Mehr Wert.
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Add value.
Inspire trust.

Technical Report No. 70.520.19.154.01

Rev. 00

Dated 2019-09-18

Client:	Titus Battery 291 N.Hubbards Lane,Suite 172-120,Louisville,KY 40207,USA
Manufacturing place:	Wuhan Zhongyuan Changjiang Technology Development Co., Ltd. No.231, Xingsan Road, Hannan Economic Development Zone, Wuhan, Hubei Province.
Test subject:	Test sample: Lithium Thionyl Chloride Battery Model: ER17505 Sample no.: SHA-01-0436965-001, SHA-01-0436965-002, SHA-01-0436965-003, SHA-01-0436965-004, SHA-01-0436965-005, SHA-01-0436965-006, SHA-01-0436965-007, SHA-01-0436965-008, SHA-01-0436965-009, SHA-01-0436965-010
Test specification:	EN 60079-0: 2012+A11:2013 (Partial) EN 60079-11: 2012 (Partial) The tests are based on the harmonised standard of the European ATEX 2014/34/EU directive
Purpose of examination:	• ☐ inspection according to specified requirements to realize the conformity with the Produktsicherheitsgesetz –ProdSG, version Nov 08, 2011 • ☐ inspection according to specified requirements to realize the observance of the protection aims of the following EC directives: ☐ LVD directive 2014/35/EU ☐ EMC directive 2014/30/EU • ☒ Test according to the test specification
Test result:	The tested products comply with the European harmonised ATEX 2014/34/EU directive standards EN 60079-0: 2012+A11:2013 (Partial), EN 60079-11: 2012 (Partial)* *see item 3 of this report for details.

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1 Description of the test subject

1.1 Function

☒ Manufacturer's specification for intended use:
(According to the user manual)

☒ Manufacturer's specification for predictive misuse:
(According to the user manual)
(combination with other products)

1.2 Consideration of the foreseeable misuse

☒ Not applicable
☐ Covered through the applied standard
☐ Covered by the following comment
☐ Covered by attached risk analysis

1.3 Technical Data

Type/Model	Product	Rated voltage (V)	Rated capacity (mAh)	Weight (g)	Dimension (mm) D*H
ER17505	Lithium Thionyl Chloride Battery	3.6	3400	22.4	Max. (Φ17.0*50.5)

2 Order

2.1 Date of Purchase Order

2019-07-29

2.2 Receipt of Test Sample, Location

2019-07-31

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Testing Center
IDP, Explosion Protection Testing Laboratory
No.1999 Duhui Road 201108, Shanghai
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2.3 Date of Testing

2019-08-15~2019-08-21

2.4 Location of Testing

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Testing Center
IDP, Explosion Protection Testing Laboratory
No.1999 Duhui Road 201108, Shanghai
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2.5 Points of Non-compliance or Exceptions of the Test Procedure

None

3 Test Results

According to Clause 10.5 of EN 60079-11: 2012:

Ten test samples are subjected to the most onerous of the short-circuit test until discharged.

- The resistance of the short-circuit link, excluding connections to it, either shall not exceed 3mΩ or have a voltage drop across it not exceeding 200mV or 15% of the cell e.m.f.
- Before short-circuit, the open voltage of each batteries/cells is measured.
- During short-circuit, short-circuit current of each batterie/cell is measured.
- During short-circuit, the maximum surface temperature is recorded by a thermal couple.
- After short-circuit, the test samples are placed over a piece of blotting paper for a period of at least 12h to observe electrolyte leakage.
- Internal resistance is calculated by s-c voltage divided s-c current.
- Five samples are tested at (20±5) °C, five samples are tested at (60±5)°C.
- Resistance of the short-circuit link: less than 3mΩ.

The results are listed in below table 1:

Table 1:

Model	Max. Open-circuit voltage (V)	Max. Short-circuit current (A)	Max. Surface temperature (°C)		Min. Internal resistance (mΩ)
			Test at (20±5)°C	Test at (60±5)°C	
ER17505	3.68	1.76	69.7	109.7	2088.09
Remark: there is no visible sign of electrolyte on the blotting paper or on the external surfaces of the test samples.					

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4 Remark

4.1 The assembly of the product has to comply with the table as above in clause 3, before the implementation of safety relevant modifications to the product into the ongoing production, the product must be retested for assessment. The results must be updated to the report.

4.2 The specification table has been examined according to the minimum requirements described in the product standard. The manufacturer is responsible for the accuracy of further particulars as well as of the composition and layout.

4.3 When bring the product to the market, it must be accompanied with safety Instructions writ-ten in official language of the country. The instructions shall give information regarding safe operation, installation and maintenance.

4.4 The manufacturer/ Importer has to ensure the appliance placing on the EU market conforms to the applicable EU directives which provide the affixing of the CE marking, such as LVD, EMC, RoHS, ErP, and so on.

5 Documentation

- Specification of the batteries
- Photo documentation report 70.520.19.154.01

6 Summary

Clause 10.5 tests for batteries of EN 60079-0: 2012+A11:2013 were conducted on 10 samples. Test results including maximum surface temperature, maximum short circuit current, minimum internal resistance, were listed in Table 1 which can be used for determination of temperature class and assessing the spark ignition compliance in end product.

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Engineer: _____ **Technical Report checked:** _____

Yuxi DENG
Project Handler

Ing. Kristof De Gersem, MSc.
Designated Reviewer

/ END Technical Report.

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