

IEC 62133 Battery Testing

Top-10 FAQs



1. Which edition of IEC62133 should be used if the battery will be used in Medical Devices?

Medical devices certified to IEC 60601-1 can use either the 1st or 2nd edition of IEC 62133 for component cells and batteries. In general, cell manufacturers should work toward 2nd edition, and pack manufacturers should follow the cell (i.e. if the cell is certified to 1st edition, then certify the pack to 1st edition. If the cell is certified to 2nd edition, then certify the pack to 2nd edition as well). If the device is for US-only (certified to AAMI 60601-1), then the battery may alternatively be certified according to US-based standards (Such as UL-1642 and UL-2054). Note that for CB Scheme certification, the IEC standards (1st or 2nd edition) must be utilized as of June 2012. NOTE the above applies mainly to Lithium-ion batteries. For Nickel chemistries, the 1st and 2nd editions are essentially identical, so any new products should be certified according to the 2nd edition.

2. My cell manufacturer cannot conduct the Forced Internal Short (Clause 8.3.9) test according to IEC 62133 2nd Edition – can Intertek do this test?

Intertek currently has multiple global sites which can conduct this test. Note that this test is only applicable for certain countries, which may have separate in-country test requirements to achieve local certification marks.

3. Is IEC 62133 sufficient for entry into Japan as I have heard it must also be tested for PSE certification according to a DENAN Ordinance Article?

Japan is currently revising the JIS C 8712 standard to be fully harmonized with IEC 62133 2nd edition. However, this harmonization has not yet been completed. In the meantime, additional testing per the released version of JIS C 8712 is still required. This includes the Forced Internal Short Circuit test (clause 8.3.9)

4. I have heard that UL 1642 and UL 2054 are harmonizing with IEC 62133. Is this true and will IEC 62133 be accepted for North American Listings?

UL 62133 has been released in January 2015, fully harmonized with IEC 62133, 2nd edition. Additionally, UL 1642 and UL 2054 are still required per several end-product standards, so the sunset schedule for these standards is not yet determined. For Canada, E62133 (harmonized with IEC 62133 2nd edition) has been released, so a Canadian listing may be achieved. In general, one must consult with their NRTL and the end-product standard requirements to determine the best course of action for North American listings.

5. What is a portable battery?

A portable battery as per IEC 62133, Ed. 1.0, Clause 1.3.14 is a battery for use in a device or appliance which is conveniently hand carried. (Note: A removable or user/serviceable battery within a non-portable end-product, is also deemed portable)



6. I have a lithium polymer battery; it's not Lithium Ion. What do I do?

Lithium polymer batteries, while utilizing different structures and electrolytes, are still considered a Lithium-ion chemistry, and therefore would follow the same safety and transportation requirements as other lithium-ion battery types. However, the Forced Internal Short circuit test (Clause 8.3.9) does not apply to polymer type cells.

7. IEC 62133 2nd edition referenced the UN 38.3 Transportation tests. Are these required for both Cell and Battery (Packs)? How are they handled for CB Scheme certifications?

The UN 38.3 tests are required by most global Dangerous Goods and Transportation agencies, in order to effectively transport cells and batteries. Therefore, it was considered redundant to include these requirements as part of the electrical safety test.

The 2nd edition only specifically requires these tests for cells (per section 6, Table 2). It should be noted that the UN 38.3 requirements do not require individual cells to be tested to the T1-T4 tests ("component cells" may be tested within a battery, rather than individually). Therefore, to be considered compliant with IEC 62133 2nd edition, the cells shall have been tested individually.

For CB Scheme Certification purposes, clause 8.3.8 states: "Manufacturer's documentation can be provided to demonstrate compliance." Therefore, in lieu of a CTL decision to the contrary, either a CB Scheme certificate to IEC 62281, a test report from an ISO 17025 accredited laboratory, OR a report with evidence of equipment calibration, must be provided by the manufacturer and reviewed to demonstrate compliance. Intertek recommends that the manufacturer maintain

a copy of actual test reports as evidence of compliance, and to support any Declaration of Conformity.

8. Is IEC 62133 sufficient to CE-mark my battery?

First it is important to note that only certain European directives govern "CE-marking" of products. In general, portable batteries within the scope of IEC 62133 do not fall under the scope of the CE-marking directives. The major exception is for Smart batteries which contain active electronics; such batteries may fall under the scope of the EMC directive (and EMC-specific standards).

EN 62133 (the EU-adopted version of IEC 62133), covers electrical safety. Unless the battery has a charge or discharge voltage above 75 VDC, it is not covered by the scope of the Low Voltage Directive.

9. My battery is under 100watt-hours. Am I exempt from IEC 62133 certification testing?

The 100 watt hour limit is related to certain packaging, labelling, and shipping requirements and exceptions. Such batteries must still meet the UN 38.3 Transportation tests to qualify for these shipping exceptions. As for IEC 62133, there is no minimum/maximum capacity. If a rechargeable Lithium-ion battery is user-replaceable, portable, or used to power a portable device, then IEC 62133 would apply. Again, certification may or may not be mandatory, depending on the market and end-product where the battery is used.

10. Can a battery or cell already certified to UL 1642 or UL 2054 be considered to meet the IEC 62133 requirements?

Although the standards are similar in scope and testing, they are not identical. When applying for a CB scheme certification to IEC 62133, a full test to both the cell and battery requirements is necessary, per CB scheme decisions, as of June 2012. A reduced test plan may be used when applying for a US or Canadian listing to UL 62133 or CSA E62133, at the discretion of the NRTL.

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IEC 62133, 2nd Edition

Changes from the 1st to 2nd Edition



Valued Quality. Delivered.



Intertek offers a full service solution to the challenges you face in the Energy Storage industry. Let us be your primary source for standards updates. As new certification requirements surface – whether for batteries, component cells, or various end-products – we provide industry-leading testing, certification and regulatory services to ensure your product complies.

IEC 62133, 2nd Edition: The new standard was published in December 2012 and serves as a replacement for the 1st Edition (published in 2002). Intertek is fully equipped to partner with you through your transition, helping you to navigate the standard revisions and applicable safety requirements.

Certification Effects: As the primary changes are for Lithium-ion cells, battery assemblers should note that when certifying to the 2nd edition, they will need to be aware of the cell's existing certifications.

Effective Compliance Deadline: US, Canada, EU and several countries have adopted this standard, however timelines for compliance with the 2nd edition vary by region and end standards. Contact Intertek with your application to determine the best course of interim action.

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Which products are affected by the standard update?

- Consumer Electronics
- Household Appliances
- IT Equipment
- Laboratory Equipment
- Medical Devices
- Power Tools



NICKEL CADMIUM AND NICKEL METAL HYDRIDE CELLS AND BATTERIES

For these battery chemistries, only minimal changes have been made, and do not preclude design changes, but mainly clarify existing test requirements.

- 7.3.2 External Short Circuit**
 Requirement of <100milli-ohm for short circuit resistance has been adjusted to 80milli-ohm +/-20 (harmonizes with existing UL 1642/2054 requirements)
- 7.3.3 Free Fall, 7.3.4 Mechanical Shock**
 Add a 1 hour minimum wait after test before evaluating the sample

LITHIUM-ION BATTERIES

While the majority of changes will affect Li-ion chemistries, this results in a reduction of tests at the battery level.

- Lithium-ion Battery Sample Requirements**
 21 samples are required (1st edition required 31 samples)
- 8.1.2: Charging Procedure 2nd Procedure**
 Procedure requires preconditioning the cells or batteries at their temperature limits prior to short circuit tests
- 8.3.2: Short Circuit**
 Only test at 55C ambient, using cells charged per 8.1.2
 1-hour additional duration added when the battery achieves steady state
- 8.3.3 Free Fall**
 +20C ambient temperature defined, 1-hour minimum post-test waiting period added
- 8.3.6 Overcharge**
 This test now applies to batteries rather than cells
 Uses 2C charge rate and ends upon achieving full charge or steady state temperature is achieved
- LITHIUM-ION CELLS**
 Majority of changes in IEC 62133 2nd edition affect Lithium Ion cells.
- Lithium-ion Cell Sample Requirements**
 43 to 53 samples, plus those used for UN transportation tests (1st edition required 61-81 samples)
- 8.1.2: Charging Procedure 2nd Procedure**
 Procedure requires preconditioning the cells or batteries at their temperature limits prior to short circuit, thermal abuse, crush or forced internal short tests
- 8.2.1: Continuous Charge**
 Test has been reduced to 7-days for lithium cells (previously 28-days in 1st edition)
- 8.3.1 Short Circuit for Cells**
 Charging procedure 8.1.2 now applies
 Shorting resistance clarified as 80mohm +/-20 (harmonized with existing UL 1642/2054 requirements)
- 8.3.3 Free Fall**
 +20C ambient temperature defined, 1-hour minimum post-test waiting period added.
- 8.3.4 Thermal Abuse**
 Charging procedure 8.1.2 now applies
 Thermal test itself is unchanged
- 8.3.5 Crush**
 Charging procedure 8.1.2 now applies, with cells tested immediately after temperature conditioning
 End point of 10% deformation added
 Prismatic cells only crushed on wide side
- 8.3.8: Transport Tests**
 UN 38.3 (UN Manual of Test and Criteria) replaces 1st edition Low Pressure, Temperature Cycling, Vibration and Mechanical Shock requirements
 May be tested separately from IEC 62133
- 8.3.9 Forced Internal Short Circuit**
 Only applies to cylindrical cells, and only for use in France, Japan, Korea and Switzerland
 Test requires a specially modified cell and then charging of the cell, followed by a precision crush of the cell to simulate an internal short circuit

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