

### SLOVENSKI STANDARD SIST EN 60952-1:2014

01-januar-2014

Nadomešča:

SIST EN 60952-1:2005

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

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

Flugzeugbatterien - Teil 1: Allgemeine Prüfanforderungen und Leistungsmerkmale

iTeh STANDARD PREVIEW

Batteries d'aéronefs - Partie 1: Exigences générales d'essais et niveaux de performances (standards.iteh.ai)

SIST EN 60952-1:2014

Ta slovenski standard je istoveten zalog/starEN 160952-11/201/3-4/80-b1fl-

032f59f29ddb/sist-en-60952-1-2014

ICS:

29.220.20 Kislinski sekundarni členi in Acid secondary cells and

baterije batteries

49.060 Letalska in vesoljska Aerospace electric

električna oprema in sistemi equipment and systems

SIST EN 60952-1:2014 en

SIST EN 60952-1:2014

# iTeh STANDARD PREVIEW (standards.iteh.ai)

### **EUROPEAN STANDARD**

### EN 60952-1

## NORME EUROPÉENNE EUROPÄISCHE NORM

October 2013

ICS 29.220.20; 49.060

Supersedes EN 60952-1:2004

English version

# Aircraft batteries Part 1: General test requirements and performance levels (IEC 60952-1:2013)

Batteries d'aéronefs -Partie 1: Exigences générales d'essais et niveaux de performances (CEI 60952-1:2013) Flugzeugbatterien -Teil 1: Allgemeine Prüfverfahren und Leistungsmerkmale (IEC 60952-1:2013)

### iTeh STANDARD PREVIEW

This European Standard was approved by CENELEC on 2013-08-13. 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.

032(59)(29)ddb/sist-en-60952-1-2014

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **CENELEC**

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

#### **Foreword**

The text of document 21/803/FDIS, future edition 3 of IEC 60952-1, prepared by IEC/TC 21 "Secondary cells and batteries" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60952-1:2013.

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) 2014-05-13

 latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-08-13

This document supersedes EN 60952-1:2004.

EN 60952-1:2013 includes the following significant technical changes with respect to EN 60952-1:2004:

Additional test requirements to meet the needs of the regulatory airworthiness authorities for both product performance and qualification.

iTeh STANDARD PREVIEW

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

#### SIST EN 60952-1:2014

https://standards.iteh.aEndorsement.notice-9f48-4f80-b1f1-

032f59f29ddb/sist-en-60952-1-2014

The text of the International Standard IEC 60952-1:2013 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 Harmonised as EN 61434.

ISO 266:1997 NOTE Harmonised as EN ISO 266:1997 (not modified).
ISO 9000:2005 NOTE Harmonised as EN ISO 9000:2005 (not modified).

## Annex ZA (normative)

## Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	<u>Year</u>	<u>Title</u>	EN/HD	<u>Year</u>
IEC 60051-1	-	Direct acting indicating analogue electrical measuring instruments and their accessories Part 1: Definitions and general requirements common to all parts	EN 60051-1 -	-
IEC 60051-2	-	Direct acting indicating analogue electrical measuring instruments and their accessories Part 2: Special requirements for ammeters and voltmeters	EN 60051-2 -	-
IEC 60485	-	Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters		-
IEC 60952-2	2013	Aircraft batteries ARD PREVIE  Part 2: Design and construction requirements	EN 60952-2	2013
IEC 60952-3	2013	Aircraft batteries - Part 3: Product specification and declaration of design and performance (DDP)	EN 60952-3	2013
ISO 2859	https://st Series		)- <u>b</u> 1fl-	-
ISO 7137	-	Aircraft - Environmental conditions and test procedures for airborne equipment	-	-
RTCA DO-160	2010	Environmental Conditions and Test Procedures for Airborne Equipment	-	-
SAE AIR 1377A-80	-	Aerospace Information Report - Fire Test Equipment for Flexible Hose and Tube Assemblies	-	-
SAE AS 1055B	1978	Aerospace Standard - Fire Testing of Flexible hose, Tube Assemblies, Coils, Fittings and Similar System Components	-	-
U.S Federal Test Method, Standard N°191A/Federal Te Method 5906	1978 st	Flammability (Horizontal Test)	-	-

SIST EN 60952-1:2014

# iTeh STANDARD PREVIEW (standards.iteh.ai)



IEC 60952-1

Edition 3.0 2013-07

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

Aircraft batteries **iTeh STANDARD PREVIEW** 

Part 1: General test requirements and performance levels

Batteries d'aéronefs -

SIST EN 60952-1:2014

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

032f59f29ddb/sist-en-60952-1-2014

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX

W

ICS 29.220.20; 49.060

ISBN 978-2-8322-0946-2

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

INT	RODU	JCTION		7
1	Scop	e		8
2	Norm	ative re	ferences	8
3	Term	s and de	efinitions	9
4	Test	conditio	ns and measuring apparatus	. 10
	4.1		Il test conditions	
	4.2		ring apparatus	
		4.2.1	General	
		4.2.2	Voltage measurement	
		4.2.3	Current measurement	
		4.2.4	Temperature measurement	.11
		4.2.5	Time measurement	.11
		4.2.6	Additional test equipment	.11
		4.2.7	Mass test equipment	.11
	4.3	Chargii	ng method	.11
	4.4	Physica	al examination	. 11
5	Elect	rical req	uirements and test procedures	. 11
	5.1	Capaci	uirements and test procedures ty tests at the 1/1 rate	.11
		5.1.1	Rated capacity standards.iteh.ai)	.11
		5.1.2	Initial capacity requirement for vented and valve regulated nickel-cadmium batteries SISTEN 60952-1-2014	
		5.1.3	Capacityaatald/ntandcat18g/Candards/sist/8aa00fa8-9f48-4f80-b1f1-	.12
		5.1.4	Capacity at 1 /10and09230d Cist-en-60952-1-2014	
		5.1.5	Capacity at 1 I <sub>1</sub> and 50 °C	
	5.2	Consta	nt voltage discharge	
		5.2.1	General	
		5.2.2	Constant voltage	.12
		5.2.3	Constant voltage discharge (14 V)	. 13
	5.3	Rapid o	discharge capacity	. 14
		5.3.1	Rapid discharge capacity at 23 °C	. 14
		5.3.2	Rapid discharge capacity at -30 °C	. 14
	5.4	Charge	retention	. 14
	5.5	Storage	<b>9</b>	. 15
	5.6	Charge	stability	. 15
	5.7	Short-c	ircuit test	. 15
	5.8	Charge	acceptance	. 16
		5.8.1	General	
		5.8.2	Ambient temperature (23 °C)	
		5.8.3	Low temperature (only for batteries fitted with heaters)	
	5.9		on resistance and dielectric strength	
		5.9.1	General	
		5.9.2	Insulation resistance	
		5.9.3	Dielectric strength	
	5.10		cle performance	
	5.11	Water	consumption test	. 18

	5.12	Overcharge endurance	19
	5.13	Cyclic endurance	19
	5.14	Deep discharge test	19
	5.15	Induced destructive overcharge	20
	5.16	Electrical emissions	20
6	Envir	onmental requirements	20
	6.1	Vibration	
	•	6.1.1 General	
		6.1.2 Battery mounting	
		6.1.3 Declaration	
		6.1.4 Vibration requirements	
	6.2	Acceleration	
	6.3	Operational shock and crash safety	
	0.5	6.3.1 Operational shock	
		6.3.2 Crash safety	
		6.3.3 Declaration	
	C 4		
	6.4	Explosion containment	
	6.5	Gas emission	
	6.6	Altitude pressure	
	6.7	Temperature variation (shock)	
	6.8	Fungus resistance STANDARD PREVIEW	
		6.8.1 General (Standards.iteh.ai) 6.8.2 General method	25
	6.9	Humidity	26
	6.10	Fluid contaminationhttps://standards.tich.avcatalog/standards/sist/8aa00fa8-9f48-4f80-b1f1-	26
		6.10.1 General <sub>032159129ddb/sist-en-60952-1-2014</sub>	26
		6.10.2 Spray test	
		6.10.3 Immersion test	
	6.11	Salt spray	
		Physical integrity at high temperature (85 °C)	
	6.13	Flammability	
		6.13.1 General	
		6.13.2 Flame resistant test	28
		6.13.3 Fire resistance	29
		6.13.4 Fire proof test	29
	6.14	Electrolyte resistance	29
	6.15	Temperature sensors	30
	6.16	Component qualification tests	30
		6.16.1 General	30
		6.16.2 Vent valve test	30
		6.16.3 Cell container test	31
		6.16.4 Battery electrolyte containment test	32
	6.17	Battery airtightness test (where applicable)	33
	6.18	Strength of connector receptacle – Connector types C and Q	33
		•	
	6.19	Handle strength test	34
		Handle strength test  Hazardous materials	
			34
	6.20 6.21	Hazardous materials	34

	6.24	Impact	t resistance (non-metallic battery container)	34
	6.25	Specia	al test requirements	35
7			rance requirements	
	7.1	Genera	al quality assurance requirements	35
	7.2		val requirements	
		7.2.1	General requirements	35
		7.2.2	Order of testing	35
		7.2.3	Maintenance of approval	
		7.2.4	Declaration of design and performance	36
		7.2.5	Qualification approval	36
		7.2.6	Quality conformance	
Bib	liograp	ohy		39
Fig	ure 1 -	- Vibrat	tion orientation	21
Tal	ole 1 –	Accele	eration conditions	22
Tal	ole 2 –	Impact	t resistance requirements	35
Tal	ole 3 –	Approv	val test schedule	38

# iTeh STANDARD PREVIEW (standards.iteh.ai)

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

#### 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.
- 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 podies rds/sist/8aa00fa8-9f48-4f80-b1f1-
- 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 60952-1 has been prepared by IEC technical committee 21: Secondary cells and batteries.

This third edition cancels and replaces the second edition published in 2004. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: 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
21/803/FDIS	21/814/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.

**-6-**

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

A list of all the parts in the IEC 60952 series, published under the general title *Aircraft batteries* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

# iTeh STANDARD PREVIEW (standards.iteh.ai)

**-7-**

#### 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 the 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 their format (shape and size) and 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.

# iTeh STANDARD PREVIEW (standards.iteh.ai)