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## Translation Test Report

Testing Laboratory  
Explosion Protected Equipment and  
Monitoring Devices

Test Report No. 06 YEX 552645-1 dated 2006-02-14

Test object: Lithium batteries of the types SL-750, SL-760, SL-2770, SL-2780,  
SL-2790, SL 2870 and SL-2880  
as well as  
Hybrid layer capacitors of the types TLI-1520/T and TLI-1550/T

Customer: Tadiran Batteries GmbH  
Address: Industriestr. 22  
63654 Büdingen, Germany

Evaluation principles: EN 50 020:2002 Intrinsic safety "i"  
clauses:  
10.9.2 Electrolyte leakage test  
10.9.3 Spark ignition and surface temperature of cells and batteries

Order number: 8000552645  
Competent: Engineer Thomas Heinen  
Test date: until 2006-02-14

This report consists of 3 pages

## 1. General

This test report documents the results of a test at lithium batteries according to the requirements of the EN 50020:2002, type of protection intrinsic safety.

In each case 20 lithium batteries of the types SL-750, SL-760, SL-2770, SL-2780, SL-2790, SL-2870 and SL-2880 as well as in each case 20 hybrid layer capacitors of the types TLI-1520/T and TLI-1550/T with the charge numbers given in clause 2 have been submitted to the following tests:

- 10.9.2 : Electrolyte leakage test
- 10.9.3 : Spark ignition and surface temperature of cells and batteries  
in each case 10 samples according to 10.9.3 a) spark ignition  
and 10 samples according to 10.9.3 b) surface temperature

Hybrid layer capacitors are rechargeable cells which were looked like primary cells within the scope of this test.

## 2. Test results

The tests have been carried out at 20 °C ambient temperature.

cell	the same like	charge number	U [V]	I [A]	Ri [Ω]	temperature rise [K]	temperature class at T <sub>amb</sub> = 40 °C	elektrolyte leakage	requirements of the EN 50020:2002 fulfilled
SL-750	TL-5902	ZSFO-OCT-05	3,66	1,0	3,6	31,5	T6	no	yes (3a)
SL-760	TL-5903	ZGFO-OCT-05	3,67	2,4	1,4	46,6	T5	no	yes (3a)
SL-2770	TL-5920	ZMFO-NOV-05	3,66	3,1	1,1	41,7	T5	no	yes (3a)
SL-2780	TL-5930	ZVFO NOV-05	3,66	<u>3,9</u>	0,8	36,2	T6	no	no (3b)
SL-2790	TL-5937	ZIIO OCT-05	3,66	<u>9,0</u>	0,3	53,0	T5	no	no (3b)
SL-2870	TL-4920	MFO JUN 05	3,66	3,0	1,1	39,8	T6	no	yes (3a)
SL-2880	TL-4930	NDO NOV-05	3,69	<u>7,1</u>	0,4	71,7	T4	no	no (3b)
TLI-1520/T	-	EIO OCT 05	3,63	<u>20</u>	<0,1	87,5	T4	no	no (3b)
TLI-1550/T	-	QHO NOV 05	3,62	<u>25</u>	<0,1	20,6	T6	no	no (3b)

Oversteppings of the allowed limit values are shown underlined.

### 3. Conclusion

The measured values listed in clause 2 are to be evaluated as follows:

- a) The present test samples of the 4 lithium battery types SL-750, SL-760, SL-2770 and SL-2870 fulfil the requirements of the EN 50020:2002 in the type of protection "intrinsic safety" for apparatus for the application in hazardous explosive areas.
- b) The present test samples of the 3 lithium battery types SL-2780, SL-2790 and SL-2880 as well as the hybrid layer capacitors types TLI-1520/T and TLI-1550/T fulfil the requirements of the EN 50020:2002 in type of protection "intrinsic safety" in relation to the danger by high surface temperatures and electrolyte leakage, however, not to the danger by spark ignition. The measured short circuit currents exceed the permissible limit value. Nevertheless, apparatus with these batteries can be admitted for the application in hazardous explosiv areas if suitable design features against the danger by spark ignition are implemented.

The classification of the temperature class refers to a maximum ambient temperature of +40 °C. The classification for higher ambient temperatures can be determined with the measured temperature rise.

The head of the testing laboratory:



Andreas Meyer

The expert:



Thomas Heinen