

BATSO and BATSO Technical Committee

General Matters Safer L(EV) batteries ...

Presenter: Tim Schäfer,
Chairman Techn. Committee
LiTec Battery GmbH, Kamenz/Germany



BATSO Technical Committee

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• BATSO approved



Technical Committee as part of the BATSO scheme

BATSO scheme

- The BATSO Scheme is a system based upon a cooperation between Extra Energy e.V. (Tanna, Germany) and TÜV Rheinland LGA Products GmbH (Nuremberg, Germany).
- Partners today: ITRI (Taiwan), UL, TÜV Rheinland, EE, other institutes as interested parties
- Interested parties: Phylion, BAK, PHET, GP, Samsung SDI, Ener1, BMZ, SK, Citic MGL, Sony, Sanyo, NEC Tokin, Amita, Coslight, Sky, Lishen...
- Others: ZVI, ZSW, Universities...
- BATSO Board of Management (today)
 - Extra Energy e.V.
 - TÜV Rheinland LGA Products GmbH
- BATSO Technical Committee



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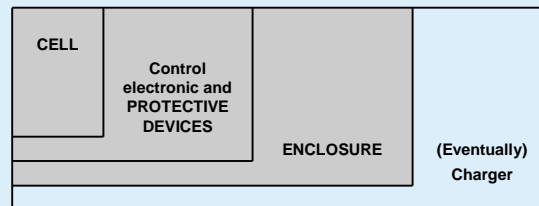


■ The goal of BATSO

- Is to increase safety of existing and new battery technologies.

Testing methods of this manual will support a fast and economic way of battery testing.

The BATSO test seal will help all parties involved in the (Light) Electric Vehicle business to find and utilize safer batteries.



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■ HIGH LEVELS OF SAFETY WITH LARGE RECHARGEABLE LITHIUM BATTERIES...and what's about Reliability?

- Electric vehicles are particularly susceptible to environmental extremes.
- Vibration, Moisture, corrosion, and temperature extremes which are common place for fossil fueled vehicles, can significantly degrade electric vehicle performance.



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■ **BATSO 01 Manual for Evaluation of Energy Systems for Light Electric Vehicles (LEV) - Secondary Lithium Batteries**

BATSO 01

Electrical tests
(Overcharge, short circuit, vibration endurance, partial short circuit)

Mechanical tests
(Crush, shock, drop)

Environmental tests
(Low pressure, thermal)

United Nations (Transport)
(UN-T 38.3)

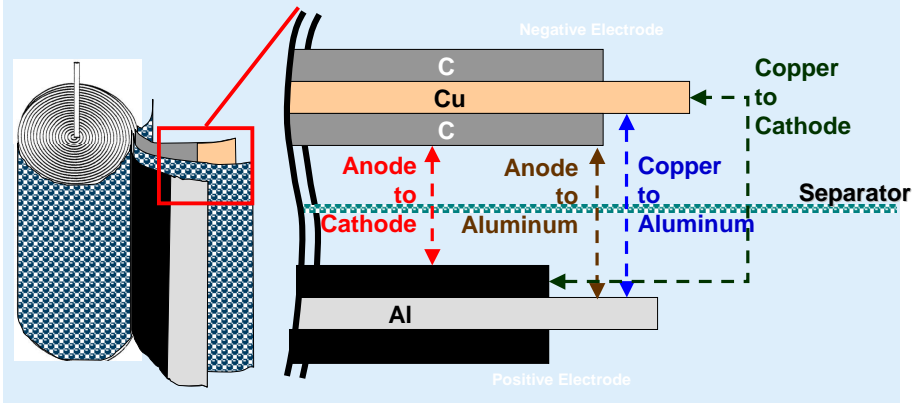
BATSO – Testing and certification of LEV batteries

Testing at manufacturer site

- In general, principles of ISO / IEC 17025 (General requirements for the competence of testing and calibration laboratories) apply
- Optional: design review and testing program discussion prior to testing
- TÜV Rheinland engineer is present during testing
- Particular focus on:
 - Qualification and training of laboratory staff
 - Laboratory must be fully equipped with required test equipment
 - Maintenance of test equipment
 - Calibration of test equipment

Internal Short Circuits

- There are 4 kinds of Internal Short Circuit Conditions:



Source: Underwriters Laboratories Inc. - General Experience and Status Update

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Certification of batteries according to BATSO

Certification

- Cooperation model of the BATSO scheme foresees currently a certification by TÜV Rheinland only
- Once type testing and factory inspections were successful, the BATSO-TUVdotCOM mark is granted



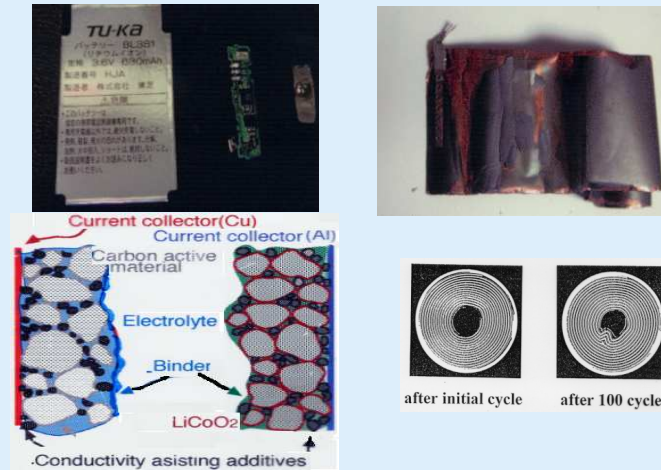
- TUVdotCOM:
Platform for displaying information of certified batteries
→ [TUVdotCOM portal](#)

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Let us see inside...



Source: Presentation Prof. T. Takamura "Carbon Material in Power Sources". June 2005, ZSW Ulm

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Certification of batteries according to BATSO

Factory Inspections

- **First inspection** (for each factory manufacturing the certified battery, prior to issuing the certificate): CIG 022 / 023 plus BATSO requirements
- **Annual inspection:** CIG 022 / 023 plus BATSO requirements
- **Check items:** (examples, in addition to CIG 022 / 023)
 - Incoming Quality Control of critical components and materials
 - Handling and storage of components and materials
 - In-process Quality
 - Control of critical operations
 - Packaging for (air) transport
 - Outgoing Quality Control
 - Regular production tests and control of records
 - Test items:

a) Weight check	b) Visual inspection
c) Short-circuit test	d) Overcharge test

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Certification of batteries according to BATSO

Testing

- **Testing in recognized laboratory**

- Currently, only TÜV Rheinland Group China Battery Testing Center is recognized
- Procedure for recognizing other laboratories will be prepared once requested, and made available

- **Testing in manufacturer facilities**

- In general, principles of ISO / IEC 17025 (General requirements for the competence of testing and calibration laboratories) apply
- Expert of a recognized laboratory is present / conducting the testing



Certification of batteries according to BATSO

Documentation

- **BATSO certificate**

Zertifikat		Certificate			
Zertifikat Nr. / Certificate No.	0001	Blatt / Page	0001		
Die Zeichen / Client Reference	0001--	Unser Zeichen / Our Reference	01234567 011	Ausstellungsdatum / Date of Issue	15.01.2010
Referenz / Refer.					(dd/mm/yyyy)
Hersteller / Manufacturer	Liener Batterie	Fertigungsstätte / Manufacturing Plant	Dumny Circle 1, 72526		
	Nichte zur Verrechnung		Nichte zur Verrechnung		
	AM, Guben, Klein		AM, Guben, Klein		
	51105 Köln		51105 Köln		
	Deutschland		Deutschland		
Prüfverfahren / Test Method	Geprüft nach / Tested acc. to: IEC 61969-01:2005/01:08				
Zertifiziertes Produkt / Certified Product	Akku / Lithium battery		Lithiumzelle - Einzel / Lithium Cell - Unit		
Type Designation:	Rated Voltage / Rated capacity:				
Test Model	DC 37V	50Ah			
The labelling requirements acc. to EU Directive 2001/95 have to be observed for distribution within the EU.					
Zusätzliche Angaben / Additional Information: Die Produkte sind für den Einsatz in Fahrzeugen bestimmt. Die Hersteller sind für die Einhaltung der Vorschriften für die Zulassung der Produkte verantwortlich. Bitte diese besonderen Bestimmungen beachten, die Produktion ist subject to surveillance.					
TÜV Rheinland IGA Products GmbH, Tillystraße 2, 90431 Nürnberg Tel: +49 221 980-0 Fax: +49 221 980-2000 www.tuev.com					



Thanks for your attention!
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Annex



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■ BATS0 focus on low voltage batteries, UN-T, reliability and safety

- To put more transparency and real safety and quality into praxis, accordingly to UN safety transportation, field failure, and application safety as well as reliability tests.
- Participants are leading international battery and (L)EV manufacturers and institutes, particularly involved in advanced Li-ion batteries. Many safety test details have been discussed circumstantially. More transparency through standardized certificates and markings following international practice were introduced.
- The Principle of BATS0 is deepened: close link to UN-T safety regulations for battery transport in conjunction with two options for BATS0 testing: 1) BATS0 and UN-T 2) BATS0 only.



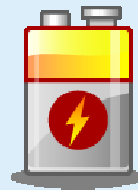
■ Summary BATS0 A

- BATS0 furthermore provides guidance to the international and constantly changing shipping regulations which are very complex.
- Based in general on principles of ISO / IEC 17025 (General requirements for the competence of testing and calibration laboratories) apply, and optional design review and testing program prior to testing were introduced.
- Inspection procedures were introduced into BATS0 including first inspection (for each factory) combined with annual factory inspection (check items specific for battery industry, re-testing).



■ Summary B

- Criteria No thermal runaway in the event of crash, No explosion/rupture or flying parts
- BATSO suitable for (L)EV application and HEV up to several KW but, indeed
- Other actual applicable standard for EV Li-Ion battery like SANDIA, SAEJ2464 and criteria Eucar hazard level:
 - No correlation between crash force and battery weight,
 - Classification of risk potential...
- Amendments, new standards will be launched soon,



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