



NSAI
Standards

Irish Standard
I.S. EN 61587-5:2014

Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 -- Part 5: Seismic tests for chassis, subracks and plug-in units

I.S. EN 61587-5:2014

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

EN 61587-5:2014

Published:

2014-03-28

*This document was published
under the authority of the NSAI
and comes into effect on:*

2014-04-08

ICS number:

31.240

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61587-5

March 2014

ICS 31.240

English version

**Mechanical structures for electronic equipment -
Tests for IEC 60917 and IEC 60297 -
Part 5: Seismic tests for chassis, subracks and plug-in units
(IEC 61587-5:2013)**

Structures mécaniques pour équipement
électronique - Essais pour la CEI 60917 et
la CEI 60297 -
Partie 5: Essais sismiques pour châssis,
bacs et unités enfichables
(CEI 61587-5:2013)

Mechanische Bauweisen für elektronische
Einrichtungen - Prüfungen für IEC 60917
und IEC 60297 -
Teil 5: Seismische Prüfungen für
Einschübe, Baugruppenträger und
steckbare Baugruppen
(IEC 61587-5:2013)

This European Standard was approved by CENELEC on 2014-01-14. 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, 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 48D/549/FDIS, future edition 1 of IEC 61587-5, prepared by SC 48D, "Mechanical structures for electronic equipment", of IEC/TC 48, "Electromechanical components and mechanical structures for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61587-5:2014.

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) 2014-10-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2017-01-14

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.

Endorsement notice

The text of the International Standard IEC 61587-5:2013 was approved by CENELEC as a European Standard without any modification.

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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-6	-	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	-
IEC 60068-2-47	-	Environmental testing - Part 2-47: Tests - Mounting of specimens for vibration, impact and similar dynamic tests	EN 60068-2-47	-
IEC 60068-2-57	-	Environmental testing - Part 2-57: Test methods - Test Ff: Vibration - Time-history & sine-beat method	EN 60068-2-57	-
IEC 60068-3-3	-	Environmental testing - Part 3: Guidance - Seismic test methods for equipments	EN 60068-3-3	-
IEC 60297	-	Dimensions des structures mécaniques de la série de 482,6 mm (19 in)	-	-
IEC 60297-3-101	-	Mechanical structures for electronic equipment - Dimensions of mechanical structures of the 482,6 mm (19 in) series - Part 3-101: Subracks and associated plug-in units	EN 60297-3-101	-
IEC 60512-2-1	-	Connectors for electronic equipment - Tests and measurements - Part 2-1: Electrical continuity and contact resistance tests - Test 2a: Contact resistance - Millivolt level method	EN 60512-2-1	-
IEC 60721-2-6	-	Classification of environmental conditions - Part 2: Environmental conditions appearing in nature - Earthquake vibration and shock	HD 478.2.6 S1	-
IEC 60917 (Series)	-	Modular order for the development of mechanical structures for electronic equipment practices -	EN 60917 (Series)	-
IEC 61587-1	-	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 series - Part 1: Environmental requirements, test set- up and safety aspects for cabinets, racks, subracks and chassis under indoor conditions	EN 61587-1	-
IEC 61587-2	-	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 2: Seismic tests for cabinets and racks	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61587-3	-	Mechanical structures for electronic equipment - Tests for IEC 60917 and IEC 60297 - Part 3: Electromagnetic shielding performance tests for cabinets and sub racks	EN 61587-3	-



IEC 61587-5

Edition 1.0 2013-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Mechanical structures for electronic equipment – Tests for IEC 60917
and IEC 60297 –**

Part 5: Seismic tests for chassis, subracks and plug-in units

**Structures mécaniques pour équipement électronique – Essais pour la
CEI 60917 et la CEI 60297 –**

Partie 5: Essais sismiques pour châssis, bacs et unités enfichables



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2013 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,...).

It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available on-line and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Liens utiles:

Recherche de publications CEI - www.iec.ch/searchpub

La recherche avancée vous permet de trouver des publications CEI en utilisant différents critères (numéro de référence, texte, comité d'études,...).

Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Just Published CEI - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications de la CEI. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (VEI) en ligne.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 61587-5

Edition 1.0 2013-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Mechanical structures for electronic equipment – Tests for IEC 60917
and IEC 60297 –
Part 5: Seismic tests for chassis, subracks and plug-in units**

**Structures mécaniques pour équipement électronique – Essais pour la
CEI 60917 et la CEI 60297 –
Partie 5: Essais sismiques pour châssis, bacs et unités enfichables**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

T

ICS 31.240

ISBN 978-2-8322-1300-1

**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.....	4
INTRODUCTION.....	6
1 Scope and object.....	7
2 Normative references	7
3 Terms and definitions	8
4 Equipment test categories	8
5 Test waveform and acceleration condition	9
5.1 General.....	9
5.2 General conditions	9
5.3 Single-axis acceleration	9
5.4 Tri-axial acceleration.....	10
5.5 Specimen monitoring	12
5.6 Seismic simulation	13
6 Test setup and parts to be monitored.....	13
6.1 General.....	13
6.2 Category A – Plug-in units	13
6.2.1 General	13
6.2.2 Plug-in unit simulated load.....	13
6.2.3 Plug-in unit test setup onto the test fixture	15
6.2.4 Plug-in unit test fixture setup to the vibration table.....	17
6.2.5 Plug-in unit mechanical parts under test	18
6.2.6 Vibration response monitoring	18
6.2.7 Plug-in unit measurements	18
6.2.8 Test sequence	19
6.2.9 Plug-in unit electrical parts test (free and fixed connector).....	19
6.2.10 Acceptance criteria	19
6.3 Category B – Chassis or subracks	19
6.3.1 General	19
6.3.2 Chassis or subrack simulated load.....	20
6.3.3 Chassis or subrack test setup onto the vibration table	21
6.3.4 Chassis or subrack mechanical parts under test	21
6.3.5 Vibration response monitoring	21
6.3.6 Chassis or subrack measurements	22
6.3.7 Test sequence	22
6.3.8 Acceptance criteria	22
Annex A (informative) Example of test setup reporting	23
A.1 Subrack test setup reporting	23
A.2 Plug-in unit test setup reporting	23
Bibliography.....	24
Figure 1 – RRS for the test wave (single-axis acceleration)(damping ratio 2,0 %)	10
Figure 2 – Time history of the test wave (single-axis acceleration).....	10
Figure 3 – RRS for the test wave (tri-axial acceleration)(damping ratio 3 %)	11
Figure 4 – Time history of the test wave for each axis (tri-axial acceleration)	12

Figure 5 – Plug-in unit intended use A load distribution (discrete)	14
Figure 6 – Plug-in unit intended use B load distribution (compact)	15
Figure 7 – Plug-in unit test setup – Subrack.....	16
Figure 8 – Plug-in unit test setup – Chassis with integrated subrack	17
Figure 9 – Block diagram of the plug-in unit test setup	18
Figure 10 – Chassis or subrack test setup	20
Figure 11 – Block diagram of the chassis or subrack test setup	21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT –
TESTS FOR IEC 60917 AND IEC 60297 –**
Part 5: Seismic tests for chassis, subracks and plug-in units**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 61587-5 has been prepared by subcommittee 48D: Mechanical structures for electronic equipment, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

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

FDIS	Report on voting
48D/549/FDIS	48D/553/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.

A list of all parts of IEC 61587 series, under the general title *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297*, 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.

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

This standard is based on IEC 61587-2: *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 2: Seismic tests for cabinets and racks* and ATIS-0600329:2008: *Network Equipment – Earthquake Resistance*.

This standard sets forth test setups, performance requirements, and acceptance criteria for determining the robustness of chassis, subracks, and associated plug-in units according to the IEC 60297 and IEC 60917 series that may provide a level of survivability and preserve functionality during and after a seismic occurrence (an earthquake). This standard does not replace regional seismic system, installation standards, or specifications.

The intent of this standard is to provide a common methodology to perform and report seismic test conformance of chassis, subracks, and plug-in units according to the IEC 60297 and IEC 60917 series within a specified weight category. Mass distribution is based on the intended use. The terms “intended use” or “simulation of service condition” or “worst-case simulated configuration” are widely used in the telecom industry but also in the electronics industry.

Seismic ground motion occurs simultaneously and randomly in all directions. Single-axis or tri-axis tests may be selected to simulate the seismic environment for testing.

MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT – TESTS FOR IEC 60917 AND IEC 60297 –

Part 5: Seismic tests for chassis, subracks and plug-in units

1 Scope and object

This part of IEC 61587 specifies seismic test requirements for chassis, subracks, and plug-in units as defined in the IEC 60297 and IEC 60917 series. It applies in whole or in part, only to the mechanical structures of chassis, subracks, and plug-in units for electronic equipment, according to the IEC 60297 and IEC 60917 series, and does not apply to electronic components, equipment or systems within the mechanical structures.

NOTE Subracks may be an integral part of a chassis (often called in the industry a shelf or a crate).

The object of this standard is to establish a level of physical integrity of chassis, subracks, and plug-in units according to IEC 60297 and IEC 60917 series that may provide a level of survivability that will preserve functionality during and after a seismic occurrence. It is intended to provide the user with a high level of confidence in the selection of an equipment practice to meet such needs.

Since IEC 60297 and IEC 60917 series chassis, subracks, and plug-in units come in many sizes, weights and mechanical complexities, it is not possible to define a single minimum seismic test requirement for all weight categories. Therefore, overall mass categories are defined in this standard. However, the mass distribution inside a chassis and subrack is considered “application-specific” and herein defined as “intended use”.

The single-axis or tri-axis acceleration for the seismic testing is selectable.

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 60068-2-6, *Environmental testing – Part 2-6: Tests – Fc: Vibration (sinusoidal)*

IEC 60068-2-47, *Environmental testing – Part 2-47: Test – Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-2-57, *Environmental testing – Part 2-57: Tests – Test Ff: Vibration – Time-history and sine-beat method*

IEC 60068-3-3, *Environmental testing – Part 3-3: Guidance – Seismic test methods for equipment*

IEC 60297 (all parts), *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series*

IEC 60297-3-101, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-101: Subracks and associated plug-in units*

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- Looking for additional Standards? Visit Intertek Inform Infostore
 - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-