



SLOVENSKI STANDARD

SIST EN 60095-1:1997

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Svinčeno-kislinske zagonske baterije - 1. del: Splošne zahteve in metode preskušanja (IEC 60095-1:1988, prilagojen + popravek 1990)

Lead-acid starter batteries -- Part 1: General requirements and methods of test

Blei-Starterbatterien -- Teil 1: Allgemeine Anforderungen und Prüfungen

Batteries d'accumulateurs de démarrage au plomb -- Partie 1: Prescriptions générales et méthodes d'essai

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EUROPEAN STANDARD

EN 60095-1

NORME EUROPEENNE

EUROPÄISCHE NORM

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Descriptors: Lead-acid battery, starter battery, identification, labelling, electrical characteristics, mechanical characteristics, test conditions, test methods, tests

ENGLISH VERSION

Lead-acid starter batteries

Part 1: General requirements and methods of test
(IEC 95-1:1988, modified + Corrigendum 1990)

Batteries d'accumulateurs de
démarrage au plomb
Partie 1: Prescriptions
générales et méthodes d'essais
(CEI 95-1:1988, modifiée
+ corrigendum 1990)

Blei-Starterbatterien
Teil 1: Allgemeine Anforderungen
und Prüfungen
(IEC 95-1:1988, modifiziert
+ Corrigendum 1990)

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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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B-1050 Brussels

FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 95-1:1988 and its corrigendum April 1990 could be accepted without textual changes, has shown that some common modifications were necessary for the acceptance as European Standard.

The reference document, together with the common modifications prepared by the CENELEC Technical Committee TC 21X, Secondary cells and batteries was submitted to the Unique Acceptance Procedure (UAP) in May 1992 and was approved by CENELEC as EN 60095-1 on 9 March 1993.

In this European Standard the common modifications to the International Standard are indicated by a vertical line in the left margin of the text.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1994-03-01
- latest date of withdrawal of conflicting national standards (dow) 1994-03-01

For products which have complied with the relevant national standard before 1994-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-03-01.

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Annexes designated "normative" are part of the body of the standard. In this standard, annex ZA is normative.



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Section one. General

1.1 Scope

This standard is applicable to lead-acid batteries with a nominal voltage of 12 V, used primarily as a power source for the starting of internal combustion engines, lighting and also for auxiliary equipment of internal combustion engine vehicles. These batteries are commonly called "starter batteries". Batteries with a nominal voltage of 6 V are also included within the scope of this standard. All referenced voltages have to be divided by two for 6 V batteries.

This standard is applicable to batteries for the following purposes:

- batteries for passenger cars;
- batteries for commercial and industrial vehicles for normal use;
- batteries for commercial and industrial vehicles for severe use.

This standard is not applicable to batteries for other purposes, for example the starting of railcar internal combustion engines.

1.2 Object

The object of this standard is to specify:

- general requirements;
- certain essential functional characteristics, the relevant test methods and results required, for several classes of starter batteries.

1.3 Electrolyte density and open circuit voltage

The density of the electrolyte in all batteries, when fully charged shall be in the range 1,27 kg/l to 1,30 kg/l at 25 °C unless otherwise specified by the manufacturer.

The open circuit voltage (OCV), when fully charged, but after a minimum 24 h stand on open circuit, shall be in the range 12,70 V to 12,90 V at 25 °C unless otherwise specified by the manufacturer.

Either the manufacturer shall specify the electrolyte density (or OCV) and tolerance, or if such information is not available, battery testing shall be carried out with a density of $(1,28 \pm 0,01)$ kg/l at 25 °C or an OCV of $12,76 \text{ V} \pm 0,06 \text{ V}$ at 25 °C.

1.4 Condition on delivery

New batteries may be supplied either:

- in a state ready for use, filled with the appropriate electrolyte to the maximum level. After an initial charge (according to sub-clause 4.2.1), the electrolyte density or OCV shall be within the ranges specified in clause 1.3;
- in a dry-charged state not filled with electrolyte. The density of the acid to fill such batteries before use shall be in the range 1,27 kg/l to 1,30 kg/l at 25 °C unless otherwise specified by the manufacturer.

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Section two. General requirements

2.1 Identification, labelling

Batteries according to this standard shall bear the following characteristics on at least one of their sides or on the top surface:

- a) the Euronumber (under development by CENELEC/TC 21X);
- b) identification of manufacturer or supplier;
- c) safety precautions;
- d) the nominal voltage, i.e. 12 V or 6 V;
- e) the capacity:
 - either nominal capacity C_n (Ah) (see sub-clause 3.1.2);
 - or nominal reserve capacity $C_{r,n}$ (min) (see sub-clause 3.1.2).

The values of C_n or $C_{r,n}$ for all batteries shall correspond to the electrolyte density or OCV given in clause 1.3.

- f) the nominal cranking current I_{cc} (see sub-clause 3.1.1).

NOTE: Batteries may be marked with other information such as the filling and charging date (see 4.1).

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2.2 Marking of the polarity

According to EN 60095-2 (section 5, clause 14) the positive terminal shall be identified by a + mark on the cover or on the terminal itself.

2.3 Additional designation

Starter batteries may be designated as "low water loss (EN)" if they comply with the requirements of clause 5.8 and the requirement 2 in sub-clause 5.5.3.

2.4 Not used

Section three. Functional characteristics

For general definitions of terms see Chapter 486 of the International Electrotechnical Vocabulary (IEV) (IEC Publication 50 (486)).

3.1 Electrical characteristics

3.1.1 The *cranking current* is the discharge current I_{cc} to be indicated by the manufacturer which a battery can supply at $-18\text{ }^{\circ}\text{C}$ for 10 s to a minimum voltage $U_f = 7,5\text{ V}$ and complying with requirements of sub-clause 5.3.

3.1.2 The *capacity* of a starter battery is defined for the temperature of $(25 \pm 2)\text{ }^{\circ}\text{C}$.

It may be indicated by the manufacturer either as:

- nominal capacity C_n (Ah) or as
- nominal reserve capacity $C_{r,n}$ (min).

The *nominal capacity* C_n is the electric charge (in Ah) which a battery can supply with a current:

$$I_n = \frac{C_n}{20}$$

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to a final voltage $U_f = 10,5\text{ V}$.

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The *effective capacity* C_e shall be determined by discharging a battery with constant current I_n to $U_f = 10,5\text{ V}$ (see clause 5.1).

The *nominal reserve capacity* $C_{r,n}$ is the period of time (in minutes) for which a battery can maintain a discharge of 25 A to a cut-off voltage $U_f = 10,5\text{ V}$.

The *effective reserve capacity* $C_{r,e}$ shall be determined by discharging a battery with the constant current $I = 25\text{ A}$ to $U_f = 10,5\text{ V}$ (see clause 5.2).

NOTE: For the correlation (relationship) of C_n and $C_{r,n}$ see appendix A.

3.1.3 The *charge acceptance* is expressed as the current I_{ca} which a partially discharged battery takes up at $0\text{ }^{\circ}\text{C}$ and at constant voltage of 14,4 V. (See clause 5.4).

3.1.4 *Charge retention* is defined as the cold cranking performance of the charged and filled battery after storage on open circuit under defined conditions (temperature, time) (see clause 5.5).

3.1.5 *Endurance in cycles* represents the ability of a battery to perform repeated discharge/recharge cycles and long rest periods on open circuit. This ability shall be tested by a series of cycles and rest periods under specified conditions after which the cold cranking performance shall be determined (see clause 5.6).

3.1.6 *Water consumption*: is defined as g/Ah C_e or g/min $C_{r,e}$ (see sub-clauses 3.1.2 and 5.8).

3.1.7 *Dry-charged battery*: A new battery may be designated as dry-charged if it can be activated - ready for service - by filling it with the defined electrolyte (see clauses 1.3 and 1.4) and in accordance with any specific instructions from the manufacturer and if it then conforms to the requirements of clause 5.11.

3.2 Mechanical characteristics

3.2.1 *Vibration resistance* represents the ability of a battery to maintain service under acceleration forces. Requirements are verified by the test defined in clause 5.9.

3.2.2 *Electrolyte retention* is the ability of a battery to retain electrolyte under specified mechanical conditions (see clause 5.10).

Section four. General test conditions

4.1 Sampling of batteries

All tests shall be carried out on new battery samples. Samples shall be considered as new not later than:

- 30 days after the acid filling and formation date in the case of filled and charged batteries;
- 60 days after shipment date of the manufacturer in the case of dry-charged batteries.

4.2 Preparation of batteries prior to test - Definition of a fully-charged battery

All tests - except that in clause 5.11 - shall commence with fully-charged batteries.

Batteries shall be considered as fully-charged if they have undergone the charging procedure of sub-clause 4.2.1.

4.2.1 Charging

The battery shall be charged at a voltage of $16 \text{ V} \pm 0,1 \text{ V}$ for 24 h with the maximum current limited to $5I_n$ (see sub-clause 3.1.2). The battery temperature shall be maintained in the range $25 \text{ }^\circ\text{C}$ to $35 \text{ }^\circ\text{C}$. If necessary, an appropriate environmental control system shall be used, e.g. water baths.

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In the case of recharging after a test for cranking performance (according to clause 5.3) the charging time may be limited to 16 h.

4.3 Activation of dry-charged batteries

Dry-charged batteries shall be filled with the defined electrolyte (according to sub-clause 1.4) to the maximum level indicated by internal or external marks or according to the manufacturer's activation instructions. Any additional manufacturer's recommended activation instructions shall be complied with.

4.4 Measuring instruments

4.4.1 Electrical measuring instruments

The range of instruments used shall be appropriate for the magnitude of the voltage or current to be measured.