
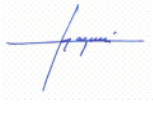
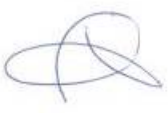





STANDARD SPECIFICATION

Non-rechargeable Li-SOCl₂ cell

LS 17500 Type

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Date	11/04	02/05	12/05	07/06	05/10
Edition Nr	5	6	7	8	9

LS 17500

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May 2010
N° 8723 Ed. 9



RECORD OF REVISIONS

REVISION DATE	EDITION NUMBER	REVISION PAGE	MODIFICATIONS
12/2000	1		Creation
10/2001	2		
12/2002	3	3002 3004 3005 3006 § 7 3007 § 8 3009 to 3017	Nominal capacity 3.3 → 3.4 Ah Typical weight 23.5 → 21.9 grams Added UN documents references New wording for transport class assignment Guaranteed capacity 3.0/2.9 → 3.05/3.00 Ah Adjusted cell dimension and better quality drawings
10/2003	4	3003 § 2B 3006 § 6c 3007 § 8 3009 to 3017 3017	On 12 kΩ/0.3 mA → on 9 kΩ/0.4 mA 120°C → 100°C Capacity initial 3.05 Ah → 3.10 Ah Adjusted cell dimensions LS 17500 FL replaced by LS 17500 FLc
11/2004	5	3003 § 2E 3008 § 10 3011 to 3017	Pulse current capability 35 mA → 250 mA Cell's coding system Adjusted cell's height
02/2005	6	3003 § 2C 3005 & 3006 3007 § 8	Nominal current on 900 Ω/4 mA → on 1200 Ω/3 mA ATEX Certification Capacity on 900 Ω → 1200 Ω
12/2005	7	3005 § 4D 3011 to 3016	New reference for UN Manual of Tests and Criteria Adjustments in cell size (length 50.8 ± 0.3 → 50.5 ± 0.4 mm)
07/2006	8	3003 § 2C	Nominal capacity 3.4 → 3.6 Ah
05/2010	9	3003 § 2B § 2D 3005 § 4D 3006 § 6, § 7 3010 § 11 3011 § 12	Nominal voltage on 9 kΩ/0.4 mA → On 12 kΩ/0.3 mA Maximum recommended current: 130 mA → 100 mA Updated the safety standards mentioned Updated safety and transport paragraph Adjustments in cell size Cell finish Ni plated steel → Stainless steel for the 2 PF, 3PF and 3PF RP finishes Add 4PF finish



1. Subject

This specification presents typical and guaranteed ex-works values for the Lithium-Thionyl Chloride (LiSOCl_2) single cell type LS 17500 (ANSI standard A).

This cell is intended for high energy applications requesting good voltage response and operating life in - 60/+ 85°C environments.

2. Typical values

A. Designation

LS 17500.

B. Nominal voltage

3.6 V (on 12 k Ω /0.3 mA at + 20°C).

C. Nominal capacity

3.6 Ah (on 1200 Ω /3 mA, at + 20°C, cut-off voltage 2 V).

(The capacity restored by the cell varies according to the current drain, the temperature and the voltage cut-off).

D. Maximum recommended continuous current

100 mA

E. Pulse current capability

Typically up to 250 mA (250 mA/0.1 second pulses, drained every 2 mn at + 20°C from undischarged batteries with 10 μA base current, yield voltage readings above 3.0 Volts). The cell voltage response varies according to pulse characteristics (frequency, duration), temperature, cell history (storage conditions prior to usage) and the application's acceptable minimum voltage. *Consult Saft for case by case study.*

The use of parallel capacitor to enhance the voltage during the first tens of millisecond of the pulses might be recommended. *Consult Saft.*



F. Operating temperature range

- 60/+ 85°C

(short excursions up to 120°C possible without leakage but external sleeve deterioration may occur above 100°C).

(Operation above ambient temperature may lead to reduced capacity and lower voltage readings at the beginning of pulses).

G. Typical weight

21.9 grams.

3. Construction and visual aspect

A. Construction

The LS 17500 cell has a “bobbin” concentric electrode construction.

A glass-to-metal seal ensures the hermeticity of the cell ($\leq 10^{-7}$ atm.cc/sec under 1 atm He).

B. Visual aspect

When inspected by naked eyes, the LS 17500 cell should not show any trace of dents, swelling, corrosion or electrolyte leakage. Marking should be readable.

4. Environment and mechanical tests

A. Altitude simulation

The LS 17500 cell complies with the UN** and IEC*** tests which consist of a storage at + 20°C during at least 6 hours under an absolute pressure of 11.6 kPa ($\approx 15,240$ m. altitude) without any leakage, fire, vent or explosion.

B. Free fall

The LS 17500 cell complies with the IEC*** test which consists of 2 drops/plane (6 in total, samples randomly oriented) onto a concrete floor from an height of 1.0 m without any leakage, vent, explosion or fire.



C. Vibration

The LS 17500 cell complies with the UL*, and IEC*** tests which consist of performing the following:

- Frequency span : 10 to 55 Hz.
- Peak to peak amplitude : 1.6 mm.
- Test duration : 95 ± 5 mm per axis.

Test carried out on three perpendicular axes. The cell must retain its operational characteristics and normal visual aspect.

D. Mechanical shock

The LS 17500 cell complies with the UL* and IEC*** tests which consist of performing the following:

- Average acceleration : 75 g.
- Maximum acceleration : 125 - 175 g.

Shock applied to each to the three perpendicular axes. The cell must retain its operational characteristics and normal visual aspect.

Safety standards mentioned:

- *UL Underwriters Laboratories Inc.
"Standard for Lithium Batteries" – UL 1642 – Fourth Edition - 2005
- **UN Secretariat of the United Nations
"Model Regulations on the Transport of Dangerous Goods"
Ref. ST/SG/AC.10/1 – Revision 15 – 2007
+ "Manual of Tests and Criteria" – Part III, sub-section 38.3,
4th Revised edition – 2003 – Ref. ST/SG/AC. 10/11/Rev. 4
- ***IEC International Electrotechnical Commission
International safety standard for lithium batteries
"IEC 60086-4" – Third Edition – 2007
- Explosive atmospheres -Equipment protection by intrinsic safety "i"
IEC 60079-11 – 2007



5. Storage

Before use, the LS 17500 cell should be stored in dry and cool conditions, at a temperature preferably not exceeding + 30°C.

Storage at higher temperature is possible but it may affect later the cell capacity and its ability to show good start up voltage characteristics.

6. Safety

We advise, during usage of the LS 17500 cell, to observe the following precautions:

- a) Do not remove the batteries from their original packing before use.
- b) Do not store the batteries in bulk in order to avoid accidental short circuiting.
- c) Do not heat above 100°C or incinerate.
- d) Do not crush and disassemble.
- e) Do not recharge.
- f) Do not solder directly on the cell. *(use tabbed cell finish versions instead).*
- g) Do not mix new and used batteries or batteries from different origins.
- h) Respect the polarities of the cell.
- i) Do not short circuit.

The LS 17500 cell is recognized as "Technician Replaceable" by the Underwriters Laboratories Inc. under the file number MH 12609 (France plant).

The LS 17500 cell complies with the International Electrotechnical Commission (IEC) Safety Standard IEC 60086-4.

The LS 17500 cell complies with the requirements of the IEC 60079-11 Intrinsic Safety standard and is assigned to the class T3 at + 40°C.

The LS 17500 cell does not contain any amount of the substances that are mentioned in the Directive 2002/95/EC of the European Parliament and of the Council on the "*Restriction of the use of certain Hazardous Substances in electrical and electronic equipment*" (in abbreviate RoHS).



7. Transport

The LS 17500 cell has demonstrated an ability to pass the safety tests listed in the United Nations “Recommendations on the Transport of Dangerous Goods, Part III, sub-section 38.3, Manual of Tests and Criteria” Reference ST/SG/AC.10/11 Revision 4 - 2003.

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 17500 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 17500 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).



8. Guaranteed minimum values

	Initial [*]	Up to 12 months storage ^{**} in the recommended + 30°C max. conditions
Open Circuit Voltage (OCV) (Voltmeter with 10 Megohm impedance and ± 1 mV precision)	3.640 V	3.640 V
Load Voltage (after 6 seconds on $56 \Omega \pm 1 \%$ at + 20°C) ($I \approx 55$ mA)	3.10 V	2.90 V
Capacity (on $1200 \Omega \pm 1 \%$ at + 20°C 2 V cut-off)	3.10 Ah	3.00 Ah

9. Incoming inspection

Prior to release from factory, the LS 17500 cell is 100 % inspected in Open Circuit Voltage (OCV) and On Load Voltage.

The capacity, visual aspect and dimensions are checked by sampling.

In case of incoming inspection, Saft recommends the following:

A. Sampling standards

French	British	German	American	ISO
NFX 06-022 NFX 06-023	BS 6001 BS 6002	DIN 40080 DIN ISO 3951	MIL STD 10 5D MIL STD 414	2859 3951

* *Initial : Within one month following of the date code printed on the sleeve.*

** *Following the date code printed on the sleeve.*



B. Acceptable Quality Levels (AQL)

Battery lot size	Sampling size	AQL
1 – 3 200	32	0.4 %
3 201 – 10 000	50	0.25 %
> 10 000	80	0.15 %

10. Labelling

The external surface of the LS 17500 cell displays the following:

SAFT LITHIUM LS 17500 Made in France 3.6V +/- polarities
UL logo Safety warning Crossed-out wheeled refuse bin logo

Finish date code with :

year/day/traceability indication (France).

Example: 09 126 A023

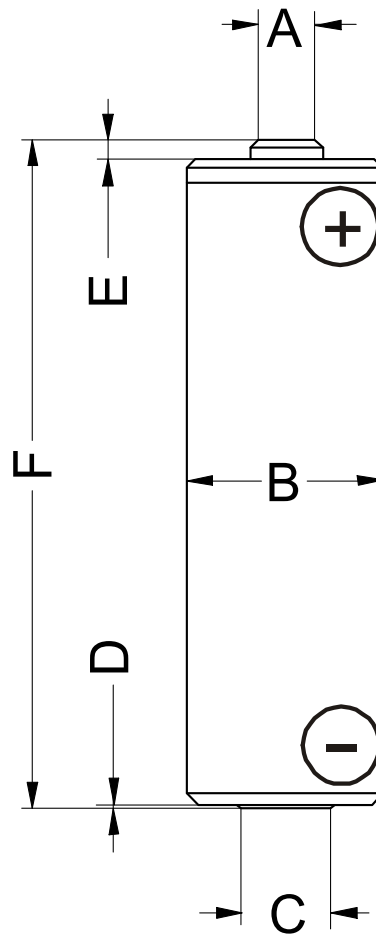
(cell finished the 126th day of year 2009. Batch internal reference A023)



11. Untabbed/sleeved cell external dimensions

(Dimensions in mm)

P/N 04811 V



	A	B	C	D	E	F
LS 17500	5.5 maxi (on flat surface)	16.94 ± 0.19	7.5 ± 0.1 (on flat surface)	0.4 ± 0.1	1.35 ± 0.3	50.5 ± 0.4



12. Main cell finish versions

- A. LS 17500 CNR**
(version with 2 rectangular nickel radial tabs) P/N 04911 Y
- B. LS 17500 CN**
(version with 2 rectangular nickel radial tabs) P/N 04910 X
- C. LS 17500 2PF**
(version with 2 stainless steel radial tabs featuring 1 prong on each side) P/N 04912 Z
- D. LS 17500 3PF**
(version with 2 stainless steel radial tabs featuring 2 prongs on the + side and 1 prong on the – side) P/N 04913 A
- E. LS 17500 3PF RP**
(version with 2 stainless steel radial tabs featuring 2 prongs on the – side and 1 prong on the + side) P/N 05717X
- F. LS 17500 CNA**
(version with 2 tinned-copper axial leads) P/N 04915 C
- G. LS 17500 FL**
(version with 2 radial tabs and flying leads) P/N 05218 C
- H. LS 17500 4PF**
(version with 2 stainless steel radial tabs featuring 2 prongs on each side) P/N 05765X

***Corresponding drawings and other finish versions are available on request.
Consult Saft.***