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Svinčeno-kislinske zaganjalne baterije - 1. del: Splošne zahteve in preskusne metode

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

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

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

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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

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European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50342-1:2015) has been prepared by CLC/TC 21X “Secondary cells and batteries”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2016-10-05
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2018-10-05

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This document supersedes EN 50342-1:2006.

EN 50342, *Lead-acid starter batteries*, is currently composed of the following parts:

- *Part 1: General requirements and methods of test* [the present document];
- *Part 2: Dimensions of batteries and marking of terminals*;
- *Part 3: Terminal system for batteries with 36 V nominal voltage*;
- *Part 4: Dimensions of batteries for heavy vehicles*;
- *Part 5: Properties of battery housings and handles*;
- *Part 6: Batteries for Micro-Cycle Applications* [currently at Formal Vote stage];
- *Part 7: General requirements and methods of tests for motorcycle batteries* [currently at Formal Vote stage].

EN 50342-1:2015 includes the following significant technical changes with respect to EN 50342-1:2006:

a) The following topics have been reworked/changed in the new version:

   1) simplified structure;

   2) correction of errors;

   3) updated to actual state of art of lead acid batteries;

   4) definition of new requirement levels and a new system for identification.

b) The following test procedures and requirements have been updated:

   1) charging procedure (reworked);

   2) cold cranking procedure (reworked);

3) charge retention (reworked);

4) deep discharge (new);

5) cycling (reworked);

6) water consumption;

7) vibration test procedures (reworked and new requirement level V4 added for heavy trucks).

1 Scope

This European 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 need to be divided by two for 6 V batteries.

This European Standard is applicable to batteries for the following purposes:

− batteries for passenger cars,

− batteries for commercial and industrial vehicles.

This European Standard is not applicable to batteries for other purposes, for example the starting of railcar internal combustion engines or for motorcycles.

2 Normative references

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

EN 50342–2, *Lead-acid starter batteries — Part 2: Dimensions of batteries and marking of terminals*

EN 50342–4, *Lead-acid starter batteries — Part 4: Dimensions of batteries for heavy vehicles*

EN 50342-5, *Lead-acid starter batteries — Part 5: Properties of battery housings and handles*

EN 50342–6, *Lead-acid starter batteries — Part 6: Batteries for Micro-Cycle Applications*

EN 61429, *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)*

IEC 60050–482, *International Electrotechnical Vocabulary — Part 482: Primary and secondary cells and batteries*

3 General

3.1 Introduction

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.

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

3.2 Designation of starter batteries

Batteries are classified according to their types.

3.2.1
flooded or vented batteries
secondary battery having a cover provided with one or more openings through which gaseous products may escape

3.2.2
Enhanced Flooded Batteries
EFB
secondary batteries with additional special design features to significantly improve the cycling capability compared to standard flooded batteries

Note 1 to entry: These batteries need to have a water consumption performance level of W3, W4 or W5.

3.2.3
Valve Regulated Lead-Acid batteries
VRLA
valve regulated lead-acid batteries are secondary batteries which are closed under normal conditions but which has an arrangement that allows the escape of gas if the internal pressure exceeds a predetermined value

Note 1 to entry: The battery cannot receive addition to the electrolyte. In VRLA batteries the electrolyte is immobilized.

3.2.4
Absorbent Glass Mat batteries
AGM
VRLA batteries in which the electrolyte is immobilized by absorption in a glass mat

3.2.5
gel batteries
VRLA batteries in which the electrolyte is immobilized by fixing as gel

3.3 Condition on delivery

3.3.1 Specific gravity of electrolyte and open circuit voltage

Specific gravity of electrolyte and open circuit voltage of a lead acid battery depend on its state of charge and temperature.

The specific gravity of the electrolyte of 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 of 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 to 13,00 V for valve regulated types at 25 °C unless otherwise specified by the manufacturer.

3.3.2 Definition of fully charged new battery

New vented batteries may be supplied:

- either in a state ready for use, filled with the appropriate electrolyte to the maximum level. 24 h after an initial charge (according to 5.2), the specific gravity of electrolyte or OCV shall be within the ranges specified in 3.3.1. In batteries with lids without plugs checking specific gravity of electrolyte is generally not possible. In these cases, only OCV shall be checked according to 3.3.1;

- or dry charged as defined in Clause 7.

Valve regulated batteries are normally supplied in a state ready for use. After an initial charge according to 5.2 followed by a 24 h rest period, the OCV shall be within the range specified in 3.3.1. For these batteries, the electrolyte is not accessible and therefore its specific gravity cannot be checked.

3.4 Electrical characteristics

3.4.1 The *cranking current* I_{cc}, to be indicated by the manufacturer, is the discharge current which the battery can supply at –18°C for 10 s to a minimum voltage U_f = 7,50 V and meeting requirements of a simulated cranking profile according to 6.2. It is used as well to check the high current discharge performance according to 6.3.

3.4.2 The *capacity* of a starter battery is defined for the temperature of 25 °C ± 2 °C. The nominal capacity C_n in this standard is a C20. It shall be indicated by the manufacturer as nominal 20 h capacity C20 (Ah).

The nominal 20 h capacity C_n is the electric charge (in Ah) that a battery can supply with a current:

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

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 6.1).

3.4.3 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 6.4).

3.4.4 *Charge retention* is measured by the high current discharge performance of the charged and filled battery after storage on open circuit under defined conditions of temperature and time (see 6.5).

3.4.5 The *Cycling test* represents the ability of a battery to perform repeated discharge / recharge cycles. This ability shall be tested by a series of cycles under specified conditions after which the cold cranking performance and the 20 h capacity shall be determined (see 6.6).

3.4.6 The *Corrosion test* checks the resistance of a battery against overcharging at increased temperatures (see 6.7)

3.4.7 The *Deep discharge* test represents the ability of battery to overcome an over discharge in a vehicle by small loads during parking for a long time (see 6.8)

3.4.8 *Water consumption* test checks if the battery can keep its performance under extended exposure to heat and overcharge conditions. It is measured as loss of weight during overcharge of a fully charged battery and is defined as g/Ah C_e (see 6.9).

3.5 Mechanical characteristics

3.5.1 *Vibration resistance* represents the ability of a battery to maintain service under acceleration forces. (see 6.10)

3.5.2 *Electrolyte retention* is the ability of a battery to retain electrolyte under specified mechanical conditions (see 6.11).

4 General requirements

4.1 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) nominal capacity C20 (Ah) (see 3.4.2),

The values of C20 for all batteries shall correspond to the specific gravity of electrolyte or OCV given in 3.3.1;

d) the nominal cranking current I_{cc} (see 3.4.1);

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'.

h) Date of production (this could be a part of more complex code too)

i) Requirement levels according to water consumption, charge retention, endurance and vibration as specified in Annex C

Batteries may be marked with other information such as the filling and charging date.

Label size: The capacity C20 (Ah) and the cold cranking current I_{cc} (A) shall be displayed on a separate label or as text on a combined label (e.g. together with additional information of the producer or type mark). The size of the label shall be at least 3 % of the largest side of the battery. The character size high should be at least 3 mm. The label shall be fixed on one of the four sides or on the lid. A multiple labelling is allowed.

For batteries for micro-cycle application: Specific identification according to EN 50342-6.

4.2 Marking of the polarity

This shall be in accordance with:

- EN 50342-2, *Lead-acid starter batteries — Part 2: Dimensions of batteries and marking of terminals*;

- EN 50342-4, *Lead-acid starter batteries — Part 4: Dimensions of batteries for heavy vehicles*.

5 General test conditions

5.1 Sampling of batteries

All tests shall be carried out on new battery samples. Samples shall be considered as new no later than:

- 30 d after the acid filling and formation date in the case of filled and charged batteries,

- 60 d after shipment date of the manufacturer in the case of dry-charged batteries.

Out of different production or sampling lots 7 batteries shall be selected for testing. Six of these batteries shall be used for the tests. In case of equipment failures or technical deviation, one battery can be replaced to repeat the complete sequence for this battery.

All tests shall be performed only if above conditions and conditions according to 3.3.2 are fulfilled.

5.2 Charging method - Definition of a fully-charged battery

All tests, except that in 7.3, shall commence with fully-charged batteries.

Batteries shall be considered as fully-charged if they have undergone the charging procedures. Prior to the first capacity test, the battery charge shall be limited to 16 h.

If not specified differently by the battery manufacturer, the batteries that will be tested according to this standard shall be charged according to Table 1.

Table 1 — Charging method

Battery Type	Voltage U_c	Current	Time	Battery temperature	Remarks
Flooded batteries having size according to EN 50342–2	16,00 V ± 0,05 V	5 I_n	24 h (16 h)[a]	15 °C to 35 °C	
Flooded batteries having size according to EN 50342–4	16,00 V ± 0,05 V	5 I_n	20 h (16 h)[a]	15 °C to 35 °C	Step 1
	no limitation	I_n	4 h (0 h)[a]	15 °C to 35 °C	Step 2
Valve regulated batteries	14,80 ± 0,05 V	5 I_n	24 h (16 h)[a]	15 °C to 35 °C	
[a] After cranking performance test and prior to first capacity check (Step 1 of present Table).					

All charges shall be performed with batteries in a water bath at 25 °C ± 2 °C according to 5.3.2.

NOTE Using the water bath, it is generally accepted that the battery temperature during the charge will be maintained in the required range.

5.3 Test equipment

5.3.1 Measuring instruments

The range of instruments used shall be appropriate for the magnitude of the parameters to be measured. The minimum accuracy of test equipment is given in Table 2.