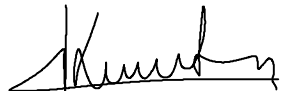


STANDARD SPECIFICATION

Non-rechargeable Li-SOCl₂ cell

LS 17500 Type

	Name	Position	Date	Signature
Written by	A. Kerouanton	Lithium Product Manager	12/02	
Checked by	G. Tardivo	Primary Lithium Quality Manager	12/02	
Approved by	PM. Leroy	Lithium Sales Director	12/02	

Issued by	A. Kerouanton	A. Kerouanton	A. Kerouanton		
Date	12/00	10/01	12/02		
Edition Nr	1	2	3		



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



1. Subject

This specification presents typical and guaranteed ex-works values for the Lithium-Thionyl Chloride (Li-SOCl₂) cell type LS 17500 (ANSI standard A).

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

3.4 Ah (*on 900 Ω /4 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

130 mA

(to get 50 % of the nominal capacity at + 20°C and 2.0 V cut-off. Higher currents are possible. Consult Saft).

E. Maximum recommended pulse current

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.*



F. Operating temperature range

- 60/+ 85°C

(short excursions up to 120°C possible without leakage but external sleeve damage 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 is constructed according to the concentric electrodes "bobbin" technology.

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 in 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 in 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 in 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 UN** and IEC*** tests which consist in 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 – Third Edition – 1995
- **UN Secretariat of the United Nations
"Model Regulations on the Transport of Dangerous Goods"
Ref. ST/SG/AC.10/1 – Revision 12 – 2001
+ "Manual of Tests and Criteria"
Ref ST/SG/AC.10/11 – Revision 3 – 1999, amended per
ST/SG/AC.10/27 – Addendum 2 – Annex 4 – 2001
- ***IEC International Electrotechnical Commission
International safety standard for lithium batteries
"IEC-CEI 86-4" – 1st Edition – 1996



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 cells from their original packing before use.
- b) Do not store the cells in bulk in order to avoid accidental short circuiting.
- c) Do not heat above 120°C or incinerate.
- d) Do not 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 cells or cells 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.

The LS 17500 cell complies with the International Electrotechnical Commission (IEC) Safety Standard IEC-CEI 86-4.

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 – Manual of Tests and Criteria " Reference. ST/SG/AC.10/11 – Revision 3, amended per ST/SG/AC.10/27 – Addendum 2 – Annex 4 dated 18/01/2001.

Hence, and in accordance with the United Nations "Model Regulation on the Transport of Dangerous Goods" Reference ST/SG/AC.10/1 – Revision 12 – 2001, the LS 17500 cell which contains less than 1 gram of lithium metal, is declared as non-restricted to transport that is non-assigned to Class 9.

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
On 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 $900 \Omega \pm 1 \%$ at + 20°C 2 V cut-off)	3.05 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 the date code printed on the sleeve.

^{**} Following the date code printed on the sleeve.



B. Acceptable Quality Levels (AQL)

- Visual inspection (§ 3.B) : 1.00 %
- Electrical inspection (§ 8) : 0.40 %
- Dimensional inspection (§ 11) : 1.00 %

10. Labelling

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

SAFT LITHIUM LS 17500 Made in France 3.6 V

+/- polarities UL logo Safety warning

Cell finish date code with year/day/traceability indication.

Example:

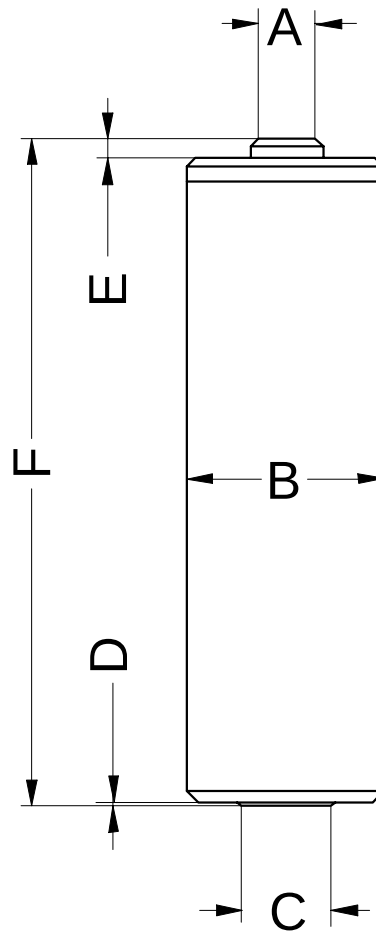
F 03 029 B

(cell finished the 29th day of year 2003, finished batch internal Saft reference B)

11. Untabbed/sleeved cell external dimensions

(Dimensions in mm)

P/N 04811 V



	A	B	C	D	E	F
LS 17500	$5.5 \begin{smallmatrix} 0 \\ -2 \end{smallmatrix}$	16.85 ± 0.15	7.5 ± 0.1	0.23 ± 0.05	1.65 ± 0.2	50.3 ± 0.2

12. Main cell finish versions

A. **LS 17500 CNR**

(version with 2 rectangular nickel-plated steel radial tabs)

P/N 04911 Y

B. **LS 17500 CN**

(version with 2 rectangular nickel-plated steel radial tabs)

P/N 04910 X

C. **LS 17500 2PF**

(version with 2 nickel-plated steel radial tabs
featuring 1 prong on each side)

P/N 04912 Z

D. **LS 17500 3PF**

(version with 2 nickel-plated 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 nickel-plated steel radial tabs
featuring 2 prongs on the – side and 1 prong on the + side)

P/N 04914 B

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 04938 C

See corresponding drawings on the following pages.

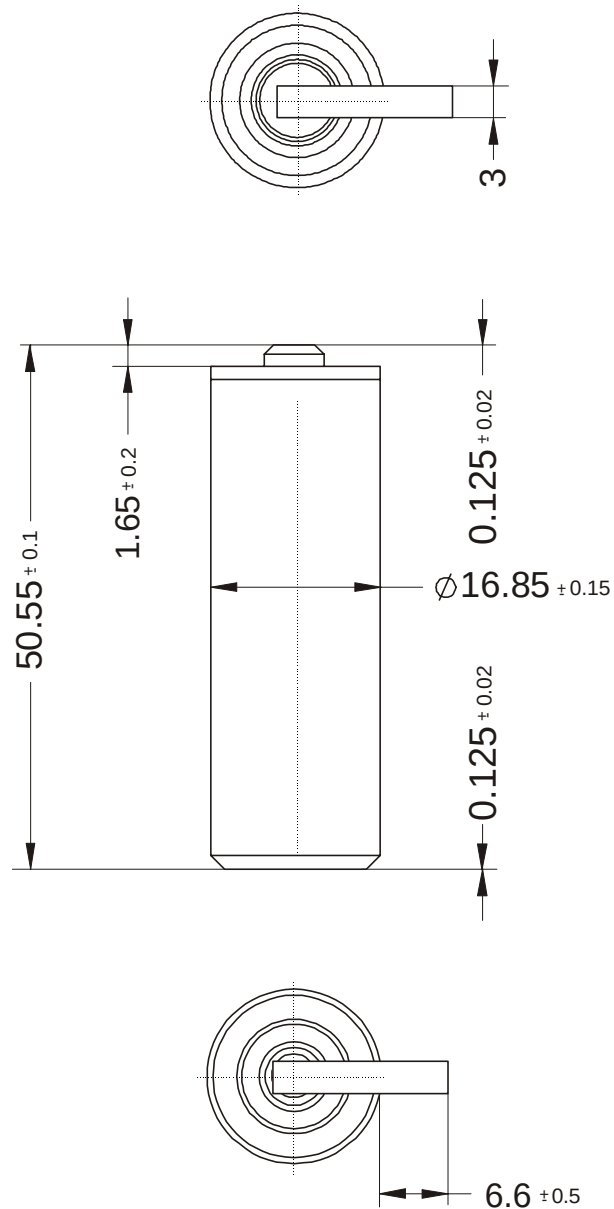
Other finish versions are available on request. Consult Saft.

LS 17500 CNR

P/N 04911 Y

(dimensions in mm)

Version with 2 rectangular nickel-plated steel radial tabs

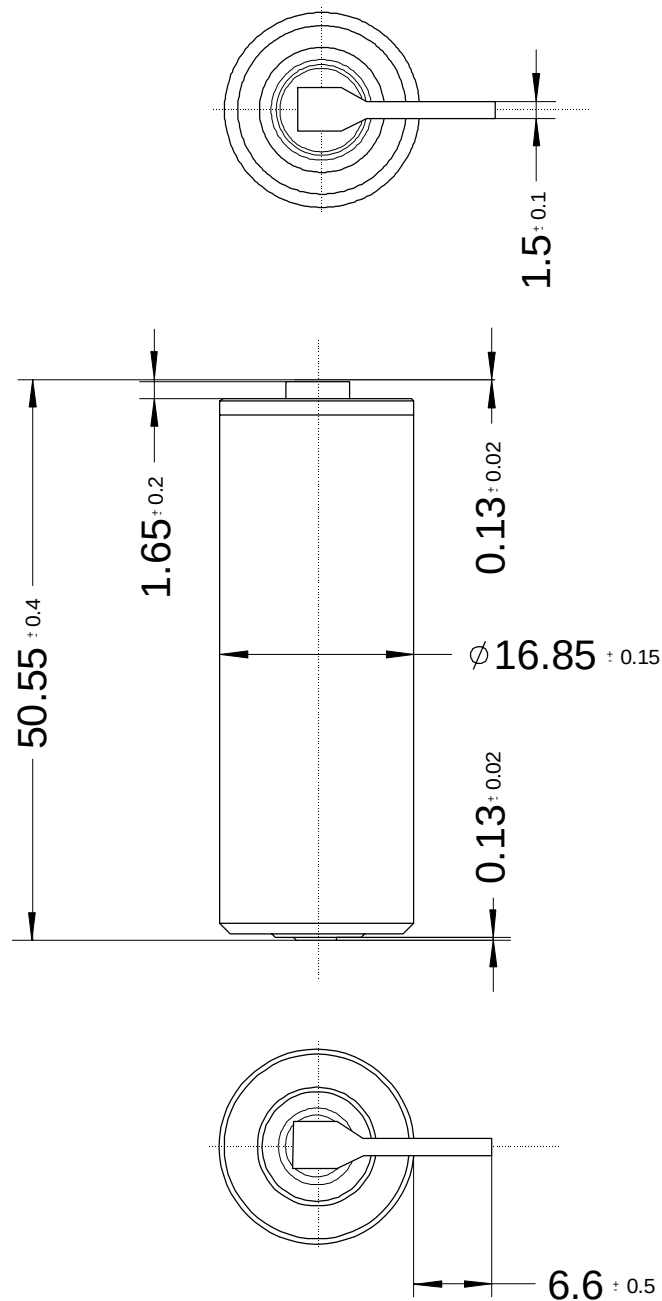


LS 17500 CN

P/N 04910 X

(dimensions in mm)

Version with 2 rectangular nickel-plated steel radial tabs



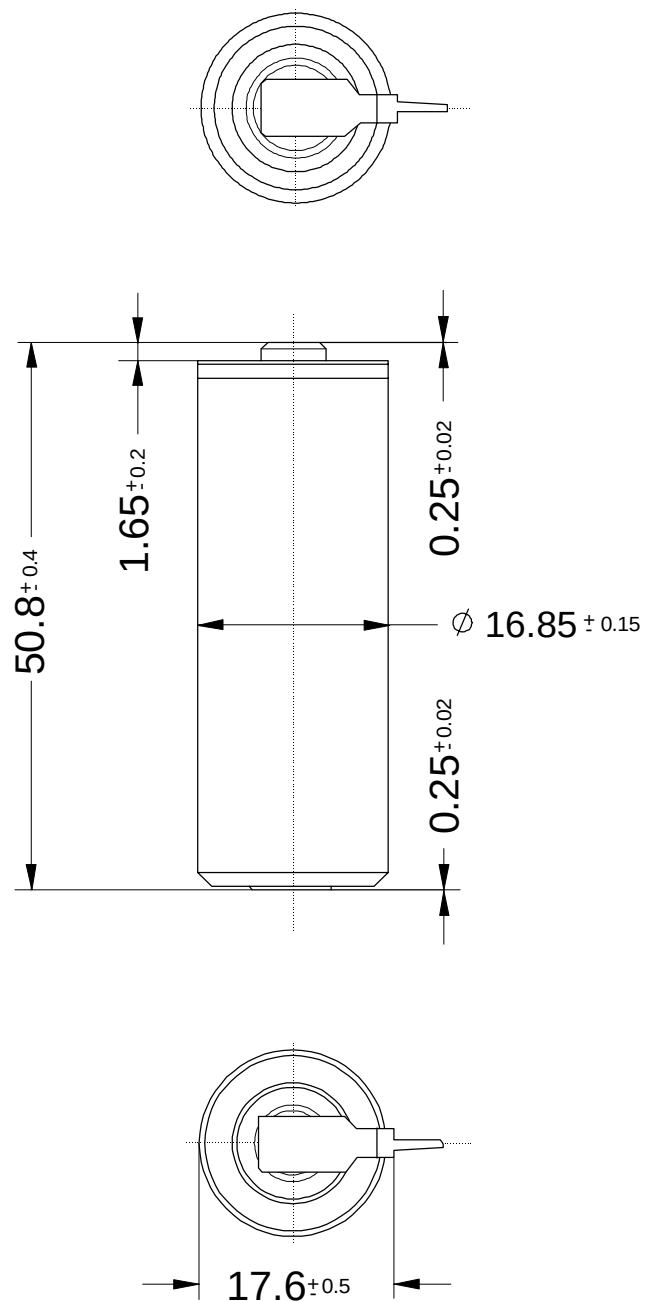


LS 17500 2PF

P/N 04912 Z

(dimensions in mm)

**Version with 2 nickel-plated steel radial tabs
featuring 1 prong on each side**



LS 17500

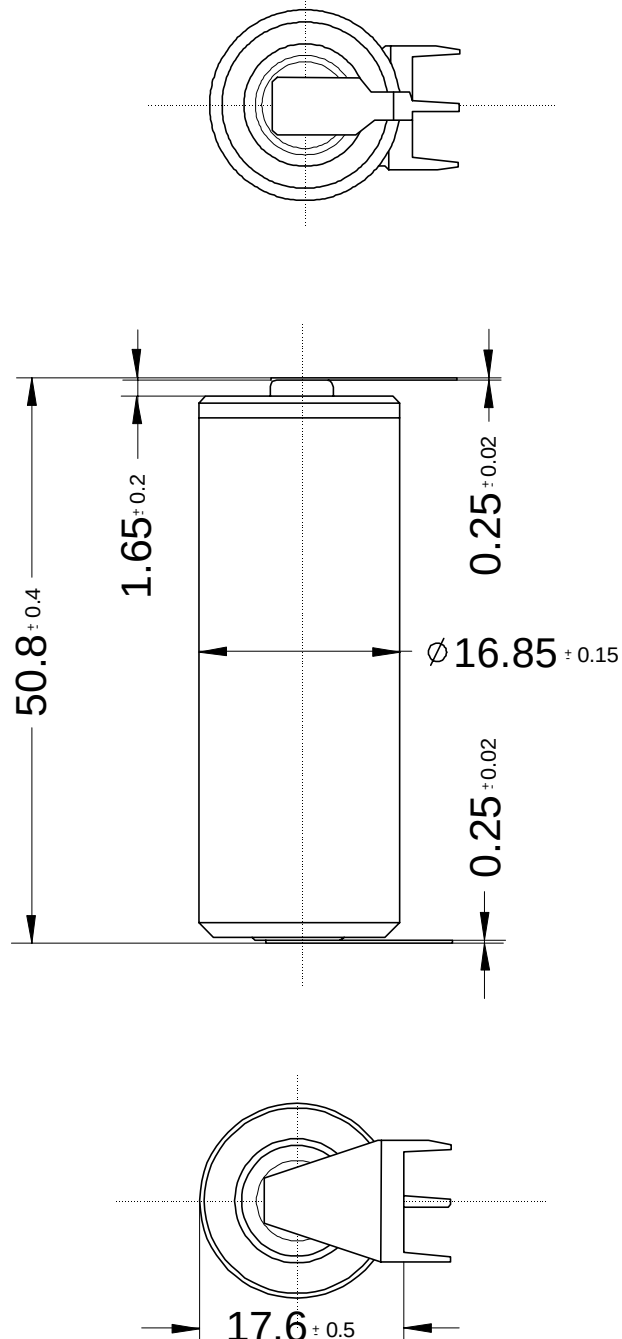


LS 17500 3PF

P/N 04913 A

(dimensions in mm)

**Version with 2 nickel-plated steel radial tabs
featuring 2 prongs on the + side and 1 prong on the – side**



LS 17500

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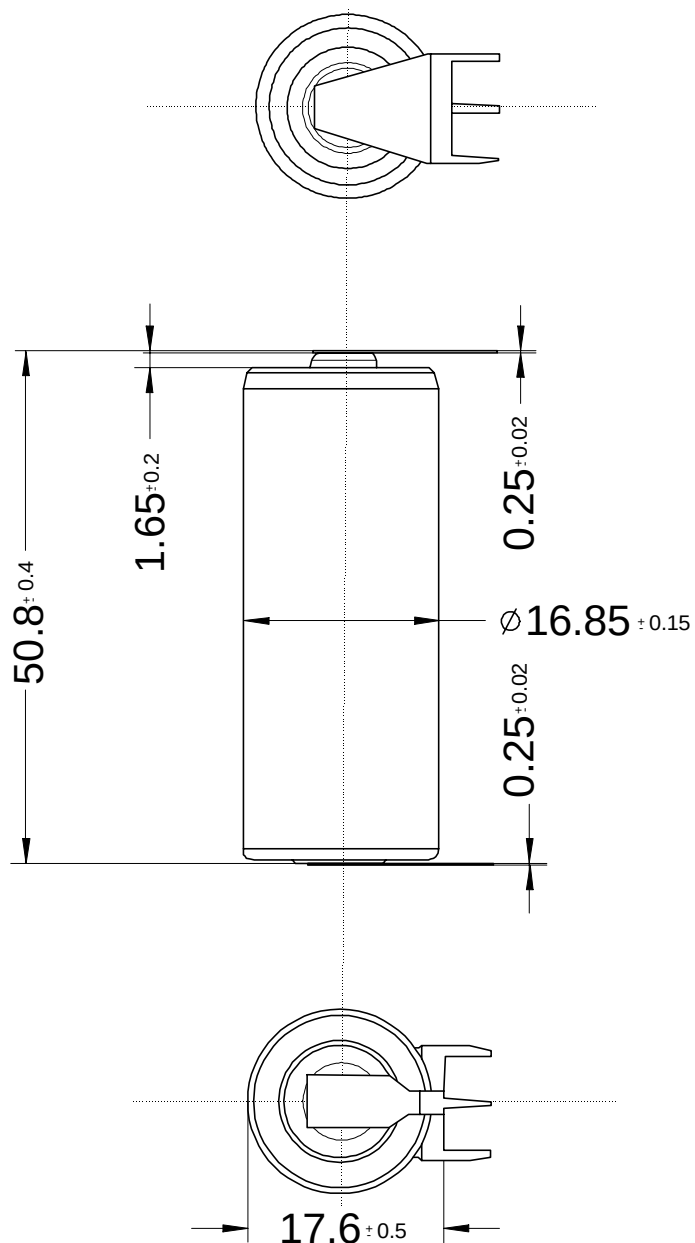


LS 17500 3PF RP

P/N 04914 B

(dimensions in mm)

**Version with 2 nickel-plated steel radial tabs
featuring 2 prongs on the – side and 1 prong on the + side**



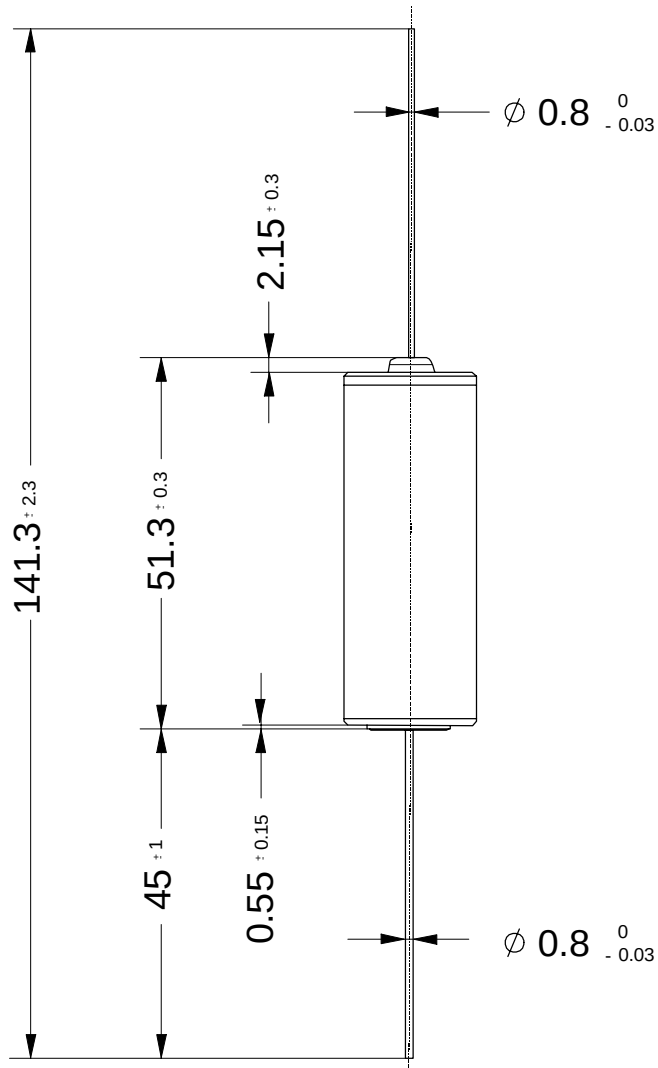
LS 17500

LS 17500 CNA

P/N 04915 C

(dimensions in mm)

Version with 2 tinned-copper axial leads

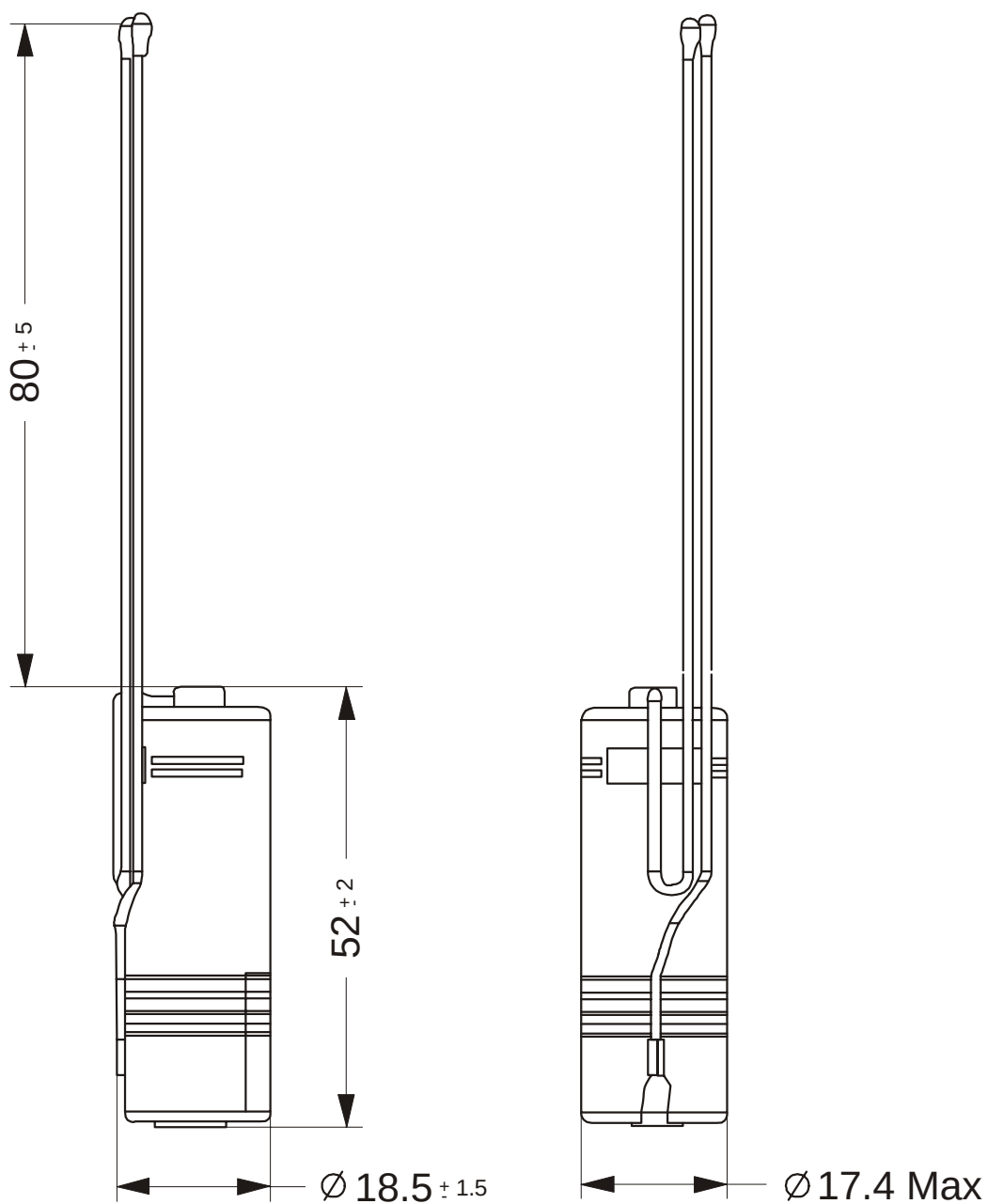


LS 17500 FL

P/N 04938 C

(dimensions in mm)

Version with 2 radial tabs and flying leads





TRANSPORTATION CERTIFICATE

Ref. TC- LS 17500 03/2006-3

This is to certify that the Saft cell **LS 17500** has been subjected and has met the requirements of:

- UN Recommendations on the transport of dangerous goods, Model Regulations 13th Revised edition - 2003 - Ref. ST/SG/AC.10/1/Rev. 13
- 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 107/01 dated 02/2001, relative to the ability to pass the T6 impact test, and P 0356/01 dated 06/2001, relative to the other tests.

Concerned Part Numbers: all the following LS 17500 cell versions that just vary by their termination mode and labeling: 04811V, 04910X, 04911Y, 04912Z, 04913A, 04914B, 04915C, 04816A, 05026C, 05309X, 0095-285-019.

Product Description

Primary (non-rechargeable) Lithium-Thionyl chloride (Li-SOCl₂) A-sized single cell

Nominal Voltage	3.6 Volts
Nominal Capacity	3.6 Ah
Lithium metal content	0.96 gram
Maximum recommended continuous discharge current	150 mA

Product Classification

Since it passes the UN-defined transport tests and since its lithium content is below the 1 gram limit, **the LS 17500 individual cell, in all of its finish versions, is declared exempt from the Dangerous Goods Regulations. It is non-restricted to transport/non-assigned to Class 9,** providing packed in accordance with Clause 188 of UN Recommendations on the transport of dangerous goods, Model Regulations 13th Revised edition - 2001 - Ref. ST/SG/AC.10/1/Rev. 13.

Signed on Behalf of Saft Specialty Battery Group

Eric Nadeau

SBG Product Test Engineer

dated 27/03/06

Pascal Hans

SBG Quality Manager

dated 27/03/06

Alain Kerouanton

SBG Lithium Product Manager

dated 27/03/2006