

Australian Standard[®]

Transport packaging for dangerous goods—Test methods



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 - Australasian Fire Authorities Council
 - Australian Institute of Petroleum
 - Australian Paint Manufacturers' Federation
 - Consumers Federation of Australia
 - Department of Consumer and Employment Protection, WA
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 - Department of the Premier and Cabinet, SA
 - Engineers Australia
 - New Zealand Chemical Industry Council
 - Plastics and Chemicals Industries Association
 - Tranz Rail (New Zealand)
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-

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Australian Standard[®]

Transport packaging for dangerous goods—Test methods

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PREFACE

This Standard was prepared by Standards Australia/Standards New Zealand Committee CH-009, Safe Handling of Chemicals. It is identical with and has been reproduced from ISO 16104:2003, *Packaging—Transport packages for dangerous goods—Test methods*.

As this Standard is reproduced from an International Standard, the following applies:

- (a) Its number appears on the cover and title page while the international standard number appears only on the cover.
- (b) In the source text ‘this European Standard’ should read ‘this Australian Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.
- (d) Additional defined terms from the UN *Recommendations on the Transport of Dangerous Goods* are provided in Appendix ZA.
- (e) Add the following note to Paragraph E.1.9:

This includes any reassessment required by Clauses 7.5 and 7.6.

References to International Standards should be replaced by references to Australian Standards, as follows:

<i>Reference to International Standard</i>	<i>Australian Standard</i>	
EN	AS	
22206 Packaging—Complete, filled transport packages—Identification of parts when testing (ISO 2206:1987)	2582	Complete, filled transport packages—Methods of test
	2582.1	Part 1: Identification of parts when testing
22234 Packaging—Compete, filled transport packages—Stacking test using static load (ISO 2234)	2582.3	Part 3: Stacking tests using a static load
EN ISO		
12048 Packaging—Compete filled transport packages—Compression and stacking tests using a compression tester (ISO 12048)	2582.10	Part 10: Compression and stacking tests using a compression tester
2431 Paints and varnishes—Determination of flow time by use of flow cups (ISO 2431)	1580	Paints and related materials—Methods of test
	1580.214.6	Method 214.6: Consistency—ISO flow cups
	AS/NZS ISO	
9001 Quality management systems—Requirements (ISO 9001)	9001	Quality management systems—Requirements
ISO/IEC	AS ISO/IEC	
17025 General requirements for the competence of testing and calibration laboratories	17025	General requirements for the competence of testing and calibration laboratories

Only international references that have been adopted as Australian Standards have been listed.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex to which they apply. A ‘normative’ annex is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

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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 may lead to the allocation of an appropriate packaging mark (e.g. UN, RID/ADR). 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 (IMDG 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.

Occasionally during adoption as a modal regulation the text has been modified; RID/ADR permit some variations to tests for light gauge metal packagings and these are included in annex A.

The cross references between this Standard, the UN Recommendations and the International Agreements are summarized in annex B.

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

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

AUSTRALIAN STANDARD

Transport packaging for dangerous goods—Test methods

1 Scope

This Standard specifies the design type test requirements for packagings as described in 3.6 of this standard and intended for use in the transport of dangerous goods.

NOTE This Standard should be used in conjunction with one or more of the international regulations set out in the Bibliography.

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).

EN 22206, *Packaging — Complete filled transport packages — Identification of parts when testing (ISO 2206:1987)*

ISO 2137, *Petroleum products — Lubricating grease and petroleum — Determination of cone penetration*

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

EN ISO 2431, *Paints and varnishes - Determination of flow time by use of flow caps (ISO 2431:1993, including Technical Corrigendum 1:1994)*

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

packaging design type

packaging of one design, size, material and thickness, manner of construction and packing, but may include various surface treatments together with packagings which differ from the design type only in their lesser design height

3.3

liquids and solids

(see annex B)

3.4 capacity

3.4.1 brimful (overflow, maximum) capacity

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

3.4.2 nominal capacity

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

3.5 packing group

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

Packing group I	Packing group II	Packing group III
High danger	medium danger	low danger

NOTE The severity of a packaging test (e.g. the drop height) varies with the packing group of the substance or article. The allocation of packing groups to substances and articles may be found in the dangerous goods list of the UN Recommendations.

3.6 packaging

receptacle and any other components or materials necessary for the receptacle to perform its containment function and are:

- designed to contain a net mass not exceeding 400 kg;
- designed with a capacity not exceeding 450 l;
- not intended to transport most gases;
- not intended to transport most infectious substances;
- not intended to transport most radioactive materials;
- not Intermediate Bulk Containers as defined in the UN Recommendations 6.5.

NOTE 1 Other definitions relevant to this standard may be found in 1.2.1 of the UN Recommendations.

NOTE 2 Annex B contains useful data on packaging types and other identifying codes with references to the regulations.

NOTE 3 Unless otherwise stated both the 400kg and 450 litre limits apply to all packages irrespective of the contents.

3.7 "V"-marked packaging

outer packaging conforming to the appropriate requirements from the UN Recommendations 6.1.5.1.7 (see annex C)

3.8 special packagings

collective term for V-marked packaging and salvage packagings (defined in the UN Recommendations 1.2.1)(see annex C)

3.9**single packaging**

means of packaging that does not require an inner packaging to be capable of performing its containment function and it includes composite packaging

3.10**light gauge metal packaging - (see annex A)**

NOTE Other definitions that may be relevant to this standard may be found in the UN Recommendations.

4 Test requirements**4.1 General**

Before the packaging is used for dangerous goods, tests shall be carried out successfully on each packaging design type (see 3.2), which may lead to the issuing of a UN packaging mark. The tests shall be successfully repeated after any modification which alters the packaging design type. With the exception of special packagings (see 3.8), all packagings for dangerous goods shall be tested in accordance with Table 1 and shall meet the requirements contained in 4.2 to 4.6. Special packagings shall meet the requirements set out in annex C.

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

NOTE Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one packaging. This may be necessary, for example, with very costly or scarce packagings. This may be accomplished by:

- a) using one set of packagings for more than one of the tests. For example five tests are required on a drum for liquids, each requiring a set of three packagings, namely first drop, second drop, leakproofness, internal pressure and stack. Subjecting one set to more than one of the five tests is considered equivalent;
- b) using one packaging for the tests. For example using one fibreboard box for all five drops is considered equivalent to carrying out 1 drop on each of five boxes.

Approval should be sought from the competent authority before employing method a) or when subjecting any one packaging to more than two tests (including investigatory drops) under method b).

The use of smaller numbers should be indicated in the test report. This is normally apparent from the serial numbers of the packagings used for the various tests but explanatory text is also desirable.

Table 1 — Allocation of test conditions to packaging types

Drop test																	Stacking test (see annex D for variations)						Leakproofness test			Hydraulic pressure test		
Table 1	Contents	Inner packaging		Temperature			Temperature						Leakproofness test			Hydraulic pressure test												
		Plastics	Other or none	No. of packagings	Ambient	23°C / 50 % rh	-18 °C	No. of packagings	Time	Ambient	23°C / 50 % rh	40° C	No. of packagings	Time	No. of packagings	Time	Total no. of packagings											
Table footnotes		h	h			a	be		d		a	c		d		d												
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)											
1. Metal packagings _k	Liquid			6	Y			3	24 h	Y			3	5m	3	5m	15											
2. Metal packagings _k	Solid		Y	6	Y			3	24 h	Y			0		0	0	9											
3. Metal packagings _k	Solid	Y		6			Y	3	24 h	Y			0		0	0	9											
4. Plastics packagings _k	Solid		Y	6			Y	3	24 h	Y			0		0	0	9 ^g											
5. Plastics packagings _k	Solid	Y		6			Y	3	24 h	Y			0		0	0	9 ^g											
6. Plastics packagings _k	Liquid			6			Y	3	28 d			Y	3	5m	3	30m	15 ^g											
7. Composite packagings — plastics _m	Solid	Y	Y	6			Y	3	24 h ⁱ	Y ⁱ			0		0	0	9 ^g											
8. Composite packagings plastics _m	Liquid			6			Y	3	24 h ⁱ	Y ⁱ			3	5m	3	30m ^j	15 ^g											
9. Composite packagings — glass, stoneware and porcelain _m	Liquid			6		Y ⁱ	Y	3	24 h ⁱ	Y ⁱ			3	5	3	5	15											

Drop test										Stacking test (see annex D for variations)				Leakproofness test		Hydraulic pressure test		Total no. of packagings
Table 1	Contents	Inner packaging		Temperature			Temperature			Temperature				No. of packagings	Time	No. of packagings	Time	Total no. of packagings
Packaging type	Liquid/ Other	Plastics	Other or none	No. of packagings	Ambient	23°C / 50 % rh	-18 °C	No. of packagings	Time	Ambient	23°C / 50 % rh	40° C						
Table footnotes		h	h			a	be		d		a	c						
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	
9a. Composite packagings – glass, stoneware and porcelain ^m	Solid	Y		6				3	24 h ⁱ	Y ⁱ			0		0		9	
9b. Composite packagings – glass, stoneware and porcelain ^m	Solid		Y	6	Y			3	24 h ⁱ	Y ⁱ			0		0		9	
10. Fibre/ plywood drums	Solid		Y	6		Y ⁱ		3	24 h	Y ⁱ			0		0	0	9	
11. Fibre/ plywood drums	Solid	Y		6			Y	3	24 h	Y ⁱ			0		0	0	9	
12. Plastics boxes	Solid	Y	Y	5			Y ⁱ	3	24 h	Y			0		0	0	8 ^g	
13. Fibreboard boxes	Solid	Y		5			Y	3	24 h		Y		0		0	0	8	
14. Fibreboard boxes	Solid		Y	5		Y		3	24 h		Y		0		0	0	8	
15. Other boxes	Solid	Y		5			Y	3	24 h	Y			0		0	0	8	
16. Other boxes	Solid		Y	5	Y			3	24 h	Y			0		0	0	8	
17. Bags (paper)	Solid		Y	3		Y		0	0				0		0	0	3	
18. Bags (other)	Solid		Y	3	Y			0	0				0		0	0	3	

NOTE 1 Annex B Table B.2 shows the relationship between this table and UN packaging codes. NOTE 2 Y indicates a requirement ^a Column (G) and (L): Paper or fibreboard packagings shall be conditioned for at least 24 h in an atmosphere having a controlled temperature and relative humidity (r.h.) unless -18 °C conditioning for plastics inner packagings or receptacles takes precedence. The preferred atmosphere is 23 °C ± 2 °C and 50 % ± 2 % r.h. NOTE 1 The two other options are 20 °C ± 2 °C and 65 % ± 2 % r.h. or 27 °C ± 2 °C and 65 % ± 2 % r.h NOTE 2 Average values should fall within these limits. Short term fluctuations and measurement limitations may cause individual measurements to vary by up to ± 5 % relative humidity without significant impairment of test reproducibility. NOTE 3 Conditioning may be carried out immediately before, or after filling the package with the test contents provided such a procedure would not affect the test results. ^b Column (H): 1) The following plastics packagings shall undergo the cold drop test: — -plastics drums and jerricans; — -plastics boxes other than expanded polystyrene boxes; — -composite packagings (plastics materials); — -combination packagings with plastics inner packagings other than plastics bags intended to contain solids or articles; 2) The temperature shall be -18 °C or lower as measured immediately after the drop test; 3) Test liquids shall be kept in the liquid state by the addition of antifreeze if necessary; NOTE Temperatures outside the range -18° to -22 °C should be pre-arranged and recorded in the test report; ^c Column (M): The temperature shall be at least 40°C. NOTE Temperatures outside the range 40°C to 44 °C should be pre-arranged and recorded in the test report. ^d h = hours d = days m = minutes ^e Column (H): Metal packagings with plastics closures not exceeding 7 cm shall not undergo the drop test at -18 °C as required for plastics packagings. Column (H): Expanded polystyrene boxes, unless inner packagings are of plastics material, shall not undergo a drop test at -18 °C; the drop shall be at ambient. Column (R): Packagings shall be at least 48 h old. Contents of inner packagings can be solid or liquid.

ⁱ Column (J):	
—	Composites with plastics outers shall be tested for 28 days at 40 °C;
—	Composites with outers other than plastics shall be tested for 24 h at ambient temperature.
^j Column (Q): Plastics packagings and Composite packagings (plastics materials) shall be tested for 30 min. Other composites shall be tested for 5 min.	
^k Column (A): Other than boxes.	
^l Column (G) and (K): where the outer is fibre/fibreboard the drop and stacking test shall be undertaken following conditioning at 23 °C ± 2 °C and 50 % ± 2 % r.h.	
^m Column (A): where a composite packaging (plastics materials) is in the shape of a box only 5 samples are required for the drop test which shall be carried out in accordance with the procedures for boxes see Table 2.	

4.2 Drop test

When tested in accordance with 7.1:

- a) the packaging shall be leakproof subsequent to any slight discharge from the closure(s) that may be apparent at the moment of impact and, in the case of packaging containing liquids, subsequent to the equalization of internal and external pressures (except for inner packagings of combination packagings when it is not necessary for the pressure to be equalized);
- b) the packaging shall not exhibit any damage liable to affect safety during transport, for example the package cannot be moved without leaking;
- c) the packagings that are to be tested for use with goods of Class 1 (explosives) shall be identified as such in the test report. When tested, they shall not display any rupture that would permit the spillage of loose explosive substances or articles from the outer packaging;
- d) the outer ply of a bag shall not exhibit damage liable to affect safety during transport;
- e) the outer of a combination packaging shall not exhibit damage liable to affect safety during transport.

4.3 Stacking test

When tested in accordance with 7.2 the packaging shall not:

- a) show any sign of leakage (this includes inner packaging and any inner receptacle);
- b) show any deterioration which could adversely affect transport safety nor any distortion liable to reduce its strength or reduce stability in stacks of packages.

4.4 Leakproofness test

When tested in accordance with 7.3, packagings intended to contain liquids (except inner packagings of combination packagings) shall be leakproof.

4.5 Hydraulic pressure test

When tested in accordance with 7.4, packagings intended to contain liquids (except inner packagings of combination packagings) shall not leak.

Inner packagings of combination packagings containing liquids, which are likely to be shipped by air, shall be capable of withstanding an internal pressure without leakage (see UN Recommendations 4.1.1.4.1.)

4.6 Test report

All packaging tests performed in conformity with this standard shall be the subject of a test report and will include a specification check prepared in accordance with annex E. It shall be possible to specifically identify the packaging relative to each test report, either by the retention of uniquely referenced packagings or by inclusion of sufficient photographs and/or drawings with unique references to enable identification of the packaging and all its components.

The test report shall be available to the users of the packaging.

NOTE The complete test report may not be required by the user. Manufacturers and subsequent distributors of packagings should provide information regarding procedures to be followed and a description of the types and dimensions of closures (included required gaskets and any other components needed to ensure that packages as presented for transport are capable of passing the applicable tests).

5 Selection and preparation of test packagings

5.1 Selection of packagings

Sufficient packagings per design type shall be selected/submitted for testing in accordance with columns E, I, N and P of Table 1 and shall be:

- a) marked with a test reference which shall also be entered on the test record and later used on the test report;
- b) marked on each face where the packaging is in the shape of a box in accordance with EN 22206;
- c) individually weighed to establish the tare or filled mass;
- d) NOTE The form of such weighing may be varied to correspond to whether the packagings have been supplied full or empty to the test station. Where the masses of individual empty packagings are recorded, it is necessary to record only a typical filled mass (or vice versa);
- e) examined for damage which might invalidate the tests, in which event the packaging shall be replaced.

NOTE Under some circumstances it may be desirable to have a range of packagings tested in a number of different sizes but of the same construction. In such situations it may not be necessary to carry out testing for every possible permutation. This selective testing procedure is recognized but only after agreement with the competent authority who will advise on options available. Guidelines are set out in annex F.

5.2 Information to be provided with packagings

5.2.1 General

Each packaging type shall be accompanied by specification(s) for that design type containing the data set out in annex G and by the following additional information as relevant.

5.2.2 Test Contents- Using water and non-dangerous substances

Where the tests are to be carried out using water or other non-dangerous substances a statement of the packing group for which the packaging is to be tested shall be provided, together with data enabling appropriate selection of inert test contents. For liquids such data will normally include the required maximum relative density for the tests together with data on, for instance, the internal pressure test required. For solids such data shall include mass, grain size and any other relevant characteristic, for example, bulk density, angle of repose etc., to clearly show equivalence of physical characteristics.

5.2.3 Test Contents - Using the dangerous substance

Where the tests are to be carried out using the dangerous substance(s) to be transported, a statement of their packing group and their physical characteristics shall be provided. Liquids shall be defined by their relative density together with viscosity and method of determination. Solids shall be defined by their mass and grain size and any other relevant characteristic, for example, bulk density, angle of repose etc. to ensure physical characteristics are sufficiently identified and included. This data shall be recorded in the test report (see annex E);

NOTE Where tests are carried out using the actual substance to be transported then the test report should be applicable for other substances having the same or equivalent characteristics.

5.2.4 Test Contents- Using Articles

Where the packaging is intended for the transport of an article(s), a statement of the packing group, an appropriate description and drawing(s) of the article(s) and or photographs and details of the way in which dummy articles were filled for the purpose of testing.

5.2.5 Vapour pressure

For liquids the vapour pressure of the substance to be carried or the hydraulic pressure to be achieved during the tests.

5.2.6 Special instructions

Any special filling or closing instructions including, where relevant, for example the closure torque (EN 26789).

5.3 Selection of contents and filling of packaging prior to testing

5.3.1 General

Single packagings and the inner packagings of combination packagings shall be filled for drop and stacking tests to not less than:

- 98% of brimful capacity for liquids;
- 95% of brimful capacity for solids.

NOTE There are two exceptions, some flexible packagings (see 5.3.5) and some packagings designed to be transported part full (see 5.3.6).

Packagings for liquids, or those capable of containing them, shall have their capacity determined as in 5.3.3 or 5.3.4. Otherwise the capacity shall be determined by other suitable means e.g. by calculation.

5.3.2 Test Contents

Where non-dangerous substances are to be used as test contents they shall be selected to accord with the data referred to in 5.3.5. Water or a water/anti-freeze mixture may be used to represent any liquid.

For solids, additives such as bags of lead shot may be used to adjust the mass if required, but if used they shall be placed in such a manner that the test results are not affected. Dangerous articles shall be replaced by dummy articles and these shall be of the same size, shape, mass and centre of gravity as the articles to be transported.

The test contents used shall be recorded in the test report.

5.3.3 Rigid packaging to contain liquids

5.3.3.1 Determination of brimful capacity

A packaging intended to contain liquids shall be filled to not less than 98 % of the brimful capacity. The brimful (overflow) capacity is determined for example by: weighing the empty packaging including closures (mass empty (m) in kg) and weighing the packaging full (mass brimful (W) in kg). The packaging shall be filled with water until the water just overflows and then fitting the closure and any surplus mopped up. No steps shall be taken, e.g. by tilting or tapping the packaging, to enable water to penetrate into a hollow handle or other design feature above the closure.

$$b = \frac{W - m}{d}$$

where:

b is the brimful capacity in litres

W is the mass in kg, of packaging when brimful with water

m is the mass in kg, of the empty packaging

d is the density of water (=1) in kg/litre

5.3.3.2 Filling of the packaging

When filling test packagings with liquids, at least one packaging shall have its capacity and filling level determined as for example below. Further packagings of that design type shall be filled using a dipstick calibrated on the first packaging or, in the case of small packagings, by mass or volume. When the capacity of the packaging is established with a liquid other than water (e.g. anti-freeze solution), the density of that liquid shall be taken into account, in order to obtain the correct volume of fill (at least 98 % of brimful capacity).

The calculation of required volume of liquids for testing shall be:

$$C = \frac{b \times 98}{100}$$

where:

C is the required volume of water in litres;

b is the brimful capacity in litres

5.3.4 Rigid packaging to contain solids

Packaging intended to contain solids shall be filled to not less than 95 % of the brimful capacity. Where the packaging is capable of containing liquids the capacity shall be determined as in 5.3.3.1

The calculation of required mass of solids for testing shall be:

$$M = \frac{(b \times d) \times 95}{100}$$

where:

M is the required mass in kg, of solids;

b is the brimful capacity either measured or calculated in litres ;

d is the bulk density of the test contents in g/cm³

Alternatively, for cylindrical packagings the level of fill required to fill the package to at least 95 % of its brimful capacity shall be calculated from its internal height, taking into account any reduction in height caused by the fitting of the closure.

This procedure is not suitable for bags (see 5.3.5 below).

5.3.5 Flexible packagings to contain solids

Flexible packagings (bags) shall be filled to the required testing mass at which the designer of the packaging intends it to be used or, if known, to the capacity which the user intends to employ using either the substance to be transported or solids of similar characteristics in respect of mass, grain size and flow characteristics; the test contents used shall be recorded in the test report.

NOTE Bags do not have a capacity which is measured in the same way as for rigid packagings. The test report should therefore specify the quantity by mass and bulk density of that solid substance, as tested, for which the bag may be used.

5.3.6 Packaging designed to be used part full

Packaging designed to be transported with filling test levels less than 98 % for liquids or less than 95 % for solids shall be filled as prepared for transport to the capacity the user intends to employ. The filled volume and mass shall be recorded in the test report.

5.4 Closing packagings

The packagings shall be closed as for transport in accordance with any special instructions.

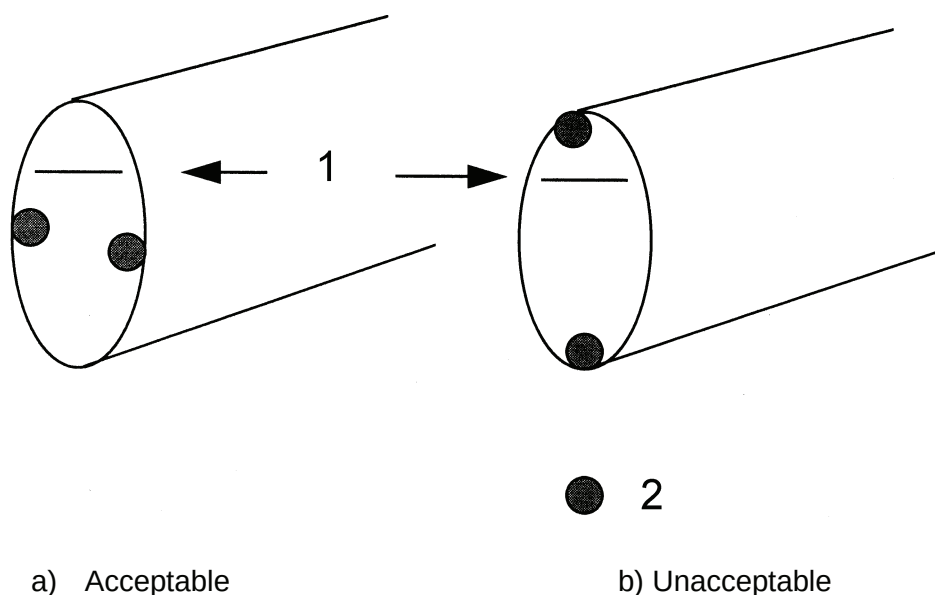
5.4.1 Drums, jerricans, composites and inner packagings

Screw type closures shall be tightened to the torque specified by the applicant where appropriate, which shall be recorded in the test report.

Closure torque shall not differ from one test to another in the test report. If it is necessary to revise a closure torque following a failure in one test, then all tests shall be completed using that torque setting.

Screw type closures shall be tightened to an appropriate torque before conditioning, or when specified during or after the conditioning period. The closure torque shall be recorded in the test report.

Where vented closures are intended for use in the packaging they shall be fitted for drop and stacking tests. Packagings fitted with vented closures shall after closing be inverted or laid on their side (see Figure 1) and observed for leakage for a period of 5 min. Leakage from the closure vent shall be regarded as a failure.



Key

1 Liquid level

2 Closure

Figure 1 — Packagings fitted with vented closure, laid on their side