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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 60068-4

February 1996

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Descriptors: Environmental testing, specification writers, test summaries, definitions, guidance documents

English version

Environmental testing
Part 4: Information for specification writers
Test summaries
(IEC 68-4:1987 + A1:1992 + A2:1994)

Essais d'environnement
Partie 4: Renseignements destinés aux
rédacteurs de spécifications
Résumés d'essais
(CEI 68-4:1987 + A1:1992 +
A2:1994)

Umweltprüfungen
Teil 4: Informationen für den Verfasser
von Einzelbestimmungen
Zusammenfassungen zu den Prüfungen
(IEC 68-4:1987 + A1:1992 +
A2:1994)

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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.

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The texts of the International Standard IEC 68-4:1987 and its amendments 1:1992 and 2:1994, prepared by TC 50, Environmental testing, were submitted to the formal vote and were approved by CENELEC as EN 60068-4 on 1995-11-28 without any modification.

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) 1996-12-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 1996-12-01

Endorsement notice

The text of the International Standard IEC 68-4:1987 and its amendments 1:1992 and 2:1994 was approved by CENELEC as a European Standard without any modification.

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NORME INTERNATIONALE INTERNATIONAL STANDARD

4

CEI IEC 68-4

Première édition
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Commission Electrotechnique Internationale

International Electrotechnical Commission

Международная Электротехническая Комиссия



Essais fondamentaux climatiques et de robustesse mécanique

Quatrième partie: Renseignements destinés aux rédacteurs
de spécifications — Résumés d'essais

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Basic environmental testing procedures

Part 4: Information for specification writers — Test summaries

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

BASIC ENVIRONMENTAL TESTING PROCEDURESPart 4: Information for specification writers -Test summaries

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

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PREFACE

This publication has been prepared by IEC Technical Committee No. 50: Environmental testing.
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The text of this publication is based on the following documents:

Six Months' Rule	Report on Voting
50(C0)200	50(C0)201

Full information on the voting for the approval of this publication can be found in the Voting Report indicated in the above table.

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 4: Information for specification writers - Test summaries

1. Object

To provide information in summarized form on the individual environmental tests in IEC Publication 68-2 to serve the purposes of specification writers and others when a knowledge of the detailed provisions of the complete standards is not required.

It should be particularly borne in mind by all concerned with laboratory testing that these summaries are not intended to be a substitute for the relevant complete standards.

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2. General

The standards in Publication 68-2 for the individual environmental tests are based on the general considerations, including definitions and guidance, to be found in Publication 68-1. That standard gives an explanation of the method used to designate the various tests.

The uniform presentation of these summaries on a single page has resulted in varying degrees of 'reduction' of original texts which themselves vary widely in length and complexity. Although, in order to facilitate the use of the summaries in this publication, the presentation has been made as consistent as possible, it should be remembered that the original texts are of different dates and are the responsibility of IEC Technical Committee No. 50 or its Sub-Committees.

Tolerances have been omitted from these summaries; they can be found in Publication 68-2.

The information in Sub-clauses 2.1, 2.2 and 2.3, although not necessarily applicable to all the summaries, is of general application.

2.1 Guidance

Many of the standards in Publication 68-2 contain guidance on the application of the testing procedure and much of this is of particular value to specification writers and others who are not required to have a knowledge of the detailed provisions of a Test. In the case of these standards, the summaries will make no specific reference to guidance.

There are other cases, for example solar radiation testing (Publication 68-2-5), where guidance is to be found in another standard in the Publication 68-2 series (Publication 68-2-9 in the case of the example), or - and then described as 'background information' - in a standard in the Publication 68-3 series. In these cases, reference is made in the summary to the other standards concerned irrespective of their degree of relevance for specification writers in order that they can indicate fully in their specifications the sources of detailed information which laboratories will require. The standard will then be listed in Clause 5.

2.2 Storage

Guidance on the application of Tests in the Publication 68-2 series to simulate the effects of storage, from short-term to long-term, is given in Publication 68-2-48, to which reference should be made in appropriate cases.

2.3 Mounting

The mounting requirements for specimens to be subjected to certain of the vibration and shock tests covered by the summaries, namely shock and bump (Test Ea, Publication 68-2-27; Test Eb, Publication 68-2-29), sinusoidal and random vibration (Test Fc, Publication 68-2-6; Test Fd, Publications 68-2-34, 68-2-35, 68-2-36 and 68-2-37) and steady-state acceleration (Test Ga, Publication 68-2-7), are the subject of Publication 68-2-47, to which attention should be drawn in relevant specifications. This applies also, of course, when dealing with 'combined' or 'composite' tests, as defined in Clause 3, embodying one or more of the tests mentioned.

3. Definitions

The following list of generally-applicable definitions is based, with some editing, on those given in Publication 68-1.

For other definitions, refer to Publications 68-1 and 68-2.

3.1 Test

Complete series of operations implied by its title, normally comprising the following operations, when required:

- a) pre-conditioning;
- b) initial examination and measurements;
- c) conditioning;
- d) recovery;
- e) final examination and measurements.

Note.- Intermediate measurements may be required during conditioning and/or recovery.

3.1.1 *Pre-conditioning*

Treatment of a specimen with the object of removing or partly counteracting the effects of its previous history.

3.1.2 *Conditioning*

Exposure of a specimen to environmental conditions in order to determine the effect of such conditions on the specimen.

3.1.3 *Recovery*

Treatment of a specimen, after environmental conditioning, in order that the properties of the specimen may be stabilized before measurement.

3.2 *Specimen*

Product designated to be tested in accordance with the procedures of Publication 68.

Note.- The term 'specimen' includes any auxiliary parts or systems that are integral functional features of the specimen, for example systems for cooling and heating.

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3.2.1 *Heat-dissipating specimen*

Specimen with the hottest point on its surface, measured in free air conditions and under the air pressure specified in Sub-clause 5.3.1 of Publication 68-1, more than 5 °C above the ambient temperature of the surrounding atmosphere after temperature stability has been reached.

3.2.2 *Non-heat dissipating specimen*

Specimen other than as defined in Sub-clause 3.2.1

3.3 *Relevant specification*

Set of requirements to be satisfied by a product, indicating the procedure(s) necessary to determine whether the requirements given are satisfied.

3.4 *Severity*

Set of parameters for the conditioning of the specimen.

3.5 *Combined test*

Test in which two or more test environments act upon the specimen simultaneously.

3.6 *Composite test*

Test in which the specimen is exposed to two or more test environments in close succession.

4. Lists of test summaries

To facilitate the finding of the required summary, the summaries are listed in numerical order in Sub-clause 4.1 and in alphabetical order in Sub-clause 4.2. The Sheets for the individual summaries are filed in alphabetical order.

Note.- The reference to any publication refers to the edition of the standard identified by its date on the corresponding test summary sheet and to all the amendments similarly identified.

4.1 *Numerical list*

<i>IEC Publication</i>	<i>Test designation and title</i>	<i>Sheet</i>
68-2-1	Tests A: Cold (including First Supplement 68-2-1A)	A/B-1
68-2-2	Tests B: Dry Heat (including First Supplement 68-2-2A)	A/B-1
68-2-3	Test Ca: Damp Heat, Steady State	C-1
68-2-5	Test Sa: Simulated Solar Radiation at Ground Level	S-1
68-2-6	Test Fc and Guidance: Vibration (Sinusoidal)	F-1
68-2-7	Test Ga and Guidance: Acceleration, Steady State	G-1
68-2-10	Test J: Mould Growth	J-1
68-2-11	Test Ka: Salt Mist	K-1
68-2-13	Test M: Low Air Pressure	M-1
68-2-14	Test N: Change of Temperature	N-1
68-2-17	Test Q: Sealing	Q-1 to Q7
68-2-20	Test T: Soldering	T-1, T-3, T-4
68-2-21	Test U: Robustness of Terminations and Integral Mounting Devices	U-1 to U-5
68-2-27	Test Ea and Guidance: Shock	E-1
68-2-29	Test Eb and Guidance: Bump	E-2
68-2-30	Test Db and Guidance: Damp Heat, Cyclic (12 + 12-hour Cycle)	D-1

<i>IEC Publication</i>	<i>Test designation and title</i>	<i>Sheet</i>
68-2-31	Test Ec: Drop and Topple, primarily for Equipment-type Specimens	E-3
68-2-32	Test Ed: Free Fall	E-4
68-2-34	Test Fd: Random Vibration Wide Band - General Requirements	F-2
68-2-35	Test Fda: Random Vibration Wide Band - Reproducibility High	F-2
68-2-36	Test Fdb: Random Vibration Wide Band - Reproducibility Medium	F-2
68-2-37	Test Fdc: Random Vibration Wide Band - Reproducibility Low	F-2
68-2-38	Test Z/AD: Composite Temperature/Humidity Cyclic Test	Z-1
68-2-39	Test Z/AMD: Combined Sequential Cold, Low Air Pressure and Damp Heat Test	Z-4
68-2-40	Test Z/AM: Combined Cold/Low Air Pressure Tests	Z-3
68-2-41	Test Z/BM: Combined Dry Heat/Low Air Pressure Tests	Z-3
68-2-42	Test Kc: Sulphur Dioxide Test for Contacts and Connections	K-3
68-2-43	Test Kd: Hydrogen Sulphide Test for Contacts and Connections	K-3
68-2-45	Test XA and Guidance: Immersion in Cleaning Solvents	X-1
68-2-50	Tests Z/AFc: Combined Cold/Vibration (Sinusoidal) Tests for both Heat-dissipating and Non-heat-dissipating Specimens	Z-2
68-2-51	Tests Z/BFc: Combined Dry Heat/Vibration (Sinusoidal) Tests for both Heat-dissipating and Non-heat-dissipating Specimens	Z-2
68-2-52	Test Kb: Salt Mist, Cyclic (Sodium Chloride Solution)	K-2
68-2-54	Test Ta: Soldering, Solderability Testing by the Wetting Balance Method	T-2
68-2-55	Test Ee and Guidance: Bounce	E-5

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4.2 *Alphabetic list*

<i>Test designation</i>	<i>IEC Publication</i>	<i>Title</i>	<i>Sheet</i>
A, Aa, Ab, Ad	68-2-1	Tests A: Cold (including First Supplement 68-2-1A)	A/B-1
B, Ba, Bb, Bc, Bd	68-2-2	Tests B: Dry Heat (including First Supplement 68-2-2A)	A/B-1
Ca	68-2-3	Test Ca: Damp Heat, Steady State	C-1
Db	68-2-30	Test Db and Guidance: Damp Heat Cyclic (12 + 12-hour Cycle)	D-1
Ea	68-2-27	Test Ea and Guidance: Shock	E-1
Eb	68-2-29	Test Eb and Guidance: Bump	E-2
Ec	68-2-31	Test Ec: Drop and Topple, primarily for Equipment-type Specimens	E-3
Ed	68-2-32	Test Ed: Free Fall	E-4
Ee	68-2-55	Test Ee and Guidance: Bounce	E-5
Fc	68-2-6	Test Fc and Guidance: Vibration (Sinusoidal)	F-1
Fd	68-2-34	Test Fd: Random Vibration Wide Band - General Requirements	F-2
Fda	68-2-35	Test Fda: Random Vibration Wide Band - Reproducibility High	F-2
Fdb	68-2-36	Test Fdb: Random Vibration Wide Band - Reproducibility Medium	F-2
Fdc	68-2-37	Test Fdc: Random Vibration Wide Band - Reproducibility Low	F-2
Ga	68-2-7	Test Ga and Guidance: Acceleration, Steady State	G-1
J	68-2-10	Test J: Mould Growth	J-1
Ka	68-2-11	Test Ka: Salt Mist	K-1

<i>Test designation</i>	<i>IEC Publication</i>	<i>Title</i>	<i>Sheet</i>
Kb	68-2-52	Test Kb: Salt Mist, Cyclic (Sodium Chloride Solution)	K-2
Kc	68-2-42	Test Kc: Sulphur Dioxide Test for Contacts and Connections	K-3
Kd	68-2-43	Test Kd: Hydrogen Sulphide Test for Contacts and Connections	K-3
M	68-2-13	Test M: Low Air Pressure	M-1
N, Na, Nb, Nc	68-2-14	Test N: Change of Temperature	N-1
Q	68-2-17	Test Q: Sealing	Q-1
Qa		Test Qa: Sealing of Bushes, Spindles and Gaskets	Q-2
Qc		Test Qc: Container Sealing, Gas Leakage	Q-3
Qd		Test Qd: Container Sealing, Seepage of Filling Liquid	Q-4
Qf		Test Qf: Immersion	Q-5
Qk		Test Qk: Sealing Tracer Gas Method with Mass Spectrometer	Q-6
Ql		Test Ql: Bomb Pressure Test	Q-7
Sa	68-2-5	Test Sa: Simulated Solar Radiation at Ground Level	S-1
T		Test T: Soldering	
Ta	68-2-20	Test Ta: Solderability of Wire and Tag Terminations	T-1
	68-2-54	Test Ta: Soldering. Solderability Testing by the Wetting Balance Method	T-2
Tb	68-2-20	Test Tb: Resistance of Components to Soldering Heat	T-3
Tc	68-2-20	Test Tc: Solderability of Printed Boards and Metal-clad Laminates	T-4

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<i>Test designation</i>	<i>IEC Publication</i>	<i>Title</i>	<i>She</i>
U	68-2-21	Test U: Robustness of Terminations and Integral Mounting Devices	
Ua ₁		Test Ua ₁ : Tensile	U-1
Ua ₂		Test Ua ₂ : Thrust	U-1
Ub		Test Ub: Bending	U-1
Uc		Test Uc: Torsion	U-1
Ud		Test Ud: Torque	U-1
XA	68-2-45	Test XA and Guidance: Immersion in Cleaning Solvents	X-1
Z/AD	68-2-38	Test Z/AD: Composite Temperature/Humidity Cyclic Test	Z-1
Z/AFc	68-2-50	Tests Z/AFc: Combined Cold/Vibration (Sinusoidal) Tests for Both Heat-dissipating and Non-heat-dissipating Specimens	Z-2
Z/AM	68-2-40	Test Z/AM: Combined Cold/Low Air Pressure Tests	Z-3
Z/AMD	68-2-39	Test Z/AMD: Combined Sequential Cold, Low Air Pressure, and Damp Heat Test	Z-4
Z/BFc	68-2-51	Tests Z/BFc: Combined Dry Heat/Vibration (Sinusoidal) Tests for Both Heat-dissipating and Non-heat-dissipating Specimens	Z-2
Z/BM	68-2-41	Test Z/BM: Combined Dry Heat/Low Air Pressure Tests	Z-3

5. Lists of guidance documents

Many of the publications referred to in Sub-clauses 4.1 and 4.2 contain guidance on the execution or application of the test procedure. In some cases, there is reference to other publications, containing guidance only, which are listed in Sub-clauses 5.1 and 5.2.

Note.- The reference to any publication refers to the edition of the standard identified by its date on the corresponding test summary sheet and to all the amendments similarly identified.