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**Packaging — Transport packages  
for dangerous goods — Test methods  
for IBCs**

*Emballage — Emballages d'expédition de marchandises  
dangereuses — Méthodes d'essai pour Grands Récipients en  
Vrac (GRV)*

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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 16467 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 3, *Performance requirements and tests for means of packaging, packages and unit loads*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

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## Foreword

This document (EN ISO 16467:2003) has been prepared by Technical Committee CEN/TC 261, "Packaging", the secretariat of which is held by AFNOR in collaboration with Technical Committee ISO/TC 122 "Packaging".

This European Standard EN ISO 16467:2003 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2004, and conflicting national standards shall be withdrawn at the latest by April 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports the objectives of the framework Directives on Transport of Dangerous Goods.

This European Standard has been submitted for reference into the RID and/or in the technical annexes of the ADR. Therefore in this context the standards listed in the normative references and covering basic requirements of the RID/ADR not addressed within the present standard are normative only when the standards themselves are referred to in the RID and/or in the technical annexes of the ADR.

Annexes A, D and E are informative. Annexes B and C are normative.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

This Standard was developed to provide requirements and test procedures to meet the multi-modal United Nations Recommendations on the Transport of Dangerous Goods [1] and successful passing of the tests can lead to the allocation of an appropriate UN IBC mark. The UN Recommendations have been developed by the United Nations Committee of Experts on the Transport of Dangerous Goods as a model regulation (referred to in this document as the UN Recommendations) in the light of technical progress, the advent of new substances and materials, the exigencies of modern transport systems and, above all, the need to ensure the safety of people, property and the environment. Amongst other aspects, the UN Recommendations cover principles of classification and definition of classes, listing of the principal dangerous goods, general packing requirements, testing procedures, marking, labelling or placarding, and shipping documents. There are in addition special recommendations related to particular classes of goods.

The UN Recommendations are given legal entity by the provisions of a series of international modal agreements and national legislation for the transport of dangerous goods. The international agreements include:

The European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) (covering most of Europe). [2]

Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) (covering most of Europe, parts of North Africa and the Middle East). [3]

The International Maritime Dangerous Goods Code (worldwide). [4]

The International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TIs)(worldwide). [5]

The application of this Standard will need to take account of the requirements of these international agreements and the relevant national regulations for domestic transport of dangerous goods.

It is important to note that there will be certain modal differences from the UN Recommendations and that the schedule for revision of the Recommendations and modal provisions may lead to temporary inconsistencies with this Standard, which is regularly updated to the latest version of the UN Recommendations.

It is noted that success in the tests and the allocation of an official UN mark do not on their own authorize the use of an IBC for any dangerous goods. There are other regulatory provisions that have to be taken into account in each instance.

This European Standard is based on Revision 12 of the UN Recommendations.

## 1 Scope

This European Standard specifies the design type test requirements for Intermediate Bulk Containers (IBCs) as described in 3.2 of this standard and intended for use in the transport of dangerous goods.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 6789, *Assembly tools for screws and nuts — Hand torque tools — Requirements and test methods for design conformance testing, quality conformance testing and recalibration procedure*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999)*.

## 3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

### 3.1

#### competent authority

any national regulatory body or authority designated or otherwise recognized as such for any purpose in connection with the regulations specified in the Bibliography.

### 3.2

#### Intermediate Bulk Containers (IBCs)

rigid or flexible portable packagings, other than those specified in Chapter 6.1 of the UN Recommendations, that:

— have a capacity of:

i) not more than 3,0 m<sup>3</sup> (3,000 l) for solids and liquids of Packing Groups II and III;

ii) not more than 1,5 m<sup>3</sup> for solids of Packing Group I when packed in flexible, rigid plastics, composite, fibreboard and wooden IBCs;

iii) not more than 3,0 m<sup>3</sup> for solids of Packing Group I when packed in metal IBCs.

iv) not more than 3,0 m<sup>3</sup> for radioactive material of class 7

— are designed for mechanical handling;

— are resistant to the stresses produced in handling and transport, as determined by tests.

### 3.3

#### IBC design type

IBC of one design, size, material and thickness, manner of construction and means of filling and discharging, including various surface treatments, together with IBCs which differ from the design type only in their lesser external dimensions

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NOTE 1 Attention is drawn to the fact that, when the IBC design type has a maximum capacity greater than 450 l and IBCs of that type with lesser dimensions bring the capacity below 450 l, additional tests can be necessary.

NOTE 2 For flexible IBCs the design type is specified by the grammage per square metre not by the thickness.

### 3.4 liquids

dangerous goods which at 50 °C have a vapour pressure of not more than 300 kPa (3 bar), which are not completely gaseous at 20 °C and at a pressure of 101,3 kPa, and which have a melting point or initial melting point of 20 °C or less at a pressure of 101,3 kPa

NOTE An expansion of this definition can be found in annex A

### 3.5 solids

dangerous goods, other than gases, that do not meet the definition of liquids

### 3.6 capacities

#### 3.6.1 brimful (overflow, maximum) capacity

maximum volume of water in litres held by the IBC when filled through the designed filling orifice to the point of overflowing in its normal position of filling

#### 3.6.2 nominal capacity

capacity in litres which, by convention is used to represent a class of packagings of similar brimful capacities

#### 3.7 packing groups

group to which substances of most classes of dangerous goods are assigned according to the degree of danger presented:

##### Packing Group I

high danger

##### Packing Group II

medium danger

##### Packing Group III

low danger

NOTE The severity of an IBC test (e.g. the drop height) varies with the packing group of the substance.

### 3.8 types of IBCs

NOTE Further definitions are found in UN 6.5.1.3:

#### 3.8.1 Rigid IBCs (RIBCs)

metal, rigid plastics, composite, fibreboard and wooden IBCs

#### 3.8.2 Flexible IBCs (FIBCs)

paper, plastics and textile IBCs

### 3.9 maximum net mass

maximum mass of contents in one IBC expressed in kilograms

### 3.10 maximum permissible gross mass (for all RIBCs)

mass of the IBC and any service or structural equipment together with the maximum net mass



### 3.11 filling

#### 3.11.1 under pressure

filling under a pressure of more than 10 kPa (0,1 bar)

#### 3.11.2 under gravity

filling under gravity alone or a pressure of not more than 10 kPa (0,1 bar)

### 3.12 discharging

#### 3.12.1 under pressure

discharging under a pressure of more than 10 kPa (0,1 bar)

#### 3.12.2 under gravity

discharging under gravity alone or a pressure of not more than 10 kPa (0,1 bar)

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## 4 Test requirements

### 4.1 Test and sequence requirements

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#### 4.1.1 Table 1 sets out the test requirements for IBCs

NOTE 1 The tests required in Table 1 correspond to the applicability provisions of the UN Recommendations but not necessarily to the tabulation therein.

NOTE 2 Successful design type tests as described in this standard normally lead to the allocation of a UN IBC mark by the competent authority. It is a requirement of the regulations listed in the Bibliography that, before the IBC is used for dangerous goods, tests are carried out successfully on each IBC design type (see 3.3). It is also a requirement of those regulations that the tests are successfully repeated after any modification that alters the IBC design type, however the Competent Authority can waive testing. Some examples of where testing may be waived are given in annex D.

NOTE 3 Where an inner treatment or coating is applied for safety reasons it should retain its protective properties even after the tests.

NOTE 4 A design type not designed for bottom or top lifting does not meet the definition of an IBC [see 3.2] because, unless otherwise approved by the competent authority, it is not considered to be suitable for mechanical handling.

**4.1.2** One sample RIBC shall be tested in accordance with the relevant test sequence in Table 1 and shall meet the applicable criteria in 4.2 to 4.7.

**4.1.3** FIBCs shall be tested in accordance with Table 1 and shall meet the applicable criteria in 4.2 to 4.10. For any one design type, the tests shall be carried out using a different sample for each test, or with a sample which has passed one test being used for other tests.

NOTE 1 IBCs for solids, which are likely to become liquid during transport, should be tested as for liquids, RIBCs for solids can also be tested for liquids, specifically leakproofness and / or hydraulic tests.

NOTE 2 IBCs being tested for solids which require phlegmatizing with a liquid for safe transport, such that there is free liquid in the packaging, should be subjected to the appropriate tests for liquids with the test contents being a representative mixture of solids and liquids.

Table 1 — Design type tests required and sequential order

Metal IBCs				Test required when contents are:	
	Sequential order	Requirement clause	Testing clause	Solids filled or discharged by gravity	Solids filled or discharged by pressure and liquids
Bottom lift	1	4.2	7.1	Yes <sup>a)</sup>	Yes <sup>a)</sup>
Top lift	2	4.3	7.2	Yes <sup>b)</sup>	Yes <sup>b)</sup>
Stacking	3	4.4	7.4	Yes <sup>c)</sup>	Yes <sup>c)</sup>
Leakproofness	4	4.5	7.5	N/A	Yes
Hydraulic pressure	5	4.6	7.6	N/A	Yes
Drop <sup>f)</sup>	6	4.7	7.7	Yes <sup>d)</sup>	Yes <sup>d)</sup>
Rigid plastics IBCs				Test required when contents are:	
	Sequential order	Requirement clause	Testing clause	Solids filled or discharged by gravity	Solids filled or discharged by pressure and liquids
Bottom lift	1	4.2	7.1	Yes <sup>a)</sup>	Yes <sup>a)</sup>
Top lift	2	4.3	7.2	Yes <sup>b)</sup>	Yes <sup>b)</sup>
Stacking	3	4.4	7.4	Yes <sup>c)</sup>	Yes <sup>c)</sup>
Leakproofness	4	4.5	7.5	N/A	Yes
Hydraulic pressure	5	4.6	7.6	N/A	Yes
Drop <sup>f)</sup>	6	4.7	7.7	Yes	Yes
Composite IBCs				Test required when contents are:	
	Sequential order	Requirement clause	Testing clause	Solids filled or discharged by gravity	Solids filled or discharged by pressure and liquids
Bottom lift	1	4.2	7.1	Yes <sup>a)</sup>	Yes <sup>a)</sup>
Top lift	2	4.3	7.2	Yes <sup>b)</sup>	Yes <sup>b)</sup>
Stacking	3	4.4	7.4	Yes <sup>c)</sup>	Yes <sup>c)</sup>
Leakproofness	4	4.5	7.5	N/A	Yes
Hydraulic pressure	5	4.6	7.6	N/A	Yes
Drop <sup>f)</sup>	6	4.7	7.7	Yes <sup>d)</sup>	Yes <sup>d)</sup>
Fibreboard and wooden IBCs				Test required when contents are:	
	Sequential order	Requirement clause	Testing clause	Solids filled or discharged by gravity	
Bottom lift	1	4.2	7.1	Yes	
Top lift	2	4.3	7.2	Yes <sup>b)</sup>	
Stacking	3	4.4	7.4	Yes <sup>c)</sup>	
Drop <sup>f)</sup>	4	4.7	7.7	Yes	

Table 1 (Continued)

Flexible IBCs				Test required when contents are:	
	Sequential order	Requirement clause	Testing clause	Solids filled or discharged by gravity	
Bottom lift	N/A	4.2	7.1	Yes <sup>a)d)</sup>	
Top lift	N/A	4.3	7.3	Yes <sup>d)e)</sup>	
Stacking	N/A	4.4	7.4	Yes <sup>c)d)</sup>	
Drop <sup>f)</sup>	N/A	4.7	7.7	Yes <sup>d)</sup>	
Tear	N/A	4.8	7.8	Yes <sup>d)</sup>	
Topple	N/A	4.9	7.9	Yes <sup>d)</sup>	
Righting	N/A	4.10	7.10	Yes <sup>d)</sup>	

a) When IBCs are fitted with means of lifting from the base.  
b) When IBCs are designed to be lifted from the top.  
c) When IBCs are designed to be stacked on each other during transport.  
d) The test is required but another IBC of the same design may be used  
e) For FIBCs designed to be lifted from the top or the side  
f) See 7.7.3 for additional drop tests for IBCs of 0,45m<sup>3</sup> capacity or less

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#### 4.2 Criteria for passing the bottom lift test

When tested in accordance with 7.1 there shall be no permanent deformation which renders the IBC, including the base pallet, if any, unsafe for transport and no loss of contents.

#### 4.3 Criteria for passing the top lift test

**4.3.1** When tested in accordance with 7.2 there shall be no permanent deformation which renders the RIBC, including the base pallet, if any, unsafe for transport and no loss of contents.

**4.3.2** When tested in accordance with 7.3 there shall be no damage to the FIBC or its lifting devices which renders the FIBC unsafe for transport or handling and no loss of contents.

#### 4.4 Criteria for passing the stacking test

**4.4.1** When tested in accordance with 7.4 there shall be no permanent deformation which renders the RIBC, including the base pallet, if any, unsafe for transport and no loss of contents.

**4.4.2** When tested in accordance with 7.4 there shall be no deterioration of the body which renders the FIBC unsafe for transport and no loss of contents.

#### 4.5 Criteria for passing the leakproofness test

When tested in accordance with 7.5 there shall be no leakage of air.

#### 4.6 Criteria for passing the hydraulic pressure test(s)

When tested in accordance with 7.6 there shall be no leakage of liquid.

When a pre-test at 65 kPa is required for metal IBCs there shall be neither permanent deformation which would render the IBC unsafe for transport nor leakage of liquid.

For rigid plastics and composite IBCs when tested in accordance with 7.6 there shall be no permanent deformation which would render the IBC unsafe for transport and no leakage.

#### 4.7 Criteria for passing the drop test

4.7.1 For metal IBCs, when tested in accordance with 7.7 there shall be no loss of contents.

4.7.2 For rigid plastics, composite, fibreboard and wooden IBCs when tested in accordance with 7.7 there shall be no loss of contents. A slight discharge from a closure upon impact shall not be considered to be a failure of the IBC provided that no further leakage occurs.

4.7.3 For FIBCs when tested in accordance with 7.7 there shall be no loss of contents. A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the FIBC provided that no further leakage occurs after the FIBC has been lifted clear of the ground.

#### 4.8 Criteria for passing the tear test

Following the test, which shall be carried out in accordance with 7.8, the original 100 mm long cut shall not have extended by more than 25 % of its original length.

#### 4.9 Criteria for passing the topple test

When tested in accordance with 7.9, there shall be no loss of contents. A slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the FIBC provided that no further leakage occurs.

#### 4.10 Criteria for passing the righting test

When tested in accordance with 7.10 there shall be no damage to the FIBC or its lifting devices which renders the FIBC unsafe for transport or handling.

#### 4.11 Equivalent testing

The test methods described in this standard shall be considered to be the reference test methods. Alternative methods may be used provided that:

- their equivalence to the reference test method can be demonstrated;
- their use is recorded in the test report;
- prior approval is obtained from the competent authority.

#### 4.12 Test report

All IBCs tested for conformity with this standard shall be the subject of a test report and specification check prepared in accordance with annexes B and C. It shall be possible to specifically identify the IBC relative to each test report, either by the retention of uniquely referenced IBCs or by inclusion of sufficient photographs and/or drawings with unique references to enable identification of the IBC and all its components.

NOTE 1 Each test report should be available to the users of the IBC.

NOTE 2 Retention and/or disposal procedures for test IBCs can be established by the competent authority.