SLOVENSKI STANDARD

SIST EN 60952-1:2005

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Letalske baterije – 1. del: Splošne zahteve za preskušanje in stopnje sposobnosti

Aircraft batteries -- Part 1: General test requirements and performance levels

ICS 29.220.20; 49.060

Referenčna številka
SIST EN 60952-1:2005(en)

EUROPEAN STANDARD **EN 60952-1**

NORME EUROPÉENNE

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ICS 29.220.20 ; 49.060

Supersedes EN 60952-1:1993

English version

Aircraft batteries
Part 1: General test requirements and performance levels
(IEC 60952-1:2004)

Batteries d'aéronefs
Partie 1: Exigences générales d'essais
et niveaux de performances
(CEI 60952-1:2004)

Flugzeugbatterien
Teil 1: Allgemeine Prüfanforderungen
und Leistungsmerkmale
(IEC 60952-1:2004)

This European Standard was approved by CENELEC on 2004-11-01. 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 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, Hungary, 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

Ref. No. EN 60952-1:2004 E

Foreword

The text of document 21/611/FDIS, future edition 2 of IEC 60952-1, prepared by IEC TC 21, Secondary cells and batteries, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60952-1 on 2004-11-01.

This European Standard supersedes EN 60952-1:1993.

The changes made involve the inclusion of additional test requirements to meet the needs of the regulatory airworthiness authorities for both product performance and qualification.

It is recognised that additional data may be required by other organisations (national standards bodies, AECMA, SAE, etc.). The present standard can be used as a framework to devise tests for generation of the required data.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2005-08-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2007-11-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60952-1:2004 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61434	NOTE	Harmonized as EN 61434:1996 (not modified).
ISO 266	NOTE	Harmonized as EN ISO 266:1997 (not modified).
ISO 9000	NOTE	Harmonized as EN ISO 9000:2000 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60051-1	- [1]	Direct acting indicating analogue electrical measuring instruments and their accessories Part 1: Definitions and general requirements common to all parts	EN 60051-1	1998 [2]
IEC 60051-2	- [1]	Part 2: Special requirements for ammeters and voltmeters	EN 60051-2	1989
IEC 60925	- [1]	D.C. supplied electronic ballasts for tubular fluorescent lamps - Performance requirements	EN 60925	1991
IEC 60952-2	2004	Aircraft batteries Part 2: Design and construction requirements	EN 60952-2	2004
IEC 60952-3	- [1]	Part 3: Product specification and declaration of design and performance (DDP)	EN 60952-3	2004 [2]
ISO 2859	Series	Sampling procedures for inspection by attributes	-	-
ISO 7137	- [1]	Aircraft - Environmental Conditions and Test Procedures for Airborne Equipment	-	-
RTCA DO-160	- [1]	Environmental conditions and text procedures for airbone equipment	-	-
U.S FTM 191A/5906	- [1]	Federal Test Method 5906, Flammability (Horizontal Test)	-	-
SAE AIR 1377A-80	- [1]	Fire Test Equipment for Flexible Hose and Tube Assemblies	-	-
SAE AS 1055B	- [1]	Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components	-	-

[1] Undated reference.

[2] Valid edition at date of issue.

NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
60952-1

Deuxième édition
Second edition
2004-09

Batteries d'aéronefs –

Partie 1: Exigences générales d'essais et niveaux de performances

Aircraft batteries –

Part 1: General test requirements and performance levels

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Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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AIRCRAFT BATTERIES –

Part 1: General test requirements and performance levels

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.

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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 60952-1 has been prepared by IEC technical committee 21: Secondary cells and batteries.

This second edition cancels and replaces the first edition published in 1988. The changes made to this edition involve the inclusion of additional test requirements to meet the needs of the regulatory airworthiness authorities for both product performance and qualification.

The text of this standard is based on the following documents:

FDIS	Report on voting
21/611/FDIS	21/615/RVD

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

It is recognised that additional data may be required by other organisations (national standards bodies, AECMA, SAE etc.). The present standard can be used as a framework to devise tests for generation of the required data.

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

IEC 60952 consists of the following parts, under the general title *Aircraft batteries:*

Part 1: General test requirements and performance levels

Part 2: Design and construction requirements

Part 3: Product specification and declaration of design and performance (DDP)[1]

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

1) The second edition of IEC 60952-3 (2004) replaces the first edition published in 1993 under the title: *Aircraft bateries – Part 3: External electrical connectors*

INTRODUCTION

The IEC 60952 series defines minimum environmental and performance requirements for establishing a qualification standard for airworthiness of lead-acid and nickel-cadmium aircraft batteries, which contain corrosive electrolytes.

The series defines test procedures for determining battery performance. The electrical test results may be used to establish airworthiness in a particular application. For all tests, the manufacturer declares minimum performance for each battery type.

The requirements of IEC 60952 for aircraft batteries are divided into three parts:

– Part 1 defines test procedures for the evaluation, comparison and qualification of batteries and states minimum environmental performance levels for airworthiness.

– Part 2 defines the design requirements for aircraft batteries as well as the format (shape and size) for the battery as well as the range of aircraft interface connectors that are used.

– Part 3 defines the product specification which is used to define specific requirements for an application and a declaration of design and performance (DDP), which details the performance of a battery format when tested to Part 1.

AIRCRAFT BATTERIES –

Part 1: General test requirements and performance levels

1 Scope

This part of IEC 60952 defines test procedures for the evaluation, comparison and qualification of batteries and states minimum environmental performance levels for airworthiness. Where specific tests are defined with no pass/fail requirement (to establish performance capability), the manufacturer's declared values, from qualification testing, will be used to establish minimum requirements for ongoing maintenance of approval for that design of battery.

To provide representative examples, this standard utilises voltage and current values based upon an aircraft electrical system nominally rated at 28 V d.c. Additionally, the nominal values for cell voltage are assumed to be 1,2 V per cell for nickel-cadmium batteries and 2,0 V per cell for lead-acid batteries. It is important to note that when using this standard to evaluate products designed to operate on an aircraft electrical system other than the nominal 28 V d.c., or whose chemical properties are such that the individual cell voltage differs from that stated above, test values need to be adjusted accordingly.

The specific topics addressed in this part of 60952 serve to establish acceptable quality standards required to qualify a battery as airworthy and are divided into 2 classes (class I and II) as defined in Clause 3 of this standard.

– Most of the requirements of this Part 1 state the minimum performance level for class I applications which are also mandatory for class II applications.

– Subclauses 5.6 and 6.6 state 2 different levels of performance for class I and II applications.

– Clause 7 states special requirements for class II applications only.

In cases where a specific application demands testing and/or requirements exceeding those detailed in this standard the purchaser will detail said requirements in the product specification and the method of establishing compliance.

2 Normative references

The following referenced documents are indispensable for the application 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 60051-1, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 1: Definitions and general requirements common to all parts*

IEC 60051-2, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 2: Special requirements for ammeters and voltmeters*

IEC 60925, *DC supplied electronic ballasts for tubular fluorescent lamps – Performance requirements*

IEC 60952-2:2004, *Aircraft batteries – Part 2: Design and construction requirements*

IEC 60952-3, *Aircraft batteries – Part 3: Product specification and declaration of design and performance (DDP)* [2)]

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

ISO 7137, *Aircraft – Environmental conditions and test procedures for aircraft equipment*

RTCA DO-160, *Environmental Conditions and Test Procedures for Airborne Equipment*

U.S. Federal Test Method, Standard No. 191A / Federal Test Method 5906, *Flammability (Horizontal Test)*

SAE AIR 1377A-80, *Fire Test Equipment for Flexible Hose and Tube Assemblies*

SAE AS 1055B, *Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings and Similar System Components*

3 Terms and definitions

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

3.1
current values
values of current in ampere (A) used to charge and discharge cells and batteries, expressed as a multiple of the capacity

NOTE 1 For example, a current of 20 A used to charge a cell with a rated capacity C (Ah) of 100 Ah would be expressed as $C/5$ or 0,2 C (A).

NOTE 2 IEC 61434 is equally applicable to both nickel-cadmium and lead-acid and therefore the reference current (I_t) can be expressed as

$$(I_t)\text{A} = C_n\text{Ah}/1\text{h}$$

where C_n is the rated capacity declared by the manufacturer in ampere hours and n is the timebase in hours for which the rated capacity is declared.

3.2
1 rate I_1
current which the battery delivers to give not less than its rated C_1 capacity in 1 h

NOTE This is the basis on which all other current ratings are defined.

3.3
rated capacity
C_1
minimum capacity, expressed in Ah, obtained from a charged battery when discharged at the 1 I_1 rate to the end point voltage (see 3.8)

3.4
end of life capacity C_1
EOL
minimum capacity, expressed in Ah, obtained from a charged battery throughout its normal service life when discharged at the 1 I_1 rate to the end point voltage

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2) The first edition (1993) was published under the title *Aircraft batteries – Part 3: External electric connectors*

3.5
constant voltage current
***I*pr**
discharge current, which the battery delivers at the conclusion of a 15 s power discharge, controlled so as to maintain a constant terminal voltage of half the nominal voltage

3.6
peak power current
***I*pp**
discharge current at t = 0,3 s while testing as in 3.5

3.7
charged battery
battery that has been fully charged in accordance with the battery manufacturer's instructions or as defined in the product specification

3.8
end point voltage
EPV
unless otherwise stated, during discharge the battery end point voltage (EPV) corresponding to a mean voltage per cell of 1,00 V for nickel-cadmium or 1,67 V for lead-acid batteries

3.9
serviced battery
battery that has been fully prepared and maintained in accordance with the manufacturer's instructions or as defined in the product specification

3.10
airworthiness
compliance of a battery or part thereof with all conditions and regulations required by the appropriate governmental authorities for their safe operation and performance

3.11
product specification
separate document which details the specific requirements which a battery is expected to meet for a particular aircraft application

3.12
class I battery
battery classification covering batteries for general purpose applications, for which this standard provides a general guideline and the minimum requirement necessary to certify a battery as airworthy

3.13
class II battery
battery classification covering batteries for special purpose applications, for which specific and more rigid requirement are specified by the user and are necessary to qualify a battery for use in an extreme climatic or operational environment