

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Environmental testing –**  
**Part 2-30: Tests – Test Db: Damp heat, cyclic (12 + 12 h cycle)**  
**(standards.iteh.ai)**

**Essais d'environnement –**  
**Partie 2-30: Essais – Essai Db: Essai cyclique de chaleur humide**  
**(cycle de 12 h + 12 h)**

IEC 60068-2-30:2005  
<https://standards.iteh.ai/catalog/standards/siv/603d44d4-d5e2-46ad-872c-bc00e8a7a9d1/iec-60068-2-30-2005>





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 1993 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

[IEC.60068-2-30.2005](mailto:IEC.60068-2-30.2005@iec.ch)

- Electropedia: [www.electropedia.org](http://www.electropedia.org) [www.iec.ch/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-](http://www.iec.ch/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

### A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: [www.iec.ch/searchpub/cur\\_fut-f.htm](http://www.iec.ch/searchpub/cur_fut-f.htm)

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: [www.iec.ch/webstore/custserv/custserv\\_entry-f.htm](http://www.iec.ch/webstore/custserv/custserv_entry-f.htm)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00



# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

BASIC SAFETY PUBLICATION

PUBLICATION FONDAMENTALE DE SÉCURITÉ

**Environmental testing –**  
**Part 2-30: Tests – Test Db: Damp heat, cyclic (12 + 12 h cycle)**

**Essais d'environnement –**  
**Partie 2-30: Essais – Essai Db: Essai cyclique de chaleur humide**  
**(cycle de 12 h + 12 h)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

N

## CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references.....	5
3 General description.....	5
4 Testing chamber – Construction requirements.....	6
5 Severities .....	6
6 Initial measurements.....	7
7 Conditioning .....	7
8 Intermediate measurements.....	8
9 Recovery .....	8
10 Final measurements .....	9
11 Information to be given in the relevant specification.....	9
Annex A (informative) Selection of variant for the temperature-fall period – Guidance .....	14
Figure 1 – Test Db – Stabilizing period .....	10
Figure 2 – Test Db – Test cycle – Variants 1 and 2.....	12
Figure 3 – Test Db – Recovery at controlled conditions.....	13

IEC 60068-2-30:2005  
<https://standards.iteh.ai/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-bc00e8a7a9d1/iec-60068-2-30-2005>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ENVIRONMENTAL TESTING –

**Part 2-30: Tests – Test Db :  
Damp heat, cyclic (12 h + 12 h cycle)**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.  
<https://standards.iteh.ai/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-6e6a1098/iec-60068-2-30-2005>
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60068-2-30 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

This third edition cancels and replaces the second edition (1980) and its amendment 1 (1985), and constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- editorial changes,
- addition of normative references,
- addition of guidance for temperature tolerances,
- period for recovery has been extended.

The text of this standard is based on the following documents:

FDIS	Report on voting
104/369/FDIS	104/374/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This standard forms Part 2-30 of IEC 60068 which consists of the following major parts, under the general title *Environmental testing*:

- Part 1: General and guidance;
- Part 2: Tests;
- Part 3: Supporting documentation and guidance;
- Part 4: Information for specification writers;
- Part 5: Guide to drafting of test methods.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

[IEC 60068-2-30:2005](http://standards.iteh.ai/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-bc00e8a7a9d1/iec-60068-2-30-2005)

<http://standards.iteh.ai/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-bc00e8a7a9d1/iec-60068-2-30-2005>

## ENVIRONMENTAL TESTING –

### Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

#### 1 Scope

This part of IEC 60068 determines the suitability of components, equipment or other articles for use, transportation and storage under conditions of high humidity – combined with cyclic temperature changes and, in general, producing condensation on the surface of the specimen. If the test is being used to verify the performance of a specimen whilst it is being transported or stored in packaging then the packaging will normally be fitted when the test conditions are being applied.

For small, low mass specimens, it may be difficult to produce condensation on the surface of the specimen using this procedure; users should consider the use of an alternative procedure such as that given to IEC 60068-2-38.

#### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-38, *Environmental testing – Part 2-38: Tests – Test Z/AD: Composite temperature/humidity cyclic test* <http://www.standardsite.com/standards/iec-60068-2-38-2005>

IEC 60068-3-6, *Environmental testing – Part 3-6: Supporting documentation and guidance – Confirmation of the performance of temperature/humidity chambers*

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60068-5-2, *Environmental testing – Part 5: Guide to drafting of test methods – Terms and definitions*

#### 3 General description

This test comprises one or more temperature cycles in which the relative humidity is maintained at a high level.

Two variants of the cycle are given which are identical except for the temperature fall period; during this part of the cycle, variant 2 allows wider tolerances of relative humidity and the rate of temperature fall.

The upper temperature of the cycle and the number of cycles (see Clause 5) determine the test severity.

Test profiles illustrating the procedure are shown in Figures 1, 2a, 2b and 3.

The tolerances stated in this standard do not take measurement uncertainty into consideration.

#### 4 Testing chamber – Construction requirements

**4.1** The temperature can be varied cyclically between  $25\text{ °C} \pm 3\text{ K}$  and the appropriate upper temperature specified with the tolerance and rate of change specified in 7.3 and Figures 2a or 2b, as applicable.

The total temperature tolerance of  $\pm 3\text{ K}$  is intended to take account of absolute errors in the measurement, slow changes of temperature, and temperature variations of the working space. However, in order to maintain the relative humidity within the required tolerances, it is necessary to keep the temperature difference between any two points in the working space at any moment within narrower limits. The required humidity conditions will not be achieved if such temperature differences exceed  $1\text{ K}$ . It may also be necessary to keep short-term fluctuations within  $\pm 0,5\text{ K}$  to maintain the required humidity.

**4.2** The relative humidity in the working space can be maintained within the limits given in 7.3 and in Figures 2a or 2b, as applicable.

**4.3** 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 chamber shall meet the performance criteria as detailed in IEC 60068-3-6.

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

**4.5** Water used for the maintenance of chamber humidity shall have a resistivity of not less than  $500\ \Omega\text{m}$ .

Condensed water shall be continuously drained from the chamber and not used again until it has been re-purified.

Precautions shall be taken to ensure that no condensed water is allowed to fall on the specimens.

**4.6** The dimensions, properties and/or electrical loading of the specimens under test shall not appreciably influence conditions within the chamber.

#### 5 Severities

**5.1** The combination of the upper temperature and the number of cycles define the severity of the test.

**5.2** The severity shall be chosen from the following:

- a) upper temperature:  $40\text{ °C}$ ,  
number of cycles: 2, 6, 12, 21, 56;
- b) upper temperature:  $55\text{ °C}$ ,  
number of cycles: 1, 2, 6.



## 6 Initial measurements

The specimens shall be visually inspected, and functionally tested, as required by the relevant specification.

## 7 Conditioning

The specimens shall be introduced into the chamber either in the unpacked, switched-off, ready-for-use state, or as otherwise specified in the relevant specification.

Where no specific mounting is prescribed, the thermal conduction of the mounting shall be low, so that for all practical purposes the specimen is thermally isolated.

### 7.1 Temperature tolerances

The total temperature tolerance of  $\pm 2$  K and  $\pm 3$  K given in this standard is intended to take account of absolute errors in the measurement, slow changes of temperature, and temperature variations of the working space. However, in order to maintain the relative humidity within the required tolerances, it is necessary to keep the temperature difference between any two points in the working space at any moment within narrower limits. The required humidity conditions will not be achieved if such temperature differences exceed 1 K. It may also be necessary to keep short-term fluctuations within  $\pm 0,5$  K to maintain the required humidity.

### 7.2 Stabilizing period

The temperature of the specimens shall be stabilized at  $25\text{ °C} \pm 3\text{ K}$  (the definition of temperature stability is given in IEC 60068-1 and IEC 60068-5-2). This shall be achieved by either

- a) placing the specimens in a separate chamber before introducing it into the test chamber, or,
- b) adjusting the temperature of the test chamber to  $25\text{ °C} \pm 3\text{ K}$  after the introduction of the specimens and maintaining them at this level until the specimens attain temperature stability.

During the stabilization of temperature by either method, the relative humidity shall be within the limits prescribed for standard atmospheric conditions for testing.

Following stabilization, with the specimens in the test chamber, the relative humidity shall be increased to not less than 95 % RH at an ambient temperature of  $25\text{ °C} \pm 3\text{ K}$ .

### 7.3 Description of the 24 h cycle

**7.3.1** The temperature of the chamber shall be raised to the appropriate upper temperature prescribed by the relevant specification. The upper temperature shall be achieved in a period of  $3\text{ h} \pm 30\text{ min}$  and at a rate within the limits defined by the shaded areas in Figures 2a and 2b.

During this period, the relative humidity shall not be less than 95 % RH. During the last 15 min it shall not be less than 90 % RH.

Condensation may occur on the specimen during this temperature-rise period.

NOTE The condensation condition implies that the surface temperature of the specimen is below the dew point of the air in the chamber.

**7.3.2** The temperature shall then be maintained within the prescribed limits for the upper temperature ( $\pm 2$  K) until  $12\text{ h} \pm 30\text{ min}$  from the start of the cycle.

During this period, the relative humidity shall be  $93\% \text{ RH} \pm 3\% \text{ RH}$ . During the first and last  $15\text{ min}$  it shall be between  $90\% \text{ RH}$  and  $100\% \text{ RH}$ .

**7.3.3** The temperature shall then be lowered in accordance with one of the two variants given below.

*Variant 1* (see Figure 2a)

The temperature shall be lowered to  $25\text{ }^\circ\text{C} \pm 3\text{ K}$  within  $3\text{ h}$  to  $6\text{ h}$ . The rate of fall for the first one and one half hours shall be such that, if maintained as indicated in Figure 2a, it would result in a temperature of  $25\text{ }^\circ\text{C} \pm 3\text{ K}$  being attained in  $3\text{ h} \pm 15\text{ min}$ . The relative humidity shall be not less than  $95\% \text{ RH}$ . During the first  $15\text{ min}$  it shall be not less than  $90\% \text{ RH}$ .

NOTE 1 See Annex A for descriptions of the type of specimen suitable for Variant 1.

*Variant 2* (see Figure 2b)

The temperature shall be lowered to  $25\text{ }^\circ\text{C} \pm 3\text{ K}$  within  $3\text{ h}$  to  $6\text{ h}$ , but without the additional requirement for the first hour and one half as in variant 1. The relative humidity shall be not less than  $80\% \text{ RH}$ .

NOTE 2 See Annex A for descriptions of the type of specimen suitable for Variant 2.

**7.3.4** The temperature shall then be maintained at  $25\text{ }^\circ\text{C} \pm 3\text{ K}$  with a relative humidity of not less than  $95\% \text{ RH}$  until the  $24\text{ h}$  cycle is completed.

## 8 Intermediate measurements

The relevant specification may require functional tests during the conditioning programme.

NOTE Measurements preceded by a recovery, which would require removal of the specimens from the chamber, are not permissible during the conditioning. If it is desired to make intermediate measurements, the relevant specification should define the measurements and the period(s) during the conditioning after which they will be carried out.

## 9 Recovery

The relevant specification shall prescribe whether recovery shall be made at standard atmospheric conditions for testing (see 5.3 of IEC 60068-1), or at controlled recovery conditions (see 5.4.1 of IEC 60068-1).

If controlled recovery conditions are required (see Figure 3), the specimen may be transferred to another chamber for this recovery period or may remain in the damp heat chamber.

In the former case, the change over time shall be as short as possible and not more than  $10\text{ min}$ .

In the latter case, the relative humidity shall be reduced to 75 % RH  $\pm$  2 % RH in not more than 1 h. The temperature shall then be adjusted to laboratory temperature within  $\pm$ 1 K in not more than one further hour. For large specimens, the relevant specification may allow longer change over times.

The recovery time of 1 h to 2 h is counted from the moment when the prescribed recovery conditions have been obtained.

Specimens having a large thermal time constant may be submitted to recovery for a period sufficient to attain temperature stability (see Clause 4 of 60068-1).

The relevant specification shall state whether any special precautions shall be taken regarding the removal of surface moisture.

## 10 Final measurements

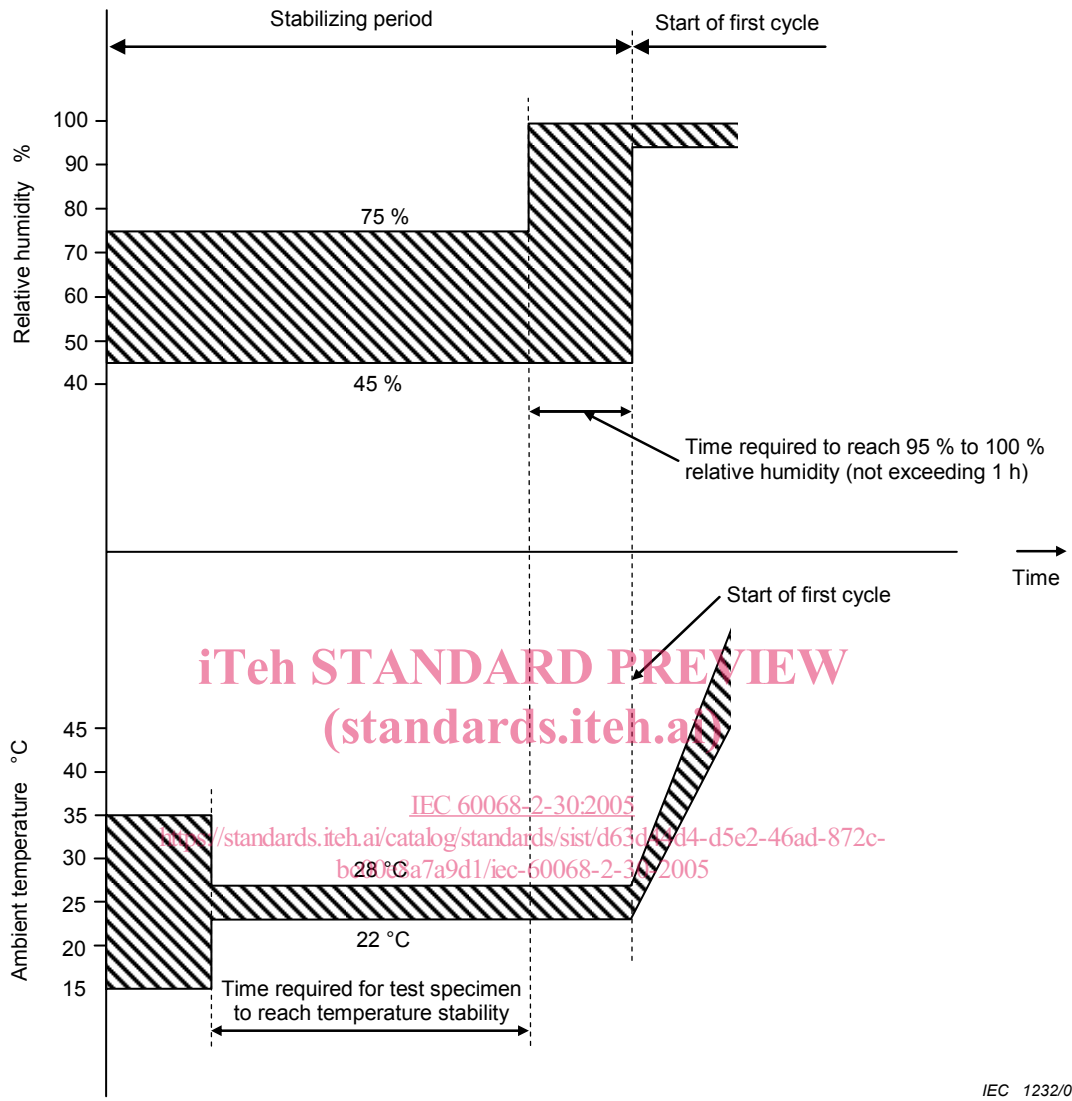
The specimens shall be visually inspected, and functionally tested as required by the relevant specification.

The measurements shall be commenced immediately after the recovery period and the parameters most sensitive to changes of relative humidity shall be measured first. Unless otherwise specified, the measurement of these parameters shall be completed within 30 min.

## 11 Information to be given in the relevant specification

When this test is included in the relevant specification, the following details shall be given as far as they are applicable.

	IEC 60068-2-30:2005	Clause or subclause
a) Severity: temperature and number of cycles	<a href="https://standards.iteh.ai/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-bc00e8a/a9d1/iec-60068-2-30-2005">https://standards.iteh.ai/catalog/standards/sist/d63d44d4-d5e2-46ad-872c-bc00e8a/a9d1/iec-60068-2-30-2005</a>	5.2
b) Initial measurements		6
c) State of the specimen during conditioning		7
d) Details of mounting or supports		7
e) Variant 1 or variant 2		7.3.3
f) Intermediate measurements		8
g) Recovery conditions		9
h) Special precautions to be taken regarding removal of surface moisture		9
i) Visual inspection and/or functional tests to be made at the end of the test, the parameters to be measured first, and the maximum period allowed for the measurement of these parameters (final measurements)		10



IEC 1232/05

Figure 1 – Test Db – Stabilizing period