SLOVENSKI STANDARD

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Svinļeve starterske baterije ï 1. del: Sploġne zahteve in preskusne metode

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

Blei-Akkumulatoren-Starterbatterien -- Teil 1: Allgemeine Anforderungen und Prfungen

Batteries d'accumulateurs de dmarrage au plomb -- Partie 1: Prescriptions gnrales et mthodes d'essais

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English version

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

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

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

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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.

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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. A draft amendment (prA4) to EN 50342:2001 was submitted to the Unique Acceptance Procedure and was approved by CENELEC on 2004-12-01 to be combined with the existing documents and published as EN 50342-1.

This European Standard supersedes EN 50342:2001 + A1:2001 + A2:2001 + corrigendum March 2003 + A3:2004 and is the result of a detailed review of the existing documents resulting in a series of changes of an editorial nature designed to make it more clearly defined and consistent.

Annex A of EN 50342:2001, which described the European Type Number for starter batteries (ETN), was removed due to the cessation of its operation by an external company.

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)	2006-11-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-12-01

Contents

1 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 and types of starter batteries.

1.3 Designation of starter batteries - Electrolyte density and open circuit voltage

1.3.1 Batteries are classified according to their types

– vented (flooded) battery: a secondary battery having a cover provided with one or more openings through which gaseous products may escape;

– valve regulated (with gas recombination) battery (VRLA): a secondary battery which is closed under normal conditions but which has an arrangement that allows the escape of gas if the internal pressure exceeds a predetermined value. The battery cannot receive addition to the electrolyte.

  In this type of battery, the electrolyte is immobilised.

1.3.2 Electrolyte density and open circuit voltage

The density of the electrolyte in all fully charged vented batteries 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), of fully charged batteries after a minimum 24 h stand on open circuit, shall be in the range 12,70 V to 12,90 V for vented types and 12,80 V minimum for valve regulated types at 25 °C unless otherwise specified by the manufacturer.

The manufacturer shall specify the electrolyte density (or OCV) and tolerance. If such information is not available, vented battery testing shall be carried out with a density of 1,28 kg/l ± 0,01 kg/l at 25 °C or an OCV of 12,76 V ± 0,06 V at 25 °C and valve regulated battery testing shall be carried out with a minimum OCV of 12,80 V.

1.4 Condition on delivery

New vented 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 4.2.1), the electrolyte density or OCV shall be within the ranges specified in 1.3;

– or 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.

Valve regulated batteries are normally supplied in a state ready for use. For these batteries the electrolyte is not accessible and therefore its density cannot be checked.

2 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 identification of manufacturer or supplier;

b) the nominal voltage, i.e. 12 V or 6 V;

c) the capacity:

– either nominal capacity C_n (Ah) (see 3.1.2);

– or nominal reserve capacity $C_{r,n}$ (min) (see 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 1.3;

d) the nominal cranking current I_{cc} (see 3.1.1);

e) the six coloured symbols as specified in Annex A, Safety labelling;

f) the marking for the separate collection and recycling according to EN 61429;

g) valve regulated batteries shall be marked ‘VRLA'.

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

2.2 Marking of the polarity

This shall be in accordance with:

EN 60095-2 Part 2: Dimensions of batteries and dimensions and marking of terminals

EN 60095-4 Part 4: Dimensions of batteries for heavy commercial vehicles

2.3 Additional designation

Vented starter batteries may be designated as "low water loss" or "very low water loss" according to this European Standard if they comply with the corresponding requirements of 5.8.1 and the requirement in 5.5.2.

3 Functional characteristics

For general definitions of terms see Part 482 of the International Electrotechnical Vocabulary (IEV) (IEC 60050-482).

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 °C for 10 s to a minimum voltage U_f = 7,50 V and complying with requirements of 5.3.

3.1.2 The *capacity* of a starter battery is defined for the temperature of 25 °C ± 2 °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 20 hour capacity* C_n is the electric charge (in Ah) that a battery can supply with a current:

$$I_n = \frac{C_n}{20} \text{ (A)}$$

to a final voltage U_f = 10,50 V.

The *effective capacity* C_e shall be determined by discharging a battery with constant current I_n to U_f = 10,50 V (see 5.1).

The nominal reserve capacity $C_{r,n}$ is the time (in minutes) that a battery can maintain a discharge of 25 A to a cut-off voltage U_f = 10,50 V.

The *effective reserve capacity* $C_{r,e}$ shall be determined by discharging a battery with the constant current I = 25 A to U_f = 10,50 V (see 5.2).

NOTE For the correlation (relationship) of C_n and $C_{r,n}$, see Annex B.

3.1.3 The *charge acceptance* is expressed as the current I_{ca} which a partially discharged battery accepts at 0 °C and a constant voltage of 14,40 V (see 5.4).

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

3.1.5 The *endurance test* consists of two parts

3.1.5.1 *Corrosion test* represents the ability of a battery to perform repeated overcharge/storage periods (see 5.6 and 5.7).

3.1.5.2 *Cycling test* 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 5.6 and 5.7).

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

Valve regulated batteries have a very low water consumption and are not intended to receive addition to the electrolyte (see 5.8.2).

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 1.3 and 1.4) and in accordance with any specific instructions from the manufacturer and if it then conforms to the requirements of 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 5.9.

3.2.2 *Electrolyte retention* is the ability of a battery to retain electrolyte under specified mechanical conditions (see 5.10). Valve regulated batteries are submitted to a special test (see 5.10.2).

4 General test conditions

4.1 Sampling of batteries

All tests shall be carried out on new battery samples. Samples shall be considered as new no 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 5.11, shall commence with fully-charged batteries.

Batteries shall be considered as fully-charged if they have undergone the charging procedures of 4.2.1 for vented batteries or 4.2.2 for valve regulated batteries.

4.2.1 Charging of vented batteries

The battery shall be charged at a voltage of 16,00 V ± 0,10 V for 24 h with the maximum current limited to 5 I_n (see 3.1.2). The battery temperature shall be maintained in the range 25 °C to 35 °C. If necessary, an appropriate environmental control system shall be used, e.g. a water bath.

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

4.2.2 Charging of valve regulated batteries

Unless otherwise recommended by the manufacturer, the battery shall be charged

– at a constant voltage of 14,40 V ± 0,01 V for 20 h with the maximum current limited to 5 I_n (see 3.1.2), and

– then with a constant current of 0,5 I_n for 4 h.

The temperature shall be maintained in the range 25 °C to 35 °C. If necessary an appropriate environmental control system shall be used, e.g. a water bath.

4.3 Activation of dry-charged batteries

Dry-charged batteries shall be filled with the defined electrolyte (according to 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.

– Voltage measurement

The instruments used for measuring voltages shall be digital voltmeters having an accuracy of ± 0,04 V or better.

– Current measurement

The instruments used for current measurement shall be digital ammeters having an accuracy of 1,0 % or better. The assembly of ammeter, shunt and leads shall have an overall accuracy of 1,0 % or better.

4.4.2 Temperature measurement

The thermometers used for measuring temperatures shall have an appropriate range, and the value of each scale division shall not be greater than 1 K. The accuracy of the calibration of the instruments shall be not less than 0,5 K.

4.4.3 Density measurement

The density of the electrolyte shall be measured with hydrometers furnished with a graduated scale, the value of each division of which is equal at most to 0,005 kg/l. The accuracy of calibration shall be to 0,005 kg/l or better.

4.4.4 Time measurement

The instruments used for measuring time shall be graduated in hours, minutes and seconds. They shall have an accuracy of at least ± 1 %.

4.5 Test sequence

4.5.1 Batteries filled and charged

Initially the batteries are subjected to the following series of tests:

1st C_e or $C_{r,e}$ check,

1st cranking performance test;

2nd C_e or $C_{r,e}$ check,

2nd cranking performance test;

3rd C_e or $C_{r,e}$ check,

3rd cranking performance test.

For C_e or $C_{r,e}$ and the cranking performance the specified values shall be met in at least one of the relevant discharges above.

NOTE It is not necessary to complete the sequence if the specified values are achieved on the first or second test other than for batteries that will subsequently be tested for charge acceptance.

If, and only if, the initial capacity and cranking tests are successful, the batteries shall be tested in accordance with the remainder of the test sequence given in Table 1.

These tests shall commence not later than one week after completion of the initial tests.

Table 1 – Test sequence

Battery	Subclause	1	2	3	4	5	6
1st C_e or $C_{r,e}$	5.1 or 5.2	X	X	X	X	X	X
1st cranking performance test	5.3	X	X	X	X	X	X
2nd C_e or $C_{r,e}$	5.1 or 5.2	(X)	(X)	(X)	X	(X)	(X)
2nd cranking performance test	5.3	(X)	(X)	(X)	X	(X)	(X)
3rd C_e or $C_{r,e}$	5.1 or 5.2	(X)	(X)	(X)	X	(X)	(X)
3rd cranking performance test	5.3	(X)	(X)	(X)	X	(X)	(X)
Endurance Corrosion	5.6 or 5.7	X					
Endurance Cycling	5.6 or 5.7		X				
Charge retention	5.5			X			
Charge acceptance	5.4				X		
Electrolyte retention	5.10				X		
Vibration resistance	5.9					X	
Water consumption [a]	5.8						X

[a] The test for water consumption should be applied only to “low water loss” and “very low water loss” vented batteries according to 2.3 and to valve regulated batteries.

NOTE (X) denotes that this test needs to be carried out if the previous same test did not achieve the required levels.