
International Standard



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Packaging — Complete, filled transport packages — Vibration tests using a sinusoidal variable frequency

Emballages — Emballages d'expédition complets et pleins — Essai de vibration à fréquence sinusoïdale variable

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Descriptors : packing, transport packing, complete-and filled packages, tests, vibration tests.

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8318 was prepared by Technical Committee ISO/TC 122, *Packaging*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Packaging — Complete, filled transport packages — Vibration tests using a sinusoidal variable frequency

1 Scope and field of application

This International Standard specifies two methods for carrying out a vibration test on a complete, filled transport package using a sinusoidal variable frequency. These tests may be used to assess the performance of a package 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 to withstand a distribution system that includes a vibration hazard.

NOTE — A vibration test for complete, filled transport packages using vibration at a fixed low frequency (of between 3 and 4,6 Hz) is given in ISO 2247.

2 References

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

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

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

ISO 2247, *Packaging — Complete, filled transport packages — Vibration test at fixed low frequency.*

3 Principle

Placing of the test package on a vibration table and vibration of it using a frequency varying at a constant rate between 3 and 100 Hz, which may be followed by vibration between $\pm 10\%$ of the principal resonant frequencies within the range from 3 to 100 Hz. The atmospheric conditions, the duration of the test, the peak acceleration, the attitude of the package and its method of restraint are predetermined. When required, a load may be superimposed on the package to simulate conditions at the bottom of a stack.

4 Apparatus

4.1 Vibration table, of sufficient size, rigidity and mass-carrying capacity, supported on a mechanism that will maintain the surface horizontal during vibration. The difference in surface level between the table extremities shall not exceed 10 mm.

The table may be equipped with

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

In addition, the apparatus shall meet the requirements and tolerances of clause 7.

4.2 Instrumentation, comprising 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, amplitude and frequencies of the contents in relation to the forcing vibrations of the vibration table and possibly those of the outer surfaces of the package.

5 Package preparation

The test package shall normally be filled with its intended contents: However, simulated or dummy contents may be used, on condition that the dimensions and physical properties of such contents shall be as close as possible to those of the intended contents.

Ensure that the test package is closed normally, as if ready for distribution. If simulated or dummy contents are used, ensure that the normal method of closure is still employed.

6 Conditioning

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

7 Procedure

Whenever possible, the test shall be carried out in the same atmospheric conditions as used for conditioning, where this is critical to the materials or application of the package. In other circumstances, carry out the test in atmospheric conditions which are as near as practicable to those used for conditioning.

7.1 Method 1

Place the test package in the predetermined attitude on the vibration table (see 4.1), with the centre of its lowest face or its centre of gravity as near as practicable within 10 mm of the centre of the table; if the package is not secured to the table it may be fenced. If a superimposed load is required, the loading procedure shall comply with ISO 2234.

Operate the table for the predetermined period with the vertical vibration frequency varying between 3 and 100 Hz at a rate of half-octave/min. The movement shall be such that the peak vertical acceleration shall be one of the following:

- a) $0,25 \pm 0,1 g$
- b) $0,5 \pm 0,1 g$
- c) $0,75 \pm 0,1 g$

when measured with the accelerometer attached to the table as close as possible to the package, but protected so that it will not be contacted by it.

In the event of a horizontal frequency component being present, the peak acceleration due to this component shall be no greater than 20 % of the value for the vertical component.

7.2 Method 2

Follow the procedure in method 1 (see 7.1) except that the vertical vibration frequency varies between ± 10 % of the principal resonant frequency. The test may also be carried out with the vertical vibration varying between ± 10 % of the second and third resonant frequencies.

NOTE — Some types of apparatus may not be able to maintain a tolerance of ± 10 % at certain frequencies. In such an event, another range may be used; note of it shall be included in the test report.

8 Test report

The test report shall include the following particulars:

- a) reference to this International Standard;
- b) number of replicate packages tested;
- c) full description, including dimensions, structural and material specifications of the package and its fittings, cushioning, blocking, closure or reinforcing arrangements;
- d) description of contents — if simulated or dummy contents were used, full details shall be given;
- e) gross mass of package and mass of contents, in kilograms;
- f) relative humidity, temperature and time of conditioning; temperature and relative humidity of test area at time of test; whether these values comply with the requirements of ISO 2233;
- g) the attitude in which the package was tested, using the method of identification given in ISO 2206;
- h) the duration of the test;
- i) whether method 1 and/or method 2 was (were) used; the frequency range, and peak acceleration used; if method 2 was used, the principle resonant frequency and, if appropriate, the second and third resonant frequencies;
- j) whether a superimposed load was used; if so, the mass, in kilograms, of the superimposed load and the period of time during which the package was under load;
- k) the method of restraint;
- l) type of apparatus used;
- m) any deviations from the test method described in this International Standard;
- n) a record of the result, with any observations which may assist in correct interpretation;
- o) date of the test;
- p) signature of tester.

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