NSAI
Standards

Irish Standard
I.S. EN 62506:2013

Methods for product accelerated testing (IEC 62506:2013 (EQV))

I.S. EN 62506:2013

Incorporating amendments/corrigenda issued since publication:

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Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 62506

August 2013

ICS 03.120.01; 21.020

English version

Methods for product accelerated testing
(IEC 62506:2013)

Méthodes d'essais accélérés de produits
(CEI 62506:2013)

Verfahren für beschleunigte Produktprüfungen
(IEC 62506:2013)

This European Standard was approved by CENELEC on 2013-06-21. 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.

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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

Ref. No. EN 62506:2013 E

Foreword

The text of document 56/1503/FDIS, future edition 1 of IEC 62506, prepared by IEC/TC 56 "Dependability" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62506:2013.

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)	2014-03-21
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-06-21

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Endorsement notice

The text of the International Standard IEC 62506:2013 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 60812	NOTE	Harmonized as EN 60812:2006
IEC 61125:1992	NOTE	Harmonized as EN 61125:1993 (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	Year	Title	EN/HD	Year
IEC 60068	Series	Environmental testing	-	-
IEC 60300-3-1	2003	Dependability management - Part 3-1: Application guide - Analysis techniques for dependability - Guide on methodology	EN 60300-3-1	2004
IEC 60300-3-5		Dependability management - Part 3-5: Application guide - Reliability test conditions and statistical test principles	-	-
IEC 60605-2		Equipment reliability testing - Part 2: Design of test cycles	-	-
IEC 60721	Series	Classification of environmental testing	-	-
IEC 61014	2003	Programmes for reliability growth	EN 61014	2003
IEC 61124 + corr. January	2012 2013	Reliability testing - Compliance tests for constant failure rate and constant failure intensity	EN 61124	2012
IEC 61163-2		Reliability stress screening - Part 2: Electronic components	-	-
IEC 61164	2004	Reliability growth - Statistical test and estimation methods	EN 61164	2004
IEC 61649	2008	Weibull analysis	EN 61649	2008
IEC 61709	2011	Electric components - Reliability - Reference conditions for failure rates and stress models for conversion	EN 61709	2011
IEC 61710		Power law model - Goodness-of-fit tests and estimation methods	EN 61710	
IEC 62303		Radiation protection instrumentation - Equipment for monitoring airborne tritium	-	-
IEC/TR 62380		Reliability data handbook - Universal model for reliability prediction of electronics components, PCBs and equipment	-	-
IEC 62429		Reliability growth - Stress testing for early failures in unique complex systems	EN 62429	

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

METHODS FOR PRODUCT ACCELERATED TESTING

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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International Standard IEC 62506 has been prepared by IEC technical committee 56: Dependability.

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

FDIS	Report on voting
56/1503/FDIS	56/1513/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.

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

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Many reliability or failure investigation test methods have been developed and most of them are currently in use. These methods are used to either determine product reliability or to identify potential product failure modes, and have been considered effective as demonstrations of reliability:

- fixed duration,
- sequential probability ratio,
- reliability growth tests,
- tests to failure, etc.

Such tests, although very useful, are usually lengthy, especially when the product reliability that has to be demonstrated was high. The reduction in time-to-market periods as well as competitive product cost, increase the need for efficient and effective accelerated testing. Here, the tests are shortened through the application of increased stress levels or by increasing the speed of application of repetitive stresses, thus facilitating a quicker assessment and growth of product reliability through failure mode discovery and mitigation.

There are two distinctly different approaches to reliability activities:

- the first approach verifies, through analysis and testing, that there are no potential failure modes in the product that are likely to be activated during the expected life time of the product under the expected operating conditions;
- the second approach estimates how many failures can be expected after a given time under the expected operating conditions.

Accelerated testing is a method appropriate for both cases, but used quite differently. The first approach is associated with qualitative accelerated testing, where the goal is identification of potential faults that eventually might result in product field failures. The second approach is associated with quantitative accelerated testing where the product reliability may be estimated based on the results of accelerated simulation testing that can be related back to the use of the environment and usage profile.

Accelerated testing can be applied to multiple levels of items containing hardware or software. Different types of reliability testing, such as fixed duration, sequential test-to-failure, success test, reliability demonstration, or reliability growth/improvement tests can be candidates for accelerated methods. This standard provides guidance on selected, commonly used accelerated test types. This standard should be used in conjunction with statistical test plan standards such as IEC 61123, IEC 61124, IEC 61649 and IEC 61710.

The relative merits of various methods and their individual or combined applicability in evaluating a given system or item, should be reviewed by the product design team (including dependability engineering) prior to selection of a specific test method or a combination of methods. For each method, consideration should also be given to the test time, results produced, credibility of the results, data required to perform meaningful analysis, life cycle cost impact, complexity of analysis and other identified factors.

METHODS FOR PRODUCT ACCELERATED TESTING

1 Scope

This International Standard provides guidance on the application of various accelerated test techniques for measurement or improvement of product reliability. Identification of potential failure modes that could be experienced in the use of a product/item and their mitigation is instrumental to ensure dependability of an item.

The object of the methods is to either identify potential design weakness or provide information on item dependability, or to achieve necessary reliability/availability improvement, all within a compressed or accelerated period of time. This standard addresses accelerated testing of non-repairable and repairable systems. It can be used for probability ratio sequential tests, fixed duration tests and reliability improvement/growth tests, where the measure of reliability may differ from the standard probability of failure occurrence.

This standard also extends to present accelerated testing or production screening methods that would identify weakness introduced into the product by manufacturing error, which could compromise product dependability.

2 Normative references

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.

IEC 60068 (all parts), *Environmental testing*

IEC 60300-3-1:2003, *Dependability management – Part 3-1: Application guide – Analysis techniques for dependability – Guide on methodology*

IEC 60300-3-5, *Dependability management – Part 3-5: Application guide – Reliability test conditions and statistical test principles*

IEC 60605-2, *Equipment reliability testing – Part 2: Design of test cycles*

IEC 60721 (all parts), *Classification of environmental conditions*

IEC 61014:2003, *Programmes for reliability growth*

IEC 61164:2004, *Reliability growth – Statistical test and estimation methods*

IEC 61124:2012, *Reliability testing – Compliance tests for constant failure rate and constant failure intensity*

IEC 61163-2, *Reliability stress screening – Part 2: Electronic components*

IEC 61649:2008, *Weibull analysis*

IEC 61709, *Electronic components – Reliability – Reference conditions for failure rates and stress models for conversion*