










Material/Product Safety Data Sheet (MSDS-PSDS)

LS/LSG/LSH/LST/LSX products	Lithium /Thionyl chloride single cells and multi-cell battery packs	Simplified Advice Code
Revision 6 Date 07/2006		G

1. Identification of the Substance or Preparation and Company				
Product	Primary Lithium/Thionyl chloride unit cells and multi-cell battery packs (Li-SOCl₂)			
Production sites	Saft Ltd. River Drive Tyne & Wear South Shields NE33 2TR – UK Ph. :+44 191 456 1451 Fax :+44 191 456 6383	Saft Rue Georges Leclanché BP 1039 86060 Poitiers cedex 9 France Ph. :+33 (0)5 49 55 48 48 Fax :+33 (0)5 49 55 48 50	Saft America Inc 313 Crescent Street Valdese NC 28690 – USA Ph. :+1 (828) 874 4111 Fax :+1 (828) 874 2431	Saft Batteries Co., Ltd Zhuhai Free Trade Zone Lianfeng Road Zhuhai 519030 Guangdong Province China Ph. : +86 756 881 9318 Fax : +86 756 881 9328
Emergency contact Within the USA		+1 (703) 527 3887 +1 (800) 494 9300	(CHEMTREC US Service Center)	

2. Composition & Information on Ingredients					
Each cell consists of an hermetically sealed metallic container containing a number of chemicals and materials of construction of which the following could potentially be hazardous upon release.					
Ingredient	Content	CAS No.	CHIP Classification		
Lithium (Li)	3.5-5%	7439-93-2			F; R14/15 C; R34 R14/15, R21, R22, R35, R41, R43 S2, S8, S45
Thionyl chloride (SOCl ₂)	40-46%	7719-09-7	 		C; R14, R21, R22, R35, R37, R41, R42/43 S2, S8, S24, S26, S36, S37, S45
Aluminum chloride anhydrous (AlCl ₃)	1-5%	7446-70-0			R14, R22, R37, R41, R43. S2, S8, S22, S24, S26, S36, S45
Carbon (C _n)	3-4%	1333-86-4			NONE KNOWN
<i>Amount varies depending on cell size</i>					







3. Hazards Identification	
<p>Do not short circuit, recharge, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion. The Lithium-Thionyl chloride batteries described in this Product Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer.</p> <p>Under normal conditions of use, the electrode materials and liquid electrolyte they contain 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 containers. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.</p>	

4. First Aid Measures	
Inhalation	Remove from exposure, rest and keep warm. In severe cases obtain medical attention.
Skin contact	Wash off skin thoroughly with water. Remove contaminated clothing and wash before reuse. In severe cases obtain medical attention.
Eye contact	Irrigate thoroughly with water for at least 15 minutes. Obtain medical attention.
Ingestion	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	
<p>CO₂ extinguishers or copious quantities of water or water-based foam can be used to cool down burning Li-SOCl₂ cells and batteries, as long as the extent of the fire has not progressed to the point that the lithium metal they contain is exposed.</p> <p>Do not use for this purpose sand, dry powder or soda ash, graphite powder or fire blankets.</p> <p>Use only metal (Class D) extinguishers on raw lithium.</p>	
Extinguishing media	Use water or CO ₂ on burning Li-SOCl ₂ cells or batteries and class D fire extinguishing agent only on raw lithium.

6. Accidental Release Measures	
<p>Remove personnel from area until fumes dissipate. Do not breathe vapours or touch liquid with bare hands.</p> <p>If the skin has come into contact with the electrolyte, it should be washed thoroughly with water.</p> <p>Sand or earth should be used to absorb any exuded material. Seal leaking battery and contaminated absorbent material in plastic bag and dispose of as Special Waste in accordance with local regulations.</p>	

7. Handling and Storage	
Handling	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 and brands. Do not mix new and used batteries. Keep batteries in non conductive (i.e. plastic) trays.
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 100°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	Lithium-Thionyl chloride batteries are not rechargeable and should not be tentatively charged. 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.

8. Exposure Controls & Personal Protection					
Occupational exposure standard		Compound	8hr TWA	15min TWA	SK
		Sulfur dioxide	1 ppm	1 ppm	-
		Hydrogen chloride	1 ppm	5 ppm	-
	Respiratory protection	In all fire situations, use self-contained breathing apparatus.			
	Hand protection	In the event of leakage wear gloves.			
	Eye protection	Safety glasses are recommended during handling.			
	Other	In the event of leakage, wear chemical apron.			



9. Physical and Chemical Properties	
Appearance	Cylindrical shape
Odour	If leaking, gives off a pungent corrosive odour.
pH	Not Applicable
Flash point	Not applicable unless individual components exposed
Flammability	Not applicable unless individual components exposed
Relative density	Not applicable unless individual components exposed
Solubility (water)	Not applicable unless individual components exposed
Solubility (other)	Not applicable unless individual components exposed

10. Stability and Reactivity	
Product is stable under conditions described in Section 7.	
Conditions to avoid.	Heat above 100°C or incinerate. Deform. Mutilate. Crush. Pierce. Disassemble Recharge. Short circuit. Expose over a long period to humid conditions.
Materials to avoid	Oxidising agents, alkalis, water. Avoid electrolyte contact with aluminum or zinc.
Hazardous decomposition Products	Hydrogen (H ₂) as well as Lithium oxide (Li ₂ O) and Lithium hydroxide (LiOH) dust is produced in case of reaction of <i>lithium metal</i> with water. Chlorine (Cl ₂), Sulfur dioxide (SO ₂) and Disulfur dichloride (S ₂ Cl ₂) are produced in case of thermal decomposition of <i>thionyl chloride</i> above 140°C. Hydrochloric acid (HCl) and Sulfur dioxide (SO ₂) are produced in case of reaction of <i>Thionyl chloride</i> with water at room temperature. Hydrochloric acid (HCl) fumes, Lithium oxide, (Li ₂ O), Lithium hydroxide (LiOH) and Aluminum hydroxide (Al(OH) ₃) dust are produced in case of reaction of <i>Lithium tetrachloroaluminate (LiAlCl₄)</i> with water.

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 100°C. Such abuse can result in loss of seal, leakage, and/or cell explosion. Dispose of in accordance with appropriate local regulations.	



14. Transport Information			
Label for conveyance	For the single cell batteries and multicell battery packs which are non-restricted to transport, use lithium 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	UN3090		
Shipping name	Lithium Batteries		
Hazard classification	Depending on their lithium metal content, some single cells and small multicell 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	Class9		
15. Regulatory Information			
Risk phrases	Lithium (Li)	R14/15 R21 R22 R35 R41 R42/43	Reacts violently with water, liberating extremely flammable gases. Harmful in contact with skin. Harmful if swallowed. Causes burns. Risk of serious damage to eye. May cause sensitization by inhalation and skin contact.
	Thionyl chloride (SOCl ₂)	R14 R22 R35 R37 R41 R42/43	Reacts with water. Harmful if swallowed. Causes burns. Irritating to respiratory system. Risk of serious damage to eye. May cause sensitization by inhalation and skin contact.
	Aluminum chloride anhydrous (AlCl ₃)	R14 R22 R37 R41 R43	Reacts with water. Harmful if swallowed. Irritating to respiratory system. Risk of serious damage to eye. May cause sensitization by skin contact.
Safety phrases	Lithium (Li)	S2 S8 S45	Keep out of reach of children Keep away from moisture In case of incident, seek medical attention.
	Thionyl chloride (SOCl ₂)	S2 S8 S24 S26 S36 S37 S45	Keep out of reach of children. Keep away from moisture. Avoid contact with skin. In case of contact with eyes, rinse immediately with plenty of water. Wear suitable protective clothing. Wear suitable gloves. In case of incident, seek medical attention.
	Aluminum chloride anhydrous (AlCl ₃)	S2 S8 S22 S24 S26 S36	Keep out of reach of children. Keep away from moisture. Do not breathe dust. Avoid contact with skin. In case of contact with eyes, rinse immediately with plenty of water. Wear suitable protective clothing.
UK regulatory references	Classified under CHIP		



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 guarantee is made to the accuracy, reliability or completeness of the information contained herein.

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TRANSPORTATION CERTIFICATE

Ref. TC - LS 14500 04/2008- 8

This is to certify that the Saft cell type, **LS 14500**, has been subjected and has met the requirements of the UN Recommendations on the transport of dangerous goods - Manual of Tests and Criteria, 4th Revised edition - 2003 - Ref. ST/SG/AC.10/11/Rev. 4, as detailed in Saft-Poitiers internal reports P 0087/01, dated 03/2001, relative to the ability of the LS 14500 cell to pass the T6 Impact test, and P 0136/02, dated 06/2002, relative to the other tests.

Concerned Part Numbers

All the following LS 14500 cell versions that just vary by their termination mode and labeling :
04224X - 04229C - 04230D - 04231E - 04286L - 04268S - 04287M - 04295V - 04300A - 04421N -
04422P - 04490Q - 04492S - 04679M - 04722D - 04746C - 04750G - 04766Y - 04768A - 04825K -
04859U - 04861W - 04927Q - 04928R - 04931U - 04933W - 05025B - 05160S - 05495R - 05510G,
05558G - 05626C.

Product Description

Primary (non-rechargeable), Lithium-Thionyl Chloride (Li-SOCl₂) AA-sized single cell

Nominal Voltage	3.6 Volts
Nominal Capacity	2.45 Ah
Lithium metal content	0.66 gram
Maximum recommended continuous discharge current	130 mA

Product Classification

Worldwide, besides the United States of America

Since it passes the UN-defined transport tests, and thanks to its lithium content below the 1 gram limit, **the LS 14500 cell in all its finish versions**, according to the current UN Recommendations on the transport of dangerous goods - Model Regulations, **is declared non-restricted to transport / non-assigned to Class 9**. For transportation, the cells must be packed in accordance with Clause 188 of the above mentioned UN Model Regulations.

Within the United States of America

The U.S. DOT CFR 49 Regulations, Parts 171, 172, 173 and 175, are governing the transportation of lithium cells and batteries. Special Provision 188 (in Part 172.102) **defines the LS 14500 cell and its finishing versions as belonging to the "small lithium cells and batteries" category**, and details the requirements to be met for the different transportation conditions. (Note: Primary lithium batteries are forbidden for transport aboard passenger aircraft within the USA).

Signed on Behalf of Saft, Specialty Battery Group

Pascal Hans SBG Quality Manager

dated 14/04/2008

Alain Kerouanton SBG Lithium Product Manager

dated 14/04/2008