DRAFT INTERNATIONAL STANDARD ISO/DIS 4180

ISO/TC **122**/SC **3** Secretariat: **BSI**

Voting begins on: **2007-08-14** Voting terminates on: **2008-01-14**

Packaging — Complete, filled transport packages — General rules for the compilation of performance test schedules

Emballages — Emballages d'expédition complets et pleins — Règles générales pour l'établissement de programmes d'essais d'aptitude à l'emploi

(Revision of ISO 4180-1:1980 and ISO 4180-2:1980)

ICS 55.180.40

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 15/1993, ce document est distribué en version anglaise seulement.

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.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

Contents

Page

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 4180 was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 3, *Performance requirements and tests for means of packaging, packages and unit loads*.

This second edition cancels and replaces the first edition (ISO 4180-1:1980 and ISO 4180-2:1980), which has been technically revised.

Packaging — Complete, filled transport packages — General rules for the compilation of performance test schedules

1 Scope

This International Standard establishes general rules to be used for the compilation of performance test schedules for complete, filled transport packages intended for use within any distribution system except for the packages for dangerous goods.

For known distribution environment with experimental data available (case 1), this standard provide guide lines for the compilation of appropriate test schedules.

For unknown distribution environment (case 2), this standard provides test schedules in dependence of the test specimen mass and forecast destination.

This International Standard also gives the factors to be considered in assessing the criteria of acceptance of such packages after they have been subjected to a package performance test schedule.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 2233 *Packaging -- Complete, filled transport packages and unit loads -- Conditioning for testing*

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

ISO 2244 *Packaging -- Complete, filled transport packages and unit loads -- Horizontal impact tests*

ISO 2247 *Packaging -- Complete, filled transport packages and unit loads -- Vibration tests at fixed low frequency*

ISO 2248 *Packaging -- Complete, filled transport packages -- Vertical impact test by dropping*

ISO 2873 *Packaging -- Complete, filled transport packages and unit loads -- Low pressure test*

ISO 2875 *Packaging -- Complete, filled transport packages and unit loads -- Water-spray test*

ISO 2876 *Packaging -- Complete, filled transport packages -- Rolling test*

ISO 4178 *Complete, filled transport packages -- Distribution trials -- Information to be recorded*

ISO 8318 *Packaging -- Complete, filled transport packages and unit loads -- Sinusoidal vibration tests using a variable frequency*

ISO 8768 *Packaging -- Complete, filled transport packages -- Toppling test*

ISO 10531 *Packaging -- Complete, filled transport packages -- Stability testing of unit loads*

ISO 12048 *Packaging -- Complete, filled transport packages -- Compression and stacking tests using a compression tester*

ISO 13355 *Packaging -- Complete, filled transport packages and unit loads -- Vertical random vibration test*

EN 14149 *Packaging - Complete, filled transport packages and unit loads - Impact test by rotational drop*

ISO/FDIS 21067 *Packaging -- Vocabulary*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
performance test schedule
single laboratory test, or series of tests, intended to ascertain the performance, under working conditions, of the subject under test

3.2
complete, filled transport package
packaging (see ISO/FDIS 21067), including contents, prepared for distribution

3.3
distribution system
all the operations which take place after a package has been filled and closed, including all handling, transport and storage operations up to and including delivery to the user

4 Distribution Systems

Distribution systems exist in great variety and complexity, but, however great the complexity; they may be considered to be combinations of a number of simple elements. These simple elements are:

a) transport of packages from one point to another, with or without change of mode of transport. Transport shall be considered to include the loading and unloading operations;

b) storage.

5 Hazards

During distribution, a transport package is subjected to a number of hazards which may cause damage. These hazards are the result of a number of factors, the most important of which are:

a) the characteristics of the distribution system, i. e. the carrier, the mode of transport, the geographic area;

b) the design of the package, i.e. its dimensions, mass and shape and the mechanical characteristic of the materials composing it.

6 Tests

6.1 General

Laboratory tests on transport package aim to simulate or represent the distribution hazards.

6.2 Appropriate application of tests

The appropriate application of tests requires:

a) a knowledge of the stress arising from these hazards;

b) the capability of reproducing these stresses by a particular test or, alternatively, of producing damage identical to that observed in practice.

6.3 Levels of intensity

The levels of intensity selected for the tests will depend on the above factors and on:

a) the mass of the package;

b) the distance and the geographic location of the destination;

c) the degree of assurance that the package should give;

d) the nature of the contents and the frequency and value of the consignment.

7 Determination of criteria of acceptance

The criteria of acceptance for a complete filled transport package may be determined by the reduction of quality of the package and/or its contents, by the extent of loss of package contents, by the extent of deterioration of the package and/or its contents, or by whether the damaged package represents a hazard or potential hazard in subsequent distribution, including storage.

In determining the extent of damage that is acceptable the following factors should be considered:

a) the unit value of the contents;

b) the number of units in the complete, filled transport package;

c) the number of complete, filled transport packages in the consignment;

d) the cost of distribution;

whether the contents are:

1) non-dangerous

2) dangerous

Methods of quantifying damage to a package are reported in annex A.

8 Selection of package attitude

The package attitude selected for use in the test should be the attitude of the package whilst it encounters the hazard simulated by the test.

9 Compilation of test schedules

9.1 Case 1: distribution system well defined; intensity of hazards determined

In this case, the performance test schedule shall be written using the experimental test data acquired as requested in ISO 4178. Applicable tests will be chosen depending on the distribution system. Appropriate test sequence and test intensity will be chosen.

Step by step procedure is as follows:

a) identify the simple elements in the distribution system;

b) decide what hazards these elements involve;

c) decide which tests are necessary to represent or simulate these hazards (including, for example, decisions concerning appropriate conditioning, package attitude, interposed hazards, duration of vibration and number of impacts);

d) decide the test sequence;

e) decide what are the test intensities associated with the particular package and distribution system combination concerned.

9.2 Case 2: distribution system undefined; intensity of hazards unknown

Very often the package manufacturer has not a clear knowledge of the distribution system, and the intensities of the hazards *are* unknown.

In this case, this standard provides *recommended* performance test schedules.

Choice criteria are the mass and the destination of the package.

10 Case 1: Distribution system well defined; intensity of hazards determined

10.1 Preferred test sequence

A typical test sequence is:

a) conditioning for testing;

b) climatic treatment;

c) vibration;

d) stacking;

e) impacts.

Other tests may be interposed in the test schedule as appropriate. When circumstances require a different order, this should be reported.

10.2 Preferred test parameters

To allow repeatability and reproducibility, test levels and parameters should be chosen among those proposed in this paragraph and will comply with the included recommendations.

10.3 Atmospheres conditioning (ISO 2233)

Table 1 — Preferred test parameters

Temperature		Relative Humidity
C°	K°	%
-55	218	-
-35	238	-
-18	255	-
+5	278	85
+20	293	65
+20	293	90
+23	296	50
+27	300	65
+30	303	65
+30	303	90
+35	308	65
+35	308	90
+40	313	65
+40	313	90
+55	328	30

10.4 Low pressure (ISO 2873)

Table 2 — Preferred test pressures

Pressure	Corresponding Altitude
hPa	m
800	about 2000 (a pass through the Alps)
650	about 3500 (aircraft)
550	about 5000 (Bolivia - La Paz)
360	about 8000 (unpressurized aircraft)
190	about 12000 (unpressurized aircraft)

10.5 Horizontal impact (ISO 2244)

The test can be defined using an impact velocity chosen among the following:

Table 3 — Preferred impact test velocities

Preferred test velocities m/s
1,0
1,3
1,5
1,8
2,2
2,7
3,3
4,0
5,0
7,0

These shocks can be also defined in terms of wave shape, peak acceleration and duration. This way to define shocks is possible when test lab has good acquisition system and suitable accelerometers. Recording these data improves the quality of the test. The severity is well determined and the reproducibility is assured.

In this case test parameters shall be chosen among the following:

Table 4a — Shock definitions – Preferred wave shapes

Preferred wave shapes
Half sine - sawtooth - Trapezium

Table 4b — Shock definitions - Preferred duration

Preferred duration ms
6
11
20
30
40
50
100