
Packaging — Complete, filled transport packages and unit loads — Sinusoidal vibration tests using a variable frequency

Emballages — Emballages d'expédition complets et pleins et charges unitaires — Essais de vibration sinusoïdale à fréquence variable

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8318 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 second edition cancels and replaces the first edition (ISO 8318:1986) which has been technically revised.

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Introduction

It is the responsibility of the user of this International Standard to establish appropriate safety and health practice in accordance with relevant legislation.

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Packaging — Complete, filled transport packages and unit loads — Sinusoidal vibration tests using a variable frequency

1 Scope

This International Standard specifies two methods for carrying out a sinusoidal vibration test on a complete, filled transport package or unit load using a variable frequency. These tests may be used to assess the performance of a package or an unit load in terms of its strength or the protection that it offers to its contents when it is subjected to vertical vibration. Each may be performed either as a single test to investigate the effects of vertical vibration or as part of a sequence of tests designed to measure the ability of a package or unit load to withstand a distribution system that includes a vibration hazard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 2206, *Packaging — Complete, filled transport packages — Identification of parts when testing.*

ISO 2233, *Packaging — Complete, filled transport packages and unit loads — Conditioning for testing.*

ISO 2234, *Packaging — Complete, filled transport packages and unit loads — Stacking tests using static load.*

3 Term and definition

For the purposes of this International Standard, the following term and definition applies.

3.1

test item

a complete, filled transport package or unit load

4 Principle

The test item is placed on a vibration table and vibrated at a frequency which varies at a constant logarithmic sweep rate between 3 Hz and 100 Hz, which may be followed by vibration between $\pm 10\%$ of the principal resonant frequencies within the range from 3 Hz to 100 Hz. The atmospheric conditions, the duration of the test, the peak acceleration, the attitude of the test item and its method of restraint are predetermined.

NOTE When required, a load may be superimposed on the test item to simulate conditions at the bottom of a stack.

5 Apparatus

5.1 Vibration table

5.1.1 The vibration table shall be of sufficient size, rigidity and mass-carrying capacity, supported on a mechanism that will maintain the surface horizontal during vibration.

5.1.2 The table shall be horizontal within a maximum angular deviation of 0,3°.

5.1.3 The apparatus shall meet the requirements and tolerances of clause 8.

NOTE The table may be equipped with:

- a) low fences to restrict sideways and endwise movement during testing;
- b) high fences or other means of maintaining a superimposed load in position on the test item during testing;
- c) means to simulate the method of restraining the test item during transit.

5.2 Instrumentation

The instrumentation shall comprise accelerometers, signal conditioners and data display or storage devices to measure and control the accelerations at the test surface. The instrumentation system shall have a response accurate to within $\pm 5\%$ over the frequency range specified for the test.

NOTE Instrumentation may also be desirable for monitoring the response of the containers and packaged items. Sensors may be used to record velocities, amplitudes and frequencies of the contents in relation to the forcing vibration from the vibration table and possibly those on the outer surfaces of the package.

6 Test item preparation

Fill the test item with its intended contents and ensure that the test item is closed normally, as if ready for distribution.

NOTE Simulated or substitute contents may be used on condition that the dimensions and physical properties of such contents are as close as possible to those of the intended contents. However, the closure should be the same as for distribution.

7 Conditioning

The test item shall be conditioned in accordance with one of the conditions described in ISO 2233.

8 Procedure

8.1 General

Wherever possible the test shall be carried out in atmospheric conditions identical to those used for conditioning, and particularly where this is critical to the materials or application of the test item.

In other circumstances, the test shall be carried out in atmospheric conditions which approximate those used for conditioning as closely as is practicable.

8.2 Method 1

8.2.1 Place the test item in the predetermined attitude on the vibration table (see 5.1). If the positioning of the test item on the platen of the vibration table changes the vibration movement, the vertical projection of the centre of gravity of the test item shall be as near as practicable to the geometrical centre of the platen of the vibration table; if the test item is not secured to the table it may be fenced. If a superimposed load is required, the loading procedure shall comply with ISO 2234.

8.2.2 Subject the test item during a predetermined test duration to a predetermined vertical sinusoidal vibration with a frequency varying up and down between 3 Hz and 100 Hz at a sweep rate of 0,5 octave/min.

8.2.3 The acceleration shall be measured with an accelerometer which is attached to the table as close as possible to the test item, but protected so that it will not be contacted by it.

8.2.4 In the event of a horizontal frequency component being present, its acceleration shall not exceed 20 % of the value for the vertical component.

8.3 Method 2

8.3.1 Perform a resonance search test over one or more complete sweep cycles applying a suitable lower level of acceleration, typically in the range of 0,2 *g* to 0,5 *g*, and record the accelerations measured on the test item and on the table.

8.3.2 Determine the most severe and critical resonances, typically up to three.

8.3.3 Perform the endurance test at one of the defined resonances by sweeping over a frequency range varying between ± 10 % of the defined resonance frequencies. Repeat this procedure for other selected severe or critical resonances by applying a suitable acceleration for a predetermined duration.

NOTE For the duration of the tests the various resonances may be tested for different durations.

9 Test report

The test report shall include:

- a) a reference to this International Standard;
- b) the name and address of testing laboratory and name and address of the customer;
- c) the unique identification of the report;
- d) the date of receipt of the test items and the date(s) of performance of the test;
- e) the name, title and signature of persons accepting test responsibility for the test report;
- f) a statement to the effect that the test results relate only to the items tested;
- g) a statement that the report shall not be reproduced except in full without the written approval of the testing laboratory;
- h) the number of replicate test items tested;
- i) a full description, including dimensions, structural and material specifications of the test item and its fittings, cushioning, blocking, closure or reinforcing arrangements, gross mass of the test item and the mass of the contents in kilograms;
- j) a description of contents, if simulated or substituted contents were used, full details shall be given;

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- k) the relative humidity, temperature and time of conditioning; the temperature and relative humidity of the test area at the time of test, whether these values comply with the requirements of ISO 2233;
- l) the attitudes in which the test item was tested, using the method of identification given in ISO 2206;
- m) the duration of the tests;
- n) the method(s) used, i.e. method 1 and/or method 2, the frequency range and peak acceleration used. If method 2 was used, give the principle resonant frequency and, if appropriate, the second and third resonant frequencies;
- o) whether a superimposed load was used; if so, the mass, in kilograms, of the superimposed load and the period of time during which the test item was under load;
- p) the method of restraint;
- q) the type of apparatus used;
- r) any deviations from the test method described in this International Standard;
- s) a record of the results, including any observations which assist in the correct interpretation of the results.

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