INTERNATIONAL STANDARD

ISO 16495

Second edition
2022-05

Corrected version
2023-04

Packaging — Transport packaging for dangerous goods — Test methods

Emballages — Emballages de transport pour marchandises dangereuses — Méthodes d'essai

Reference number
ISO 16495:2022(E)

© ISO 2022



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO 2022 – All rights reserved

Contents

Page

Foreword ... **v**

Introduction ... **vi**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Selection and preparation of packaging, IBCs and large packaging for testing ... **2**

4.1 General ... 2
4.2 Selection of packaging, IBCs and large packaging ... 2
4.3 Information to be provided with packaging, IBCs and large packaging ... 2
4.3.1 General ... 2
4.3.2 Test contents – using water and non-dangerous substances ... 2
4.3.3 Test contents – using the dangerous substance ... 3
4.3.4 Vapour pressure ... 3
4.3.5 Test contents – using articles ... 3
4.3.6 Closing instructions ... 3
4.3.7 Handling characteristics of IBCs and large packaging ... 3
4.4 Selection of contents and filling of packaging, IBCs and large packaging prior to testing ... 3
4.4.1 General ... 3
4.4.2 Packaging, IBC, inner packaging of combination packaging and large packaging to contain liquids ... 4
4.4.3 Rigid packaging, rigid IBCs, inner packaging of combination packaging and large packaging to contain solids ... 4
4.4.4 Flexible packaging, flexible inner packaging and flexible IBCs to contain solids ... 5
4.4.5 Packaging/inner packaging designed to be used part full ... 5
4.5 Closing packaging, IBCs and large packaging ... 5
4.5.1 Drums, jerricans, composites and inner packaging, IBCs ... 5
4.5.2 Bags ... 6
4.5.3 Other packaging ... 6
4.6 Check of design type specification with requirements ... 6
4.7 Conformity check of test samples with design type specification ... 6

5 Test methods ... **7**

6 Facilities for testing ... **7**

6.1 General requirements ... 7
6.2 Accuracy of measurement equipment ... 7
6.3 Accuracy of measurements in testing ... 7
6.4 Climatic conditions ... 7
6.5 Reassessment when failure occurs ... 8

7 Test report ... **8**

Annex A (normative) **Test report** ... **9**

Annex B (normative) **Packaging specifications** ... **11**

Annex C (normative) **IBC specifications** ... **17**

Annex D (normative) **Large packaging specifications** ... **21**

Annex E (informative) **Type of contents** ... **24**

Annex F (informative) **Drop test** ... **25**

Annex G (informative) **Leakproofness test** ... **28**

Annex H (informative) **Hydraulic pressure test** ... **30**

© ISO 2022 – All rights reserved

Annex I (informative) **Stacking test** **32**
Annex J (informative) **Water spray test** **36**
Annex K (informative) **Bottom lift test** **37**
Annex L (informative) **Top lift test** **38**
Annex M (informative) **Tear test** **39**
Annex N (informative) **Topple test** **40**
Annex O (informative) **Righting test** **41**
Annex P (informative) **Puncture test** **42**
Annex Q (informative) **Vibration test** **43**
Bibliography **44**

© ISO 2022 – All rights reserved

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 3, *Performance requirements and tests for means of packaging, packages and unit loads (as required by ISO/TC 122),* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 261, *Packaging,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 16495:2013), which has been technically revised.

The main changes are as follows:

— changes to Table B.1, Table B.2, Table B.3, Table C.1, Table D.1, Table D.2 and Table D.3;

— additional requirements in Annex H, "H.2 Preparation" added;

— deletion of Table H.1;

— editorial improvements.

This corrected version of ISO 16495:2022 incorporates the following corrections:

— the positioning of the lines in the table header of Table C.1 has been corrected.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2022 – All rights reserved

Introduction

This document was developed to provide requirements and test procedures to meet the multi-modal United Nations Recommendations on the Transport of Dangerous Goods Model Regulations referred to as "UN Recommendations" throughout this document, and successful passing of the tests may lead to the allocation of an appropriate UN packaging mark. The UN Recommendations have been developed by the United Nations Subcommittee of Experts on the Transport of Dangerous Goods as a 'model regulation' 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. In addition, there are 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 following:

— The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) (covering most of Europe)[4];

— Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) (covering most of Europe, parts of North Africa and the Middle East)[5];

— The International Maritime Dangerous Goods Code (IMDG Code) (worldwide)[6];

— The International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TIs) (worldwide)[7].

Application of this document presupposes awareness 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 document.

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 a packaging for any dangerous goods, which are subject to the packing instructions published in the various modal regulations.

This document is based on Revision 21 of the UN Recommendations.

© ISO 2022 – All rights reserved

Packaging — Transport packaging for dangerous goods — Test methods

1 Scope

This document specifies the information needed for the design type testing of packaging, intermediate bulk containers (IBCs) and large packaging intended for use in the transport of dangerous goods.

NOTE 1 This document can be used in conjunction with one or more of the international regulations set out in the Bibliography.

NOTE 2 The term "packaging" includes packaging for Class 6.2 infectious substances according to the United Nations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2248:1985, *Packaging — Complete, filled transport packages — Vertical impact test by dropping*

ISO 2875:2000, *Packaging — Complete, filled transport packages and unit loads — Water-spray test*

ISO/IEC 17025:2017, *General requirements for the competence of testing and calibration laboratories*

United Nations Recommendations on the Transport of Dangerous Goods — Model Regulations

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the UN Recommendations, Chapter 1.2.1, and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
brimful capacity
volume of water in litres held by the packaging, intermediate bulk container (IBC), inner packaging of a combination packaging and/or large packaging, when filled through the designed filling orifice to the point of overflowing in its normal position of filling, and considered for testing purposes as maximum capacity

3.2
nominal capacity
capacity in litres which, by convention, is used to represent a class of packaging of a similar *brimful capacity* (3.1)

© ISO 2022 – All rights reserved