

Environmental testing —

Part 2-47: Test methods — Mounting of components, equipment and other articles for vibration, impact and similar dynamic tests

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The UK participation in its preparation was entrusted to Technical Committee GEL/104, Environmental conditions, classification and testing, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 20, an inside back cover and a back cover.

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Environmental testing
Part 2-47: Test methods - Mounting of components, equipment and
other articles for vibration, impact and similar dynamic tests
(IEC 60068-2-47:1999)

Essais d'environnement
Partie 2-47: Méthodes d'essai
Fixation de composants, matériels et
autres articles pour essais dynamiques
de vibrations, d'impacts et autres essais
similaires
(CEI 60068-2-47:1999)

Umweltprüfungen
Teil 2-47: Prüfverfahren
Befestigung von Bauelementen, Geräten
und anderen technischen Erzeugnissen
beim Schwingen, Stoßen und ähnliche
dynamische Prüfungen
(IEC 60068-2-47:1999)

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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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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Foreword

The text of document 104/128/FDIS, future edition 2 of IEC 60068-2-47, prepared by IEC TC 104, Environmental conditions, classification and methods of test, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60068-2-47 on 1999-12-01.

This European Standard supersedes EN 60068-2-47:1993.

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) 2000-03-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2000-09-01

Annexes designated "normative" are part of the body of the standard.

In this standard, annex ZA is normative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60068-2-47:1999 was approved by CENELEC as a European Standard without any modification.

CONTENTS

	Page
INTRODUCTION	4
Clause	
1 Scope	5
2 Normative references	5
3 Definitions	5
4 General	5
5 Mounting of components	6
6 Mounting of equipment and other articles	6
7 Information to be given in the relevant specification	7
Annex A (informative) Guidance	8
A.1 Components	8
A.2 Equipment and other articles	9
A.3 Test fixture	9
A.4 General recommendations for fixture design	12
A.5 Balancing	13
A.6 Positioning of accelerometers	14
A.7 Performance check of test fixture	14
A.8 Large and/or complex specimens	14
ZA (normative) Normative references to international publications with their corresponding European publications	20
Figure 1 – Examples of obvious means of mounting components	15
Figure 2 – Examples of mounting of components by the leads only	16
Figure 3 – Examples of mounting of components by the body only	17
Figure 4 – Examples of mounting of components by the body and the leads	18
Figure 5 – Examples of mounting of electronic cabinets	19

INTRODUCTION

This International Standard defines the requirements and gives information regarding the mounting of components, equipment and other articles, referred to as "specimens", when they are subjected to vibration, impact and similar dynamic tests.

In all cases, component-type specimens must be mounted as stated in the relevant specification. Where these details are not specified, a number of standardized methods of mounting are given in this standard.

Equipment-type specimens must be mounted by their normal means of attachment unless otherwise stated in the relevant specification.

An attempt must be made, in the first instance, to categorize specimens into either component or equipment types and then to proceed to test accordingly. If this is not possible, for example for packaged items, this standard may still be relevant, but must be related to the package and not to the contents.

General guidance is provided in annex A as appropriate for both the specification writer and the test engineer.

In some instances, requirements and guidance on mounting are included, partly or wholly, in the individual standards of IEC 60068, for example, Test Fh¹⁾. Where such an International Standard is called up by the relevant specification, it will need to be studied as well as this International Standard.

¹⁾ IEC 60068-2-64:1993, *Environmental testing – Part 2: Methods of test – Test Fh: Vibration, broad band random (digital control) and guidance*.

ENVIRONMENTAL TESTING –

Part 2-47: Test methods – Mounting of components, equipment and other articles for vibration, impact and similar dynamic tests

1 Scope

This part of IEC 60068 provides methods of mounting components, and mounting requirements for equipment and other articles, for the families of dynamic tests in IEC 60068-2, that is impact (Test E), vibration (Test F) and acceleration, steady-state (Test G).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60068. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60068 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

ISO 2041:1990, *Vibration and shock – Vocabulary*

3 Definitions

The terms used are generally defined in ISO 2041 and IEC 60068-1.

4 General

The relevant specification shall state whether the effect of gravitational force is important. If so, the specimen shall be mounted in such a way that the gravitational force acts in the same direction as it would in use. Where the effect of gravitational force is not important, the specimen may be mounted in any attitude.

Also, if significant to the test results, the relevant specification shall state

- a) the temperature limits within which the specimen shall be tested;
- b) the maximum level of magnetic interference which may be imposed on the specimen and/or the orientation of the specimen in relation to the direction of the magnetic field (for example, near an electrodynamic vibration generator);
- c) relative humidity limits within which the specimen shall be tested.

5 Mounting of components

The mounting method to be used shall be as stated in the relevant specification.

Where the method of mounting is not specified but is obvious from the design, as in figure 1, this method shall be used. Where it is not obvious, the mounting methods shall, whenever possible, be chosen in accordance with the principles shown in figures 2, 3 or 4, bearing in mind whether the intention is to load dynamically the leads and/or the body or to determine the internal robustness.

When the specimen is to be tested with additional leads attached, these shall be so arranged that they impose similar restraint and mass to those when the specimen is used in its normal manner.

In all cases, components shall be fastened to a rigid test fixture or direct to the mounting surface of the test apparatus.

NOTE – A "rigid test fixture" is one where there are no resonances within the test range or where the requirements of the test tolerances can be met.

6 Mounting of equipment and other articles

The specimen shall be mechanically connected to the mounting surface of the test apparatus either directly or by means of a rigid test fixture (see note above), or as stated in the relevant specification.

NOTE – In the case of acoustically induced vibration, the mounting technique is quite different and reference shall be made to IEC 60068-2-65¹⁾.

In cases where the normal mounting structure for the equipment is available, the relevant specification shall state if it shall be used (see also clause A.2).

Any additional stays or straps shall be avoided. Any connections to the specimen such as cables, pipes, etc., shall be so arranged that they impose similar restraint and mass to those when the specimen is installed in its operational position. In order to achieve this, it may be necessary to fasten the cables, pipes, etc., to the fixture.

Specimens intended for use with isolators shall normally be tested with their isolators. If it is not practicable to carry out the test with the appropriate isolators, the specimen may be tested without the isolators at a different severity, as stated in the relevant specification.

The relevant specification may require an additional test on a specimen with the external isolators removed or blocked, in order to demonstrate that minimum acceptable structural resistance has been achieved. In this case, the severity to be applied shall be given in the relevant specification.

Where, operationally, any heating effect on the isolators is likely to be of significance, this shall be taken into account during testing.

¹⁾ IEC 60068-2-65:1993, *Environmental testing – Part 2: Methods of test – Test Fg: Vibration, acoustically induced*.