SLOVENSKI STANDARD
SIST EN 60068-2-38:2001

01-september-2001

Environmental testing - Part 2: Tests - Test Z/AD: Composite temperature/humidity cyclic test

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Umweltprüfungen -- Teil 2: Prüfungen - Prüfung Z/AD: Zusammengesetzte Prüfung Temperatur/Feuchte, zyklisch

Essais d'environnement -- Partie 2: Essais - Essais Z/AD: Essai cyclique composite de température et d'humidité

Ta slovenski standard je istoveten z: **EN 60068-2-38:1999**

ICS:

19.040	Preskušanje v zvezi z okoljem	Environmental testing

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EUROPÄISCHE NORM

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April 1999

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English version

Environmental testing
Part 2: Tests - Test Z/AD: Composite temperature/humidity cyclic test
(IEC 60068-2-38:1974)

Essais d'environnement
Partie 2: Essais
Essais Z/AD: Essai cyclique composite
de température et d'humidité
(CEI 60068-2-38:1974)

Umweltprüfungen
Teil 2: Prüfungen - Prüfung Z/AD:
Zusammengesetzte Prüfung
Temperatur/Feuchte, zyklisch
(IEC 60068-2-38:1974)

This European Standard was approved by CENELEC on 1999-04-01. 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, 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

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

Ref. No. EN 60068-2-38:1999 E

Foreword

The text of the International Standard IEC 60068-2-38:1974, prepared by SC 50B (transformed into IEC TC 104 "Environmental conditions, classification and methods of test), was approved by CENELEC as HD 323.2.38 S1 on 1977-03-01.

This Harmonization Document was submitted to the formal vote for conversion into a European Standard and was approved by CENELEC as EN 60068-2-38 on 1999-04-01.

The following date was 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) 2000-04-01

Endorsement notice

The text of the International Standard IEC 60068-2-38:1974 was approved by CENELEC as a European Standard without any modification.

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(affiliée à l'Organisation Internationale de Normalisation — ISO)

RECOMMANDATION DE LA CEI

INTERNATIONAL ELECTROTECHNICAL COMMISSION

(affiliated to the International Organization for Standardization — ISO)

IEC RECOMMENDATION

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1974

Essais fondamentaux climatiques et de robustesse mécanique

Deuxième partie: Essais

Essai Z/AD: Essai cyclique composite de température et d'humidité

Basic environmental testing procedures

Part 2: Tests

Test Z/AD: Composite temperature/humidity cyclic test

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Part 2: Tests — Test Z/AD:
Composite temperature/humidity cyclic test

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.

PREFACE

This recommendation has been prepared by Sub-Committee 50B, Climatic Tests, of I E C Technical Committee No. 50, Environmental Testing.

A first draft was discussed at the meeting held in Leningrad in 1971. As a result of this meeting, a new draft, document 50B(Central Office)169, was submitted to the National Committees for approval under the Six Months' Rule in November 1972.

The following countries voted explicitly in favour of publication:

Australia
Belgium
Czechoslovakia
Denmark
Finland
Germany
Israel
Japan
Netherlands
Norway
Poland
Portugal
South Africa (Republic of)
Spain
Turkey
United States of America

This recommendation should be read in conjunction with I E C Publication 68-1, Basic Environmental Testing Procedures, Part 1, General.

BASIC ENVIRONMENTAL TESTING PROCEDURES

Part 2: Tests — Test Z/AD: Composite temperature/humidity cyclic test

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1. Introduction

Test Z/AD is a cyclic temperature/humidity test which is designed to reveal defects in test specimens caused by "breathing" as distinct from the absorption of moisture.

This test differs from other cyclic damp heat tests in that it derives its increased severity from:

a) A greater number of temperature variations or "pumping" actions in a given time.

b) A greater cyclic temperature range.

c) A higher cyclic rate of change of temperature.

d) The inclusion of a number of excursions to sub-zero temperatures.

The accelerated breathing and the effect of the freezing of trapped water in cracks and fissures are the essential features of this composite test.

It is emphasized however that the freezing effect will occur only if the fissure dimensions are large enough to allow the penetration of a coherent mass of water, as is normally the case in fissures between seals and metal assemblies or between seals and wire terminations.

The degree of condensation will depend mainly upon the thermal time constant of the surface of the test specimens and may be negligible for very small specimens but copious for large specimens.

Similarly, the breathing effect will be more apparent on specimens which contain relatively large air-filled or gas-filled voids but again the severity of the test will depend to some extent on the thermal characteristics of the specimens.

Application of the test

For the reasons given above, it is recommended that this test procedure be limited to component type specimens when the construction of the specimens suggests a "breathing" type of damp heat test combined with icing and where the thermal characteristics are compatible with the rates of change of temperature, etc., of test Z/AD.

For solid type specimens, e.g. plastic encapsulated, where there may be small hairline cracks or porous material, the absorption or diffusion mechanisms will predominate and a steady damp heat such as test C is preferred for investigating these effects.

For larger specimens such as equipment or when it is essential for components to ensure thermal stability during the various phases of the cycle, test Db should be employed, although due to the reduced number of cycles in a given period the degree of acceleration may not be so great. In this case, test Db should normally form part of a sequence such as that defined in Clause 7 of I E C Publication 68-1.

As in other damp heat tests, a polarizing voltage or electrical loading may be applied to the specimens. In the case of electrical loading, the loading should be such that the temperature rise of the specimens does not unduly affect the chamber conditions.

From the above, it is therefore evident that test Z/AD should not be considered to be interchangeable with, or an alternative to, either steady state or other cyclic damp heat tests, but the choice of test procedure should be made with due regard for the physical and thermal characteristics of the test specimens and the types of failure mechanisms which are significant for each particular case.

2. Object

To provide a composite test procedure, primarily intended for component type specimen, to determine in an accelerated manner the resistance of specimens to the deteriorative effects of high temperature/humidity and cold conditions.

3. General description of the test

The test employs temperature cycling at high-relative humidity and will produce a "breathing" action of moisture into partially sealed containers.

The test includes exposure to low temperatures to determine the effects of periodic icing.

4. Description of test apparatus

The exposure to moisture, followed by cold, can either be performed in one chamber or in two separate chambers.

4.1 The chamber for the exposure to moisture shall be so constructed that:

a) The temperature can be varied between 25 ± 2 °C and 65 ± 2 °C in a period of between 1.5 h and 2.5 h for both rising and falling temperatures.

b) The relative humidity can be maintained at 93 ± 3% during the periods of constant or rising temperature and between 80% rh and 96% rh during the falling temperature periods.

c) Care shall be taken to ensure that the conditions prevailing at any point in the working space are uniform and are as similar as possible to those prevailing in the immediate vicinity of suitably located temperature and humidity sensing devices.

The air in the chamber shall therefore be continuously stirred at a rate necessary to maintain the specified conditions of temperature and humidity.

d) The specimens under test shall not be subjected to radiant heat from the chamber conditioning processes.

e) Water used for the maintenance of chamber humidity shall have a resistivity of not less than 500 Ωm.

Condensed water is continuously drained from the chamber and not used again until it has been repurified.

Precautions shall be taken to ensure that no condensed water from the walls and roof of the test chamber can fall on the specimens.

4.2 The chamber for exposure to cold shall be so constructed that:

a) The temperature can be maintained at −10 ± 2 °C.