The hard cell

A range of global battery safety regulations has been harmonised as IEC62133. By Jody Leber.

Batteries are an essential part of many of today’s high technology products. Along with the continuous development of battery technology and the increasing perfection of manufacturing techniques, batteries are used more widely as a ‘green power’ enabler for all kinds of applications.

Whether they are high performance lithium ion (Li-ion) or the more conventional nickel metal hydride cell (NiMh), batteries present potential safety issues. That is why batteries are covered by a number of standards and testing methods. This article gives an overview of the regulatory situation, with a brief introduction to IEC 62133—an emerging unified international safety standard for rechargeable batteries.

Harmonising IEC standards

The safety of battery operated devices is attracting increasingly stringent scrutiny. In June 2011, the International Electrotechnical Commission System for Conformity Testing and Certification of Electrotechnical Equipment and Components’ (IECEE) Certification Management Committee (CMC) met in Istanbul and discussed safety requirements for lithium-ion batteries. These batteries are governed by IEC 62133. Secondary cells and batteries containing alkaline or other non-acid electrolytes—safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications. It was determined during the meeting that, from 1 May 2012, all lithium-ion batteries must be tested and certified to IEC 62133, with the exception of those contained in information technology equipment (IEC 60950-1) and audio/video (IEC 60065) products.

When designing batteries and battery powered products, it is crucial to identify the applicable regulatory requirements related to lithium-ion battery safety. As of 1 May 2012, battery packs—including those intended for use in medical products—must be evaluated for full compliance to IEC 62133.

The International Electrotechnical Commission (IEC), a non-profit standards organisation, writes international standards for all electrical, electronics and related technologies, including batteries. For lithium batteries, the key standards are IEC 62133, the IEC 60086 suite, IEC 62960 and IEC 62281 (the IEC version of UN 38.3). In the US, UL 1642 applies to lithium based cells, while battery packs are covered by UL 2054, which also references UL 1642 for lithium cells.

International harmonised battery standards include the IEC 60086 suite of standards for non rechargeable battery and IEC 62133 for rechargeable and secondary batteries. The first testing reports and certification between the participating countries and certification organisations. The CB Scheme offers a simplified way of obtaining multiple national safety certifications—providing entry into more than 45 countries.

For many years, the CB Scheme accepted the UL Standard as the basis for batteries. Within IECEE, full acceptance of IEC 62133 as the standard was proposed in 2002 and a transitional period was included to allow time for industry to adjust. In recent years, the IEC has been working with product level groups to enforce IEC 62133 as the product level standard. Some product level committees have already made revisions to their standards to comply with the battery.

What is affected by the changes?

Portable battery IEC 62133 – Medical Devices, Power Tools, Household Applications and others [except Telecom, Audio/Video and ICT products – TC108 is expected to adopt IEC 62133 by 2013]; cells must be certified to IEC 62133 in order to certify the battery. Because battery packs do not have a ‘delta test’, they will need evaluation with a CB report.
IEC 62133 is the safety standard for rechargeable secondary cells and batteries, that contain alkaline or other non-acid electrolytes, which are used in portable applications. Since 26 October 2010, additional tests must be carried out on CB certified batteries tested in accordance with UL 1642 in order to ensure they comply with IEC 62133. Since 27 June 2011, CB certificates can only be issued for the products in question in accordance with IEC 62133.

The decision regarding the battery standard backs up the global development of the IECCE CB Scheme. IEC 62133 is the most important standard for exporting lithium-ion batteries, including those used in IT equipment, tools, laboratory, household and medical equipment. Until 30 April 2011, secondary (rechargeable) lithium batteries tested to UL 1642 were accepted for CB certification. Since 1 May, 2011, the batteries shall be additionally 'gap' tested to parts of IEC 62133. Now, cells and batteries must be fully tested to IEC 62133 for CB certification.

Development of regulations
To solve a long running inconsistency in battery standards amongst CBs, the following agreements were reached at the CMC’s Tel Aviv meeting in 2010:

For products not included in TC108 (Technical Committee of Media Products and IT Products)

- Since 1 May 2011, batteries certified with UL 1642 need only be tested according to specific items according to IEC 62133.
- Since 1 May 2012, IEC 62133 came into force. In the CMC’s meeting in Istanbul in 2011, a plan for further development regarding the application of IEC 62133 in audio and video equipment was discussed and confirmed.
- The second draft of IEC 62133 passed committee voting. It was seen as possible this would come into effect by the end of 2011 or during 2012.
- A modified version of standards for audio/video and IT products (IEC 60065, IEC 60950-1, IEC 62368-1) will introduce test requirements from the second version of IEC 62133.

Standard update
The first version of IEC 62133 was issued in 2002 and is still effective. But it is an old standard; some the test methods it specifies have fallen behind the rapid development of battery technology and this has driven a growing demand for its improvement.

After many modifications, IEC issued the second version, which is closest to the formal version of IEC 62133 – 21A/481/CDV at the end of 2010. Comparing IEC 62133 second version (draft) with the IEC 62133 first version, the following improvements can be highlighted:

- Clearer classification on tests in the nickel and lithium systems.
- More detailed clarification on the number of samples and sample pretreatment.
- Additional advice on design of lithium batteries.
- Promotes requirements for transportation safety of lithium battery.
- Compulsory internal short circuit test is added for assessment of internal design.

The practice of revising versions of standards undoubtedly promotes improved requirements in battery manufacturing.

This new standard will urge battery manufacturers to improve their production techniques and levels of quality assurance to guarantee a wider application of the battery standard in different fields.

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