
International Standard



2234

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Packaging — Complete, filled transport packages — Stacking tests using static load

Emballages — Emballages d'expédition complets et pleins — Essai de gerbage utilisant une charge statique

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

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.

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 2234 was prepared by Technical Committee ISO/TC 122 *Packaging*.

This second edition cancels and replaces the first edition (ISO 2234-1972), which has been technically revised as follows: <https://standards.iteh.ai/catalog/standards/sist/fce3c439-5f72-4d84-b37d-d4d996565c28/iso-2234-1985>

- two new, alternative methods for carrying out the stacking test have been specified;
- a new clause on "Package preparation" has been added.

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.

Packaging — Complete, filled transport packages — Stacking tests using static load

1 Scope and field of application

This International Standard specifies three methods for carrying out a stacking test on a complete, filled transport package, using a static load. Whichever method is employed, the 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 stacking. It may be performed either as a single test to investigate the effects (deformation, creep, collapse or failure) of stacking or as part of a sequence of tests designed to measure the ability of a package to withstand a distribution system that includes a stacking hazard.

The test may also be used to investigate performance under particular conditions of loading, as, for example, when the bottom package in a stack rests on an open-decked pallet; or when the profile of the superimposed load is eccentric, as when it is supported on the bearers of a single-decked pallet which rests on a container. For such purposes, one of the three methods of carrying out the test may be more suitable than the others.

NOTE — A method for carrying out a stacking test using a compression tester is given in ISO 2874.

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 2874, *Packaging — Complete, filled transport packages — Stacking test using compression tester.*

3 Principle

In simple testing, placing of the test package on a flat, horizontal surface and subjection of the package to an evenly distributed load applied from above, using one of three methods. The load, atmospheric conditions, period of time under load and attitude of the package are predetermined. The top-to-bottom or the side-to-side deflection of the package during the test may be measured, if appropriate.

4 Apparatus

4.1 Horizontal surface, which is flat (the difference in height between the highest and lowest points not exceeding 2 mm) and rigid. A concrete floor at least 150 mm thick is suitable.

4.2 Means of loading, which, according to the method chosen (1, 2 or 3), is as described in 4.2.1 to 4.2.3.

4.2.1 Method 1: stack of packages, each package being identical with the package under test. The number of packages is such that their total mass forms an appropriate load.

4.2.2 Method 2: loading platform, free to tilt to an equilibrium position on the test package, together with an appropriate load. The load and loading platform may be integral.

The loading platform, when placed centrally on top of the test package, shall be large enough to extend to at least 100 mm over all sides of the top surface of the package and rigid enough to support the load completely without deformation.

NOTE — This type of load is sometimes referred to as "free load".

4.2.3 Method 3: loading platform, such that the lower surface of the platform is constrained to remain horizontal, together with an appropriate load. The load and loading platform may be integral.

The loading platform, when placed centrally on top of the test package, shall be large enough to extend to at least 100 mm over all sides of the top surface of the package and rigid enough to support the load completely without deformation.

NOTES

1 This type of load is sometimes referred to as a "guided load".

2 If guides are used to ensure that the loading platform remains horizontal, they shall not cause friction that could affect the test results.

4.3 Means of measuring deflection (if necessary), accurate to ± 1 mm and capable of indicating either an increase or a decrease in dimensions.

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

NOTE — Stable and safe loading during the test is dependent on the friction between the top surface of the package and the bottom surface of the loading platform, as well as the ability of the package to resist deformation. Means shall therefore be provided to produce a stable test assembly and to ensure that if failure occurs the load is restrained and does not cause danger to personnel in the vicinity.

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

7.1 Position the stack of packages (4.2.1) or, alternatively, the loading platform (4.2.2 or 4.2.3) centrally over the test package which has been placed on the flat, horizontal surface (4.1).

7.2 If methods 2 and 3 are being used, place the masses making up the load on the loading platform without impact, ensuring that they are in full contact with the loading platform before being released. The masses shall be distributed uniformly over that portion of the surface of the loading platform in direct contact with the test package to ensure that the centre of gravity of the load is immediately above the centre of the top surface of the package. The mass of the total load, including the mass of the loading platform, shall be within 2 % of the predetermined value. The distance of the centre of gravity of the load above the loading platform shall not exceed 50 % of the height of the test package.

7.3 Apply the load for the required period of time (usually 24 h, according to the material) or until collapse.

7.4 Remove the load and examine the package.

NOTES

- 1 At any time during the test it may be necessary to measure dimensions.
- 2 Appropriately profiled inserts to represent particular loading conditions may be placed above or below the test package or both above and below, as required.

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 of the package, 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 the 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) mass, in kilograms, of total load, including mass of loading platform, and the period of time during which the package was under load, the means of loading used, i.e. method 1, 2 or 3, whether guides were used, and if so, their design;
- j) location of deflection measurement points on packages, and stage of test at which deflection measurements were made;
- k) design and dimensions of any profiles used;
- m) type of apparatus used;
- n) any deviations from the test methods described in this International Standard;
- p) a record of the result, with any observations which may assist in correct interpretation;
- q) date of the test;
- r) signature of tester.