
Varnostne zahteve za sekundarne baterije in baterijske naprave - 1. del: Splošne varnostne informacije

Safety requirements for secondary batteries and battery installations - Part 1: General safety information

Sicherheitsanforderungen an Batterien und Batterieanlagen - Teil 1: Allgemeine Sicherheitsinformationen

Règles de sécurité pour les batteries et les installations de batteries - Partie 1: Information générale de sécurité

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Kislinski sekundarni členi in
baterije

Acid secondary cells and
batteries

SIST EN 50272-1:2010

en

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Safety requirements for secondary batteries and battery installations - Part 1: General safety information

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les installations de batteries -
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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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 21X, Secondary cells and batteries. It was submitted to the formal vote and was approved by CENELEC as EN 50272-1 on 2010-10-01.

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) 2011-10-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2013-10-01

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1 Scope

This European Standard is Part 1 of EN 50272 under the generic title “*Safety requirements for secondary batteries and battery installations*” with nominal voltages up to DC 1 500 V (low voltage directive) and specifies the basic requirements referred to in the other parts of the standard as follows:

- Part 2 Stationary batteries
- Part 3 Traction batteries
- Part 4 Batteries for use in portable appliances

The requirements regarding safety, reliability, life expectancy, mechanical strength, cycle stability, internal resistance, and battery temperature, are determined by various applications, and this, in turn, determines the selection of the battery design and technology.

In general, the requirements and definitions are specified for lead-acid and nickel-cadmium batteries. For other battery systems, the requirements may be applied accordingly.

The standard covers safety aspects taking into account hazards associated with:

- electricity (installation, charging, discharging, etc.);
- electrolyte;
- inflammable gas mixtures;
- storage and transportation.

With respect to electrical safety, reference is made to EN 60364-4-41.

2 Normative references

(standards.iteh.ai)

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.

EN 50272-2	Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries
EN 50272-3	Safety requirements for secondary batteries and battery installations - Part 3: Traction batteries
EN 50272-4	Safety requirements for secondary batteries and battery installations - Part 4: Batteries for use in portable appliances
EN 60364-4-41	Electrical installations of buildings - Part 4: Protection for safety - Chapter 41: Protection against electric shock (IEC 60364-4-41)
EN 61429:1996 + A11:1998	Marking of secondary cells and batteries with the international recycling symbol ISO 7000-1135 and indications regarding directives 93/86/EEC and 91/157/EEC (IEC 61429:1995)
EN 62281	Safety of primary and secondary lithium cells and batteries during transport (IEC 62281)
IEC 60050-482	International Electrotechnical Vocabulary - Chapter 482: Primary and secondary cells and batteries
IEC 60993 series	Electrolyte for vented nickel-cadmium cells

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-482 and the following apply.

3.1

stationary battery / stationary battery installation

stationary batteries are installed in a fixed location and not generally intended to be moved from place to place. They are permanently connected to both the load and the power supply and are incorporated into stationary equipment or installed in battery rooms for use in telecom, uninterruptible power supply (UPS), utility switching, emergency power or similar applications

3.2

traction battery

a secondary battery which is designed to provide the propulsion energy for electrical vehicles

3.3

cranking battery

cranking batteries are used for starting of internal combustion engines in stationary, railway or other onboard applications

3.4

starter battery

starter batteries are primarily used as a power source for the starting of internal combustion engines, lighting and also for auxiliary equipment of internal combustion engine vehicles

3.5

onboard battery

batteries used for power supply of a DC network onboard ships, rail vehicles or off-road vehicles without authorization for public traffic

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3.6

aircraft battery

batteries used in aircrafts and helicopters for starting auxiliary engine and powering DC network

3.7

portable battery

portable batteries are mainly used for power supply of portable appliances

NOTE Batteries for portable equipment are usually maintenance-free.

3.8

battery room

room in a building dedicated for the accommodation of stationary batteries

3.9

battery enclosure

enclosure designed for the accommodation of batteries to protect against environmental impacts, unauthorised access of persons and hazards caused by the batteries

3.9.1

battery cabinet

enclosure equipped with lockable or non-lockable doors for servicing the battery. The cabinet can be completely or partly filled with batteries or can be equipped with additional electric or electronic devices respectively

3.9.2

battery shelter

battery enclosure for outdoor installations. It can be designed as a movable unit for transportation

3.9.3**battery box**

closed box designed for the accommodation of batteries. They can form an integral part or parts of other equipment

3.10**mode of operation**

batteries require different type of charging and discharging depending on the type of application. The following modes of operation are typical:

- battery / cycle operation (charge / discharge operation)

The load is powered by the battery only, after the battery has been charged. This can be permanently repeated (cycle operation);

- response mode operation (switch mode operation)

In case of power failure the load is switched to the fully charged battery. The battery is charged by a separate charger;

- parallel operation mode. Battery, load and charger are permanently connected and operated in parallel. In case of power failure the load is continuously powered without any interruption by discharging the battery

3.11**charge of a battery**

operation during which a secondary cell or battery is supplied with electric energy from an external circuit which results in chemical changes within the cell and thus storage of energy as chemical energy [IEV 482-05-27 MOD]

3.12**discharge of a battery**

operation by which a secondary cell or battery delivers to an external electric circuit and under specified conditions electric energy produced in the cells [IEV 482-03-23 MOD]

4 General Information**4.1 General**

The technical characteristics of secondary cells are listed in Table 1. The different electro-chemical systems have acidic, alkaline, non-aqueous or solid electrolyte. These electro-chemical systems generate different voltages depending on the type of positive and negative electrodes and the type of electrolyte. For each of the systems a nominal voltage is defined.

During operation some systems may generate and release gasses, which may be hazardous under certain conditions and require specific protective measures.

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Table 1 – Electrochemical couples (secondary cells)

Battery system	Designation of System Components						Nominal voltage [V]	Gassing voltage [V]	Simplified equation of cell reaction charged condition → discharged condition
	Electrodes	Electrolyte	Active mass of electrodes						
			charged		discharged				
			positive	negative	positive	negative			
Lead-acid	Pb / PbO ₂	H ₂ SO ₄	PbO ₂	Pb	PbSO ₄	PbSO ₄	2,00	≈ 2,40	PbO ₂ + Pb + 2H ₂ SO ₄ → 2PbSO ₄ + 2H ₂ O
Nickel-cadmium	Ni / Cd	KOH / NaOH	NiOOH	Cd	Ni(OH) ₂	Cd(OH) ₂	1,20	≈ 1,55	2NiOOH + Cd + 2H ₂ O → 2Ni(OH) ₂ + Cd(OH) ₂
Ni-metal-hydride	Ni/MH	KOH	NiOOH	H ₂	Ni(OH) ₂	H ₂ O	1,20	≈ 1,55	2(NiOOH•H ₂ O) + H ₂ → 2Ni(OH) ₂ + 2H ₂ O
Nickel-iron	Ni / Fe	KOH	NiOOH	Fe	Ni(OH) ₂	Fe(OH) ₂	1,20	≈ 1,70	2NiOOH + Fe + 2H ₂ O → 2Ni(OH) ₂ + Fe(OH) ₂
Silver-zinc	Ag / Zn	KOH	AgO	Zn	Ag	Zn(OH) ₂	1,55	≈ 2,05	AgO + Zn + H ₂ O → Ag + Zn(OH) ₂
Lithium-systems	Li _x / C	non-aqueous	Li _{1-x} MetO ₂ + xLi	C	LiMetO ₂	C+xLi	3,60 ^a	none ^b	Li _{1-x} MO ₂ +CLi _x → LiMO ₂ +C

^a Typical nominal voltage.

^b Li or Li-Ion cells have a limiting voltage specified by the manufacturer.

Table 2 - Preferred fields of application of secondary battery design

Field of application	Stationary battery EN 50272-2	Traction battery EN 50272-3	Portable battery EN 50272-4
Telecommunication	<input checked="" type="checkbox"/>		
Power plants / Substations	<input checked="" type="checkbox"/>		
DC power supply systems alarm system, signal systems, railway crossings, etc.	<input checked="" type="checkbox"/>		
Emergency power supply	<input checked="" type="checkbox"/>		
UPS systems	<input checked="" type="checkbox"/>		
Starting of internal combustion engines (cranking battery)	<input checked="" type="checkbox"/>		
PV solar systems	<input checked="" type="checkbox"/>		
Forklift trucks / Electric handling machines /		<input checked="" type="checkbox"/>	
Automatic guided vehicles Mobile robots		<input checked="" type="checkbox"/>	
Cleaning machines Wheel chairs		<input checked="" type="checkbox"/>	
Explosion proof batteries mining batteries		<input checked="" type="checkbox"/>	
Leisure type batteries, e.g. Caravans, boats, yachts		<input checked="" type="checkbox"/>	
Batteries onboard ships (boats), railway and other vehicles	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Portable appliances			<input checked="" type="checkbox"/>
General purpose batteries	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

4.2 Charge

4.2.1 General

After a discharge, Secondary Batteries can be recharged by use of a suitable DC power source. Normally batteries supply the energy for a specified time period to appliances, systems or vehicles independent from the mains power supply.