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Svinčeno-kislinske zaganjalne baterije - 5. del: Lastnosti baterijskih ohišij in ročic

Lead-acid starter batteries - Part 5: Properties of battery housings and handles

Blei-Akkumulatoren-Starterbatterien - Teil 5: Eigenschaften der Batteriekästen und -griffe

Batteries d'accumulateurs de démarrage au plomb - Partie 5: Propriétés des poignées et des bacs et couvercles de batteries

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English Version

Lead-acid starter batteries - Part 5: Properties of battery housings and handles

Batteries d'accumulateurs de démarrage au plomb - Partie 5: Propriétés des poignées et des bacs et couvercles de batteries

Blei-Akkumulatoren-Starterbatterien - Teil 5: Eigenschaften der Batteriekästen und -griffe

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2024-05-24.

It has been drawn up by CLC/TC 21X.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 50342-5:2024) has been prepared by CLC/TC 21X, ”Secondary cells and batteries”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This document will supersede EN 50342-5:2010 and all of its amendments and corrigenda (if any).

1 Scope

This document is applicable to housing and accessory parts of lead-acid batteries made of polypropylene.

Lead-acid batteries are used primarily as a power source for the starting of internal combustion engines, lighting and for auxiliary equipment of road vehicles. These batteries are all referred to as starter batteries.

This document is applicable to starter batteries for passenger cars and for commercial or industrial vehicles.

Battery housing and accessory parts according to this document do not provide any protection of the polypropylene against aging due to light. The parts are intended to be used within the engine compartment or within battery boxes where they are protected from light.

The purpose of this document is to define requirements for raw material used to produce housing and accessory parts for starter batteries, to define requirements of the physical properties of battery housing and to define uniform test procedures for validation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 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*

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

EN ISO 527-1, *Plastics - Determination of tensile properties - Part 1: General principles (ISO 527-1)*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

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
battery case
container for the plate pack or packs and electrolyte of a cell or cells made of a material impervious to the electrolyte

[SOURCE: IEC 60050-482-02-14]

3.2
cell lid
battery lid
part used to close the case normally having holes for filling, topping-up, gas escape, terminals, etc

[SOURCE: IEC 60050-482-02-15]

3.3
battery housing
entity made of a battery case and a battery lid, intended to be welded together

3.4
battery accessories
any item coming on top of the battery housing (i.e. handles, plugs, etc.)

3.5
raw material
material defined by the substance used for the production of the battery housing and accessories

Note 1 to entry: It can be polypropylene (PP), polyethylene (PE) or a mixture of both. Raw material can be either a virgin material or a recycled, regenerated or regrind material.

3.6
hold-down
ledge at the lower part of the battery case for fixation within vehicle

Note 1 to entry: See EN 50342-2 and EN 50342-4 for dimensions.

4 Properties of raw materials

4.1 General

The examination of the raw materials should be performed in accordance to the specifications shown in Annex B. If not agreed otherwise, the results need to be documented in a corresponding material specification.

Test methods are based on international ISO standards. The needed specimens for the individual examination are given in Annex B.

The specimens shall be stored before starting any test for at least 4 days at (23° ± 0,5) °C and shall be tested within 3 months.

Annex C recommends possible test procedures for the material properties taken out of the battery housing, without being normative.

4.2 Resistance against chemical substances

The purpose of this test is to check if chemical substances which might be present in the vicinity of batteries and have some chemical affinity to PP can significantly weaken the material properties.

The test shall be carried out on specimens 5A according to EN ISO 527-2. The specimens are prepared by injection moulding and shall be aged at 100 °C for 4d before starting the test.

Each sample shall be weighed and all samples for one liquid are treated together under reflux at a temperature and time according to Table 1.

In Annex E a laboratory equipment for heat treatment under reflux is depicted.

For statistical reasons the test shall be carried out on at least 6 samples

After treatment each sample shall be dried, weighed and tested on tensile strength at yield according to EN ISO 527-1.

The maximum change in weight and tensile strength at yield compared to the initial data, before treatment with chemicals, is given in Table 1.

111 **Table 1 — Resistance against chemicals**

Substance	Test temperature °C	Test time h	Maximum change in weight %	Maximum change in tensile at yield %
Synthetic motor oil	70	72	10	- 20
Gasoline [a] > 95 ROZ	70	72	10	−30
Diesel [b]	70	72	20	−30
Biodiesel [c] (Rape seed methyl ester)	70	72	15	−30
Brake fluid DOT 4	70	72	1	±5
Cooling agent (Commercial mixture)	70	72	< 0,5	±5
Sulphuric acid 1,28 g/ml at 25 °C	70	1 000	< 0,5	±5

[a] According to EN 228
[b] According to EN 590
[c] According to EN 14214

112 # 5 Production of battery housings

113 ## 5.1 General

114 The test procedures in this section are intended to check characteristics of battery cases and battery lids
115 during production. They might be used to judge the quality after injection moulding of these components.

116 These tests are not relevant any more for finished batteries after completion of the production process.

117 ## 5.2 Test on disruptive strength

118 ### 5.2.1 General

119 Purpose of this test is to prove an injection quality without risk of acid leakage by small holes.

120 ### 5.2.2 Apparatus

121 Commercial high voltage generator with test electrodes. In most cases this are two adjacent plates.
122 Electrodes with brush design can be beneficial. The electric field is higher on the surface of a tip but
123 decreases with square of distance. The setup of the system shall be checked and confirmed by experiment.

124 The voltage shall be adjustable up to (25 ± 2) kV DC or AC sinus peak to peak with a frequency of (50 ± 10)
125 Hz. The maximum output current of the generator shall be adjustable to a current limit ≤ 1 mA.

126 ### 5.2.3 Procedure

127 The sample to be tested shall be dry. It shall be positioned between the test electrodes in a way, that one
128 electrode contacts the internal side, the other the outer side of the sample.

129 The applied voltage shall be adjusted to generate an electric field strength of at least 5 kV / mm up to about
130 10 kV / mm.

To find the operation threshold a test sample e.g. a battery case with a drilled hole of (1,0 ± 0,1) mm in diameter can be used. The electric field is adjusted until the set current limit is reached.

5.2.4 Requirement

No disruptive discharge – the current stays below the adjusted set current limit.

5.3 Warm storage

5.3.1 General

Purpose of this test is to prove the thermal stability of the battery components.

The test discovers any internal tensions inside the parts after the injection moulding process which might result in a warping of the container.

5.3.2 Apparatus

Temperature test chamber with sufficient power. The air temperature shall be recovered to the target temperature within 10 min after the sample part have been inserted.

5.3.3 Procedure

The sample part is placed into the preheated temperature test chamber at (120 ± 2) °C in a way that it is not mechanically stressed. It shall not touch other samples or the walls of the temperature test chamber. Samples should be evenly distributed to the available space.

After 2 h of storage the samples shall be removed from the temperature test chamber and shall be cooled to room temperature.

5.3.4 Requirements

The surface shall remain even and no change of the original colour shall occur.

In case of battery cases any deformation of the cell walls shall be less than 1.5 % referred to the width of the cells. The deformation shall be measured at the centre of the cell wall.

Changes in overall dimensions in length width and height shall be less than 1.5 %.

5.4 Heat resistance test

5.4.1 General

Purpose of this test is to secure, that during a normal battery life even under elevated temperatures as they may occur in hot climate regions or for batteries mounted near the engine, there will be no degradation of the PP material. Degradation during battery life would result in a damage of the container and acid loss.

The test is carried out preferably with welded lids and containers (battery housings), but single containers and lids can be used as well.

5.4.2 Apparatus

Temperature test chamber with forced air circulation and sufficient power. The air temperature shall be recovered to the target temperature within 10 min after the sample part have been inserted. In addition, an exhaust system need to be considered as hazardous gases might evolve.

5.4.3 Procedure

The parts are placed into the temperature test chamber. Any direct contact of the test parts to walls or floor of the temperature test chamber shall be avoided. Isolating spacers made from wood or heat resistance poly material shall be used.

The parts are exposed to (150 ± 2) °C of circulating air.

The possible exposure times are shown in Table 2. According to the intended usage the appropriate duration need to be chosen.

Table 2 — Exposure time

Materials for generic usage	300 h
Materials for increased heat stability	400 h

Once the exposure time has passed the parts shall be taken out of the temperature test chamber and cooled down to room temperature for 24 h.

A steel ball with (900 ± 20) g weight and 60 mm diameter shall be dropped from a height of 30 cm to the surface of the tested parts. The steel ball should hit any areas of the tested part that are conspicuous during visual inspection.

5.4.4 Requirements

No thermal decomposition, brittleness or cracks shall be detected by visual and manual inspection.

After drop test with the steel ball no mechanical damage shall occur. White marks (stress whitening) can be accepted.

6 Mechanical properties of batteries

6.1 General

The test procedures in this section are intended to check the mechanical properties of finished batteries.

6.2 Top load test

6.2.1 General

Purpose of this test is to check if the lid of a battery is able to withstand the forces of a overtop fixation in a car.

6.2.2 Apparatus

Temperature test chamber with sufficient size to be loaded with one battery including stamp and weight and sufficient power to heat up the battery to (85 ± 2) °C.

Stamp with a size of 2 cm x 2 cm of heat resistant material (steel, aluminium, copper) loaded with a weight of 25 ± 1 kg (equivalent to 250N / 4cm^2 = 61,6 N/cm^2).

The system shall be fixed mechanically by a stabilization frame which ensures even application of the force without tilting (see Figure 1).

Metering device with a precision of ± 0,1 mm

6.2.3 Procedure

The battery is placed into the temperature test chamber and the stamp is positioned between two centre cells above the cell separate wall. The temperature test chamber is closed and heated to (85 ± 2) °C. After 24 h the battery is taken out and allowed to cool down to room temperature and the impression of the stamp is measured with the metering device.

6.2.4 Requirements

The depth of the impression shall not exceed 3 mm.