / cell or Battery / pack: >100Wh，The batteries are considered to be dangerous by the INTERNATIONAL MARITIME DANGEROURS GOODS regulation (IMDG) .The batteries shall meet the requirement of "Recommendations on the Transport of Dangerous Good - Manual of Tests and Criteria, Part III, sub-section 38.3. Batteries shall be shipped as class 9 hazardous materials.

However, if those lithium ion battery or cells are pack with or contained in an equipment, then it is the responsibility of the shipper to ensure that the consignment are packed in compliance to the latest edition of the IATA Dangerous Goods Regulations section I or II of either Packing Instruction 966 or 967 in order for that consignment to be declared as “NOT RESTRICTED” (non-hazardous / non-dangerous) or

"DANGEROUS GOODS".

15. Regulation Information

With regards to transport, the following regulations are cited and considered:

15.1 The International Civil Aviation Organization (ICAO) Technical Instructions (2011-2012 Edition),

15.2 The International Air Transport Association (IATA) Dangerous Goods Regulations (54th Edition, 2013)

15.3 The International Maritime Dangerous Goods (IMDG) Code (35-10 Edition),

15.4 US Hazardous Materials Regulations 49 CFR (Code of Federal Regulations) Sections 173 -185 Lithium batteries and cells,

15.5 The UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria 38.3 lithium batteries, 4th revised edition (UN3480).

16. Other Information

For further information, please contact our sales representative.