INTERNATIONAL STANDARD ISO 2244

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Packaging — Complete, filled transport packages — Part V : Horizontal impact tests (Inclined plane test; Pendulum test)

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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.

International Standard ISO 2244 was drawn up by Technical Committee ISO/TC 122, *Packaging.*

It was approved in October 1971 by the Member Bodies of the following countries :

Australia	India	Spain
Austria	Ireland	Sweden
Belgium	Israel	Switzerland
Canada	Japan	Thailand
Czechoslovakia	Korea, Rep. of	Turkey
Egypt, Arab Rep. of	Netherlands	United Kingdom
France	Norway	U.S.A.
Germany	Romania	U.S.S.R.
Hungary	South Africa, Rep. of	Yugoslavia

No Member Body expressed disapproval of the document.

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Packaging — Complete, filled transport packages — Part V : Horizontal impact tests (Inclined plane test; Pendulum test)

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method of horizontal impact test (inclined plane test and pendulum test) on a complete, filled transport package.

The test may be performed either as a single test to investigate the effects of horizontal impact or as part of a sequence of tests designed to measure the ability of a package to withstand a distribution system that includes a horizontal impact hazard.

2 REFERENCES

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

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

3 PRINCIPLE

The package is given a horizontal velocity and brought to a halt by impact of the leading face or edge with a vertical impact surface. The atmospheric conditions, the horizontal velocity and the attitude of the package are predetermined. Particular conditions of impact may be simulated by placing appropriately profiled inserts between the impact surface and the impacting face or edge of the package under test.

4 APPARATUS

4.1 Impact surface, which should be either

a) a plane inclined to the vertical at $10 \pm 1^\circ$ (for the inclined plane test), or

b) a plane vertical to within 1° (for the pendulum test).

The dimensions of the impact surface shall be greater than those of the impacting face, or selected part, of the package under test.

The impact surface shall be sufficiently rigid not to deflect more than 0.25 mm when an area of 1 cm^2 anywhere on the surface is loaded to 160 kg.

Additionally the apparatus shall meet the requirements and tolerances of section 6.

4.2 Optional interposed hazards, to be used when it is required to concentrate the impact in a particular area of the test package.

The dimensions, material, and location of the interposed hazard shall be carefully specified.

Example : A steel beam with a length of 200 mm and a cross-section of 100 mm × 100 ± 1 mm and with rounded edges of radius 5 ± 0.1 mm placed centrally in the impact surface.

4.3 Impact testing apparatus. Types of apparatus that may be used are described in 4.3.1 and 4.3.2.

4.3.1 *Inclined plane tester,* consisting of the following items :

4.3.1.1 TWO-RAIL STEEL TRACK, inclined at 10° to the horizontal. The distance along the incline shall be graduated at intervals of 50 mm. (See Figure 1.)

4.3.1.2 ROLLING CARRIAGE OR DOLLY. The friction between package and carriage shall be such that during movement from rest to impact the package will not move in relation to the carriage, but such that upon impact the package will move freely.

4.3.1.3 IMPACT SURFACE. The impact surface (or bumper) shall be placed at the bottom of the track with its face perpendicular to the direction of movement of the carriage down the track.

It shall consist of a number of heavy timbers mounted horizontally across the face of the structure in such a manner that the optional interposed hazard can be fitted easily when required.

NOTES

1 It is recommended that the bumper be made in such a way that the carriage can travel underneath it for about 100 mm so that the package impacts the bumper before the carriage stops.

2 The apparatus should preferably be equipped with a device to prevent the carriage from springing back after the impact. Either a spring damper or an oil damper may be incorporated into such a device.

3 The track and the wheels must be kept clean.

4 The wheel bearings must be regularly lubricated. Roller-bearings are recommended.

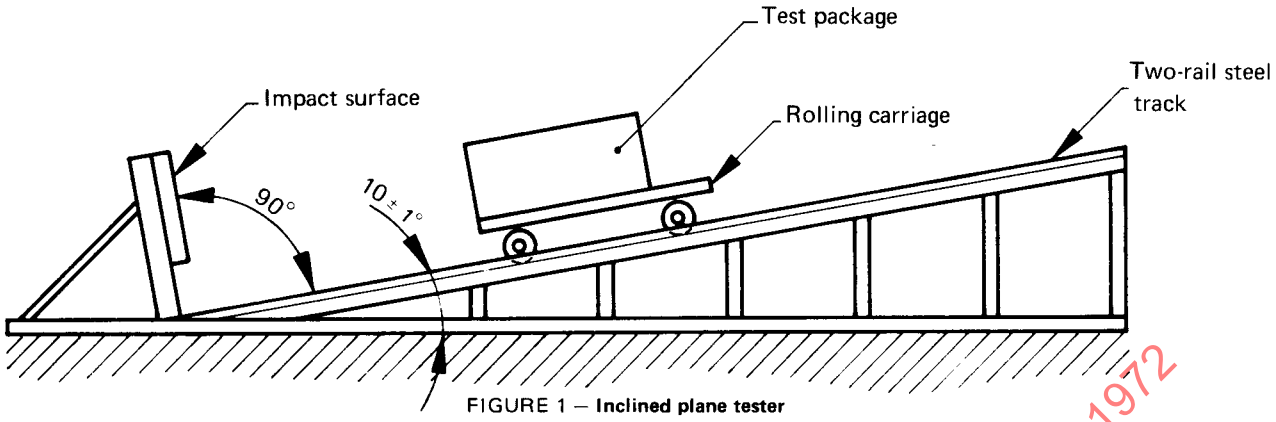

FIGURE 1 — **Inclined plane tester**

4.3.2 *Pendulum apparatus,* consisting of a rectangular platform suspended at each corner by steel rods or ropes so that in its rest position the front edge just touches an impact surface vertical to within 1°. The suspension system shall be such that it moves freely and its path is not obstructed when the package is mounted on the platform. (See Figure 2.)

For certain types of package, such as carboys, it may be sufficient to suspend the test package from a single rod or rope.

In both instances the suspension system must not impart a rotary movement to the test package.

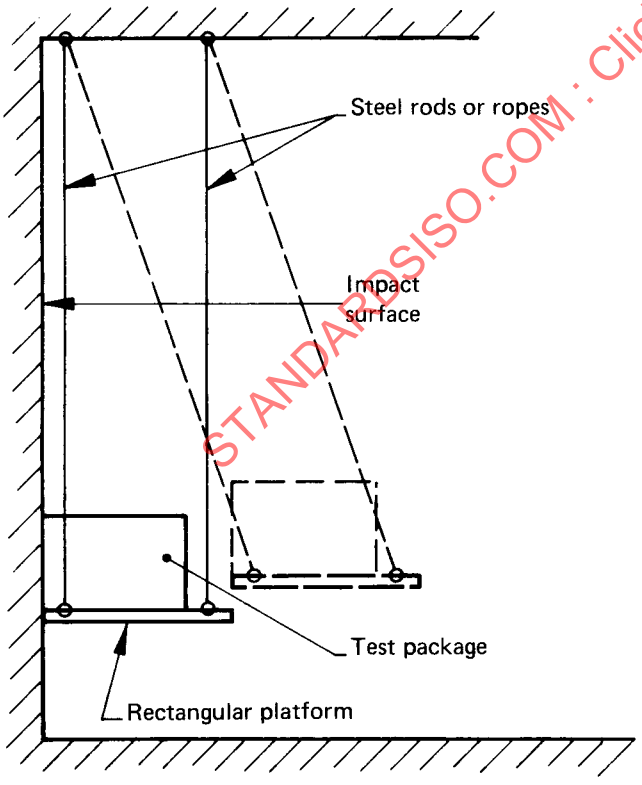

FIGURE 2 — **Pendulum apparatus**

5 CONDITIONING

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

6 PROCEDURE

The test shall normally be carried out in the same atmospheric conditions as used for conditioning, or the test shall be commenced within 5 min of removing the package from those atmospheric conditions.

The velocity at impact shall be ± 5 % of the predetermined horizontal velocity.

When the impact is on a face or edge, the package shall strike the impact surface so that the angle between the face or edge and the plane of the impact surface is less than 2°.

When the impact is on an edge of a parallelepipedal package, the attitude of the package at impact shall be such that the angle between a prescribed surface of the package and the impact surface is within ±5° or ± 10 % of the predetermined angle, whichever is the greater.

6.1 Procedure with inclined plane tester

Place the test package on the carriage in an attitude that will ensure that it strikes the impact surface in the desired position.

The package shall not project beyond the edges of the carriage.

Raise the carriage to that height up the incline which corresponds with the desired impact speed, then release it.

6.2 Procedure with pendulum apparatus

Place the test package on the rectangular platform so that the impacting face or edge just touches the impact surface.

Raise the pendulum by pulling out the platform to the distance from the impact surface appropriate to the velocity required, then release it.

7 TEST REPORT

The test report shall include the following information :

a) number of replicate packages tested;

b) full description, including dimensions, structural and material specifications of the container and its fittings, cushioning, blocking, closure or reinforcing arrangements;

c) description of contents;

d) gross mass of package and net mass of contents in kilograms;

e) 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;

f) attitude in which the package was tested, using the method of identification given in ISO 2206;

g) velocity at impact;

h) position and description of interposed hazard, if used;

i) type of apparatus used;

j) any deviations from the test method described in this International Standard;

k) a record of results, with any observations which may assist in correct interpretation;

l) date;

m) signature of tester.