

Environmental testing —

Part 2.2: Guidance —

Tests C & D: Guidance for damp heat tests

This Part should be read in conjunction with Part 1.1 General and guidance

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Electrotechnical Standards Policy Committee (GEL/-) to Technical Committee GEL/15, upon which the following bodies were represented:

- Association of Manufacturers of Domestic Electrical Appliances
- British Telecommunications plc
- Directorate of Telecommunications
- EEA — the Electronics and Business Equipment Association
- Electronic Components Industry Federation
- Ministry of Defence
- National Supervising Inspectorate
- Society of Environmental Engineers
- Society of Motor Manufacturers and Traders Limited
- Telecommunication Engineering and Manufacturing Association

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Biodeterioration Society
- Institute of Metals

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
1 Scope and object	1
2 Environmental influence of damp heat	1
3 Definitions	1
4 Procedures for the production of humidity	2
5 Physical appearance of humidity	3
6 Physical processes acceleration	4
7 Comparison of steady state and cyclic tests	4
8 Influence of test environment on specimens	5
Appendix A Humidity effects diagram	7
Publication(s) referred to	Inside back cover

National foreword

This Part of BS 2011 has been prepared under the direction of the General Electrotechnical Standards Policy Committee. It is identical with IEC Publication 68-2-28:1990 “*Environmental testing — Part 2: Tests — Guidance for damp heat tests*”, published by the International Electrotechnical Commission (IEC). Most 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.

This revision of this British Standard supersedes BS 2011-2.2C & D:1981, which is withdrawn.

The title of BS 2011 has been changed to “Environmental testing” to correspond with the change in the title of IEC Publication 68. This change reflects the fact that IEC Publication 68 and BS 2011 are concerned with the whole subject of testing, and avoids any possible confusion over whether it is the “procedures” or the “testing” that are basic. Amendments are not being issued to the other Parts of BS 2011, but their titles are being changed when these Parts are revised.

Cross-references

International Standard ^a	Corresponding British Standard
	BS 2011 <i>Environmental testing</i>
IEC 68-2-3:1969	BS 2011-2.1Ca:1977 <i>Test Ca: Damp heat, steady state</i> (Identical)
IEC 68-2-30:1980	BS 2011-2.1Db:1981 <i>Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)</i> (Identical)
IEC 68-2-38:1974	BS 2011-2.1Z/AD:1977 <i>Tests Z/AD. Composite temperature/humidity cyclic test</i> (Identical)
IEC 68-2-56:1988	BS 2011-2.1Cb:1990 <i>Test Cb: Damp heat, steady state, primarily for equipment</i> (Identical)

^a Undated in the text.

The Technical Committee has reviewed the provisions of IEC 260:1968, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard. A British Standard related to IEC 260:1968 is BS 3718:1964 “*Laboratory humidity ovens (non-injection type)*”.

There are no corresponding British Standards for IEC 355:1971, IEC 721-2-1:1982, or IEC 721-3:1984. These have been considered by the Technical Committee and found to be acceptable for the purposes of this British Standard.

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 10, 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.

1 Scope and object

This guide includes the necessary information for those experts who, when preparing a relevant specification (e.g. standards for components or equipment), have to select the appropriate tests and test severities for a particular product and possibly a given kind of application.

The object of damp heat tests is to determine the ability of electrotechnical products to withstand the stresses occurring in a climate of high relative humidity, with or without condensation, with special regard to variations of electrical and mechanical characteristics. Damp heat tests may also be applied to check the resistance of a specimen to some forms of corrosion attack (see Sub-clause 8.3).

This guide should be used together with the following parts of IEC Publication 68 which contain damp heat tests i.e.:

68-2-3: Test Ca:	Damp heat, steady state.
68-2-56: Test Cb:	Damp heat, steady state, primarily for equipment.
68-2-30: Test Db and guidance:	Damp heat, cyclic (12 + 12-hour cycle).
68-2-38: Test Z/AD:	Composite temperature/humidity cyclic test.

2 Environmental influence of damp heat

Temperature and relative humidity of the air, in varying combinations, are climatic factors which always act upon a product during storage, transport and operation.

Meteorological measurements made over many years have shown that a relative humidity above or equal to 95 % combined with a temperature above 30 °C does not occur in free air conditions over long periods, except in regions with extreme climates (e.g. Persian Gulf). For a classification of climates and climatic data, see IEC Publication 721-2-1. In dwelling-rooms and workshops, temperatures above 30 °C may occur, but are in most cases combined with a lower relative humidity than in the open air. Climatic data for various environments for different applications are given in the series of IEC Publication 721-3.

Special conditions exist in certain wet rooms in the chemical industry, metallurgical plants, mines, electroplating plants, laundries, etc., where the temperature can reach as much as 45 °C combined with a relative humidity of 100 % over long periods.

However, it is possible that certain equipment placed under particular conditions may be subjected to relative humidities of more than 95 % at higher temperatures. In particular, this may happen when the equipment is placed in unventilated enclosures such as vehicles, tents, or aircraft cockpits. In these circumstances the intense heating through solar radiation can be combined with a high relative humidity because of moisture released from hygroscopic materials, the breathing and perspiration of people, open vessels containing water, or other sources of moisture.

In rooms having several heat sources, temperatures and relative humidities may differ in different parts of the room.

Atmospheric pollution, which is found to a large extent in a number of places, can intensify the effects of a damp climate on products. Attention is drawn to this fact because of its general importance although pollutants are not contained in the atmospheres used for damp heat testing. If the effects of pollutants are to be investigated, a suitable test, for example corrosive atmospheres or mould growth, should be used.

3 Definitions

For the purpose of this publication, the following definitions apply.

3.1 condensation

the precipitation of water vapour on a surface when the surface temperature is lower than the dew-point temperature of the ambient air. The water is thereby transformed from the vapour to the liquid state of aggregation

3.2 adsorption

the adherence of water vapour molecules to a surface when the surface temperature is higher than the dew-point temperature