DRAFT INTERNATIONAL STANDARD

ISO/DIS 13355

ISO/TC **122**/SC **3**	Secretariat: **BSI**
Voting begins on: **2015-06-18**	Voting terminates on: **2015-09-18**

Packaging — Complete, filled transport packages and unit loads — Vertical random vibration test

Emballages — Emballages d'expédition complets et pleins et charges unitaires — Essais de vibration verticale aléatoire

ICS: 55.180.40

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
ISO/DIS 13355:2015(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13355 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)*.

Introduction

A random vibration test is the most realistic way to reproduce environmental vibration during transportation. For this reason, if suitable laboratory facilities are available, this kind of test should be preferred to any fixed or swept frequency sinusoidal vibration tests similar to those given in ISO 2247[1] and ISO 8318[3].

Packaging — Complete, filled transport packages and unit loads — Vertical random vibration test

1 Scope

This international standard specifies a method to carry out a vertical random vibration test on a complete, filled transport package(s) and unit loads using a random excitation[1].

This test 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. It may be performed either as a single test to investigate the effects of vertical vibration or as a part of a sequence of tests designed to measure the ability of a test specimen to withstand a distribution system that includes a vibration hazard.

NOTE In the following text a package or unit load is called a test specimen.

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 — Condition for testing*

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

3 Principle

The test specimen is placed on a vibration table and made to vibrate using a random excitation with effective frequency range for the test specimen. The atmospheric conditions, the duration of the test, the acceleration power spectral density, the attitude of the test specimen and its method of restraint are predetermined.

NOTE 1 When required, a load may be superimposed on the test specimen to simulate conditions at the bottom of a stack.

NOTE 2 Specific requirements for the mounting of the test specimen on the vibrating platform is given in ISO 4180:2009[2] 10.7.1.

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1 The treatment of random vibration theory can be found in IEC 60068-2-64[4].

4 Apparatus

4.1 Vibration table, of sufficient size and performance (in terms of power, displacement, frequency range) capable of being stiff (its lower resonant frequency shall be higher than the higher test frequency) and remaining horizontal during the test.

The frequency range shall be 2 Hz to 200 Hz, with a resolution of at least 1 Hz. By considering the resonance frequency of seismic-base of test equipment, the frequency range at low end may be modified based on the agreement between the involved stakeholders or on the technical instruction of the test equipment.

The table may be equipped with the following components:

4.1.1 Low fences, restricting sideways and endways movements during testing;

4.1.2 High fences, or other means of maintaining a superimposed load in position on the test specimen during testing:

Furthermore, the apparatus shall meet the requirements and tolerances of Clause 6.

4.2 Vibration measurement, data storage and control system comprising accelerometers, signal conditioners and a computer, capable of:

a) generating vibration with the required power spectral density;

b) controlling the motion of the vibration table by feeding back the signal from the control accelerometer which monitors the table acceleration;

c) performing the analysis with at least 120 statistical degrees of freedom;

d) having data acquisition and control channels with a response accurate to 5% over the frequency range specified for the test.

5 Sampling

5.1 Test specimen preparation

The test specimen shall normally be filled with its intended contents. However, simulated or substituted contents may be used, provided that the dimensions and physical properties of such contents are as close as possible to those of the intended contents.

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

5.2 Conditioning

Condition the test specimen in accordance with ISO 2233.

6 Procedure

Carry out the test in the same atmospheric conditions as used for conditioning where this is critical to the performance of the test specimen.

In other circumstances, the test shall be carried out in atmospheric conditions which are as near as practicable to those used for conditioning.

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

Measure the imposed acceleration of the vibration table as closely as possible to the test specimen.

Ensure the horizontal components of the acceleration are no greater than 20% of the value of the vertical component.

Start the test 6 dB below the test level to allow the system to equalize the power spectral density profile, then carefully adjust the level to reach full test level and continue the test for the predetermined duration.

The test duration and the power spectral density of the vibration table, in absence of experimental data concerning the effects of transportation to be reproduced, should be chosen as indicated in annex A.

When distribution system and intensity of vibration acceleration is partly known, the test duration and the power spectral density of the vibration table may be chosen from B.1 or B.2 as indicated.

NOTE Vibration spectra depend very much on the transportation conditions selected. Therefore, whenever possible, perform tests with spectra obtained from measured data of the particular transportation conditions.

The test schedule may be changed as agreed by the involved stakeholders. In this case, the change and the reason should be added to the test report.

The tolerance on root mean square acceleration shall not exceed 15%; the obtained acceleration power spectral density of the test control signal shall not deviate by more than ±3 dB over the entire test frequency range.

Tests may be interrupted at any time to allow visual inspection of the test specimen, or for any other purpose.