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7965-2

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Sacks — Drop test —

Part 2:

Sacks made from thermoplastic flexible film

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Essais de chute —

Partie 2: Sacs faits d'un film thermoplastique flexible

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Reference number
ISO 7965-2:1993(E)

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.

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.

International Standard ISO 7965-2 was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 2, *Sacks*.

ISO 7965 consists of the following parts, under the general title *Sacks — Drop test*:

- *Part 1: Paper sacks*
- *Part 2: Sacks made from thermoplastic flexible film*

Annexes A, B and C of this part of ISO 7965 are for information only.

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Sacks — Drop test —

Part 2:

Sacks made from thermoplastic flexible film

1 Scope

This part of ISO 7965 specifies a method of vertical impact testing on a filled sack made from thermoplastic flexible film by dropping. It may be performed either as a single test to investigate the effects of vertical impact or as a part of a sequence of tests designed to measure the ability of a sack to withstand a distribution system that includes a vertical impact hazard.

This part of ISO 7965 specifies the testing procedure and how the results of tests should be presented. It is based on ISO 2248¹⁾, but is specifically related to sacks made from thermoplastic flexible film.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 7965. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7965 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2233:1986, *Packaging — Complete, filled transport packages — Conditioning for testing*.

ISO 7023:1983, *Packaging — Sacks — Method of sampling empty sacks for testing*.

3 Principle

The filled sack is raised above a rigid surface and released to strike this surface after a free fall, the atmospheric conditions, the height of the drop and the position of the package being set in advance.

4 Apparatus

The apparatus necessary to carry out the drop test shall include the following (examples are shown in annex A):

4.1 Lifting arrangement, which will not damage the sack during either lifting or release.

4.2 Means of holding the sack prior to release in its predetermined position.

The difference in behaviour of a sack suspended from the top or supported underneath in a butt drop can be significant, and the method of holding the sack before dropping shall be included in the test report.

4.3 Release mechanism, to release the sack in such a way that its fall is not obstructed by any part of the apparatus before striking the impact surface (4.4).

4.4 Impact surface, horizontal and flat, massive enough to be immovable and rigid enough to be nondeformable under test conditions.

1) ISO 2248:1985, *Packaging — Complete, filled transport packages — Vertical impact test by dropping*.

In normal circumstances the impact surface provided should be:

- of one piece, with a mass at least 50 times that of the heaviest sack to be tested;
- flat, such that no two points on its surface differ in level by more than 2 mm;
- rigid, such that it will not be deformed by more than 0,1 mm when an area of 100 mm² is loaded statically with 10 kg anywhere on the surface;
- sufficiently large to ensure that the sack falls entirely upon the surface.

A plastic film may be used on the impact surface under the sack in order not to damage the sack while moving it.

5 Sampling

Sampling shall be carried out in accordance with ISO 7023.

6 Conditioning

The filled and closed sacks shall be conditioned in accordance with ISO 2233, using one of the designated conditioning atmospheres.

7 Procedure

The tests shall be carried out in the same atmospheric conditions as used for conditioning (see clause 6) or, if not, the test shall commence within 3 min of removing the filled sack from the conditioning atmosphere.

7.1 Filling

Fill the sack with the intended commodity or, if this is not possible, with similar material, taking into account type and size of granules etc., to give the same degree of filling. The mass of filling material shall be within $\pm 0,2\%$ of that of the nominal mass of the intended contents of the sack.

Close the sack in the intended way.

7.2 Test dropping procedure

7.2.1 Lifting and release requirements

Place the sack under test centrally on the platform (4.1). Raise the platform to a height that is within

$\pm 2\%$ of the predetermined drop height, defined as the distance between the lowest point of the sack at the time of release and the nearest point of the impact surface.

The sack shall be released from its predetermined position within the following tolerances:

- a) for drops on any side, the impacting surface of the sack shall be parallel, to within 2° , to the impact surface;
- b) the velocity of the sack at impact shall be within $\pm 1\%$ of that which would be achieved by a free fall.

7.2.2 Dropping procedure

NOTE 1 The designation of the various surfaces of a filled sack is given in annex B.

7.2.2.1 Flat dropping

Drop successive sacks alternately on the face side (1) and on the back side (3), so that the first sack is dropped on the face side until it breaks and the second on the back side until it breaks, and so on.

7.2.2.2 Side dropping

Drop successive sacks alternately on the right side (2) and on the left side (4), so that the first sack is dropped on the right side (2) until it breaks and the second on the left side (4) until it breaks, and so on.

7.2.2.3 Butt dropping

Drop the sack only on the bottom (5), until it breaks.

7.3 Test methods

7.3.1 Progressive drop height method

7.3.1.1 General

This method may be used for flat, side and butt drop testing of sacks made from thermoplastic flexible film.

The drop height, h , in metres, is given by the formula

$$h = h_0 + [(n - 1) \times \Delta h]$$

where

h_0 is the value, in metres, of the initial drop height;

n is the total number of drops;

Δh is the value, in metres, of the increment in drop height after each drop.

A sack shall be considered broken when spillage of the contents occurs.

A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the sack provided that no further leakage occurs after the sack has been raised clear of the ground.

The type of drop (i.e. flat, side or butt drop), the number of drops (n) and the final drop height at break (h) shall be recorded.

The test result can be reported as the average breaking height (\bar{h}) and the corresponding number of drops (\bar{n}).

7.3.1.2 Flat and side drop tests

Flat and side drop tests shall be initiated at 0,85 m height (h_0). After each drop without any visible failure in the sack, an increment (Δh) of 0,15 m in drop height is made.

The test shall be evaluated and results shall be reported in accordance with 7.3.1.1.

7.3.1.3 Butt drop test

Butt drop tests shall be initiated at 0,30 m height (h_0). After each drop without any visible failure in the sack, an increment (Δh) of 0,05 m in drop height is made.

The test shall be evaluated and results shall be reported in accordance with 7.3.1.1.

7.3.2 Constant drop height method

This method may be used for testing of sacks made from thermoplastic flexible film as an alternative to the progressive drop height method.

This test may be used for either flat, side or butt dropping and shall be performed from a constant height so selected that the number of drops before rupture is about 10.

A sack shall be considered broken when spillage of the contents occurs.

A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of

the sack provided that no further leakage occurs after the sack has been raised clear of the ground.

The test report shall give the drop height, number of drops to breakage and the type of drop (i.e. flat, side or butt drop).

NOTE 2 The constant drop height method has particular application for testing sacks made from thermoplastic flexible film intended for the transport of dangerous goods (maximum net mass 50 kg), see recommendations by the United Nations²⁾ and the IMDG Code³⁾.

7.3.3 Limit height method

This method may be used to test sacks stronger than ordinary sacks made from thermoplastic flexible film.

The test may be performed as a flat, side or butt drop test.

In this test, the lowest height at which the sack will break on the first drop (the "limit height" H) is calculated from the results obtained.

The sack shall be dropped from three constant heights, so selected to give mean numbers of drops to breakage (\bar{n}) of approximately 3, 8 and 30.

The limit height H , expressed in metres, is calculated from the formula:

$$\bar{n} = (H/h)^a$$

where

\bar{n} is the mean drop number;

h is the drop height, in metres;

a is a constant particular to the sack grade.

H may also be calculated using a graphical method by plotting the mean drop number, \bar{n} , against the corresponding drop height, h , on log-log graph paper as shown in figure 1.

The test report shall give the drop heights used, the number of drops to breakage at each height and the type of drop (i.e. flat, side or butt).

8 Test report

The test report shall include full details of size, construction and type of all sacks tested, together with

2) *Transport of Dangerous Goods*, Recommendations prepared by the United Nations Committee of Experts on the Transport of Dangerous Goods, United Nations Economic and Social Council, E.89.VIII.1, New York, 1989.

3) *International Maritime Dangerous Goods Code*, IMO-200E, 1992.

information on the type and mass of sack contents and type of closure.

A suitable format for a test report form that may be used for this purpose is given in annex C.

All test results shall be given (see 7.3) and shall include the method of holding the sack before dropping, and details of location and type of failure.

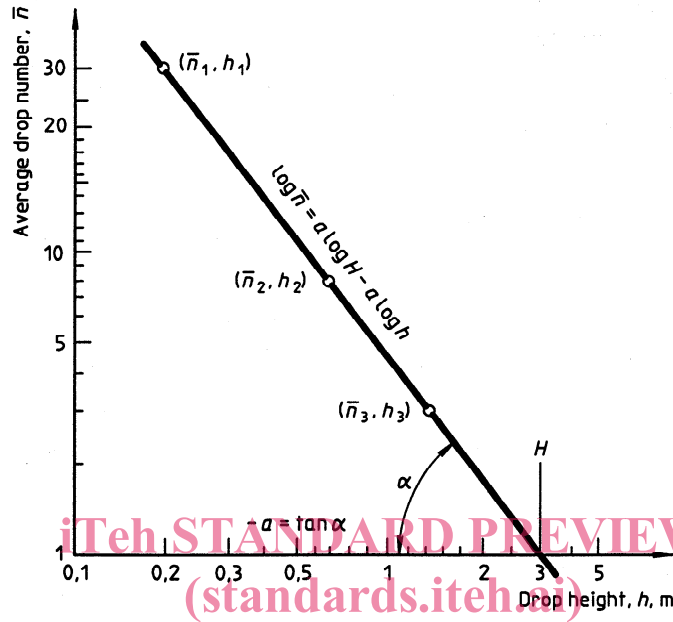


Figure 1 — Graphical method for calculation of limit height, H

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Annex A
(informative)

Examples of apparatus for drop testing

Figures A.1 and A.2 show examples of apparatus for drop testing of sacks made of thermoplastic flexible film.

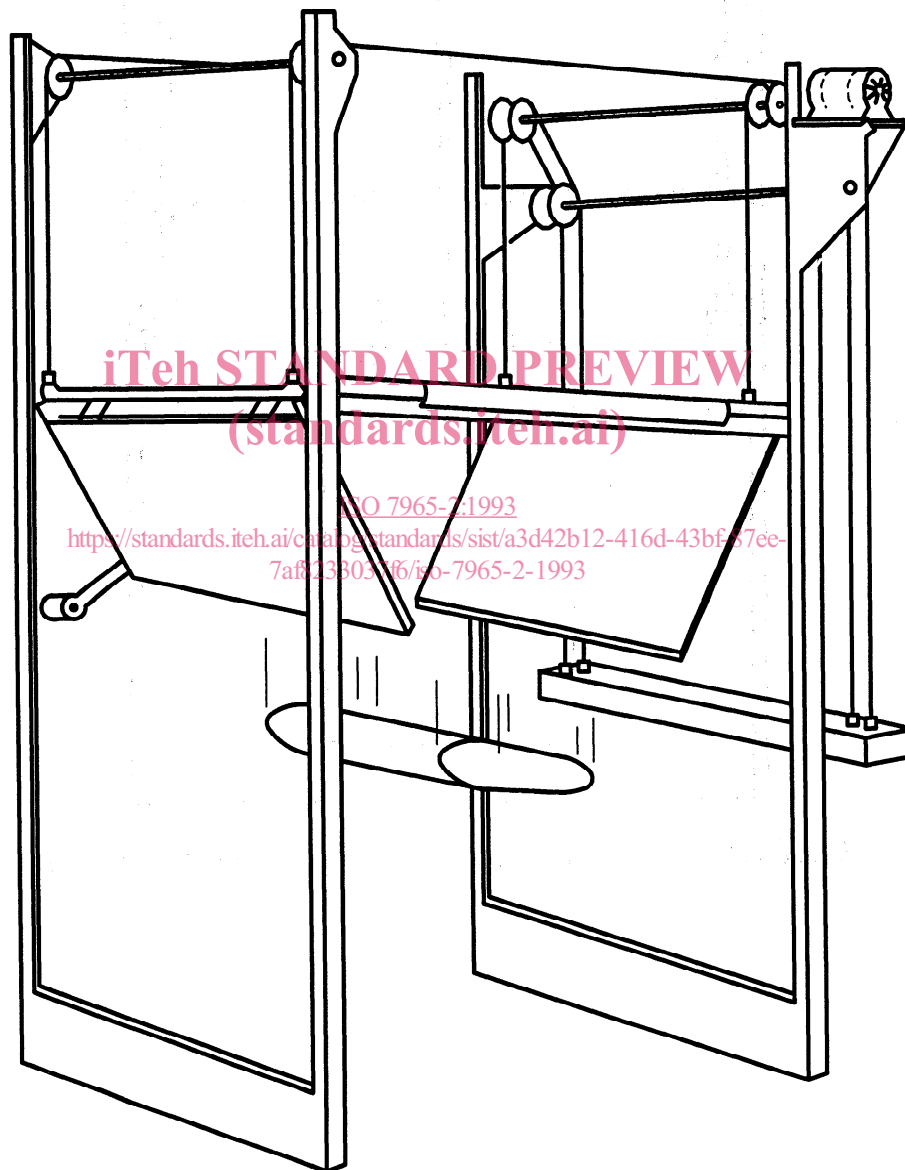


Figure A.1 — Example of apparatus suitable for flat and side dropping

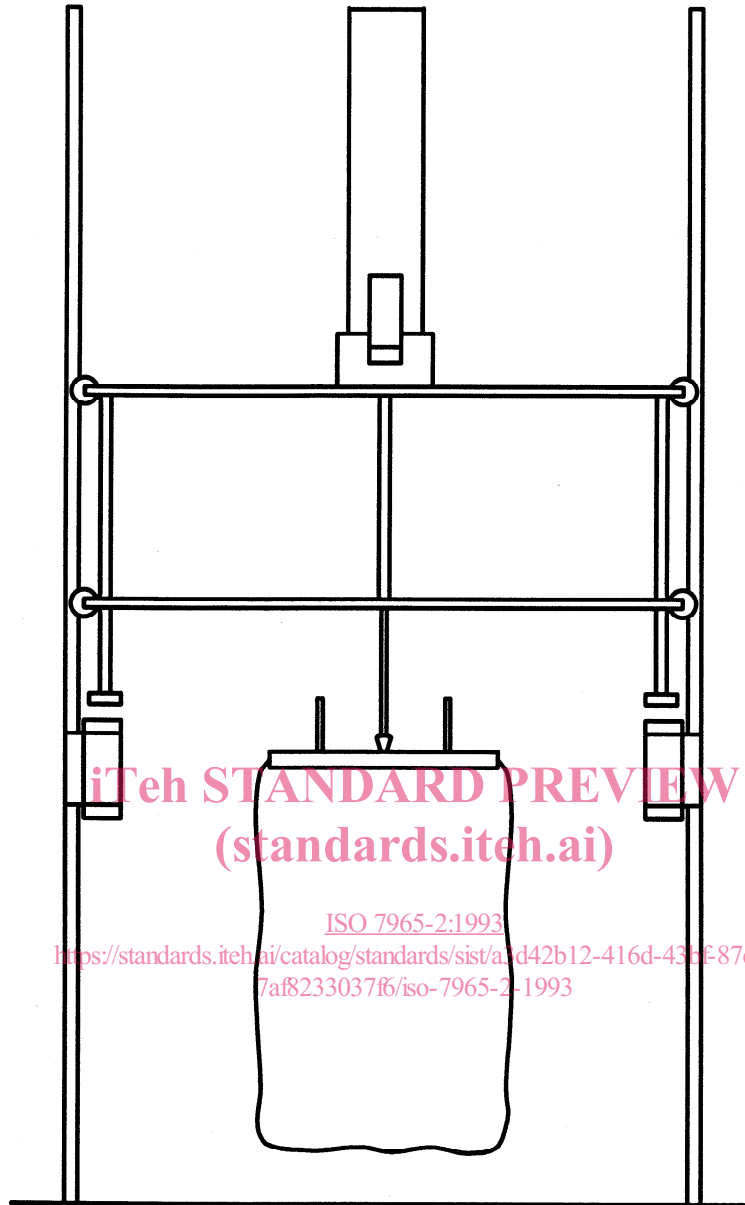


Figure A.2 — Example of apparatus suitable for butt dropping

Annex B (informative)

Identification of surfaces of filled sacks for testing

The sack shall be placed on the back side (3) (i.e., the side containing the longitudinal seam) downwards, and the top (6) (i.e. the filling end) of the sack positioned away from the observer, as shown in figure B.1. The different surfaces are identified as:

- Surface 1: Face side (optionally printed)
- Surface 2: Right side
- Surface 3: Back side (longitudinal seam)

- Surface 4: Left side
- Surface 5: Bottom
- Surface 6: Top (filling end)

NOTE 3 On sacks with a longitudinal seam, the back side (3) is the side containing the seam. On sacks without any printing or without a longitudinal seam, the side towards which the bottom overlap is turned should be considered as the back side (3).

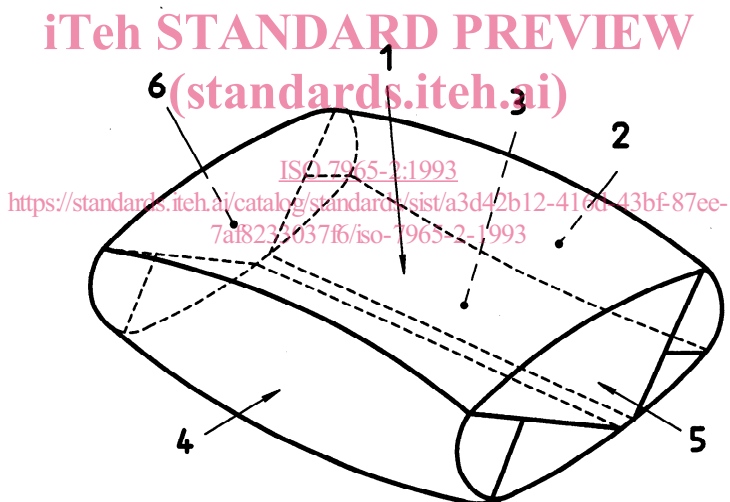


Figure B.1 — Surface identification