

LS 17500

Product specification

High energy density 3.6 V Li-SOCl₂ cell



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Approved by	Tom Willis	Marketing Director Connected Smart Energy	 Digitally signed by Tom Willis Date: 2023.07.05 16:04:23 +01'00'

Revision date	Edition #	Changes	Issued by
12/2000	1	Creation	
10/2001	2		
12/2002	3	Nominal capacity 3.3 -> 3.4 Ah Typical weight 23.5 -> 21.9 g Added UN document references New wording for transport class assignment Adjusted cell's dimensions and better drawings' quality	A. Kerouanton
10/2003	4	Nominal voltage obtained under 12 k Ω / 0.3 mA -> 9 k Ω / 0.4 mA Safety maximum temperature from 120°C to 100°C Garanteed minimum nominal capacity: initial: 3.05 Ah -> 3.10 Ah Adjusted cell's dimensions LS 17500 FL replaced by LS 17500 FLc	A. Kerouanton
11/2004	5	Pulse current capability 35 mA -> 250 mA Cell's date code system added Adjusted cell's dimensions	A. Kerouanton
02/2005	6	Nominal capacity obtained under 900 Ω / 4 mA -> on 1.2 k Ω / 3 mA ATEX certification	A. Kerouanton
12/2005	7	New reference for UN Manual of Tests and Criteria Adjusted cell's dimensions	A. Kerouanton
07/2006	8	Nominal capacity: 3.4 Ah -> 3.6 Ah	A. Kerouanton
05/2010	9	Nominal voltage obtained under 9 k Ω / 0.4 mA -> 12 k Ω / 0.3 mA Maximum continuous current: from 130 mA to 100 mA Update on safety standards Adjusted cell's dimensions Cell's finishing Ni-plated steel -> stainless steel for 2PF, 3PF, 3PF RP New 4PF version	Y. Chartier
05/2019	10	Update of standards versions for UN, UL, IEC Update of guaranteed minimum values for nominal capacity	C. Joannin
07/2022	11	Update of the document template Update of the cell picture Correction of chapter numbers Correction of the current value, chapter 11, Guaranteed minimum values Update of the sleeve design, chapter 12	B. Larrea

1. Scope

This specification presents typical and guaranteed ex-works values for the Lithium-Thionyl Chloride (Li-SOCl₂) 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°C / + 85°C environments.

2. 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). The LS 17500 comes in two basic finishing versions (both of which are unfused), which differ by their positive end profile and overall length.

B. Visual aspect

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

3. Electrical characteristics

A. Nominal capacity

■ 3.6 Ah

(Under 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 cut-off voltage.

B. Nominal voltage

■ 3.6 V

(After 1 hour under a 12 k Ω load, at + 20°C.)

C. Open circuit voltage

■ 3.67 V at + 20°C

D. Nominal energy

■ 12.96 Wh

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

E. Maximum recommended pulse current

■ Up to 250 mA

(250 mA / 0.1 s pulses drained every 2 min during 24 h, at + 20°C from undischarged cells with a 10 μ A base current, yield voltage readings above 3.0 V after initial stabilization.)

■ The cell voltage response varies according to pulse characteristics (frequency, duration), temperature, cell history (storage conditions prior to usage) and the application acceptable minimum voltage. Please consult Saft.

■ The use of a capacitor, supercapacitor, electrochemical double layer capacitor or hybrid layer capacitor may be recommended to enhance the voltage during the first 10 milliseconds of the pulse. Please consult Saft.

F. Maximum recommended continuous current

■ 100 mA, at + 20°C

(To maintain cell heating within safe limits.)

Battery packs may imply lower level of maximum current and may request specific thermal protection.

Please consult Saft.

G. Self-discharge rate in storage

■ < 1% of nominal capacity, per year of storage at 20°C

H. Recommended storage temperature

■ + 30°C maximum

I. Operating temperature range

■ - 60°C / + 85°C

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

Short excursions up to + 100°C are possible without leakage but performance degradation can be expected above + 85°C.



4. Physical characteristics

A. Diameter

■ Maximum: 17.16 mm (0.67 in)

B. Height

■ Maximum: 50.77 mm (1.99 in)

C. Weight

■ Typical: 22 g

D. Lithium metal content

■ Typical: 0.9 g

5. Compliance to international standards

A. Underwriters Laboratories

The LS 17500 cell is recognized as "Technician Replaceable" by the Underwriters Laboratories, "Standard for Lithium batteries" UL 1642, under the file numbers:

Production site	UL file number
France	MH12609
China	MH46911
United Kingdom	MH12802

B. International Electrotechnical Commission

The LS 17500 cell complies with the International Electrotechnical Commission (IEC) Safety Standard IEC 60086-4:2014.

The LS 17500 cell partially complies with the requirements of the International Electrotechnical Commission "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i" Ref. IEC 60079-11, and is assigned to the class T4 for a temperature of + 60°C, please consult Saft.

C. Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS)

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".

D. Transport

The LS 17500 has been subjected and has met the requirements of the United Nations Secretariat's Recommendations on the transport of dangerous goods, Part III, sub-section 38.3, "Manual of Tests and Criteria" and its amendments.

6. Environment and mechanical tests

A. Altitude simulation

The LS 17500 complies with the IEC* and UN** 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 achieving 6 drops per cell (twice in each of the directions of the three axes) onto a concrete floor from a height of 1.0 m without any explosion or fire.

C. Vibration

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

- Frequency span: 10 to 55 Hz
 - Peak to peak amplitude: 1.6 mm
 - Test duration: 95 ± 5 min per axis
- Test is carried out on 3 perpendicular axes. The cell must retain its operational characteristics and normal visual aspect.

D. Mechanical shock

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

- Maximum acceleration: 150 g.
- Shocks applied to each of the three perpendicular axes. The cell must retain its operational characteristics and normal visual aspect.

Safety Standards mentioned

*IEC International Electrotechnical Commission: international safety standard for Lithium batteries IEC 60086-4.

**UN Secretariat of the United Nations: "Recommendations on the Transport of Dangerous Goods - Model Regulations".

***UL Underwriters Laboratories: "Standard for Lithium Batteries" UL 1642.

7. Storage

The LS 17500 cell should be stored in dry, cool, and ventilated conditions. The maximum recommended storage temperature is + 30°C.

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

8. Handling

A. Battery Information Sheet (BIS)

A BIS is available on Saft's website, www.saft.com

B. Safety recommendations

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

- Do not remove the cells from their original packing before use.
- Do not store the cells in bulk to avoid accidental short circuiting.
- Do not heat above 100°C or incinerate.
- Do not crush or disassemble.
- Do not recharge.
- Do not solder directly on the cell, use tabbed cell finish version instead.
- Do not mix new and used cells or cells from different origins.
- Mind the polarities of the cell.
- Do not short circuit.

9. Transport

A. Transport qualification

The LS 17500 cell meets the requirements of the UN Recommendations on the transportation of dangerous goods, Part III, sub-section 38.3, "Manual of Tests and Criteria":

Test	Results
Test 1: Altitude Simulation	Passed
Test 2: Thermal tests	Passed
Test 3: Vibrations	Passed
Test 4: Shock	Passed
Test 5: External short circuit	Passed
Test 6: Impact/crush	Passed
Test 7: Overcharge	Not applicable
Test 8: Forced discharge	Passed

B. Shipping responsibility

When transporting any Lithium battery product, the commitment is upon the shipper to conform with current global, local, and modal regulations. According to the Recommendations on the Transport of Dangerous Goods - Model Regulations, Chapter 1.3 - Training, "persons engaged in the transport of dangerous goods shall be trained in the contents of dangerous goods requirements commensurate with their responsibilities."

C. Transport classification

In accordance with the United Nations Secretariat's Recommendations on the Transport of Dangerous Goods - Model Regulations, the LS 17500 cell, is declared restricted for transport with the following classification:

- UN Numbers:
3090 Lithium Metal Batteries
3091 Lithium Metal Batteries Contained In Equipment
3091 Lithium Metal Batteries Packed With Equipment
- Shipping name:
Lithium Metal Batteries
- Hazard Classification: Class 9
- Air International cargo:
ICAO, UN 3090 or UN 3091
- Sea International:
IMDG, UN 3090 or UN 3091
- EU road transportation:
ADR, UN 3090 or UN3091
- EU rail transportation:
RID, UN 3090 or UN 3091
- USA transportation:
US-DOT, 49 Code of Federal Regulations

10. Quality management and incoming inspection

- Prior to release from the factory, the LS 17500 cell is 100% inspected for Open Circuit Voltage (OCV) and Closed Circuit voltage (CCV), i.e., voltage under load.
- The capacity, visual aspect and dimensions are checked by sampling.
- In case of incoming inspection, Saft recommends the following standards:

A. Sampling standards

Country	Standard
France	NFX 06-022
	NFX 06-023
United Kingdom	BS 6001
	BS 6002
Germany	DIN 40080
	DIN ISO 3951
USA	ANSI/ASQ Z1.4
	MIL STD 1916
World	ISO 2859
	ISO 3951

B. Acceptable Quality Levels (AQL)

Battery lot size	Sampling size	AQL
1 - 3200	32	0.4%
3201 - 10 000	50	0.25%
>10 000	80	0.15%

11. Guaranteed minimum values

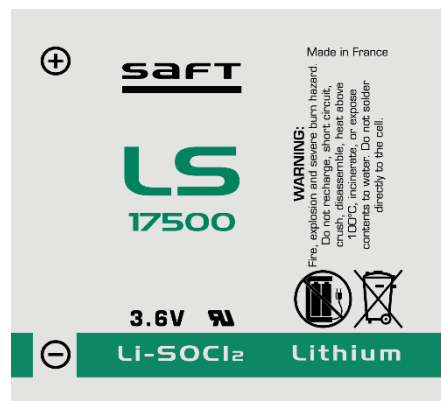
	Initial*	After storage**
Open Circuit Voltage (OCV)	3.64 V	3.64 V
Voltage under load (after 2 seconds under 56 Ω at + 20°C) ($I \approx 60$ mA)	3.10 V	2.90 V
Capacity (under 1200 Ω at + 20°C, 2 V cut-off voltage)	3.1 Ah	3.0 Ah

*Initial: within 3 months following the date code printed on the sleeve

**After storage: up to 12 months storage following the date code printed on the sleeve, in the recommended conditions, at + 30°C maximum

12. Marking

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



- SAFT, LS 17500, 3.6 V, UL logo, Li-SOCl₂, Lithium, Made in China or France or UK, Safety warning, "Do not recharge" symbol, "Crossed-out wheeled bin" logo, +/- polarities.

- A date code is printed on the sleeve, which contains the following information:

Made in China: YY MM DDL

Made in France: YY DDD LNNN

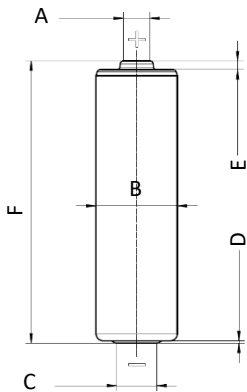
Made in UK: YY DDD

With YY: year / MM: month of the year / DDL: day of the month followed by internal batch code / DDD: day of the year / LNNN: internal batch code.

13. Product dimensions

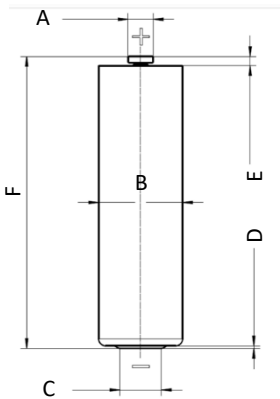
All dimensions are in mm.

■ LS 17500 cell made in France P/N 04811V



A	B	C	D	E	F
5.5 max / 4.2 min (on flat surface)	16.94 ± 0.22	7 min (on flat surface)	0.35 ± 0.07	1.53 ± 0.15	50.53 ± 0.24

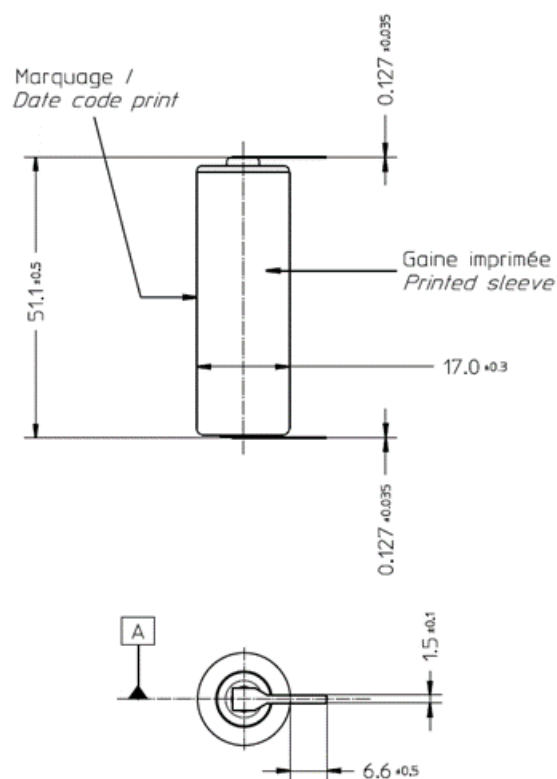
■ LS 17500 cell made in China P/N C10-0079, made in UK P/N LS17500.STD



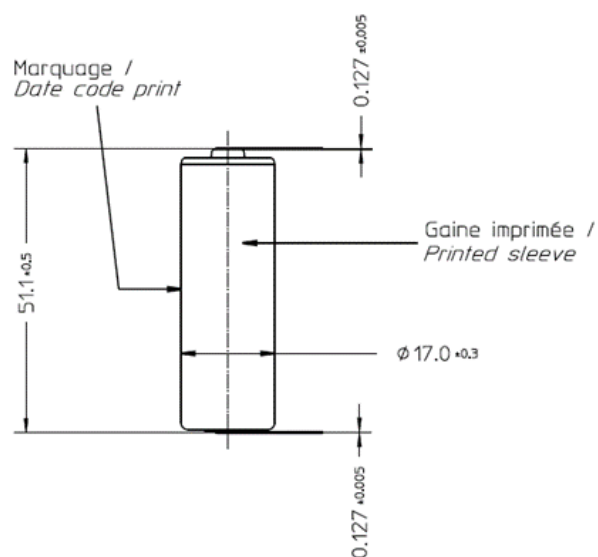
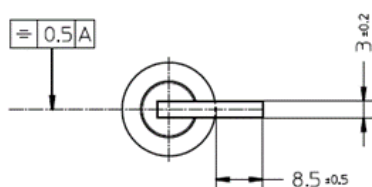
Site	A	B	C	D	E	F
China	4.42 max / 4.2 min (on flat surface)	16.91 ± 0.08	7 min (on flat surface)	0.37 ± 0.07	1.52 ± 0.20	50.45 ± 0.28
UK	4.42 max / 4.2 min (on flat surface)	16.94 ± 0.08	7 min (on flat surface)	0.35 ± 0.07	1.50 ± 0.20	50.45 ± 0.28

14. Available tabbed versions

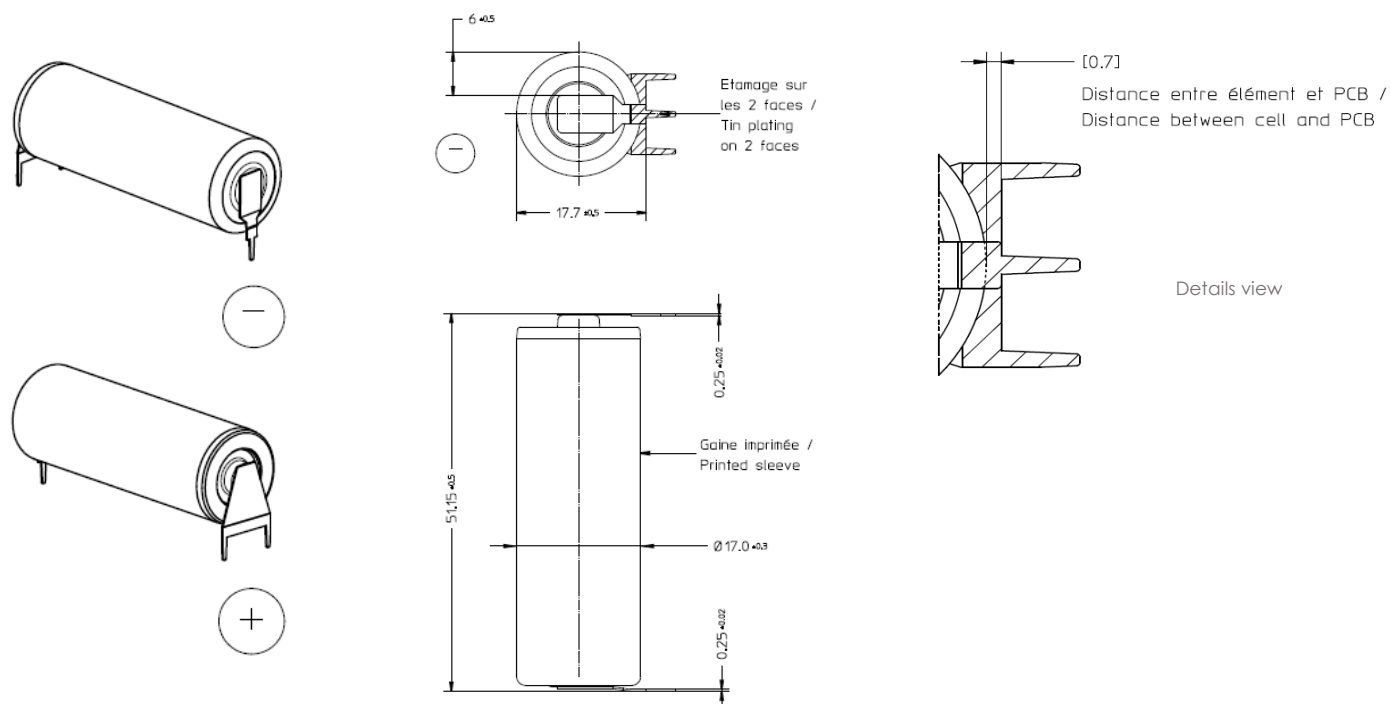
■ LS 17500 CN (with 2 rectangular nickel radial tabs). Example of P/N 04910X



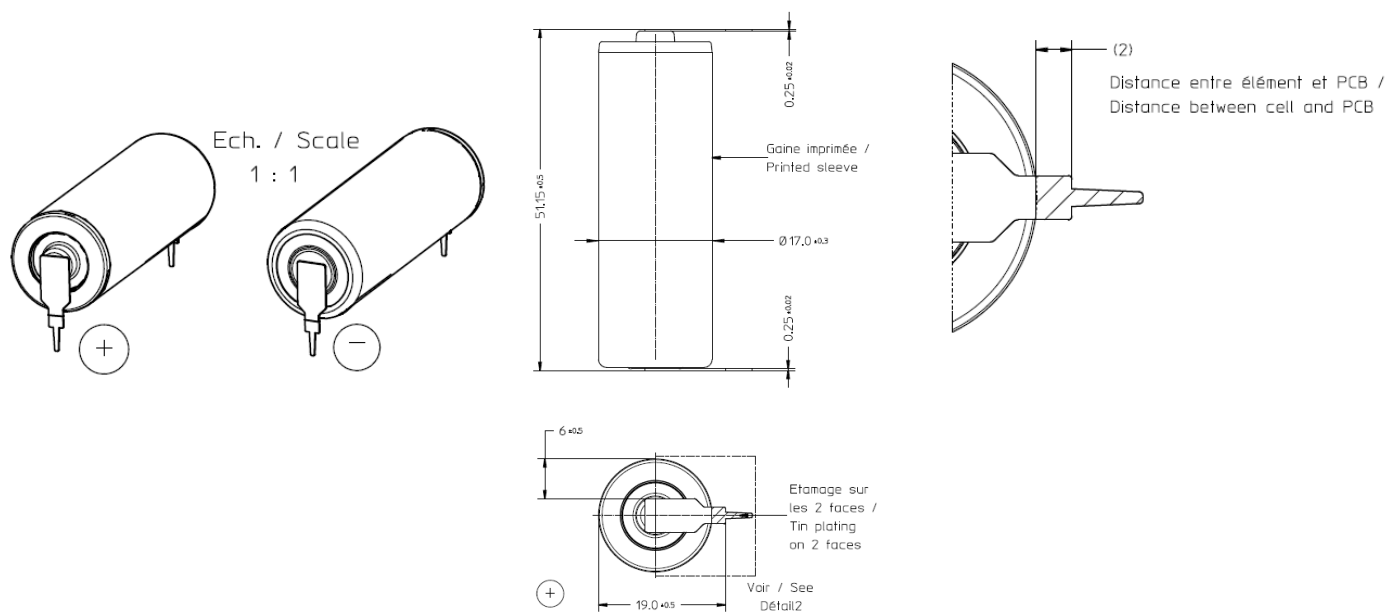
■ LS 17500 CNR. Example of P/N 04911Y



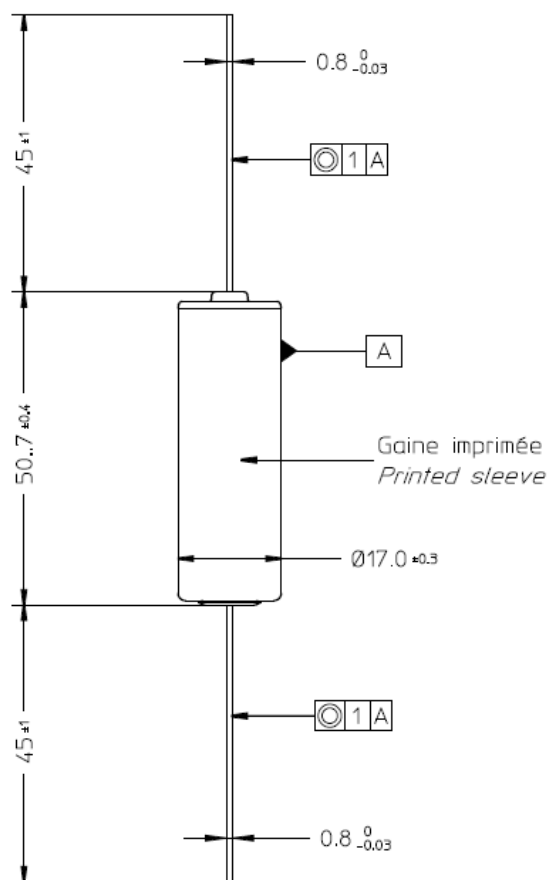
■ LS 17500 3PF. Example of P/N 06100W



■ LS 17500 2PF. Example of P/N 05809T



■ LS 17500 CNA (with 2 tinned-copper axial leads). Example of P/N 04915C



■ Other finish versions are available on request. Please consult Saft.

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Saft, a subsidiary of TotalEnergies
S.A.S. au capital de 26 724 876 €
R.C.S. Nanterre 481 480 465

Document N° 31030-2-0723
Edition: July 2023
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