

Lead-acid starter batteries — General requirements, methods of test and numbering

The European Standard EN 50342:2001, with the incorporation of amendments A1:2001, A2:2001 and A3:2004, has the status of a British Standard

ICS 29.220.20

National foreword

This British Standard is the official English language version of EN 50342:2001, including amendments A1:2001, A2:2001, A3:2004 and Corrigendum March 2003. It supersedes BS EN 60095-1:1993, which is withdrawn.

The start and finish of text introduced by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee PEL/21, Secondary cells and batteries, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 12 September 2001

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
14552 Corrigendum No. 1	11 September 2003	Changes to Subclause 3.1.5 and Table 1.
16298	30 June 2006	See national foreword

© BSI 2006

ISBN 0 580 38467 5

Lead-acid starter batteries — General requirements, methods of test and numbering

(includes amendments A1:2001, A2:2001 and A3:2004)

Batteries d'accumulateurs de démarrage
au plomb —
Prescriptions générales, méthodes
d'essais et numérotation
(inclut les amendements A1:2001,
A2:2001 et A3:2004)

Blei-Akkumulatoren
Starterbatterien —
Allgemeine Anforderungen, Prüfungen
und Kennzeichnung
(enthält Änderungen A1:2001, A2:2001
und A3:2004)

This European Standard was approved by CENELEC on 2000-08-01. Amendment A1 was approved by CENELEC on 2000-09-01 and amendment A2 was approved by CENELEC on 2001-05-01. Amendment A3 was approved by CENELEC on 2004_02-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard and its amendment 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, 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

This European Standard was prepared by the Technical Committee CENELEC TC 21X, Secondary cells and batteries.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50342 on 2000-08-01.

This European Standard supersedes EN 60095-1:1993 + A2:1995 + A11:1995 + A12:1999 + A13:1997.

A draft for an amendment was submitted to the Unique Acceptance Procedure and was approved as amendment A1 to EN 50342 on 2000-09-01.

The following dates were fixed:

- latest date by which the EN and the amendment have to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2001-10-01
- latest date by which the national standards conflicting with the EN and the amendment have to be withdrawn (dow) 2003-04-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A, B, C and D are normative.

Foreword to amendment A3

This amendment was prepared by the Technical Committee CENELEC TC 21X, Secondary cells and batteries.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A3 to EN 50342:2001 on 2004-02-01.

The following dates were fixed:

- latest date by which the EN and the amendment have to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2005-02-01
- latest date by which the national standards conflicting with the EN and the amendment have to be withdrawn (dow) 2007-02-01

Contents

	Page
Foreword	2
1 General	4
1.1 Scope	4
1.2 Object	4
1.3 Designation of starter batteries — Electrolyte density and open circuit voltage	4
1.4 Condition on delivery	5
2 General requirements	5
2.1 Identification, labelling	5
2.2 Marking of the polarity	5
2.3 Additional designation	5
3 Functional characteristics	6
3.1 Electrical characteristics	6
3.2 Mechanical characteristics	7
4 General test conditions	7
4.1 Sampling of batteries	7
4.2 Preparation of batteries prior to test — Definition of a fully-charged battery	7
4.3 Activation of dry-charged batteries	7
4.4 Measuring instruments	8
4.5 Test sequence	8
5 Tests/methods and requirements	9
5.1 Capacity check C_e	9
5.2 Reserve capacity check $C_{r,e}$	10
5.3 Cranking performance test	10
5.4 Charge acceptance test	11
5.5 Charge retention test	11
5.6 Endurance tests for vented batteries	12
5.7 Water consumption test	15
5.8 Vibration resistance test	16
5.9 Electrolyte retention test	17
5.10 Cranking performance for dry-charged batteries after activation	17
Annex A (normative) European type number for starter batteries	18
Annex B (normative) Safety labelling — Definition of the six coloured symbols	21
Annex C (normative) Correlation between C_n et $C_{r,n}$	22
Annex D (normative) Normative references	23

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: a secondary battery which is closed under normal conditions but which has an arrangement which 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 immobilized.

1.3.2 Electrolyte density and open circuit voltage

The density of the electrolyte in all vented 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 for vented batteries and 12,80 V minimum for valve regulated batteries 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, vented battery testing shall be carried out with a density of 1,28 kg/l $\pm$ 0,01 kg/l at 25 °C or an OCV of 12,76 V $\pm$ 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;
- 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 European type number (see annex A);
- b) identification of manufacturer or supplier;
- c) the nominal voltage, i.e. 12 V or 6 V;
- d) 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;

- e) the nominal cranking current I_{cc} (see 3.1.1);
- f) safety labelling: batteries shall be marked with six coloured symbols as described in annex B;
- g) the marking for the separate collection and recycling according to EN 61429;
- h) valve regulated batteries shall bear a special indication.

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

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 lid or on the terminal itself.

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 5.7.1 and the requirement in 5.5.2. 

3 Functional characteristics

For general definitions of terms see Chapter 486 of the International Electrotechnical Vocabulary (IEV) (IEC 60050-486).

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 °C for 10 s to a minimum voltage $U_f = 7,50\text{ V}$ and complying with the requirements of 5.3.

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

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:

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

to a final voltage $U_f = 10,50\text{ V}$.

The *effective capacity* C_e shall be determined by discharging a battery with constant current I_n to $U_f = 10,50\text{ V}$ (see 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 $U_f = 10,50\text{ V}$.

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

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

3.1.3 The *charge acceptance* is expressed as the current I_{ca} which a partially discharged battery takes up at 0 °C and at a constant voltage of 14,4 V (see 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 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 5.6).

Endurance test in corrosion represents the ability of a battery to perform repeated overcharge/storage periods (see 5.6).

3.1.6 *Water consumption* is defined as g/Ah C_e or g/min $C_{r,e}$ (see 3.1.2 and 5.7).

Valve regulated batteries have a very low water consumption and are not intended to receive addition to the electrolyte (see 5.7.2).

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 5.10.