

© Copyright SEK. Reproduction in any form without permission is prohibited.

## Laddningsbara alkaliska celler och batterier – Litiumceller och litiumbatterier för bärbara tillämpningar

*Secondary cells and batteries containing alkaline or other non-acid electrolytes –  
Secondary lithium cells and batteries for portable applications*

Som svensk standard gäller europastandarden EN 61960:2011. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61960:2011.

### Nationellt förord

Europastandarden EN 61960:2011

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61960, Second edition, 2011 - Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61960, utgåva 1, 2004, gäller ej fr o m 2014-07-21.

### *Standarder underlättar utvecklingen och höjer elsäkerheten*

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

### *SEK är Sveriges röst i standardiseringsarbetet inom elområdet*

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

### *Stora delar av arbetet sker internationellt*

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

### *Var med och påverka!*

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

### **SEK Svensk Elstandard**

Box 1284  
164 29 Kista  
Tel 08-444 14 00  
[www.elstandard.se](http://www.elstandard.se)

English version

**Secondary cells and batteries containing alkaline or other non-acid electrolytes -  
Secondary lithium cells and batteries for portable applications  
(IEC 61960:2011)**

Accumulateurs alcalins et autres  
accumulateurs à électrolyte non acide -  
Eléments et batteries d'accumulateurs au  
lithium pour applications portables  
(CEI 61960:2011)

Akkumulatoren und Batterien mit  
alkalischen oder anderen  
nichtsäurehaltigen Elektrolyten -  
Lithium-Akkumulatoren und -batterien für  
tragbare Geräte  
(IEC 61960:2011)

This European Standard was approved by CENELEC on 2011-07-21. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## Foreword

The text of document 21A/486/FDIS, future edition 2 of IEC 61960, prepared by SC 21A, Secondary cells and batteries containing alkaline or other non-acid electrolytes, of IEC TC 21, Secondary cells and batteries, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61960 on 2011-07-21.

This European Standard supersedes EN 61960:2004.

EN 61960:2011 includes the following significant technical changes with respect to EN 61960:2004:

- 7.6 Endurance in cycles: addition of an accelerated test procedure.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-04-21
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-07-21

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 61960:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

|                  |      |                                |
|------------------|------|--------------------------------|
| IEC 60051 series | NOTE | Harmonized in EN 60051 series. |
| IEC 61434        | NOTE | Harmonized as EN 61434.        |
| IEC 61959        | NOTE | Harmonized as EN 61959.        |
| IEC 62133        | NOTE | Harmonized as EN 62133.        |
| IEC 62281        | NOTE | Harmonized as EN 62281.        |

---

**Annex ZA**  
(normative)

**Normative references to international publications  
with their corresponding European publications**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u> | <u>Year</u> | <u>Title</u>   | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-------------|--|--------------|-------------|
| IEC 60050-482      | -           | International Electrotechnical Vocabulary - Part 482: Primary and secondary cells and batteries                            | -            | -           |
| IEC 61000-4-2      | -           | Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test | EN 61000-4-2 | -           |

## CONTENTS

|       |  |    |
|-------|--|----|
| 1     | Scope.....   | 5  |
| 2     | Normative references .....   | 5  |
| 3     | Terms and definitions .....  | 5  |
| 4     | Parameter measurement tolerances .....   | 6  |
| 5     | Cell designation and marking.....  | 7  |
| 5.1   | Cell and battery designation .....   | 7  |
| 5.2   | Cell or battery termination .....  | 8  |
| 5.3   | Marking .....  | 8  |
| 6     | Standard cells .....   | 8  |
| 7     | Electrical tests.....  | 8  |
| 7.1   | General .....  | 8  |
| 7.2   | Charging procedure for test purposes.....  | 9  |
| 7.3   | Discharge performance .....  | 9  |
| 7.3.1 | Discharge performance at 20 °C (rated capacity).....   | 9  |
| 7.3.2 | Discharge performance at –20 °C .....  | 9  |
| 7.3.3 | High rate discharge performance at 20 °C .....   | 9  |
| 7.4   | Charge (capacity) retention and recovery .....   | 10 |
| 7.5   | Charge (capacity) recovery after long term storage .....   | 10 |
| 7.6   | Endurance in cycles .....  | 11 |
| 7.6.1 | General .....  | 11 |
| 7.6.2 | Endurance in cycles at a rate of 0,2 $I_t$ A .....   | 11 |
| 7.6.3 | Endurance in cycles at a rate of 0,5 $I_t$ A (accelerated test procedure).....                       | 11 |
| 7.7   | Battery internal resistance.....   | 11 |
| 7.7.1 | General .....  | 11 |
| 7.7.2 | Measurement of the internal a.c. resistance.....   | 12 |
| 7.7.3 | Measurement of the internal d.c. resistance.....   | 12 |
| 7.8   | Electrostatic discharge (ESD).....   | 13 |
| 7.8.1 | General .....  | 13 |
| 7.8.2 | Test procedure .....   | 13 |
| 7.8.3 | Acceptance criterion .....   | 13 |
| 8     | Test protocol and conditions for type approval.....  | 13 |
| 8.1   | Test protocol .....  | 13 |
| 8.2   | Conditions for type approval.....  | 13 |
| 8.2.1 | Dimensions .....   | 13 |
| 8.2.2 | Electrical tests.....  | 13 |
| 8.2.3 | Conditional type approval .....  | 14 |
|       | Bibliography.....  | 17 |
|       | Table 1 – Standard secondary lithium cells .....   | 8  |
|       | Table 2 – Endurance in cycles at a rate of 0,2 $I_t$ A .....   | 11 |
|       | Table 3 – Endurance in cycles at a rate of 0,5 $I_t$ A .....   | 11 |
|       | Table 4 – Sample sizes and sequence of tests.....  | 15 |
|       | Table 5 – Minimum requirements for each type of standard secondary lithium cells and batteries ..... | 16 |

# **SECONDARY CELLS AND BATTERIES CONTAINING ALKALINE OR OTHER NON-ACID ELECTROLYTES – SECONDARY LITHIUM CELLS AND BATTERIES FOR PORTABLE APPLICATIONS**

## **1 Scope**

This International Standard specifies performance tests, designations, markings, dimensions and other requirements for secondary lithium single cells and batteries for portable applications.

The objective of this standard is to provide the purchasers and users of secondary lithium cells and batteries with a set of criteria with which they can judge the performance of secondary lithium cells and batteries offered by various manufacturers.

This standard defines a minimum required level of performance and a standardized methodology by which testing is performed and the results of this testing reported to the user. Hence, users will be able to establish the viability of commercially available cells and batteries via the declared specification and thus be able to select the cell or battery best suited for their intended application.

This standard covers secondary lithium cells and batteries with a range of chemistries. Each electrochemical couple has a characteristic voltage range over which it releases its electrical capacity, a characteristic nominal voltage and a characteristic end-of-discharge voltage during discharge. Users of secondary lithium cells and batteries are requested to consult the manufacturer for advice.

## **2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-482, *International Electrotechnical Vocabulary (IEV) – Part 482: Primary and secondary cells and batteries*

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*