



SLOVENSKI STANDARD SIST EN IEC 63193:2021

01-februar-2021

Svinčeno-kislinske baterije za pogon in obratovanje lahkih vozil in opreme - Splošne zahteve in preskusne metode

Lead-acid batteries for propulsion and operation of lightweight vehicles and equipment -
General requirements and methods of test

iTeh STANDARD PREVIEW

Batteries d'accumulateurs au plomb pour la propulsion et le fonctionnement de véhicules
et équipements légers - Prescriptions générales et méthodes d'essai

[SIST EN IEC 63193:2021](https://standards.iteh.ai/catalog/standards/sist/63193-2021/iec-63193-2021)

Ta slovenski standard je istoveten z: EN IEC 63193:2021

<https://standards.iteh.ai/catalog/standards/sist/63193-2021/iec-63193-2021>

ICS:

29.220.20	Kislinski sekundarni členi in baterije	Acid secondary cells and batteries
-----------	---	---------------------------------------

SIST EN IEC 63193:2021

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 63193:2021

<https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-d58cc4faa318/sist-en-iec-63193-2021>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 63193

January 2021

ICS 29.220.20

English Version

**Lead-acid batteries for propulsion power of lightweight vehicles -
General requirements and methods of test
(IEC 63193:2020)**

Batteries au plomb pour la puissance de propulsion des
véhicules légers - Exigences générales et méthodes d'essai
(IEC 63193:2020)

Bleibatterien für den Antrieb von Leichtkraftfahrzeugen -
Allgemeine Anforderungen und Prüfverfahren
(IEC 63193:2020)

This European Standard was approved by CENELEC on 2020-12-23. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 63193:2021 (E)**European foreword**

The text of document 21/1056/FDIS, future edition 1 of IEC 63193, prepared by IEC/TC 21 "Secondary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63193:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-09-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-12-23

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 63193:2020 was approved by CENELEC as a European Standard without any modification.

ITh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN IEC 63193:2021
<https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-d58cc4faa318/sist-en-iec-63193-2021>

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60695-11-4	2011	Fire hazard testing - Part 11-4: Test flames - 50 W flame - Apparatus and confirmational test method	EN 60695-11-4	2011
IEC 60695-11-10	2013	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods	EN 60695-11-10	2013
IEC/TR 61430	1997	Secondary cells and batteries - Test methods for checking the performance of devices designed for reducing explosion hazards - Lead-acid starter batteries	-	-
IEC 62902	2019	Secondary cells and batteries - Marking symbols for identification of their chemistry	EN IEC 62902	2019
ISO 1043-1	2011	Plastics - Symbols and abbreviated terms – Part 1: Basic polymers and their special characteristics	EN ISO 1043-1	2011
ISO 3864-1	2011	Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs and safety markings	-	-
ISO 3864-3	2012	Graphical symbols - Safety colours and safety signs - Part 3: Design principles for graphical symbols for use in safety signs	-	-
ISO 7000	-	Graphical symbols for use on equipment - Registered symbols	-	-
ISO 7010	-	Graphical symbols - Safety colours and safety signs - Registered safety signs	-	-
ISO 8608	2016	Mechanical vibration - Road surface profiles - Reporting of measured data	-	-

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN IEC 63193:2021

<https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-d58cc4faa318/sist-en-iec-63193-2021>



IEC 63193

Edition 1.0 2020-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Lead-acid batteries for propulsion power of lightweight vehicles – General requirements and methods of test

Batteries au plomb pour la puissance de propulsion des véhicules légers – Exigences générales et méthodes d'essai

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.220.20

ISBN 978-2-8322-8717-0

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD	5
1 Scope	7
2 Normative references	8
3 Terms and definitions	8
4 Test set-up	13
4.1 Accuracy of the measuring instruments	13
4.2 General test features and rules	13
5 Test methods for batteries destined for electric two- and three-wheelers	15
5.1 General	15
5.2 Capacity determination with the 2 h rate current at 25 °C	16
5.3 Capacity determination with the 3 h rate current at 25 °C	17
5.4 High-rate constant current capacity at 25 °C	18
5.5 Capacity at a battery temperature of –18 °C	19
5.6 Capacity recovery at a battery temperature of –10 °C	20
5.7 Capacity recovery at a battery temperature of 25 °C with a time-limited fast charge	21
5.8 Cycle life with repetitive discharges at 25 °C to 90 % DoD of the rated capacity	22
5.9 Dynamic driving range at 25 °C	24
5.10 Dynamic driving range at 5 °C	25
5.11 Charge retention during storage at 40 °C	26
5.12 Cycle life with repetitive discharges at 40 °C to 50 % DoD of rated capacity	27
5.13 Vibration resistance	28
5.14 Protection against internal ignition from external spark sources	30
5.15 Flammability rating of materials	31
5.16 Content and durability of required marking	32
5.17 Material identification	35
6 Test methods for batteries destined for golf car and similar utility- and multi-passenger vehicles	36
6.1 General	36
6.2 Capacity determination with the 5 h rate current at 30 °C	36
6.3 Running time in minutes with a 56 A or 75 A current at 30 °C	38
6.4 Running time in minutes with a 56 A or 75 A current at 5 °C	39
6.5 Capacity recovery at a battery temperature of 30 °C and time-limited fast charge	40
6.6 Cycle life with repetitive discharges at 30 °C with the 5 h rate current to 1,75 V per cell	41
6.7 Pulsed-power cycle life at 40 °C	42
6.8 Determination of electrolyte level maintenance interval – Flooded types only	43
6.9 Charge retention during storage at 40 °C	44
6.10 Vibration resistance	45
6.11 Protection against internal ignition from external spark sources	47
6.12 Flammability rating of materials	48
6.13 Content and durability of required marking	49
6.14 Material identification	52

Annex A (informative) Guidance on expected test results.....	53
A.1 General.....	53
A.2 Expected outcomes for tests 5.2 to 5.17 with batteries destined for electric two- and three-wheelers.....	53
A.3 Expected outcomes for tests in 6.2 to 6.14 with batteries destined for golf car and similar utility- and multi-passenger vehicles.....	55
Figure 1 – Examples of vehicles covered by this document.....	7
Figure 2 – Example of orientation of the monoblocs on the vibration table in relation to their specified orientation in service.....	29
Figure 3 – Example of orientation of the monoblocs on the vibration table in relation to their specified orientation in service.....	46
Table 1 – Listing of the number of monoblocs to be tested for Clause 5 applications	15
Table 2 – Capacity at 25 °C determined with the 2 h rate discharge current I_2	17
Table 3 – Capacity at 25 °C determined with the 3 h rate discharge current I_3	18
Table 4 – Capacity at 25 °C determined with the high-rate discharge current $3,6 I_2$	19
Table 5 – Capacity at –18 °C determined with the 2 h rate discharge current I_2	20
Table 6 – Capacity recovery after discharge and charge at –10 °C	21
Table 7 – Capacity recovery at 25 °C with a time-limited fast charge	22
Table 8 – Cycle life with repetitive discharges to 90 % of the rated C_2 capacity at 25 °C	23
Table 9 – Cycle life with repetitive discharges to 90 % of the rated C_3 capacity at 25 °C	24
Table 10 – Dynamic discharge sequence.....	24
Table 11 – Achieved discharge sequences at 25 °C.....	25
Table 12 – Dynamic discharge sequence.....	25
Table 13 – Achieved discharge sequences at 5 °C.....	26
Table 14 – Capacity retained after 30 days of storage at 40 °C.....	27
Table 15 – Cycle life with repetitive discharges to 50 % DoD of rated C_2 capacity at 40 °C	28
Table 16 – Cycle life with repetitive discharges to 50 % DoD of rated C_3 capacity at 40 °C	28
Table 17 – Capacity retained after 60 min vibration and subsequent 24 h OC stand	30
Table 18 – Battery status after spark test.....	31
Table 19 – Burning classification achieved when tested in accordance with IEC 60695-11-10:2013	32
Table 20 – Content and durability of the required marking	33
Table 21 – Information to be present on the monobloc	34
Table 22 – Material identification and durability of the required marking.....	35
Table 23 – Listing of the number of monoblocs to be tested for Clause 6 applications	36
Table 24 – Capacity at 30 °C determined with the 5 h rate discharge current I_5	37
Table 25 – Running time determined with the 56 A or 75 A discharge current at 30 °C.....	38
Table 26 – Running time determined with the 56 A or 75 A discharge current at 5 °C	39
Table 27 – Capacity recovery at 30 °C with a time-limited fast charge.....	41
Table 28 – Cycle life with repetitive discharges at 30 °C to 1,75 V per cell with the I_5 current.....	42
Table 29 – Pulsed power discharge and charge sequence – Flooded types	42

Table 30 – Pulsed power discharge and charge sequence – VRLA types	42
Table 31 – Achieved discharge and charge cycle sequences at 40 °C	42
Table 32 – Discharge and charge sequence for the determination of the electrolyte level maintenance interval	43
Table 33 – Achieved discharge and charge sequences at 40 °C until the manufacturer specified minimum electrolyte level mark is reached	44
Table 34 – Capacity retained after 30 days of storage at 40 °C	45
Table 35 – Capacity retained after 60 min vibration and subsequent 24 h OC stand	46
Table 36 – Battery status after spark test.....	48
Table 37 – Burning classification achieved when tested in accordance with IEC 60696-11-10:2013	49
Table 38 – Content and durability of the required marking	50
Table 39 – Information to be present on the monobloc	51
Table 40 – Material identification and durability of the required marking.....	52

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN IEC 63193:2021

<https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-d58cc4faa318/sist-en-iec-63193-2021>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LEAD-ACID BATTERIES FOR PROPULSION POWER OF LIGHTWEIGHT VEHICLES – GENERAL REQUIREMENTS AND METHODS OF TEST

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 63193 has been prepared by IEC technical committee 21: Secondary cells and batteries.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
21/1056/FDIS	21/1066/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN IEC 63193:2021](https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-d58cc4faa318/sist-en-iec-63193-2021)

<https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-d58cc4faa318/sist-en-iec-63193-2021>

LEAD-ACID BATTERIES FOR PROPULSION POWER OF LIGHTWEIGHT VEHICLES – GENERAL REQUIREMENTS AND METHODS OF TEST

1 Scope

This document is applicable to lead-acid batteries powering electric two-wheelers (mopeds) and three-wheelers (e-rickshaws and delivery vehicles), and also to golf cars and similar light utility and multi-passenger vehicles.



IEC

iTeh STANDARD PREVIEW
a) Electric two- and three-wheelers
(standards.iteh.ai)



IEC

b) Electric golf car and light utility and multi-passenger vehicles

Figure 1 – Examples of vehicles covered by this document

Persons with a low level of technical skills as regards these vehicles and associated batteries, operate them most often in an environment with many bystanders who are unaware of the possible risks involved. The batteries have thus to be eminently reliable, consumer friendly and minimize risks of fire, explosions, electrical shocks and chemical burns.

These batteries are submitted to frequent and deep discharges with electrical power delivered to the propulsion system in short surges of high current when accelerating, followed by lower current levels when at cruising speed. The subsequent charge of the battery can also occur in areas accessible to the public.

The document specifies methods of tests tailored to batteries destined for the above-referenced types of vehicles so as to ensure satisfactory and safe battery performance in the intended application.

This document does not apply for example to lead acid cells and batteries used for:

- vehicle engine starting applications (IEC 60095 series);
- traction applications (IEC 60254 series);

- stationary applications (IEC 60896 series);
- general purpose applications (IEC 61056 series); or to
- motorized wheelchairs and similar personal assist vehicles.

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.

IEC 60695-11-4:2011, *Fire hazard testing – Part 11-4: Test flames – 50 W flame – Apparatus and confirmational test method*

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC TR 61430:1997, *Secondary cells and batteries – Test methods for checking the performance of devices designed for reducing explosion hazards – Lead-acid starter batteries*

IEC 62902:2019, *Secondary cells and batteries – Marking symbols for identification of their chemistry*

ISO 1043-1:2011, *Plastics – Symbols and abbreviated terms – Part 1: Basic polymers and their special characteristics*

ISO 3864-1:2011, *Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings*

ISO 3864-3:2012, *Graphical symbols – Safety colours and safety signs – Part 3: Design principles for graphical symbols for use in safety signs*

ISO 7000, *Graphical symbols for use on equipment – Registered symbols* (available at <http://www.graphical-symbols.info/equipment>)

ISO 7010, *Graphical symbols – Safety colours and safety signs – Registered safety signs* (available at <https://www.iso.org/obp>)

ISO 8608:2016, *Mechanical vibration – Road surface profiles – Reporting of measured data*

Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1**acceptance test**

<of a battery> contractual test to prove to the customer that the battery meets certain conditions of its specification

Note 1 to entry: Such a test consists generally in a capacity determination carried out at the manufacturer's premises prior to shipping and in the presence of the customer.

Note 2 to entry: Such a test could be also be combined with the commissioning test.

[SOURCE: IEC 60050-151:2001, 151-16-23, modified – The second preferred term "hand-over test" has been omitted, "item" has been replaced with "battery" in the definition, and the domain and notes to entry have been added.]

3.2**accuracy**

<of a measuring instrument> quality which characterizes the ability of a measuring instrument to provide an indicated value close to a true value of the measurand

Note 1 to entry: This term is used in the "true value" approach.

Note 2 to entry: Accuracy is all the better when the indicated value is closer to the corresponding true value.

[SOURCE: IEC 60050-311:2001, 311-06-08]

3.3**ambient temperature**

average temperature of air or another medium in the vicinity of the battery

Note 1 to entry: During the measurement of the ambient temperature the measuring instrument/probe should be shielded from draughts and radiant heating. [SIST EN IEC 63193:2021](https://standards.iteh.ai/catalog/standards/sist/229ab662-679b-47de-aa85-458ceaa519/sist-en-iec-63193-2021)

[SOURCE: IEC 60050-826:2001, 826-10-03, modified – The word "equipment" has been replaced with "battery" in the definition.]

3.4**running time****autonomy time**

<of a battery> extent of time over which the battery can support independently the electrical load by providing all the load's required power

Note 1 to entry: This time is also called back-up or discharge duration and varies in function of battery age, load size, state of charge and temperature.

3.5**capacity**

<for cells or batteries> electric charge which a cell or battery can deliver under specified discharge conditions

Note 1 to entry: The SI unit for electric charge, or quantity of electricity, is the coulomb (1 C = 1 A·s) but in practice, capacity is usually expressed in ampere hours (Ah).

[SOURCE: IEC 60050-482:2004, 482-03-14]

3.6**actual capacity**

<of cells and batteries> capacity value determined experimentally at a defined instant of time with a discharge at a specified rate to a specified end-voltage and at a specified temperature

Note 1 to entry: Each actual capacity determination may yield a capacity value which may differ from the preceding one.