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(IEC 68-1 : 1988)

Environmental testing Part 1 : General and guidance

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Environmental testing

Part 1: General and guidance

Foreword as Japanese Industrial Standard

This Japanese Industrial Standard has been prepared based on the 6th edition issued in 1988 of **IEC 68-1**, *Environmental testing. Part 1: General and guidance*, without changing the technical contents.

This Standard has "informative references" that are indicated by side bar or underline (dotted line). They do not appear in the original International Standard.

The original International Standard of this Standard has its normative references. Some Japanese Industrial Standards (JIS) are identical to them, others are equivalent to them, others correspond to them, and others do not correspond to them. They are designated as follows:

- . When JIS is identical to the International Standard: **JIS C xxxx/IEC 68-xxxx**
- . When JIS has the same technical contents as the International Standard: **JIS C xxxx/equivalent IEC 68-xxxx**
- . When JIS corresponds to International Standard: **JIS C xxxx/corresponding to IEC 68-xxxx**
- . When the International Standard does not correspond to any JIS: **IEC 68-xxxx**

The original International Standard of this Standard has its normative references that are series of standards. They are designated as follows:

Original International Standard	Designation in this Standard (JIS C 0010)
IEC 68	JIS C 00 series/IEC 68
IEC 68-1	JIS C 0010/IEC 68-1
IEC 68-2	JIS C 00 testing standards series/IEC 68-2
IEC 68-3	JIS C 00 background information standards series/IEC 68-3

1 Introduction

1.1 JIS C 00 series/IEC 68 (The composition of this testing method series is described at the end of this sub-clause) contains fundamental information on environmental testing procedures and severity of tests.

In addition, this "General and guidance" contains information on atmospheric conditions for measurement and testing.

It is intended to be used in those cases where a relevant specification for a certain type of product (electrical, electromechanical and electronic equipment and devices, their sub-assemblies and constituent parts and components), hereafter referred to as "specimen", has to be prepared, so as to achieve uniformity and reproducibility in the environmental testing of this product.

Remarks: Although **JIS C 00** series/**IEC 68** is primarily intended for electrotechnical products, many of the environmental testing procedures in Part 2 of this Standard are equally applicable to other industrial products.

Informative references: This Standard and its original International Standards have the following normative references.

JIS C 0025-1988 *Basic environmental testing procedures Part 2: Tests, Test N: Change of temperature*

This standard and **IEC 68-2-14**: 1984, *Basic environmental testing. Part 2: tests, Test N: Change of temperature* are equivalent.

JIS C 0026-1989 *Basic environmental testing procedures Part 2: Tests—Test Q: Sealing*

This standard and **IEC 68-2-17**: 1989, *Basic environmental testing. Part 2: tests, Test Q: Sealing* are equivalent.

JIS C 0028-1988 *Basic environmental testing procedures Part 2: Tests Test Z/AD: Composite temperature/humidity cyclic test*

This standard and **IEC 68-2-38**: 1974, *Basic environmental testing. Part 2: Test Z/AD: Composite temperature/humidity cyclic test* are equivalent.

JIS C 0041-1987 *Basic environmental testing procedures Part 2: Tests, Test Ea and guidance: Shock*

This standard and **IEC 68-2-47**: 1982, *Basic environmental testing. Part 2: Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance* and **IEC 68-2-27**: 1987, *Basic environmental testing. Part 2: Test Ea and guidance: Shock* are equivalent.

JIS C 0050-1985 *Basic environmental testing procedures Part 2: Tests, Test T: Soldering*

This standard and **IEC 68-2-20**: 1979, *Basic environmental testing. Part 2: Test T: Soldering* are equivalent.

JIS C 0051-1986 *Basic environmental testing procedures Part 2: Tests, Test U: Robustness of terminations and integral mounting devices*

This standard and **IEC 68-2-21**: 1983, *Basic environmental testing. Part 2: Test U: Robustness of terminations and integral mounting devices* are equivalent.

JIS C 0060-1993 Fire hazard testing. Part 2: Test methods Section 1:
Glow-wire test and guidance

This standard and **IEC 695-2-1: 1991**, *Fire hazard testing. Part 2: Test methods—Section 1: Glow-wire tests and guidance* are identical.

JIS C 0061-1993 Fire hazard testing Part 2: Test methods Section 2:
Needle-flame test

This standard and **IEC 695-2-2: 1991**, *Fire hazard testing. Part 2: Test methods—Section 2: Needle-flame test* are identical.

IEC 50 (301, 302, 303): 1983 *International Electrotechnical Vocabulary (IEV):*

chapter 301 *General terms on measurements in electricity;*

chapter 302 *Electrical measuring instruments;*

chapter 303 *Electronic measuring instruments.
(Advance edition).*

IEC 68: *Environmental testing*

This series of standards and **JIS C 00** series correspond.

Hereafter, it shall be referred to as "**JIS C 00 series/IEC 68**".

IEC 68-1: 1988 *Environmental testing. Part 1: General and guidance*

This standard and **JIS C 0010-1993**, *Environmental testing Part 1: General and guidance* are identical.

Hereafter, it shall be referred to as "**JIS C 0010/IEC 68-1**".

IEC 68-2: *Environmental testing. Part 2: Tests*

This standard and **JIS C 00** testing standards series correspond.

Hereafter, it shall be referred to as "**JIS C 00 testing standards series/IEC 68-2**".

IEC 68-2-14: 1984 *Basic environmental testing. Part 2: tests, Test N: Change of temperature*

This standard and **JIS C 0025-1988**, *Basic environmental testing procedures Part 2: Tests, Test N: Change of temperature* are equivalent.

Hereafter, it shall be referred to as "**JIS C 0025/equivalent IEC 68-2-14**".

IEC 68-2-17: 1989 *Basic environmental testing. Part 2: tests, Test Q: Sealing*

This standard and **JIS C 0026-1989**, *Basic environmental testing procedures Part 2: Tests—Test Q: Sealing* are equivalent.

Hereafter, it shall be referred to as "**JIS C 0026**/equivalent **IEC 68-2-17**".

IEC 68-2-20: 1979 *Basic environmental testing. Part 2: Test T: Soldering*

This standard and **JIS C 0050-1985**, *Basic environmental testing procedures Part 2: Tests, Test T: Soldering* are equivalent.

Hereafter, it shall be referred to as "**JIS C 0050**/equivalent **IEC 68-2-20**".

IEC 68-2-21: 1983 *Basic environmental testing. Part 2: Test U: Robustness of terminations and integral mounting devices*

This standard and **JIS C 0051-1986**, *Basic environmental testing procedures Part 2: Tests, Test U: Robustness of terminations and integral mounting devices* are equivalent.

Hereafter, it shall be referred to as "**JIS C 0051**/equivalent **IEC 68-2-21**".

IEC 68-2-27: 1987 *Basic environmental testing. Part 2: Test Ea and guidance: Shock*

This standard and **JIS C 0041-1987**, *Basic environmental testing procedures Part 2: Tests, Test Ea and guidance: Shock* are equivalent.

Hereafter, it shall be referred to as "**JIS 0041**/equivalent **IEC 68-2-27**".

IEC 68-2-38: 1974 *Basic environmental testing. Part 2: Test Z/AD: Composite temperature/humidity cyclic test*

This standard and **JIS C 0028-1988**, *Basic environmental testing procedures Part 2: Tests Test Z/AD: Composite temperature/humidity cyclic test* are equivalent.

Hereafter, it shall be referred to as "**JIS C 0028**/equivalent **IEC 68-2-38**".

IEC 68-2-47: 1982 *Basic environmental testing. Part 2: Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance*

This standard and **JIS C 0041-1987**, *Basic environmental testing procedures Part 2: Tests, Test Ea: Shock* are equivalent.

Hereafter, it shall be referred to as "**JIS C 0041**/equivalent **IEC 68-2-47**".

IEC 68-2-48: 1982 *Environmental testing. Part 2: Test. Guidance on the application of the tests of IEC 68 to simulate the effects of storage.*

- IEC 68-3** *Environmental testing. Part 3: Background information*
- IEC 68-3-1: 1974** *Environmental testing. Part 3: Background information. Section one—Cold and dry heat tests*
- (IEC 68-3-1A: 1968 *First supplement* is included.)
- IEC 68-4** *Environmental testing. Part 4: Information for specification writers—Test summaries*
- IEC 160: 1963** *Standard atmospheric conditions for test purposes*
- IEC 271: 1974** *List of basic terms, definitions and related mathematics for reliability*
- IEC 529: 1976** *Classification of degrees of protection provided by enclosures*
- IEC 695: Fire hazard testing**
- IEC 721-1: 1981** *Classification of environmental conditions. Part 1: Classification of environmental parameters and their severities*
- IEC 721-2: 1981** *Classification of environmental conditions. Part 2: Environmental conditions appearing in nature*
- IEC 721-3: 1981** *Classification of environmental conditions. Part 3: Classification of groups of environmental parameters and their severities*
- IEC Guide 104: 1984** *Guide to the drafting safety standards, and the role of Committees with safety pilot functions and safety group functions*
- ISO 554: 1976** *Standard atmospheres for conditioning and/or testing—Specifications*
- ISO 3205: 1976** *Preferred test temperatures*

The expression "environmental conditioning" or "environmental testing" covers the natural and artificial environments to which specimens may be exposed so that an assessment can be made of their performance under conditions of use, transport and storage to which they may be subjected in practice.

The requirements for the performance of specimens subjected to environmental conditioning are not covered by this publication. The relevant specification for the specimen under test defines the allowed performance limits during and after environmental testing.

When drafting a relevant specification or purchasing contract, only those tests should be specified that are necessary for the relevant specimen taking into account the technical and economic aspects.

JIS C 00 series/IEC 68 consists of:

- a) this first Part (**JIS C 0010/IEC 68-1**) which deals with generalities;

Remarks: Attention is drawn to **IEC 68-2-48**.

- b) the second Part (**JIS C 00** testing standards series/**IEC 68-2**) published as separate booklets each dealing with a family of tests or a particular test or guidance for their application;

Remarks: Attention is drawn to **JIS C 0041**/equivalent **IEC 68-2-47**.

- c) the third Part (**JIS C 00** background information series/**IEC 68-3**) published as separate booklets each dealing with background information on a family of tests;
- d) the fourth Part (**IEC 68-4**), giving information for specification writers, published in two sections of which the second, in loose-leaf form, contains summaries of all the current tests in **JIS C 00** testing standards series/**IEC 68-2**;

Remarks: Fire hazard tests are separately published in **IEC 695**.

Japanese Industrial Standards that correspond to **IEC 695** are **JIS C 0060** and **JIS C 0061**.

1.2 The following historical survey gives the significant features of this (6th) and of the earlier editions of **IEC 68-1**:

Japanese Industrial Standard that corresponds to **IEC 68-1** was established on August 1, 1985, based on its 5th edition. That JIS was revised on September 1, 1993 to prepare this Standard (**JIS C 0010**) that is identical to the 6th edition.

First edition (1954)

Contained not only the general part but also many of the individual tests which now form part of the **IEC 68-2** series.

Second edition (1960)

Format changed to **IEC 68-1**: General. Tests published separately as **IEC 68-2** series. Degrees of severity were included for all tests.

Third edition (1968)

Degrees of severity dropped, many more definitions included which were amended and added to in **Amendment No. 1**, December 1972, and component climatic category introduced. The recovery clause (sub-clause **5.4**) was intended to apply to normal applications so that ALL SPECIMENS would be submitted to rigidly controlled conditions, unless otherwise specified. **Supplement A** was issued in December 1974 to add further definitions of combined and composite tests and sequences of tests.

Fourth edition (1978)

Amendment No. 1 and **Supplement A** to the third edition were incorporated in this edition and an amendment to standard recovery conditions, also including further recovery conditions with wider tolerances on temperature and humidity, was added to the original sub-clause **5.4** of the third edition.

Fifth edition (1982) [to which this Standard (**JIS C 0010**-1985) corresponds]

This edition comprised the text of the fourth edition with the addition of

clause 10: Significance of the numerical value of a quantity, and of an appendix giving general guidance on environmental testing.

Sixth edition (1988) [to which this Standard (JIS C 0010-1993) is identical]

This edition contains a largely editorial revision of the fifth edition, the technical content of **IEC 160** (which will be withdrawn) and technical amendments of clause 7 and Annex A.

1.3 The families of tests comprising Part 2 of this Standard are designated by the following upper case letters:

- A : Cold.
- B : Dry heat.
- C : Damp heat (steady state).
- D : Damp heat (cyclic).
- E : Impact (for example shock and bump).
- F : Vibration.
- G : Acceleration.
- H : Awaiting allocation (was originally allotted to "storage" tests for which see note in Item a) of sub-clause 1.1).
- J : Mould growth.
- K : Corrosive atmospheres (for example salt mist).
- L : Dust and sand.
- M : Air pressure (high or low).
- N : Change of temperature.
- P : Awaiting allocation (was originally allotted to "flammability" tests now being dealt with as "fire hazard" tests in **IEC 695**).
- Q : Sealing (including panel sealing, container sealing and protection against ingress and leakage of fluid).
- R : Water (for example rain, dripping water).
- S : Radiation (for example solar, but excluding electromagnetic).
- T : Soldering (including resistance to heat from soldering).
- U : Robustness of terminations (of components).
- V : Awaiting allocation (was originally allocated to "acoustic noise" but "vibration, acoustically induced" will now be Test Fg, one of the "vibration" family of tests).
- W : Awaiting allocation.
- Y : Awaiting allocation.

The letter **X** is used as a prefix together with a second upper case letter providing for extension of the list of families of tests, e.g. Test **XA**: Immersion in

cleaning solvents. The letter **Z** is used to denote combined tests and composite tests as follows: **Z** is followed by a solidus and a group of upper case letters relating to the combined or composite stresses, for example Test **Z/AM**: Combined cold and low air pressure tests.

If appropriate, any test may be designated as "primarily intended for components" or "primarily intended for equipment".

1.4 To provide for future expansion within a family of tests and to maintain consistency of presentation, each family of tests may be subdivided.

The subdivisions are identified by the addition of a (lower case) second letter, for example:

U: Robustness of terminations and integral mounting devices (**JIS C 0051**/equivalent **IEC 68-2-21 Test U**)

Test **Ua** : Subdivided as Test **Ua₁**: Tensile and Test **Ua₂**: Thrust

Test **Ub** : Bending

Test **Uc** : Torsion

Test **Ud** : Torque

This subdivision will be made even though only one test is published and no further tests are immediately contemplated in the relevant family.

In order to avoid confusion with numbers, the letters **i**, **I**, **o** (lower case) and **O** (upper case) will not be used.

1.5 See editorial footnote.

Editorial note: "Safety pilot functions" (see **IEC Guide 104**) have been allocated to sub-committee **50A** for "mechanical robustness" testing and to sub-committee **50B** for "corrosion" testing.

2 Scope **JIS C 00 series/IEC 68** includes a series of methods of environmental test and their appropriate severities, and prescribes various atmospheric conditions for measurements and tests designed to assess the ability of specimens to perform under expected conditions of transportation, storage and all aspects of operational use.

Although primarily intended for electrotechnical products this publication is not restricted to them and may be used in other fields where desired.

Other methods of environmental test, specific to the individual types of specimen, may be included in the relevant specifications.

3 Object The object of **JIS C 00 series/IEC 68** is to provide a series of uniform and reproducible methods of environmental (primarily climatic and mechanical robustness) test, with standard atmospheric conditions for measurements and tests, for those preparing specifications and for those engaged in the testing of those products.

These methods of test have been based upon available international engineering experience and judgement and are primarily designed to provide information on