Material/Product Safety Data Sheet
(MSDS-PSDS)

VL 25500-125 products **Revision 2** **Date 02/2009**	**Lithium-Ion single cells and multi-cell battery pack for high temperature applications**

1. Identification of the Substance or Preparation and Company		
Product	**Rechargeable lithium-ion single cells and multi-cell battery packs for high temperature applications**	
Production sites	Saft America Inc. 313 Crescent Street Valdese North Carolina 28690 USA Tel. No. +1 (828) 874 4111 Fax No. +1 (828) 874 2431	Saft Rue Georges Leclanché BP 1039 86060 Poitiers cedex 9 FRANCE +33 (0)5 49 55 48 48 +33 (0)5 49 55 48 50
www.saftbatteries.com (section "Contact")		
Emergency contacts	+1 (703) 527 3887 (CHEMTREC U.S. Service Center) within the USA : 800 424 9300	

2. Composition and Information on Ingredients

Each cell consists of a hermetically sealed metallic container containing a number of chemicals and materials of construction of which the following could potentially be hazardous upon release.

There is no potential for exposure to these ingredients unless the cell leaks, or opens, following high temperature, mechanical or electrical abuse.

Ingredient	**Content*** (wt. %)	**CAS #**	**ACGIH (TLV)**	**OSHA (PEL)**
Lithium metal	0 *(in spite of their name, these batteries do not contain lithium metal)*			
$LiCoO_2$ $LiNiO_2$ $LiMn0_2$ *(Lithium NMC oxide)*	20-30 %	12190-79-3 12031-65-1 12162-79-7	0.02 mg/m^3 8 hours 0.2 mg/m^3 8 hours 0.02 mg/m^3 8 hours as dust and fumes	5 mg/m^3 as dust and fumes
Organic solvents	10-20 % EA (*Ethyl Acetate*) PC *(Propylene Carbonate)*	96-49-1 108-32-7	None established	None established
$LiPF_6$ *(Lithium Hexafluoro phosphate)*	0 – 5 %	21324-40-3	None established	None established
PVDF	0 – 5 %	24937-79-9	None established	None established

Copper *(Cu)*	5 – 10 %	7440-50-8	0.2 mg/m^3 as fume 1.0 mg/m^3 as dust and mist	0.1 mg/m^3 as fume 1.0 mg/m^3 as dust and mist
Aluminium *(Al)*	5 – 10 %	7429-50-5	10.0 mg/m^3, as dust	2.0 mg/m^3, as soluble salt
Graphite and Carbon	15 - 20 %	7782-42-5 1333-86-4	3.5 mg/m^3, TWA for carbon	2.0 mg/m^3, as dust
Steel, Nickel, and inert components	Balance		Balance	

* Quantities may vary a little with cell model
ACGIH : American Council of Governmental Industrial Hygienists
TLV : Threshold Limit Value is personal exposure limit, determined y ACGIH.

3. Hazards Identification

The rechargeable lithium-ion batteries described in this Product Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer and as long as their integrity is maintained.

Do not short circuit, puncture, incinerate, crush, immerse in water, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion.

Under normal conditions of use, the active materials and liquid electrolyte contained in the cells and batteries are not exposed to the outside, provided the battery integrity is maintained and seals remain intact. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.

4. First Aid Measures (in case of leaking or accidentally opened cells)

In case of accumulator breakage or burst, please evacuate employees from the contaminated area and ensure maximal ventilation in order to break-up corrosive gas, smoke and unpleasant odors.

If it occurs, by accident, following measures must be taken:

Inhalation	Not anticipated under normal use. Remove from exposure. Remove to fresh air. Rest and keep warm. In severe cases obtain medical attention.
Skin contact	Not anticipated under normal use. Wash off skin thoroughly with water. Remove contaminated clothing and wash before reuse. In severe cases obtain medical attention.
Eye contact	Not anticipated under normal use. Irrigate thoroughly with water for at least 15 minutes. Obtain medical attention.
Ingestion	Not anticipated under normal use. Wash out mouth thoroughly with water and give plenty of water to drink. Obtain medical attention.
Further treatment	All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or been affected by breathing its vapours should be seen by a doctor.

5. Fire Fighting Measures

Dry chemical type or CO_2 extinguishers, Halon, or copious quantities of water or water-based foam can be used to cool down burning Li-ion cells and batteries. During water application, caution should be exercised as burning pieces of flammable particles may be ejected from the fire.

In case of fire, it is recommended to wear self-contained breathing apparatus, to avoid contact with irritant fumes. Evacuate all persons from immediate area of fire.

Do not re-enter the area until it has been adequately purged of the fire vapour and extinguishing agent.

6. Accidental Release Measures

In case of electrolyte leakage from a cell or battery, do not inhale the gas as possible.
Remove personnel from area.

If the skin has come into contact with the electrolyte, it should be washed thoroughly with water.

Using protective glasses and gloves, sand or earth should be used to absorb any exuded material.

Seal leaking battery (unless hot) and contaminated absorbent material in plastic bag and dispose of as Special Waste in accordance with local regulations.

7. Handling and Storage

Handling	Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e. metal) goods, which would end up into excessive heating. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types and brands. Do not mix new and used batteries. Keep batteries in non conductive (i.e. plastic) trays. Do not disassemble, mutilate or mechanically abuse cells and batteries.
Storage	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 140°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not jumble them.
Other	Follow Manufacturers recommendations regarding maximum recommended currents and operating temperature range. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation. Do not immerse in water. The Li-ion cells and batteries are not designed to be recharged from external power sources besides specific Li-ion charger models approved by Saft. Connecting to inappropriate power supplies can result in fire or explosion.

8. Exposure Controls & Personal Protection

Occupational exposure standard		See section 2
	**Respiratory protection**	In all fire situations, use self-contained breathing apparatus.

	**Hand protection**	In the event of leaking or ruptured cells, wear gloves.
	**Eye protection**	Safety glasses are recommended in case of leaking or ruptured cells
	**Other**	In the event of leakage or ruptured cells, wear chemical apron.

9. Physical and Chemical Properties Note: The following points are not applicable unless in case of leaking or damaged batteries with internal components sipping out.	
Appearance	Solid object with cylindrical or prismatic shape
Odour	Odourless (unless in case of damaged product with leaking electrolyte)
pH	Not applicable
Flash point	Not applicable
Flammability	Not applicable
Relative density	> 2 g/cm^3
Solubility (water)	Not applicable, unless inner components are exposed
Solubility (other)	Not applicable

10. Stability and Reactivity	
The product is stable under conditions described in Section 7.	
Conditions to avoid.	Heating above 140°C or incinerate. Deformation. Mutilation. Crushing. Piercing. Disassembly. Short circuiting. Exposition over a long period to humid conditions.
Materials to avoid	Strong mineral acids, alkali solutions, strong oxidising materials and conductive materials
Hazardous decomposition Products	HF, CO, CO_2

11. Toxicological Information	
Signs & symptoms	None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.
Inhalation	Lung irritant.
Skin contact	Skin irritant
Eye contact	Eye irritant.
Ingestion	Tissue damage to throat and gastro-respiratory tract if swallowed.
Medical conditions generally aggravated by exposure	In the event of exposure to internal contents, eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

12. Ecological Information	
Mammalian effects	None known if used/disposed of correctly.
Eco-toxicity	None known if used/disposed of correctly.
Bioaccumulation potential	None known if used/disposed of correctly.
Environmental fate	None known if used/disposed of correctly.

13. Disposal Considerations

Do not incinerate, or subject cells to temperatures in excess of 140°C. Such abuse can result in loss of seal, leakage, and/or cell explosion. Dispose of or recycle in accordance with appropriate local regulations.

14. Transport Information

Note: when manufacturing a new battery pack, one must assure that it is tested in accordance with the UN Model Regulations, Manual of Tests and Criteria, Part III, subsection 38.3

Label for conveyance	For the single cell batteries and multi-cell battery packs that are non-restricted to transport, use lithium-ion batteries inside label. For the single cell batteries and multicell battery packs which are restricted to transport (assigned to the Miscellaneous Class 9), use Class 9 Miscellaneous Dangerous Goods and UN Identification Number labels. In all cases, refer to the product transport certificate issued by the Manufacturer.
UN number	UN 3480, for Li-ion batteries transported in bulk UN 3481, for Li-ion batteries contained in equipment or packed with it
Shipping name	Lithium-ion batteries
Hazard classification	Depending on their nominal energy, some single cells and small multi-cell battery packs may be non- assigned to Class 9 (Refer to Transport Certificate)
Packing group	II
IMDG Code	9033
CAS	
EmS No.	4.1-06
Marine pollutant	No
ADR Class	Class 9

15. Regulatory Information

Regulations specifically applicable to the product:

- ACGIH and OSHA: see exposure limits of the internal ingredients of the battery in section 2.
- IATA/ICAO (air transportation): UN 3480 or UN 3481
- IMDG (sea transportation) : UN 3480 or UN 3481
- Transportation within the US-DOT, 49 Code of Federal Regulations

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.

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 himself as to the suitability and completeness of this information for his particular use.

Saft does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information. Saft does not offer warranty against patent infringement.

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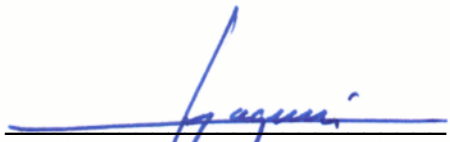
Signature 

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