

Environmental testing —

Part 2: Tests —

Test Eh. Hammer tests

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ICS 19.040

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National foreword

This British Standard is the English language version of EN 60068-2-75:1997. It is identical with IEC 60068-2-75:1997. It supersedes BS EN 60068-2-62:1996 and BS EN 60068-2-63:1995 which are withdrawn. The UK participation in its preparation was entrusted by Technical Committee GEL/50, Environmental testing of electrotechnical products, to Subcommittee GEL/50/1, Dynamic tests, which has the responsibility to:

- aid enquirers to understand the text;
- 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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A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 26, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 December 1997

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Contents

	Page
National foreword	Inside front cover
Foreword	2
Text of EN 60068-2-75	5

Descriptors: Environmental testing, test Eh: hammer tests, provisions common to all hammer tests, test Eha: pendulum hammer, test Ehb: spring hammer, test Ehc: vertical hammer

English version

Environmental testing
Part 2: Tests — Test Eh: Hammer tests
(IEC 60068-2-75:1997)

Essais d'environnement
Partie 2: Essai Eh: Essais aux marteaux
(CEI 60068-2-75:1997)

Umweltprüfungen
Teil 2: Prüfungen
Prüfung Eh: Hammerprüfungen
(IEC 60068-2-75:1997)

This European Standard was approved by CENELEC on 1997-10-01. 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, 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 50A/328/FDIS, future edition 1 of IEC 60068-2-75, 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 60068-2-75 on 1997-10-01.

This European Standard supersedes EN 60068-2-62:1995 and EN 60068-2-63:1994.

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) 1998-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-07-01

Annexes designated “normative” are part of the body of the standard.

Annexes designated “informative” are given for information only.

In this standard, normative, normative and normative are normative and informative, informative and informative are informative. normative has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60068-2-75:1997 was approved by CENELEC as a European Standard without any modification.

Contents

	Page	Page
Foreword	2	Annex B (normative) Procedure for the calibration of spring hammers 15
Introduction	5	Annex C (informative) Guidance 22
1 Scope	5	Annex D (informative) Example of pendulum hammer test apparatus 23
2 Normative references	5	Annex E (informative) Example of spring hammer test apparatus 26
3 Provisions common to all hammer test methods	5	Annex ZA (normative) Normative references to international publications with their corresponding European publications Inside back cover
3.1 Definitions	5	Figure 1 — Example sketch of the striking element 6
3.2 Severities	5	Figure 2 — Derivation of measuring point 8
3.2.1 General	5	Figure 3 — Shape of release head for 2 J 9
3.2.2 Impact energy value	5	Figure A.1 — Example of a striking element for ≤ 1 J 11
3.2.3 Number of impacts	6	Figure A.2 — Example of a striking element for 2 J 11
3.3 Test apparatus	6	Figure A.3 — Example of a striking element for 5 J 12
3.3.1 Description	6	Figure A.4 — Example of a striking element for 10 J 12
3.3.2 Mounting	6	Figure A.5 — Example of a striking element for 20 J 13
3.4 Preconditioning	7	Figure A.6 — Example of a striking element for 50 J 14
3.5 Initial measurements	7	Figure B.1 — Calibration device 16
3.6 Testing	7	Figure B.2 — Pendulum “c” 17
3.6.1 Attitudes and impact locations	7	Figure B.3 — Steel spring of pendulum “c” 18
3.6.2 Preparation of the specimen	7	Figure B.4 — Details of calibration device 19
3.6.3 Operating mode and functional monitoring	7	Figure B.5 — Arrangement for the calibration of the calibration device 20
3.7 Recovery	7	Figure B.6 — Division of scale plate “f” 21
3.8 Final measurements	7	Figure D.1 — Test apparatus 23
3.9 Information to be given in the relevant specification	7	Figure D.2 — Striking element of the pendulum hammer for energies ≤ 1 J 24
4 Test Eha: Pendulum hammer	7	Figure D.3 — Mounting fixture 24
4.1 Definitions	7	Figure D.4 — Adapter for flush-type switches 25
4.2 Test apparatus	8	Figure D.5 — Adapter for lamp holders 25
4.2.1 Test apparatus for severities not exceeding 1 J	9	Figure E.1 — Spring hammer test apparatus 26
4.2.2 Test apparatus for severities of 2 J and above	9	Table 1 — Co-ordinated characteristics of the striking elements 6
4.3 Height of fall	9	Table 2 — Height of fall 8
4.4 Testing	9	Table C.1 — Energy levels in joules 22
5 Test Ehb: Spring hammer	9	Table E.1 — Kinetic energy of striking element 26
5.1 Test apparatus	9	
5.2 Influence of earth’s gravity	10	
5.3 Calibration	10	
6 Test Ehc: Vertical hammer	10	
6.1 Definition	10	
6.2 Test apparatus	10	
6.3 Height of fall	10	
Annex A (normative) Shapes of striking elements	11	

Introduction

Mechanical impacts likely to stress electrotechnical equipment in service can be generated by hammers of various types. For standardization purposes, the results of such testing should not depend on the type of testing apparatus and therefore, the characteristics of the various types of test hammers described in this part of IEC 60068 are intended to be as close as practicable for the same severity level.

It is important to note that both clause 5 and the test method selected from clauses 7, 9, and 10 need to be complied with in order to satisfy the requirements of this International Standard.

The severity levels are, in general, taken from IEC 60721-1.

For co-ordination purposes, it has been necessary to change certain fundamental parameters of the previous tests Ef: Impact, pendulum hammer, and Eg: Impact, spring hammer. In all cases, both sets of parameters are shown at the appropriate places in the text and will remain valid until five years from the publication of this part of IEC 60068. At that time, the values in brackets will be removed.

1 Scope

This part of IEC 60068 provides three standardized and co-ordinated test methods for determining the ability of a specimen to withstand specified severities of impact. It is used, in particular, to demonstrate an acceptable level of robustness when assessing the safety of a product and is primarily intended for the testing of electrotechnical items. It consists of the application to the specimen of a prescribed number of impacts defined by their impact energy and applied in the prescribed directions.

This part of IEC 60068 covers energy levels ranging from 0,14 joules (J) to 50 joules (J).

Three types of test apparatus are applicable to perform these tests. **<bold>** provides some guidance as to this aspect.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60068. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60068 should investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

IEC 60721-1:1990, *Classification of environmental conditions — Part 1: Environmental parameters and their severities*.

Amendment 1, 1992

ISO 1052:1982, *Steels for general engineering purposes*.

ISO 2039-2:1987, *Plastics — Determination of hardness — Part 2: Rockwell hardness*.

ISO 2041:1990, *Vibration and shock — Vocabulary*.

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerances indicated*.

ISO 6508:1986, *Metallic materials — Hardness test — Rockwell test*
(scales A – B – C – D – E – F – G – H – K).

3 Provisions common to all hammer test methods

3.1 Definitions

For the purpose of this part of IEC 60068, the terms used are generally defined in ISO 2041 or in IEC 60068-1. The following additional common definitions are also applicable for the purpose of this part of IEC 60068. Definitions specific to the tests of clauses 7 and 10 are given therein.

3.1.1 fixing point

part of the specimen in contact with the mounting fixture at the point where the specimen is normally fastened in service

3.1.2 equivalent mass

mass of the striking element and any relevant portions of the test apparatus which, combined with its velocity, provides the impact energy

NOTE For the particular application to the pendulum hammer apparatus, See 4.1.3.

3.2 Severities

3.2.1 General

The severity is defined by the impact energy value chosen from 5, and the number of impacts according to 6.

3.2.2 Impact energy value

The impact energy value shall be one of the following, as prescribed by the relevant specification:

0,14 – 0,2 – (0,3) – 0,35 – (0,4) – 0,5 – 0,7 – 1 – 2 – 5 – 10 – 20 – 50 joules.

NOTE Figures in brackets appear in current IEC 60068-2 standards, but will be removed five years from the date of publication of this standard.

Table 1 — Co-ordinated characteristics of the striking elements

Energy value J	≤ 1 $\pm 10\%$	2 $\pm 5\%$	5 $\pm 5\%$	10 $\pm 5\%$	20 $\pm 5\%$	50 $\pm 5\%$
Equivalent mass $\pm 2\%$ kg	0,25 (0,2)	0,5	1,7	5	5	10
Material	Polyamide ^a	Steel ^b				
R mm	10	25	25	50	50	50
D mm	18,5 (20)	35	60	80	100	125
f mm	6,2(10)	7	10	20	20	25
r mm	—	—	6	—	10	17
l mm	To be adjusted to match the equivalent mass, see <bold>.					
NOTE The values shown in brackets for the equivalent mass and the diameter of the striking element for the energy value equal to or less than 1 J are those in the current test Ef. The values currently in test Eg are also shown for these two parameters. For co-ordination purposes, the values in brackets will be deleted five years from the publication of this standard.						
^a 85 $\leq$ HRR $\leq$ 100, Rockwell hardness according to ISO 2039-2.						
^b Fe 490–2, according to ISO 1052: Rockwell hardness: HRE 80...85 according to ISO 6508.						

3.2.3 Number of impacts

Unless otherwise prescribed by the relevant specification, the number of impacts shall be three per location.

3.3 Test apparatus

3.3.1 Description

Three types of test apparatus are available to perform these tests:

- the pendulum hammer;
- the spring hammer;
- the vertical hammer.

The types of test apparatus are defined in clauses 7, 9 and 10 as tests Eha, Ehb and Ehc respectively. The co-ordinated characteristics of the striking element are, in principle, similar in all three cases and are stated in Table 1, in relation to the outline shown in Figure 1.

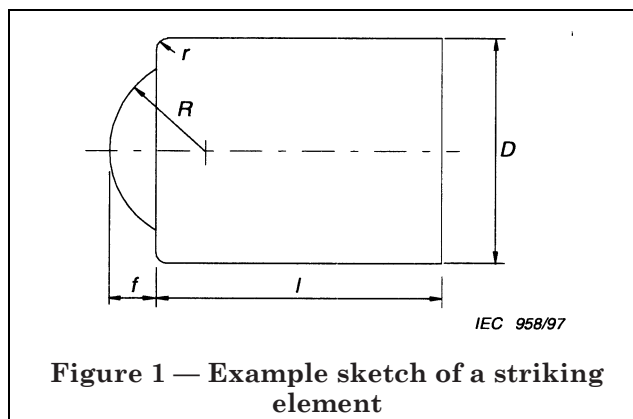
Dimensions are in millimetres. Tolerances are as per class m of ISO 2768-1, unless otherwise stated. The striking surface shall be visually examined before each impact in order to ensure that there is no damage that might affect the result of the test.

3.3.2 Mounting

As prescribed by the relevant specification, the specimen shall either:

- be mounted by its normal means on a rigid plane support, or
- be placed against a rigid plane support.

In order to ensure that the specimen is rigidly supported, it may be necessary when performing the test to place the specimen against a plane solid support, for example a wall or a floor made of brick or concrete, covered by a sheet of polyamide which is tightly fixed to the support.



Care shall be taken to ensure that there is no appreciable air gap between the sheet and the support. The sheet shall have a Rockwell hardness of $85 \leq \text{HRR} \leq 100$ according to ISO 2039-2, a thickness of approximately 8 mm and a surface area such that no parts of the specimen are mechanically over stressed due to the supporting area being insufficient.

The mounting arrangement is deemed to be sufficiently rigid if the displacement of the impact surface of the plane support does not exceed 0,1 mm when struck by an impact applied directly to it with the same level of energy as for the specimen.

NOTE 1 For specimens to be subjected to impact energies not exceeding 1 J, some examples of mounting and support are shown in Figure D.3, Figure D.4 and Figure D.5.

NOTE 2 When the mass of the mounting is at least 20 times that of the specimen, the rigidity of the mounting is likely to be sufficient.