SLOVENSKI STANDARD
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Svinčeno-kislinske zaganjalne baterije - 6. del: Baterije za mikrociklične aplikacije

Lead-acid starter batteries - Part 6: Batteries for micro-cycle applications

Blei-Akkumulatoren-Starterbatterien - Teil 6 : Batterien für Mikrozyklen-Anwendungen

Batteries d'accumulateurs de démarrage au plomb - Partie 6: Batteries pour applications micro-cycles

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Blei-Akkumulatoren-Starterbatterien - Teil 6 : Batterien für Mikrozyklen-Anwendungen

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
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European foreword

This document (prEN 50342-6:2024) 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• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)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 50342-6:2015 and all of its amendments and corrigenda (if any).

TC21X working group 3 has been agreed to implement an improved version of Micro-hybrid test (MHT). This test replaces the version of EN 50342-6:2015.[1]

prEN 50342-6:2024 includes the following significant technical changes with respect to EN 50342-6:2015:

— Change of test temperature from 25 °C to 40 °C for entire test procedure including initials, cycling and check-up

— Change from 100 cycles to 200 cycles each test block

— Change of rest time between blocks from 12 h to 3 h

— Change of total number of cycles from 8000 to 16000

— a new performance level “D” for dynamic charge acceptance (DCA) with two steps has been introduced and some minor errors have been corrected.

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

— *Part 1: General requirements and methods of test* [currently at Formal Vote stage];

— *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* [the present document];

— *Part 7: General requirements and methods of tests for motorcycle batteries* [currently at Formal Vote stage].

[1] As amended by EN 50342-6:2015/A1:2018.

1 Scope

This document is applicable to lead-acid batteries with a nominal voltage of 12 V, used primarily as power source for the starting of internal combustion engines (ICE), lighting and also for auxiliary equipment of ICE vehicles. These batteries are commonly called “starter batteries”. Batteries with a nominal voltage of 6 V are also included in the scope of this document. All referenced voltages need to be divided by two for 6 V batteries. The batteries under the scope of this document are used for micro-cycle applications in vehicles which can also be called Start-Stop (or Stop-Start, idling-stop system, micro-hybrid or idle-stop-and-go) applications. In cars with this special capability, the internal combustion engine is switched off during a complete vehicle stop, during idling with low speed or during idling without the need of supporting the vehicle movement by the internal combustion engine. During the phases in which the engine is switched off, most of the electric and electronic components of the car need to be supplied by the battery without support of the alternator. In addition, in most cases an additional regenerative braking (recuperation or regeneration of braking energy) function is installed. The batteries under these applications are stressed in a completely different way compared to classical starter batteries. Aside of these additional properties, those batteries need to crank the ICE and support the lighting and also auxiliary functions in a standard operating mode with support of the alternator when the internal combustion engine is switched on. All batteries under this scope need to fulfil basic functions, which are tested under application of EN 50342-1:2015.

This document is applicable to batteries for the following purposes:

— Lead-acid batteries of the dimensions according to EN 50342-2 for vehicles with the capability to automatically switch off the ICE during vehicle operation either in standstill or moving (“Start-Stop”);

— Lead-acid batteries of the dimensions according to EN 50342-2 for vehicles with Start-Stop applications with the capability to recover braking energy or energy from other sources.

This document is not applicable to batteries for purposes other than mentioned above, but it is applicable to EFB delivered in dry-charged conditions according to EN 50342-1:2015, Clause 7.

NOTE The applicability of this document also for batteries according to EN 50342-4 is under consideration.

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 50342-1:2015, *Lead-acid starter batteries - Part 1: General requirements and methods of test*

3 Terms and definitions

No terms and definitions are listed in this document.

4 General

4.1 Designation of starter batteries

Regarding the designation of starter batteries, refer to EN 50342-1:2015, 3.2.

4.2 Condition on delivery

Regarding the condition on delivery, refer to EN 50342-1:2015, 3.3.

5 General requirements — Identification and labelling

For detailed information about measurement and labelling EN 50342-1 shall be used.

In addition to the mandatory information defined in EN 50342-1:2015, 4.1 and Annexes A and C, the battery shall be marked with the micro-cycling performance level according to this document (8.3).

For better identification and comparison of batteries under the scope of this document, a special marking specified in Annex B shall be used by the battery manufacturer.

NOTE Within the European community, legal demands can exist for the identification of the batteries. Furthermore, the regulations of the Battery Directive 2006/66/EC and the amendment 2008/12/EC or their equivalent national laws are applicable.

6 General test conditions

6.1 Characteristics and abbreviations

6.1.1 Nominal capacity C_n

Refer to EN 50342-1:2015, 3.4.2.

6.1.2 Cranking current I_{CC}

Refer to EN 50342-1:2015, 3.4.1.

6.2 Syntax of test descriptions

The test description is given in tabular form. All test steps shall be carried out in a water bath according to 5.3.3 at the given temperature, if not stated otherwise.

The following definitions and abbreviations are used:

Test steps:

Table 1 — Test steps

Abbreviation	*Test step*	*Description*
CHA	Charge	Battery to be charged with given parameters
DCH	Discharge	Battery to be discharged with given parameters
PAU	Pause	No charging or discharging but measurement of voltage as required. If the battery is connected to the test unit, there shall be no quiescent current.
RPT	Repeat	Instruction to repeat certain steps several times
CAS	Case of	Decision point leading to different actions dependent on the value of the reference variable

152 Description of columns:

153 **Table 2 — Description of columns**

Column text	***Description***
Structure	General explanation of test block
N°	Numbering of individual test steps
Step	Definition of test phase of individual step according to Table 1. NOTE All steps in each table are numbered subsequently starting at “10” The next table of the same section starts at “20”, etc. Example: 10 Action 1 11 Action 2 12 Action 3 20 Action 1 21 Action 2 22 Action 3 23 Action 4
T	Duration of the individual step in days [d], hours [h] or seconds [s]
U [V]	Voltage in Volts to be maintained during the step. In case of a “CHA” phase, this is the constant charging voltage to be given by the rectifier. In case of a “DCH” phase, this is a cut off criteria at which the phase shall be stopped for the defined current.
I [A]	Current in Ampere to be maintained during the step. In case of a “CHA” phase, this is a current limitation for this step. In case of a “DCH” phase this is the constant discharge current to be given by the rectifier
Description	Explanation of individual test step
Data acquisition frequency	Recommended data acquisition frequency
Result of measurement of each step	Final result of the individual test step to be reported

Acronyms and symbols:

Table 3 — Acronyms and symbols

Acronym or Symbol	***Description***	***Acronym or Symbol***	***Description***
C_e	Effective capacity [Ah]	I_c	Average charge current in DCA test after charge history [A]
C_n	Nominal capacity [Ah]	I_d	Average charge current in DCA test after discharge history [A]
C_{rch}	Recharged capacity [Ah]	I_r	Average charge current in DCA test during regenerative braking [A]
DoD	Depth of discharge [% of C_n]	Q_{CHA}	Charged capacity [Ah]
EOS	End of step	Q_{DCH}	Discharged capacity [Ah]
I_{CHA}	Charge current [A]	R_{dyn}	Calculated dynamic internal resistance [Ω]
I_{CC}	Discharge current for cranking [A]		
I_{DCA}	Weighted normalized dynamic charge acceptance, measured in A per Ah nominal capacity C_n [A/Ah]	RC	Reserve capacity (discharge with a fixed current of 25 A to U = 10,5 V), used in DCA test, subsection 8.3
I_{DCH}	Discharge current [A]	t_{DCH}	Discharge time [s]
I_n	Nominal discharge current [A] I_n [A] = C_n [Ah] / 20 [h]	U_c	Charging voltage [V]

6.3 Requirements for measuring equipment capability

6.3.1 Equipment requirements for the micro-hybrid test MHT (8.2)

Table 4 — Equipment requirements for the micro-hybrid test MHT

Parameter	***Range***	***Accuracy***	***Sampling rate***	***Sampling precision***
U_{CHA}	14…16 V	±0,04 V	10 ms	±0,01 V
I_{CHA}	0…100 A	±0,5 % of upper range value	10 ms	±0,1 %
Q_{CHA}	-	-	10 ms	±1 mAh
U_{DCH}	6...14 V	± 0,04 V	10 ms	±0,01 V
I_{DCH}	0...300 A with 300 A t_{DCH} ≥ 1s every minute, transition time < 0,01 s	±0,5 % of upper range value	10 ms	±0,1 %
Q_{DCH}			10 ms	±1 mAh

6.3.2 Equipment requirements for the dynamic charge acceptance test DCA (8.3)

Table 5 — Equipment requirements for the dynamic charge acceptance test DCA

Parameter	*Range*	*Accuracy*	*Sampling rate*	*Sampling precision*
U_{CHA}	14…18 V	±0,04 V	200 ms	±0,01 V
I_{CHA}	0…200 A	±0,5 %	200 ms	±0,1 %
Q_{CHA}	-	-	10 ms	±1 mAh
U_{DCH}	6...14 V	± 0,04 V	200 ms	±0,01 V
I_{DCH}	0...100 A	±0,5 %	200 ms	±0,1 %
Q_{DCH}			10 ms	±1 mAh

Computer controlled unit needed with the ability to use integrated charge balance (e.g. Q_{CHA} and Q_{DCH}) for terminating discharge steps. The software shall be able to output the information in the format of standard table calculation programs or special software to output tables or graphs.

6.3.3 Water bath

Refer to EN 50342-1:2015, 5.3.2.

6.3.4 Equipment for other tests, measuring instruments

Refer to EN 50342-1:2015, 5.3.1.

6.4 Sampling of batteries

Refer to EN 50342-1:2015, 5.1.

7 Test sequence

The test sequence is shown in Table 6.

The total number of 4 batteries shall be tested according to the test sequence of Table 6. The requirements of C_e capacity check and cranking performance test shall be fulfilled according to the requirements defined in EN 50342-1.

In addition, more batteries shall be tested according to EN 50342-1:2015, 5.4. Refer to the test sequence given there, with one exception:

— Test battery sample No. 4 undergoes a 50 % DoD test with preceding discharge. This test replaces the endurance cycling test defined in EN 50342-1:2015, 5.4, battery sample No. 1, which may be omitted.