

# Basic environmental testing procedures —

## Part 2.1 Tests —

### Test N: Change of temperature

UDC 621.3.002.6.001.4:620.169.1:536.4

# National foreword

This British Standard has been prepared under the direction of the General Electrotechnical Engineering Standards Committee. It is identical with IEC Publication 68-2-14:1984 “Basic environmental testing procedures and Amendment No. 1 published in 1984. Part 2: Tests — Test N: Change of temperature” published by the International Electrotechnical Commission (IEC). All parts of IEC Publication 68 are endorsed by CENELEC Harmonization Document (HD) 323 as a general rule, although in some cases an enquiry is made before endorsement.

**Terminology and conventions.** The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following. For the purposes of this Part of this standard, the scope clause is given in BS 2011-1.1.

Wherever page numbers are referred to in the text, they are IEC page numbers.

### Cross-references

| International standard <sup>a</sup> | Corresponding British Standard                                                               |
|-------------------------------------|----------------------------------------------------------------------------------------------|
| IEC 68-2-1:1974                     | BS 2011 Basic environmental testing procedures<br>Part 2.1A:1977 Test A. Cold<br>(Identical) |
| IEC 68-2-2:1974                     | Part 2.1B:1977 Test B. Dry heat<br>(Identical)                                               |
| IEC 68-2-33:1971                    | Part 2.2 :1977 Test N. Guidance on change of<br>temperature tests<br>(Identical)             |

<sup>a</sup> Undated in the text.

**WARNING NOTE.** This British Standard calls for the use of procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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.

### Amendments issued since publication

| Amd. No. | Date of issue | Comments                              |
|----------|---------------|---------------------------------------|
| 5435     | March 1987    | Indicated by a sideline in the margin |
|          |               |                                       |
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This British Standard, having been prepared under the direction of the General Electrotechnical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 28 February 1985

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The committees responsible for this British Standard are shown in Part 1.1.

The following BSI references relate to the work on this standard:

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## Introduction

A change of temperature test is intended to determine the effect on the specimen of a change of temperature or a succession of changes of temperature.

It is not intended to show effects which are due only to the high or low temperature. For these effects, the dry heat test or the cold test should be used.

The effect of such tests is determined by:

- values of high and low conditioning temperature between which the change is to be effected;
- the conditioning times for which the test specimen is kept at these temperatures;
- the rate of change between these temperatures;
- the number of cycles of conditioning;
- the amount of heat transfer into or from the specimen.

Guidance on the choice of suitable test parameters for inclusion in the detail specification is given in Publication 68-2-33: Basic Environmental Testing Procedures, Part 2: Tests — Guidance on Change of Temperature Tests, which should be read in conjunction with this standard.

## 1 Test Na: Rapid change of temperature with prescribed time of transition

### 1.1 Object

To determine the ability of components, equipment or other articles to withstand rapid changes of ambient temperature. The exposure times adequate to accomplish this will depend upon the nature of the specimen.

### 1.2 General description of the test

The specimen is exposed to rapid changes of temperature in air, or in a suitable inert gas, by alternate exposure to low temperature and to high temperature.

### 1.3 Description of the test apparatus

#### 1.3.1 Testing chamber

**1.3.1.1** Two separate chambers shall be provided, one for the low temperature and one for the high temperature, the location being such as to allow transfer of the specimen from one chamber to the other within the prescribed time. Either manual or automatic transfer methods may be used.

**1.3.1.2** The chambers shall be capable of maintaining the atmosphere at the appropriate temperature for the test in any region where the specimen is placed.

**1.3.1.3** The absolute humidity of the atmosphere should not exceed  $20 \text{ g/m}^3$ .

**1.3.1.4** The temperature of the walls of the hot and cold chambers shall not differ by more than 3 % and 8 % respectively from the specified ambient temperature of the test, expressed in kelvins. 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.

**1.3.1.5** The volume of the chambers and the air velocity shall be such that after insertion of the test specimens, the temperature of the atmosphere shall be within the specified tolerance after a time of not more than 10 % of the exposure time.

**1.3.1.6** The air in the chamber shall be circulated. Air velocity measured close to the test specimen, shall be not less than 2 m/s.

#### 1.3.2 Mounting or supporting of the test specimen

Unless otherwise specified in the relevant specification, the thermal conduction of the mounting or supports shall be low, such that for practical purposes the specimen is thermally isolated. When testing several specimens simultaneously they shall be so placed that free circulation should be provided between specimens, and between specimens and chamber surfaces.

### 1.4 Severities

**1.4.1** The severity of the test is defined by the combination of the two temperatures, the transition time and the number of cycles.