SLOVENSKI STANDARD

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Basic environmental testing procedures - Part 2: Tests - Tests B: Dry heat

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Basic environmental testing procedures
Part 2 : Tests
Tests B : Dry heat
(includes amendment A1 : 1993)

(IEC 68-2-2 : 1974 + IEC 68-2-2A : 1976 + A1 : 1993)

Essais fondamentaux climatiques et de robustesse mécanique
Deuxième partie: Essais
Essais B : Chaleur sèche
(inclut l'amendement A1 : 1993)
(CEI 68-2-2 : 1974 + CEI 68-2-2A : 1976 + A1 : 1993)

Umweltprüfungen
Teil 2 : Prüfungen
Prüfgruppe B : Trockene Wärme
(enthält Änderung A1 : 1993)
(IEC 68-2-2 : 1974 + IEC 68-2-2A : 1976 + A1 : 1993)

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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.

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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 Harmonization Document HD 323.2.2 S1 : 1988 (IEC 68-2-2 : 1974 + IEC 68-2-2A : 1976) was submitted to the CENELEC voting procedure for conversion into a European Standard.

The text of the International Standard was approved by CENELEC as EN 60068-2-2 on 15 September 1992.

This European Standard supersedes HD 323.2.2 S1 : 1988.

The following date was fixed :

- latest date of publication of an identical national standard (dop) 1994-01-01

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative.

Foreword of EN 60068-2-2 : 1993/A1 : 1993

The text of document 50B(CO) 332, as prepared by sub-committee 50B: Climatic tests, of IEC technical committee 50 : Environmental testing, was submitted to the IEC-CENELEC parallel vote in February 1992.

The reference document was approved by CENELEC as amendment A1 to EN 60068-2-2 on 9 December 1992.

The following dates were fixed :

- latest date of publication of an identical national standard (dop) 1994-01-01
- latest date of withdrawal of conflicting national standards (dow) 1994-01-01

CONTENTS

RELATIONSHIP OF SUFFIXES BETWEEN TESTS A: COLD, AND TESTS B: DRY HEAT

The relationship of suffixes between Tests A: Cold, and Tests B: Dry heat, is shown in the following table:

Suffix letter	Tests A: Cold			Tests B: Dry heat		
	Specimen type	Temperature change	Specimen temperature at commencement of test duration	Specimen type	Temperature change	Specimen temperature at commencement of test duration
a	non heat	sudden	stabilized*	non heat	sudden	stabilized*
b	non heat	gradual	stabilized*	non heat	gradual	stabilized*
c	—	—	—	heat	sudden	stabilized*
d	heat	gradual	stabilized*	heat	gradual	stabilized*

* The specimens will normally reach temperature stability before commencement of test duration. In exceptional cases, this will not be so, and additional information will be required in the relevant specification. See Clause 1 of the Introduction and IEC Publication 68-3-1. (Amendments to cover these cases are under consideration.)

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: Tests — Tests B: Dry heat

INTRODUCTION

1. **General**

This publication deals with dry heat tests applicable both to heat-dissipating and non heat-dissipating specimens. For non heat-dissipating specimens, Tests Ba and Bb do not deviate essentially from earlier issues.

The object of the dry heat test is limited to the determination of the ability of components, equipment or other articles to be used or stored at high temperature.

These dry heat tests do not enable the ability of specimens to withstand or operate during temperature variations to be assessed. In this case, it would be necessary to use Test N: Change of temperature.

The dry heat tests are subdivided as follows:

Dry heat tests for non heat-dissipating specimens

— with sudden change of temperature, Ba;
— with gradual change of temperature, Bb.

Dry heat tests for heat-dissipating specimens

— with sudden change of temperature, Bc;
— with gradual change of temperature, Bd.

The procedures given in this publication are normally intended for specimens which achieve temperature stability during the performance of the test procedure.

The duration of the test commences at the time when temperature stability of the specimen has been reached.

For the exceptional cases when the specimen does not reach temperature stability during the performance of the test procedure, the duration of the test commences at the time when the test chamber reaches the test temperature.

The relevant specification shall define:

a) the rate of change of temperature in the test chamber;

b) the time at which the specimens are introduced into the test chamber;

c) the time at which the exposure commences;

d) the time at which the specimens are energized.

For these cases, the specification writer will find guidance on choosing the above four parameters in IEC Publication 68-3-1. (Amendments to cover these cases are under consideration.)

2. **Application of tests for non heat-dissipating specimens versus tests for heat-dissipating specimens**

A specimen is considered heat-dissipating only if the hottest point on its surface, measured in free air conditions (i.e. with no forced air circulation), is more than 5 deg C above the ambient temperature of the surrounding atmosphere after temperature stability has been reached (see IEC Publication 68-1, Sub-clause 4.6).

It is obvious that when the relevant specification calls for a storage test or does not specify an applied load during the test, the Dry Heat Tests Ba and Bb will apply.

3. **For non heat-dissipating specimens: Application of tests with sudden change of temperature versus tests with gradual change of temperature**

In Test Ba with sudden change of temperature, the specimen is introduced into the test chamber, the latter being at the temperature specified for the test. It has been introduced as a convenient and time-saving method. Test Ba shall be used only when it is known that the effects of a sudden change of temperature are not detrimental to the test specimen.

In Test Bb with gradual change of temperature, the specimen is introduced into the test chamber, the latter being at the laboratory temperature. The temperature in the chamber is then increased gradually so as to cause no detrimental effects on the test specimen due to the temperature change.

4. **Testing of heat-dissipating specimens with and without forced air circulation**

The preferable method of testing heat-dissipating specimens is that which does not use forced air circulation. If this is impracticable, however, Tests Bc and Bd envisage also procedures for testing heat-dissipating specimens with forced air circulation.

Two methods for testing with air circulation are given (Method A, Method B). Method A applies to the cases where the chamber is large enough to comply with the requirements for testing without forced air circulation, but where the high temperature cannot be maintained without circulating the air in the chamber.

Method B applies to the cases where the chamber is too small to comply with the requirements for testing without forced air circulation.

5. **Diagrammatic representations**

To facilitate the choice of test method, a diagrammatic representation of the various procedures is given on page 15.

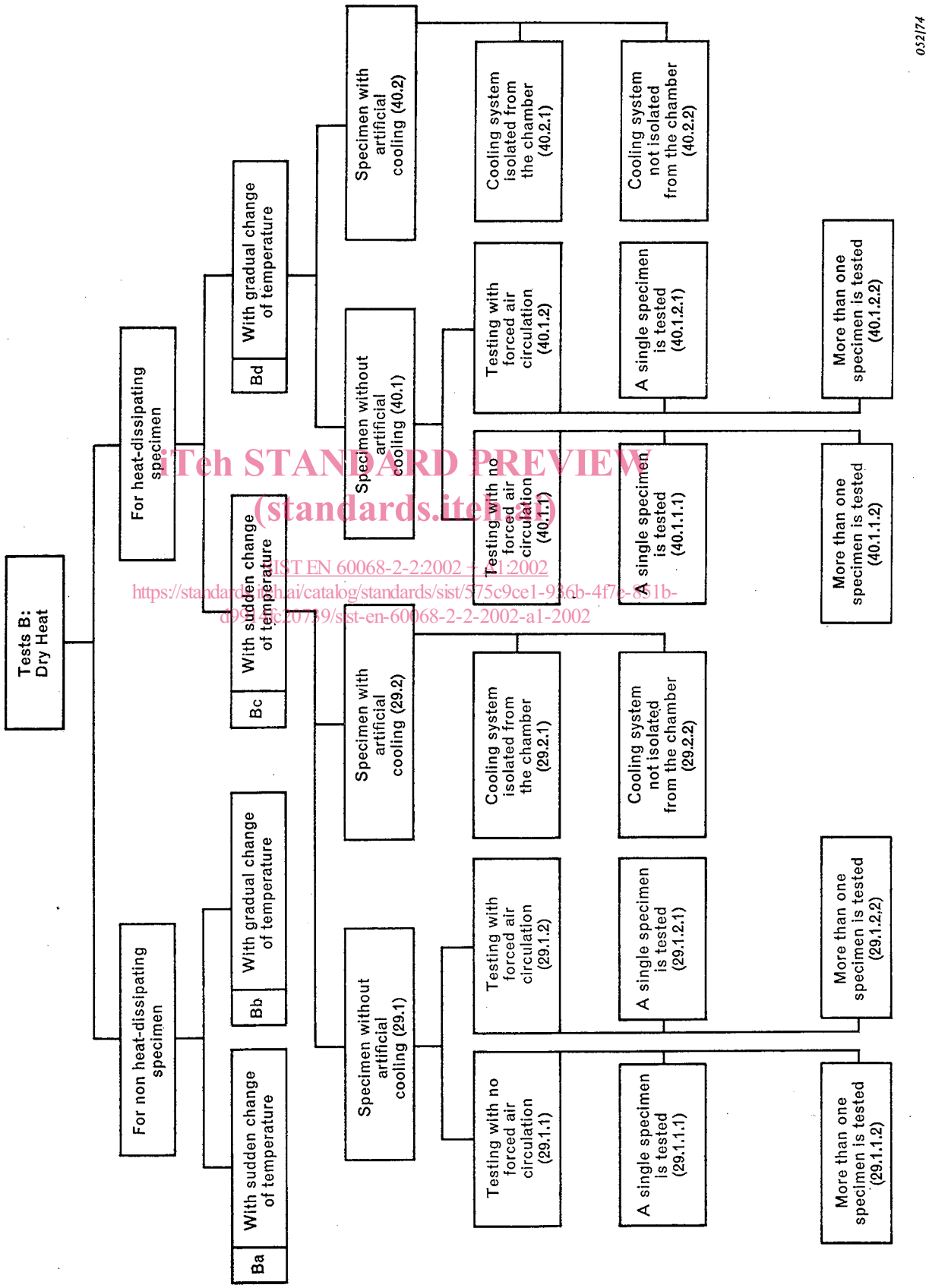
For the convenience of the user of this publication, a complete text without cross-references for each testing procedure is given.

Several clauses are therefore identical, especially in Tests Ba and Bb and in Tests Bc and Bd.

A block diagram showing which clauses are identical and which are different is given on page 16.

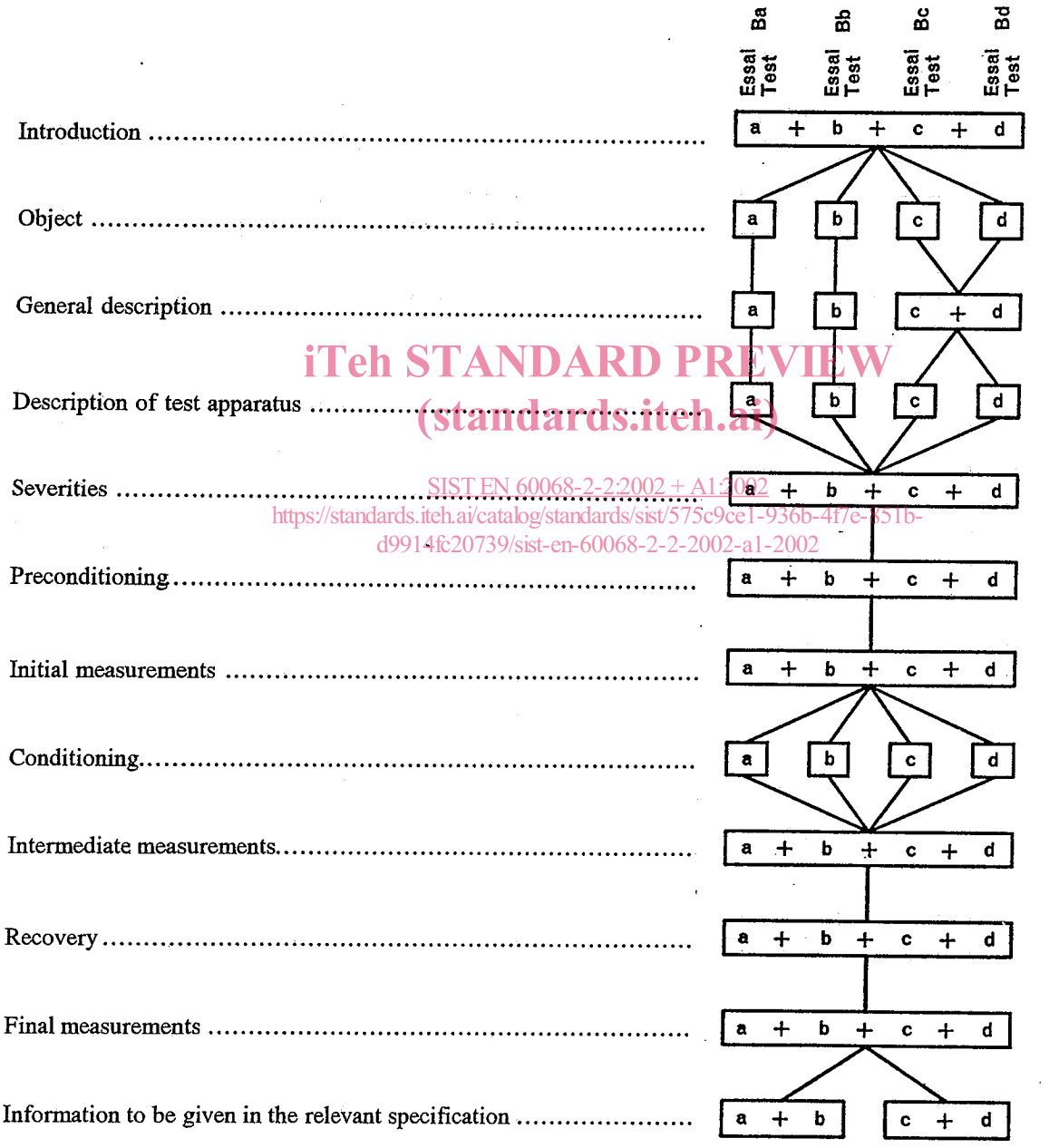
BLOCK DIAGRAM OF TESTS B: DRY HEAT

DIAGRAMMATIC REPRESENTATION OF THE VARIOUS TEST PROCEDURES



BLOCK DIAGRAM OF TESTS B: DRY HEAT

Identical and different clauses of the Tests Ba, Bb, Bc and Bd are shown in this diagram



SECTION ONE — TEST Ba: DRY HEAT FOR NON HEAT-DISSIPATING SPECIMEN WITH SUDDEN CHANGE OF TEMPERATURE

1. Object

To provide a standard test procedure to determine the suitability of non heat-dissipating components, equipment or other articles for use and/or storage under conditions of high temperature and for which the subjection to a sudden change of temperature has no detrimental effect.

This procedure is for specimens which are subjected to an elevated temperature for a time long enough for the specimen to achieve temperature stability.

In this procedure, the test duration is normally measured from the time when the specimen achieves temperature stability. For cases where this does not apply, see Introduction, Clause 1.

2. General description

In this test, the specimen while being at the ambient temperature of the laboratory is introduced into the chamber, the latter being at the temperature appropriate to the degree of severity as specified in the relevant specification.

After temperature stability of the test specimen has been reached, the specimen is exposed to these conditions for the specified duration.

Specimens under test are normally in non-operating conditions.

Forced air circulation is normally used for this test.

3. Description of test apparatus

3.1 The chamber shall be capable of maintaining the specified temperature in the working space within the tolerances given in Sub-clause 4.1. Forced air circulation may be used to maintain homogeneous conditions.

3.2 In order to limit radiation problems, the temperature of the walls of the chamber shall not differ by more than 3% of the specified ambient temperature of the test, expressed in K. This requirement applies to all parts of the chamber walls and the specimens shall be unable to "see" any heating or cooling elements which do not comply with this requirement.

3.3 The absolute humidity shall not exceed 20 g of water vapour per cubic metre of air (corresponding approximately to 50% relative humidity at 35 °C). When testing is performed at a temperature lower than 35 °C, the relative humidity shall not exceed 50%.

4. Severities

The severities, as indicated by temperature and duration of exposure, shall be specified in the relevant specification. The values shall be selected from those given in Sub-clauses 4.1 and 4.2.

4.1 *Temperature*

+ 200 ± 2 °C
+ 175 ± 2 °C
+ 155 ± 2 °C
+ 125 ± 2 °C
+ 100 ± 2 °C

+ 85 ± 2 °C
+ 70 ± 2 °C
+ 55 ± 2 °C
+ 40 ± 2 °C
+ 30 ± 2 °C

Notes 1. — In the absence of other considerations, temperatures above 200 °C and up to 1 000 °C should be chosen from the following values:
250 °C 315 °C 400 °C 500 °C 630 °C 800 °C 1 000 °C.
The tolerance in each case should be ± 2% of the above temperatures in °C.

2. — Where due to the size of the chamber it is not feasible to maintain these tolerances, the tolerance may be widened to ± 3 °C up to 100 °C and ± 5 °C up to 200 °C. When this is done, the tolerance used shall be specified in the test report.

4.2 *Duration*

2 h
16 h
72 h
96 h

Where this testing procedure is used in connection with tests associated with endurance or reliability, due note shall be taken of IEC publications which give particular recommendations for durations for such tests.

If the only intention of the testing procedure is to show whether the specimen will function at high temperature, the conditioning may be limited to a time such that the specimen under the test has reached temperature stability.

5. Preconditioning

The relevant specification may call for a preconditioning.

6. Initial measurements

The specimen shall be visually inspected and electrically and mechanically checked as required by the relevant specification.

7. Conditioning

7.1 The chamber shall be at the temperature of the specified severity.

The specimen, while being at the ambient temperature of the laboratory, shall be introduced into the chamber in the unpacked, switched off, "ready for use" state, in its normal position or as otherwise specified.

When the test specimen is intended for use with specific mounting devices, these should be used for testing.

The test (ambient) temperature shall be measured as in Sub-clause 4.4 of IEC Publication 68-1.

7.2 Time shall then be allowed for the chamber conditions to be re-established and for the specimen to reach temperature stability. (Temperature stability is defined in Sub-clause 4.6 of IEC Publication 68-1.)

7.3 For operational tests only:

The specimen shall be switched on or electrically loaded and checked to ascertain whether it is capable of functioning in accordance with the relevant specification.

If required by the relevant specification, the specimen shall remain in operating condition in accordance with the duty cycle and at the loading condition (if applicable) as prescribed by the relevant specification, or be switched off.