IEC 62133:2012 -Vs- IEC 62133-2:2017

"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"

IEC 62133:2012 (2nd edition) has been replaced by two new standards, IEC 62133-1:2017 (1st edition) and IEC 62133-2:2017 (1st edition). Part 1 is for nickel systems and Part 2 is for lithium systems. Given that nickel systems (NiCd and NiMH) are well established there are no changes to the testing of these cells and batteries whereas lithium systems are still evolving and therefore Part 2 of the standard does include some changes which cell manufacturers, battery manufacturers and device OEMs need to be aware of.

This short document highlights the main changes which have been incorporated into 'Part 2: Lithium Systems'. Significant changes are shown in red.

Forward

The forward refers to the following significant technical changes with respect to IEC 62133:2012:

- Separation of nickel systems into a separate Part 1;
- Inclusion of coin cell requirements;
- Update of assembly of cells into batteries;
- Mechanical tests (vibration and shock);
- Insertion of IEC TR 62914 within the Bibliography.

Section 3

Section 3.16 'polymer cell' changed to 'lithium ion polymer cell'.

Section 3.17 Definition of capacity amended in line with IEC 60050-482:2004, 482-03-15, modified.

Section 3.18 'Reference test current' definition added.

Section 3.21 'Coin cell, button cell, coin battery' definition added.

Section 3.22 'cylindrical cell' definition added.

Section 3.23 'prismatic cell' definition added.

Section 3.24 'cell block' 'parallel connection' definition added.

Section 3.25 'functional safety' definition added.

Section 3.26 'end of discharge voltage' 'final voltage' definition added.

Section 5

Section 5.2 Note added that 'solder alone is not considered a reliable means of connection'.

Section 5.5 The text 'terminals shall have clear polarity marking on the external surface of the battery" has been removed (it has been moved to section 9.2).

Section 5.6.1 'Assembly of cells into batteries – General' has been rewritten for clarity.

Section 5.6.2 Four new 'design recommendations' added as follows: (i) 'For batteries consisting of series-connected cells or cell blocks, nominal charge voltage shall not be counted as an overcharge protection'. (ii) 'For batteries consisting of series-connected cells or cell blocks, cells should have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer'. (iii) 'It is recommended that the cells and cell blocks should not be discharged beyond the cell manufacturer's specified final voltage'. (iv) 'For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry should be incorporated into the battery management system'.

Section 5.3.3 'Mechanical protection for cells and components of batteries' – is a new section which briefly states that 'mechanical protection for cells, cell connections and control circuits within the battery should be provided to prevent damage as a result of intended use or reasonably foreseeable misuse'. It does state that batteries intended for building into a portable end product can have the mechanical tests conducted with the battery installed in that equipment.

Section 6 Modified to allow for coin cells.

Section 7 Was section 8 (Specific requirements and tests)

Section 7.2.1 'Intended use – Continuous charging at constant voltage (cells)' – no changes to this section.

Section 7.2.2 'Intended use - Case stress at high ambient temperature (battery)' was called 'Moulded case stress at high ambient temperature'. The test only applies to batteries with moulded cases. The test remains the same. Slight editorial changes to wording.

Section 7.3.1 'Reasonably foreseeable misuse – External short circuit (cell)' – no changes to this section.

Section 7.3.2 'Reasonably foreseeable misuse – External short circuit (battery)' – change from testing at +55°C to testing at +20°C (2nd procedure for charging not adopted). Addition of single fault testing

Section 7.3.3 'Reasonably foreseeable misuse – Free Fall' – addition of metal floor as an option for the drop test (alongside concrete floor).

Section 7.3.4 'Reasonably foreseeable misuse – Thermal abuse (cells)' – Addition of a +20°C for 1-hour rest period before temperature rise commences. Adoption of a 30-minute hold at +130°C before test is terminated (it was 10 minutes or 30 minutes depending in cell size).

Section 7.3.5 'Reasonably foreseeable misuse – Crush (cells)' – Some editorial changes but test and acceptance criteria remain the same.

Section 7.3.6 'Reasonably foreseeable misuse – Over-charging of battery' – Some changes to the charging voltage used for this test but acceptance criteria remains the same.

Section 7.3.6 'Reasonably foreseeable misuse – Forced discharge (cells)' – Changes to explain the reverse voltage that is used for the test and what to do when the cell reaches that voltage.

Note that the Transportation tests which were shown in section 8.3.7 of IEC 62133:2012 have been removed

Section 7.3.8.1 'Reasonably foreseeable misuse – Mechanical tests (batteries) – vibration' – This is a new requirement.

Section 7.3.8.2 'Reasonably foreseeable misuse – Mechanical tests (batteries) – mechanical shock' – This is a new requirement.

Section 7.3.9 'Reasonably foreseeable misuse – Design evaluation – Forced internal short-circuit (cells)' – Editorial changes only.

Section 8

Section 8.1 'Information for safety – General' – Addition of 'Do not allow children to replace batteries without adult supervision'.

Section 8.2 'Information for safety – Small cell and battery safety information' - New section for cells and batteries that may pose an ingestion hazard.

Section 9

Section 9.1 'Marking – Cell marking' – Editorial changes to include coin cells.

Section 9.2 'Marking – Battery marking' – Editorial changes to show batteries must be marked in accordance with IEC 61960. Addition of text to show polarity terminals must be marked on the outside of batteries unless the battery is mechanically keyed to a specific product.

Section 9.3 'Marking – Caution for ingestion of small cells and batteries' - New section requiring hazard of ingestion text to be placed on battery and (if applicable) packaging.

Section 9.4 'Marking – Other information' – New section requiring 'storage and disposal instructions' and 'recommended charging instructions' to be marked on or supplied with the battery.

Section 10 'Packaging and Transport' – Editorial changes. Content moved to Annex E. Addition of notes on packaging coin cells.

Annex A - Charging and discharging range of secondary lithium cells for safe use

Modifications to the explanation of safe operating ranges for cells. Addition of 'Experimental procedure of the forced internal short-circuit test'.

Annex B – Recommendations to equipment manufacturers and battery assemblers

New text added 'Compartments should be designed to prevent easy access to the batteries by young children'.

Text referring to 'dropping the device containing the battery' removed from this section.

Annex C - Recommendations to the end-users

'Keep batteries out of the reach of children' added. 'Especially keep small batteries out of reach of small children' added.

Annex D – Measurement of the internal AC resistance for coin cells

New section which provides a method of measuring the internal resistance of a coin cell to determine if testing according to Table 1 is required.

Annex E – Packaging and transport

New section which discusses the need for suitable packaging to prevent short-circuit, mechanical damage and possible ingress of moisture. Refences to ICAO, IATA and IMO are made along with references to the UN Manual of Tests and Criteria and to IEC 62281.

Annex F – Component Standard References

New section which states that components relied on for safety should comply with their appropriate component standard if applicable. A table is provided which provides the IEC standard references for various fuses, PTC devices, thermal links and FETs. This Annex is referenced in section 7.3.2.

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