

INTERNATIONAL
STANDARD

ISO
2233

Third edition
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**Packaging — Complete, filled transport
packages — Conditioning for testing**

*Emballages — Emballages d'expédition complets et pleins —
Conditionnement en vue des essais*



Reference number
ISO 2233:1994(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 2233 was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 3, *Performance requirements and tests for means of packaging, packages and unit loads (as required by ISO/TC 122)*.

This third edition cancels and replaces the second edition (ISO 2233:1986), which has been technically revised.

Annex A forms an integral part of this International Standard.

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Packaging — Complete, filled transport packages — Conditioning for testing

1 Scope

This International Standard specifies a method for the conditioning of complete, filled transport packages for testing.

2 Principle

The package is exposed to predetermined atmospheric conditions for a predetermined period of time.

3 Atmospheric conditions

One or more of the preferred conditions given in table 1 shall be selected.

Table 1 — Preferred atmospheres for conditioning

Condition	Temperature		Relative humidity %
	°C	K	
A	− 55	218	Not specified
B	− 35	238	Not specified
C	− 18	255	Not specified
D	+ 5	278	85
E	+ 20	293	65
F	+ 20	293	90
G	+ 23	296	50
H	+ 27	300	65
J	+ 30	303	90
K	+ 40	313	Uncontrolled
L	+ 40	313	90
M	+ 55	328	30

4 Control tolerances (as described in annex A)

4.1 Temperature

4.1.1 Deviation among peak values

For conditions A, B, C and K, the maximum permissible temperature difference of ten measurements distributed about the nominal value over at least 1 h shall be ± 3 °C. For all other conditions, the maximum permissible difference shall be ± 2 °C.

4.1.2 Deviation of the mean

For all conditions, the mean value shall be within ± 2 °C of the nominal value chosen from table 1.

NOTES

1 When using condition D, care should be taken to ensure that the dew-point is not reached.

2 Permissible temperature deviations given are not necessarily those required to maintain the required range of relative humidity; smaller temperature deviations may therefore be necessary in order to comply with the tolerances required for relative humidity.

4.2 Relative humidity

4.2.1 Deviation among peak values

For all conditions with a humidity requirement, the maximum permissible relative humidity difference of ten measurements distributed about the nominal value over at least 1 h shall be ± 5 percentage units.

4.2.2 Deviation of the mean

For all conditions, the mean value shall be within ± 2 percentage units of the nominal value chosen from table 1.

NOTES

3 The mean value of relative humidity may be obtained by taking the average of a minimum of ten measurements over a period of 1 h, or may be derived from a continuous instrument trace.

4 The deviation of ± 5 for peak values of % r.h. represents the maximum variation to be expected in conditioning chambers. Modern, well-designed conditioning chambers are capable of maintaining ± 2 % r.h. The response of most packages to changes in atmospheric moisture is relatively slow compared with the fluctuations of relative humidity within the chamber and, provided that the mean relative humidity within the working space, taken over any 1 h period during the duration of the test, lies within ± 5 percentage units of the specified relative humidity, it may be assumed that wider fluctuations such as may occur on opening the door of the conditioning chamber have little effect on the moisture content of the package.

5 Apparatus

5.1 Conditioning chamber, having a working space the temperature and humidity of which is continuously recorded and which can be maintained at the specified conditions within the control range given in clause 4.

The working space is that part of a conditioning chamber within which the specified controlled conditions are maintained. The boundaries of this space shall be specified for each chamber.

5.2 Drying chamber, if necessary, to reduce the moisture content of certain packages to below that which will be attained by conditioning.

5.3 Measuring and recording apparatus, sufficiently sensitive and stable to allow measurement of temperature to an accuracy of 0,1 °C and relative humidity to 1 %. For the purposes of this International Standard, the record is deemed continuous if the period between individual readings is not greater than 5 min.

The recording equipment shall exhibit sufficiently rapid response to record accurately, to the precision stated above, changes in temperature of 4 °C per minute and changes in relative humidity of 5 % per minute.

6 Procedure

Select the temperature and relative humidity conditions most appropriate to the transport and storage of the package to be tested. Place the package within the working space of the conditioning chamber (5.1) and expose to the specified conditions for a minimum period which shall be selected from 4 h, 8 h, 16 h, 24 h, 48 h or 72 h or from 1 week, 2 weeks, 3 weeks or 4 weeks.

Support the package in such a way that the conditioning atmosphere has free access to the top, sides and at least 75 % of the base. The conditioning period is deemed to start 1 h after the specified conditions in the chamber have been regained following insertion of the package.

When the package is constructed of materials, such as fibreboard, that are known to show a hysteresis effect in their characteristics, it may be necessary to predry the package before conditioning. This shall be done by placing the package for a minimum period of 24 h in the drying chamber (5.2) in conditions such that, when transferred to the test conditions, it will approach equilibrium by taking up moisture. This is not necessary when the specified relative humidity is 40 % or below.

7 Test reports

The reports of tests on conditioned, complete, filled transport packages, such as impact tests, stacking tests and vibration tests carried out as specified in the appropriate International Standard, shall include the following information:

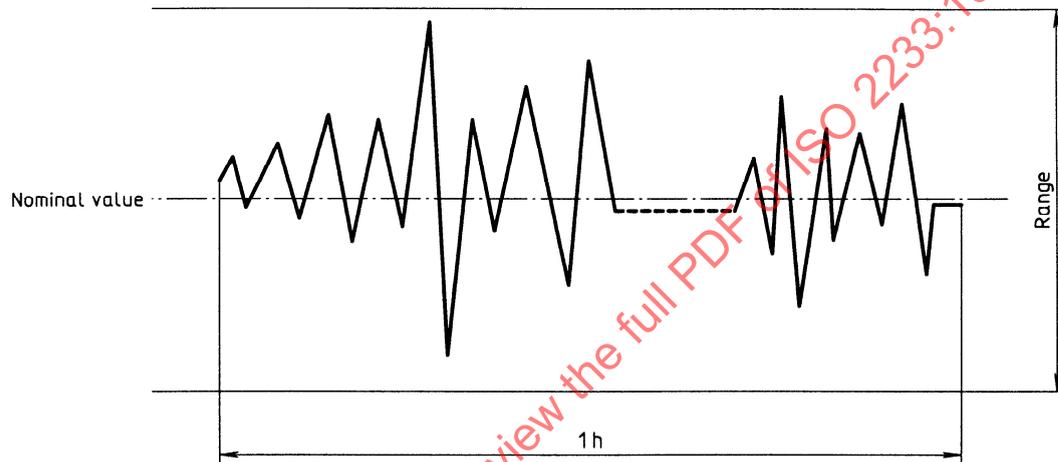
- reference to this International Standard;
- the conditions (see table 1) used and time required for conditioning;
- the temperature and relative humidity of the test area at the time of test;
- any deviation from this International Standard.

Annex A (normative)

Interpretation of the measurement of temperature and relative humidity

A continuous record of temperature or relative humidity will show a cyclic variation. It is therefore necessary to determine the precise values which define both the level and variation of these properties.

Consider the typical record below.



All the extreme values shall be included in the specified peak-to-peak range.

The mean of the extreme measurements shall be included in the range specified for the mean value.

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