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Packaging — Transport packages for dangerous goods — Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings — Guidelines for the application of ISO 9001

Emballage — Emballage de transport pour marchandises dangereuses — Emballage pour marchandises dangereuses, grands récipients vrac (GRV) et grands emballages — Directives pour l'application de l'ISO 9001

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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 16106 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 261, *Packaging*, in collaboration with 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 accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

This International Standard gives guidance for the application of the ISO 9000 quality management system to the manufacture, measuring and monitoring of design type approved dangerous goods packagings, Intermediate Bulk Containers (IBCs) and large packagings.

The United Nations Recommendations on the Transport of Dangerous Goods [1] (referred to in this International Standard as the UN Model Regulations) require the application of a quality assurance programme for the manufacture and testing of packagings, IBCs and large packagings that satisfies the competent authority in order to ensure that each manufactured packaging, IBC and large packaging meets the requirements.

The UN Model Regulations are given legal entity by the provision of a series of international modal agreements and national legislation for the transport of dangerous goods. These international agreements include

— the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) [2];

— the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) [3];

— the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air [4];

— the International Maritime Dangerous Goods Code (IMDG) [5].

The application of this International Standard will need to take into account the requirements of these international agreements and the national legislation for the transport of dangerous goods.

Compliance with this International Standard does not replace the agreement of competent authorities with quality assurance programmes. In conjunction with ISO 9001, this International Standard specifies a system for applying quality processes and assurance to the production of dangerous goods packagings, IBCs and large packagings.

The change in terminology in the ISO 9000 series from "quality assurance programmes" (1987 edition), over "quality systems" (1994 edition) to "quality management systems" (2000 edition), is not reflected in the UN Model Regulations and the international agreements referred to in the bibliography of this International Standard. The former term "quality assurance programme" is still used there. Furthermore, the term "testing", which was used in the 1994 edition of the ISO 9000 series in the context of product inspection and testing has now been replaced by "measurement and monitoring" in the 2000 edition. For the purposes of this International Standard, the latest terminology is used in accordance with ISO 9000. This difference in terminology should not deter users from using this International Standard.

The reasons for establishing this International Standard in addition to the ISO 9000 series are as follows.

a) The wording of the requirements in 6.1.1.4, 6.5.1.6.1 and 6.6.1.2 of the UN Model Regulations is restricted to the bare need that a quality assurance programme be applied that satisfies the competent authority. This allows different interpretations.

b) Dangerous goods packagings, IBCs and large packagings are subject to legal requirements. The conformity of any manufactured item with the relevant legal provisions is based on the principle of official design type testing and approval, which requires that specific measures be applied in order to secure the conformity of any of the unlimited number of items with the requirements of an approved design. Quality assurance can help standardize these specific measures.

c) In view of the cost implications of quality assurance/quality management measures, complete freedom of interpretation could have an avoidable negative impact on competition.

d) The establishment of quality assurance/quality management measures is, particularly for smaller companies, a large undertaking and calls for further guidance.

e) Interactions between companies and competent authorities on the adequacy of quality assurance/quality management programmes need to be rationalized to minimize unnecessary effort.

This International Standard is based on Revision 14 of the UN Model Regulations.

Clause referencing in this International Standard corresponds to ISO 9001:2000, with the exception of the annexes.

Packaging — Transport packages for dangerous goods — Dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings — Guidelines for the application of ISO 9001

1 Scope

This International Standard gives guidance on quality management provisions applicable to the manufacture, measuring and monitoring of design type approved dangerous goods packagings, intermediate bulk containers (IBCs) and large packagings.

This International Standard can only be used in combination with ISO 9001:2000 and is not a stand-alone document.

It does not apply to design type testing, for which reference is made to 6.1.5, 6.5.4 and 6.6.5 of the UN Model Regulations [1].

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 9000, *Quality management systems — Fundamentals and vocabulary*

ISO 9001:2000, *Quality management systems — Requirements*

ISO/IEC 17050-2, *Conformity assessment — Supplier's declaration of conformity — Part 2: Supporting documentation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9000 and the following apply.

3.1
competent authority
any national regulatory body or authority designated, or otherwise recognized as such, for any purpose in connection with the international agreements referred to in the bibliography of ISO 16106:2006

3.2
design type approved packaging, IBC or large packaging
dangerous goods packaging that has been tested and approved in accordance with chapters 6.1.5, 6.5.4 and 6.6.5 of the UN Model Regulations, the modal agreements listed in the bibliography of ISO 16106:2006 or with national regulations

4 Quality management system

The management system requirements of ISO 9001:2000, Clause 4 apply.

Documentation specified in ISO 9001:2000, 4.2.4 should be kept during the assumed lifetime of packagings, IBCs and large packagings or for five years, whichever is longer.

5 Management responsibility

The management system requirements of ISO 9001:2000, Clause 5 apply.

NOTE Documentation can be subject to audit by the competent authority.

6 Resource management

The management system requirements of ISO 9001:2000, Clause 6 apply.

7 Product realization

7.1 Planning of product realization

The management system requirements of ISO 9001:2000, 7.1 apply.

The product specifications for packaging and IBCs should conform to Annex A and Annex B.

NOTE Annex A and Annex B are extracted from ISO 16104:2003, Annex G and ISO 16467:2003, Annex C, respectively.

7.2 Customer-related processes

The management system requirements of ISO 9001:2000, 7.2 apply.

7.3 Design and development

The management system requirements of ISO 9001:2000, 7.3 apply.

For the design validation process, specified in ISO 9001:2000, 7.3.6, reference should be made to the official design validation process (design type testing and approval procedure) which is completed by the allocation of the UN marking, as required in 6.1.3, 6.5.2 and 6.6.3 of the UN Model Regulations.

7.4 Purchasing

The management system requirements of ISO 9001:2000, 7.4 apply.

Purchased products should conform to customer requirements and the approved design type specification. Verification of conformity by certificates of conformity in accordance with ISO/IEC 17050-2 or any other documentation providing the same level of confidence, or, where those are not provided with the delivery, by tests, should be based on the criteria given in C.1.

The conformity of components with the approved design type specification should be verified in accordance with the minimum specification data given in Annex A and Annex B.

7.5 Production and service provision

7.5.1 Control of production and service provision

The management system requirements of ISO 9001:2000, 7.5.1 apply.

After any change in process parameters, visual inspection should be carried out to ensure that the changes do not impair or change the specified design type criteria.

NOTE Changes in process parameters can change the design characteristics and require retesting in accordance with 6.1.5, 6.5.4 and 6.6.5 of the UN Model Regulations.

7.5.2 Validation of processes for production and service provision

Manufacturing processes should be validated using the control parameters given in C.2.

The design type test and approval procedure is also required as validation of the manufacturing process and the equipment, personnel and procedures involved.

7.5.3 Identification and traceability

The management system requirements of ISO 9001:2000, 7.5.3 apply

7.5.4 Customer property

The management system requirements of ISO 9001:2000, 7.5.4 apply

7.5.5 Preservation of product

The management system requirements of ISO 9001:2000, 7.5.5 apply

7.6 Control of monitoring and measuring devices

The management system requirements of ISO 9001:2000, 7.6 apply.

8 Measurement, analysis and improvement

8.1 General

The management system requirements of ISO 9001:2000, 8.1 apply.

8.2 Monitoring and measurement

The management system requirements ISO 9001:2000, 8.2 apply.

Monitoring of production should be based on visual or computer-aided automated monitoring of the manufacturing process to identify any need for adjustment to the function of machines and installations.

At initial production, first samples should be checked for conformity with the design type specifications as described in Annex A and Annex B. Where applicable, conformity of the following should be verified:

— dimensions;

— masses;

— quality of openings;

— quality of seams.

Monitoring and measurement of the manufactured packagings, IBCs and large packagings should include (as a minimum) the items/elements given in C.3.

Conformity with the approved performance levels of packaging, IBC and large packaging design types should be verified periodically as specified in a test plan or procedure (including frequency and acceptance limits) to confirm the continuing ability of the manufacturing process to satisfy its intended purpose.

NOTE 1 See 6.1.5, 6.5.4 and 6.6.5 of the UN Model Regulations for the relevant regulatory requirements.

NOTE 2 See Annex D for examples of typical frequencies for the verification of conformity.

Performance test conditions should be specified. For the execution of the performance tests listed in C.4 and C.5, the design type performance test requirements should be met.

NOTE 3 For the purpose of production monitoring, the test conditions may differ from the design type test requirements and may be restricted to comparisons with previous test results.

NOTE 4 The monitoring and measurement of product can also be used to demonstrate compliance with 6.1.5.1.3, 6.5.1.6.7 and 6.6.5.1.3 of the UN Model Regulations. For this purpose, performance tests at random may be performed on production samples at intervals agreed with the competent authority.

8.3 Control of nonconforming product

The management system requirements of ISO 9001:2000, 8.3 apply.

If controls have previously shown nonconformities during production, appropriate measures, such as final inspection of the complete lot, or performance testing at a higher frequency, should be carried out in context with corrective/preventive actions.

NOTE Corrective actions can be subject to the agreement of the competent authority.

8.4 Analyses of data

The management system requirements of ISO 9001:2000, 8.4 apply.

8.5 Improvement

The management system requirements of ISO 9001:2000, 8.5 apply.

NOTE In order to achieve conformity with the approved design type specifications, the procedures for corrective action may require agreement with the competent authority.

Annex A
(normative)

Packaging specifications

NOTE This annex is a modified extract of ISO 16104:2003, Annex G.

A.1 Specification data

Tables A.1.1, A.1.2, A.2.1, A.2.2, A.3.1, A.3.2, A.4, A.5.1 and A.5.2 correlate the different packaging types with data, which are necessary for the identification of test packagings by users, test facilities and competent authorities.

Specification data in this annex are grouped for the following five categories of packagings:

1) drums, jerricans, bottles, jars, etc. — Tables A.1.1 and A.1.2;

2) boxes — Tables A.2.1 and A.2.2;

3) bags — Tables A.3.1 and A.3.2;

4) inner receptacles of composite packagings — Table A.4;

5) inner packagings of combination packagings — Tables A.5.1 and A.5.2.

Tables A.1.1, A.2.1, A.3.1 and A.5.1 apply to all packagings in that category. Tables A.1.2, A.2.2, A.3.2 and A.5.2 apply only to particular packaging types when indicated by an “S”.

Each item in the tables is numbered and at the end of this annex there are explanatory notes for many of the numbers to assist in interpretation.

Table A.1.1 — Drums, jerricans, bottles, jars, etc.: packaging specification detail applicable to all

No.		No.	
1	Packaging description (code and trade name)	17	Closure(s), [or neck(s)] position(s)
2	Manufacturer's name and address	18	Closure(s), material(s) and grade
3	Method of construction	19	Closure(s), type, identification
4	Nominal capacity	20	Closure(s), thread, type and pitch
5	Brimful capacity	21	Closure(s) mass
6	Diameter, nominal (cylindrical) internal	22	Closure manufacturer's name and address
7	Diameter, external at widest point	23	Closure torque(s)
8	Nominal diameters (conical, i.e. pails)	24	Type of overseal
9	Body/section dimensions (non-round)	25	Closure(s) seal, material
10	Recess of ends	26	Neck internal diameter
11	Height overall	27	Height to neck face
12	Stacking height	28	Neck height (external)
13	End seams type	29	Neck thread, type and pitch
14	Side seam type	30	Neck thread number of starts
15	Handles: material type, number and position	31	Tare mass
16	Closure(s), diameter(s) and design		
NOTE See A.2.			

Table A.1.2 — Drums, jerricans, bottles, jars, etc.: packaging specification detail applicable as indicated

No.		Non-removable head metal	Removable head metal	Non-removable head plastics	Removable head plastics	Fibreboard	Plywood	Glass and other materials
32	Nominal thickness and material type and grade, head or lid	S	S			S	S	S
33	Nominal thickness and material type and grade, body	S	S			S	S	S
34	Nominal thickness and material type and grade, base	S	S		S	S	S	
35	Material type and grade (polymer), body			S	S			
36	Material type and grade (polymer), base			S	S			
37	Material type and grade (polymer), lid/head			S	S	S		S
38	Material lid gasket		S		S	S	S	S
39	Body corrugations, number	S	S					
40	Body corrugation, heights	S	S					
41	Rolling hoops: number, height and location	S	S	S	S	S	S	
42	Closing ring type		S		S	S	S	
43	Closing ring material		S		S	S	S	
44	Thickness closing ring		S		S	S	S	
45	Number of plies (body)					S		
46	Grammage per ply body, and combined					S		
47	Inner lining or coating material					S		
48	Chime reinforcement	S	S			S	S	
49	Method of lid retention (other than closing ring)		S		S	S	S	S
50	Mass body			S	S			S

NOTE See A.2.

Table A.2.1 — Boxes packaging specification detail: applicable to all

No.	
1	Packaging description (code and trade name)
2	Manufacturer's name and address
3	Method of construction
9	Dimension, internal (l × b × h)
12	Stacking height
15	Handles: material type, number and position
31	Tare mass
51	Design standard, drawing, or style
52	Dimension, external (l × b × h)
53	Closures: number, type, position and materials
54	Reinforcements: type, position and materials
NOTE See A.2.	

Table A.2.2 — Boxes packaging specification detail: applicable as indicated

No.		Metal	Natural wood	Plywood and reconstituted wood	Fibreboard	Expanded plastics	Plastics
32	Nominal thickness and material type and grade, head or lid	S	S	S	S	S	
33	Nominal thickness and material type and grade, side walls	S	S	S	S	S	
34	Nominal thickness and material type and grade, base	S	S	S	S	S	
35	Material type and grade (polymer), body						S
36	Material type and grade (polymer), base						S
37	Material type and grade (polymer), lid						S
38	Material lid gasket	S				S	S
55	Material ends			S	S		
56	Method of joining panels		S	S			
57	Manufacturer's join body				S		
58	Grammage by paper and paper type				S		
59	Corrugated flute type				S		
60	Corrugated combined grammage				S		
61	Corrugated edge crush				S		
62	Burst strength				S		
63	Density					S	
64	Top flap inner gap or meet				S		
65	Top flap outer meet or overlap				S		
66	Bottom flap inner gap or meet				S		
67	Bottom flap outer meet or overlap				S		
91	Puncture				S		

NOTE See A.2.

Table A.3.1 — Bags packaging specification detail: applicable to all

No.	
1	Packaging description (code and trade name)
2	Manufacturer's name and address
3	Method of construction
4	Nominal capacity
51	Design standard or drawing
52	Dimensions, flat unopened
68	Style
69	Gusset, open width
70	Bottom width, flat unopened
71	Valve width
73	Closure method (top, base, side)
74	Perforations
75	Sewing, style and density of stitches
76	Type of thread and minimum breaking load
77	Filter cord
78	Adhesive, type
NOTE	See A.2.

Table A.3.2 — Bags packaging specification detail: applicable as indicated

No.		Unlined/uncoated woven plastics	Other woven plastics	Plastics film	Unlined/uncoated textile	Other textile	Paper
32	Material type and grade	S	S		S	S	S
33	Nominal thickness, material type and grade			S			
35	Type of film grade			S			
45	Number of plies						S
46	Grammage of plies	S	S				S
79	Fabric (warp/weft), tapes per 100 mm	S	S		S	S	
82	Coating: material, thickness/weight		S			S	S
83	Liner: material, thickness		S			S	S
84	Material strength, elongation	S	S	S			
85	Material strength, tensile (energy absorption)						S
NOTE See A.2.							

Table A.4 — Inner receptacles of composites packaging specification detail: applicable to all

No.	
1a	Description
2	Manufacturer's name and address
4	Nominal capacity
5	Brimful capacity
30	Material type and grade
31	Tare mass
32	Nominal thickness, body
33	Nominal thickness, base
34	Nominal thickness, head
86	Assembler of complete container
NOTE See A.2.	

Table A.5.1 — Inner packaging of combination packaging specification detail: removable fittings

No.	
1	Description
31	Tare mass
30	Material type (and grade)
32	Nominal thickness
51	Design standard or drawing
52	Dimensions
58	Grammage by paper and paper type
60	Corrugated combined grammage
87	Quantity or number
90	Orientation and arrangement of inner packagings
NOTE	See A.2.

Table A.5.2 — Inner packaging of combination packaging specification detail: permanent fittings

No.	
1	Description
30	Material type and grade
51	Design standard or drawing
87	Number
88	Location(s)
89	Means of fixing to packaging
NOTE	See A.2.

A.2 Notes to packaging specification detail applicable to tables in A.1

1. Packaging description, i.e. steel drum, code where appropriate, e.g. 1A1 (see 6.1.2.7 of the UN Model Regulations) and trade name.

2. Name and address of manufacturer of packaging or appropriate component.

3. Method of construction, i.e. welded, glued and stitched, nailed.

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

5. Brimful 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.

8. Smallest and largest for conical shaped packagings.

9. For non-circular packagings.

10. Usually found on drums.
11. From ground to highest point; however, the dimension may be less than that specified in the test report.
12. Adjusted height to allow for any interlocking features of packaging; may also include battens on boxes.
13. Where applicable.
14. Where applicable.
15. Also indicate if an optional extra.
16. Required for each closure and variant.
17. Position on drum.
18. Required for each one and variant, including plastics polymer details.
19. May include trade name and any features or marks on closure.
21. Mass of individual closure with gasket/wad.
22. For each closure.
23. For each closure.
24. If fitted.
25. Gasket details.
31. Mass of container and closures and associated fittings.
32. All materials other than plastics.
33. All materials other than plastics.
34. All materials other than plastics.
35. Plastics materials only.
36. Plastics materials only.
37. Plastics materials only.
38. When lid or head fitted with gasket, washer or seal.
46. Combined grammage will include an allowance for the glues between the paper plies.
49. To allow for large screw caps, pillbox lids, etc.
50. Particularly plastics.
51. Include FEFCO/ESBO code for fibreboard boxes if applicable.
53. This is to include taping patterns and any additional means of closing such as straps.
54. Battens, corner posts, etc.
68. Valved, gusseted, etc. Some of this may be covered by 1.
86. This may not be the same as any of the manufacturers of the parts of a composite packaging.

Annex B
(normative)

IBC specifications

NOTE 1 This annex is a modified extract of ISO 16467:2003, Annex C.

NOTE 2 In many instances specifications may be in the form of dimensioned drawings rather than as text.

NOTE 3 For flexible IBC (FIBC), a sample of the body material is usually cut-out, labelled or otherwise identified and retained as part of the specification.

B.1 Specification data

Tables B.1.1, B.1.2, B.2.1 and B.2.2 correlate the different types of IBCs with data which are necessary for the identification of IBCs for users, test facilities and competent authorities.

Tables B.1.1 and B.1.2 relate to all IBC types, except FIBCs. Table B.1.1 applies to all IBC types in that group; Table B.1.2 is applicable only to particular IBC types when indicated by an “S”.

Tables B.2.1 and B.2.2 list items that apply to FIBCs. Table B.2.1 gives general data for FIBCs; Table B.2.2 gives additional data, applicable for particular types of wall material when indicated by an “S”.

Each item in the tables is numbered and at the end of this annex there are explanatory notes for many of the numbers to assist in interpretation.

Table B.1.1 — Metal IBCs, rigid plastics IBCs, composite IBCs with rigid receptacles, wooden and fibreboard IBCs: IBC specification detail applicable to all

No.		No.	
1	IBC description (code and trade name)	22	Filling aperture closure: manufacturer, address and identity/part number
2	Manufacturers' names and addresses	23	Filling closure, closure torque
3	Method(s) of construction	16	Discharge aperture(s), internal diameter and design
4	Nominal capacity	17	Discharge aperture(s), position
5	Brimful capacity	18	Discharge aperture closure, material and grade
6	Diameter, nominal (cylindrical) internal	19	Discharge aperture closure, type and identification
92	Diameter, external (at widest point) of receptacle	20	Discharge aperture closure, thread type and pitch
93	Diameters, external conical type receptacles	21	Discharge aperture closure, mass
94	Cross section dimensions (non-round receptacles)	22	Discharge aperture closure: manufacturer, address and identity/part number
9	Overall cross section (non-round)	16	Pressure relief fittings, internal diameter and design
95	Position and types of seam in receptacle	17	Pressure relief fittings, position
96	Number of top lift points	18	Pressure relief fittings, material and grade
97	Number of bottom lift points or access directions	20	Pressure relief fittings, thread type and pitch
11	Overall height	21	Pressure relief fittings, mass
12	Number to be stacked on top during transport	22	Pressure relief fittings: manufacturer and manufacturer's identity/part number
16	Filling aperture(s), internal diameter and design	98	Other fittings in body of receptacle: type, number, location and identity
17	Filling aperture(s), position	31	Tare mass
18	Filling aperture, material and grade	99	Details of any liner: material type, thickness, grammage, tare mass
19	Filling aperture, closure type and identification	100	Details of any coatings: material type, grammage
20	Filling aperture, closure thread type and pitch	101	Type of base, material and means of attachment (where appropriate)
21	Filling aperture, closure mass	102	Compliance to drawings
NOTE See B.2.			

Table B.1.2 — Metal IBCs, rigid plastics IBCs, wooden and fibreboard IBCs: IBC specification detail applicable as indicated

No.		Metal IBCs	Plastics IBCs	Natural-wood (wooden) IBCs	Plywood IBCs	Reconstituted-wood IBCs	Fibreboard IBCs
32	Nominal thickness and material type and grade, head or lid	S		S	S	S	S
33	Nominal thickness and material type and grade, body	S		S	S	S	S
34	Nominal thickness and material type and grade, base	S		S	S	S	S
35	Material type and grade (polymer), body		S				
36	Material type and grade (polymer), base		S				
37	Material type and grade (polymer), lid/head		S				
38	Material lid gasket	S	S	S	S	S	S
42	Closing ring type	S	S	S	S	S	S
43	Closing ring material	S	S	S	S	S	S
44	Closing ring thickness	S	S	S	S	S	S
45	Number of plies				S		S
46	Grammage of material					S	S
47	Inner lining or coating material			S	S	S	S
49	Method of lid retention (other than closing ring)	S	S	S	S	S	S
53	Fastening system: number, position and material			S	S	S	S
54	Reinforcements: type, position, material			S	S	S	S
56	Method of joining panels			S	S	S	
59	Corrugated flute type						S
60	Corrugated combined grammage						S
61	Edge compression test (ECT)						S
62	Burst strength						S
91	Puncture resistance						S

NOTE See B.2.

Table B.2.1 — Flexible IBCs: IBC specification detail applicable to all

No.		No.	
1	IBC description (code and trade name)	19	Filling aperture closure type
2	Manufacturer's name and address	16	Discharge aperture, internal diameter and design
3	Method of construction	17	Discharge aperture position
4	Nominal capacity	18	Discharge aperture closure material and grammage
12	Stacking capability, number	19	Discharge aperture closure type
15	Top lift devices: number, material, position	75	Sewing: style and density of stitches
31	Tare mass	76	Type of thread and minimum breaking load
51	Design standard or drawing	77	Filter cord
52	Dimensions of the empty IBC	78	Adhesive, type
16	Filling aperture internal diameter and design	103	Statement of compliance to appropriate UN design type
17	Filling aperture position	104	Seams, type
18	Filling aperture closure material and grammage		
NOTE See B.2.			

Table B.2.2 — Flexible IBCs: IBC specification detail applicable as indicated

No.		Unlined/uncoated woven plastics	Other woven plastics	Plastics film	Unlined/uncoated textile	Other textile	Paper
32	Material type and grade	S	S		S	S	S
33	Nominal thickness, material type and grade			S			
35	Type of film grade			S			
45	Number of plies						S
46	Grammage of material	S	S				S
79	Fabric (warp/weft), tapes per 100 mm	S	S		S	S	
82	Coating: material, thickness/weight		S			S	S
83	Liner: material, thickness		S			S	S
84	Material strength, elongation	S	S	S			
85	Material strength, tensile (energy absorption)						S
NOTE See B.2.							

B.2 Notes to IBC specification detail applicable to tables in B.1

1. IBC description, i.e. metal IBC made of steel for liquids, code where appropriate e.g. 31A (see 6.5.1.4.3 of the UN Model Regulations) and trade name.

2. Name and address of manufacturer of IBC and major components if different.

3. Method of construction of receptacle and framework (where appropriate), i.e. welded, glued, stitched, nailed.

4. Volume declared by the manufacturer (smaller than brimful capacity).

5. 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.

6. If cylindrical: internal diameter; if conical: 2 internal diameters; if angular: length × breadth.

8. Conical shaped IBCs: smallest and largest external diameter.

11. From ground to highest point (including framework and fittings, if existing).

12. Number to be stacked on top during transport.

15. Notice: fibreboard or wooden IBCs shall not incorporate top lifting devices.

16. Required for each closure and variant.

18. Required for each one and variant, including plastics polymer details.

19. May include trade name and any features or marks on closure.

20. If fitted.

21. Mass of individual closure with gasket/wad.

22. For each closure.

23. For each closure.

Annex C
(normative)

Items and elements of verification, controls, monitoring and validation

NOTE 1 Tables C.1 to C.4 cover the materials, packagings, IBCs and large packagings most commonly in use. For other items, adequate controls may need to be agreed with the competent authority.

NOTE 2 This annex is only partially applicable for product specifications of large packagings.

C.1 Minimum conformity verification of materials

Materials obtained as purchased product should be verified for conformity with the design type specification according to the minimum criteria given in Table C.1, as relevant. Where raw material is concerned, verification should take type, grade or agreed specification into account.

Table C.1 — Minimum conformity of material

Material	Criteria
Metal	Thickness, linear dimensions Tensile strength and elongation Hardness
Paper (for bags)	Basis weight Tensile strength and elongation Tensile energy absorption
Plastics, granular/powder	Melt flow rate Density
Fibreboard, corrugated	Basis weight Bursting strength Puncture test Edgecrush test Cobb-Test
Fibreboard, solid	Thickness Basis weight Bursting strength and/or Puncture test Cobb-Test
Plastics film	Thickness or basis weight Melt flow rate Tensile strength and elongation
Woven fabric	Basis weight Number of warps and wefts per area Breaking strength and elongation
Wood, natural/ reconstituted	Basis weight Humidity Thickness
Plywood	Thickness Number of plies Basis weight

C.2 Monitoring elements of manufacturing processes

The elements as shown in Table C.2 should, as a minimum, be monitored during production.

Table C.2 — Monitoring elements of manufacturing processes

Type of packaging, IBC and large packaging	Parameter
Metal packagings, IBCs and large packagings	Folding (seams) Welding Soldering Application of sealing material Mounting of gaskets/closures
Paper/fibreboard: packagings, IBCs and large packagings	Gluing Taping Creasing/folding Joining
Bags, FIBCs and flexible large packagings	Sewing Gluing Assembly of filling/emptying/lifting devices
Plastics packagings, rigid plastics IBCs and large packagings	Tare mass Mounting of gaskets/closures
Composite packagings and IBCs	Combination of the above items, as appropriate Assembly of components

C.3 Measurement items/elements for the manufacture of packagings, IBCs and large packagings

The items/elements as shown in Table C.3 should, as a minimum, be measured or visually controlled during production.

Table C.3 — Measurement items/elements

Type of packaging/IBC/large packaging	Item/element
Metal packagings, IBCs and large packagings	Dimensions Tare mass Surface treatment Proper installation of gaskets/sealing/closures
Fibre drums	Dimensions Tare mass
Plastics packagings, rigid plastics IBCs and large packagings, plastic inners of composite IBCs	Dimensions, wall thickness distribution Tare mass Proper installation of gaskets/closures
Boxes (non-paper, non-fibreboard, non-metal), wooden IBCs and large packagings	Outer dimensions Correct assembly (e.g. nailing pattern) Mounting of closures Surface treatment/liners
Fibreboard boxes, IBCs and large packagings	Dimensions Appearance of creases, cuttlings and joints
Bags, FIBCs and flexible large packagings	Dimensions Appearance of seams and joints

Outer packagings of combination/composite packagings and outer casings of composite IBCs should be controlled as relevant with respect to their material in analogy with the types of packagings, IBCs and large packagings mentioned in Table C.3. The same applies to inner packagings/receptacles.

Verification of correctness and legibility of the UN marking and verification of the specification check data as defined in Annex A and Annex B should be applicable to all types of packagings, IBCs and large packagings.

C.4 Performance validation of completed packagings and IBCs designed to carry liquids

Performance validation should be performed periodically in accordance with Table C.4 and Table C.5, as relevant, and as specified in test plans, which may be agreed with the competent authority.

Verification of correctness and legibility of the UN marking, and verification of the specification check data as defined in Annex A and Annex B should be applicable to all types of packagings and IBCs.

Table C.4 — Performance validation of completed packagings and IBCs to carry liquids

Type of packaging/IBC	Performance verification
Metal jerricans and drums	Drop test Leakproofness test Hydraulic pressure test
Plastics jerricans and drums	Drop testing (–18 °C) Leakproofness test Hydraulic pressure test Dynamic compression test
Composite packagings, type 6HA1 [a]	Drop testing (–18 °C) Leakproofness test Hydraulic pressure test
Composite packagings, type 6HH1 [a]	Drop testing (–18 °C) Leakproofness test Hydraulic pressure test Dynamic compression test
Composite packagings, types 6HG1 and 6HG2 [a]	Drop testing (–18 °C) Leakproofness test Hydraulic pressure test Compression or stacking test
Metal IBCs	Conformity check with design type specification Leakproofness test Hydraulic pressure test Non-destructive testing (e.g. dye penetrant) of the welds Function test of service equipment (if assembled with the manufacturer)
Plastics and composite IBCs	Conformity check with design type specification Leakproofness test Hydraulic pressure test Function test of service equipment (if assembled with the manufacturer)
The leakproofness test should be an obligatory part of the performance validation for every manufactured item.	
[a] For types of composite packagings, see Table A.2 of ISO 16104:2003.	

C.5 Performance validation of completed packagings and large packagings for solids/articles and IBCs for solids

Performance tests should be performed periodically in accordance with Table C.5 as relevant, and as specified in test plans, which may be agreed with the competent authority.

Verification of correctness and legibility of the UN marking and verification of the specification check data as defined in Annex A and Annex B should be applicable to all types of packagings and IBCs.

Table C.5 — Performance validation of completed packagings and large packagings for solids/articles and IBCs for solids

Type of packaging/IBC/large packaging	Performance verification
Metal jerricans and drums	Drop test
Plastics jerricans and drums	Drop testing (–18 °C) Dynamic compression test
Fibre drums	Drop test Stacking or compression test
Combination packagings	To be tested as relevant with respect to the material of their outer packaging in analogy with the other types of packagings mentioned in the table
Boxes, all materials	Drop test Compression or stacking test
Bags, all materials	Drop test
Metal IBCs and large packagings	Conformity check with design type specification Non-destructive testing (e.g. dye penetrant) of the welds Function test of service equipment (if relevant and if assembled with the manufacturer)
Plastics and composite IBCs and plastics large packagings	Conformity check with design type specification Function test of service equipment (if relevant and if assembled with the manufacturer)
Fibreboard and wooden IBCs and large packagings	Conformity check with design type specification Drop test Stacking test
FIBCs and flexible large packagings	Drop test Top lift test
For combination packagings with inner plastics packagings, the temperature of the test sample should be reduced to –18 °C or lower.	
NOTE Packagings and IBCs discharged under pressure may require additional pressure and leak testing.	

Annex D
(informative)

Typical frequencies for the verification of conformity with design and performance requirements

NOTE 1 The frequencies indicated in Table D.1 to Table D.3 are considered typical for mass production of packagings and IBCs. They may be used for the establishment of test plans, as mentioned in 8.2 and may be agreed with the competent authority. The frequency will depend on the type and volume of the packaging as well as on the processes and equipment used for its production. Alternative frequencies may be used, especially for smaller lots. In any case, the items/elements may, at least, be monitored once per lot.

NOTE 2 Due to the limited experience with quality assurance measures for the production of large packagings, this annex does not include typical frequencies for large packagings.

Table D.1 — Typical frequencies for verification items/elements during production

Type of packaging/IBC	Item/element	Frequencies
Metal packagings	Dimensions	Once per 1 000 units [a]
	Tare mass	"
	Surface treatment	"
	Proper installation of gaskets/sealing/closures	"
Fibre drums	Dimensions	Once per 1 000 units
	Tare mass	"
Plastics packagings	Dimensions, wall thickness distribution	Once per shift
	Tare mass	Twice per shift
	Proper installation of gaskets/sealing/closures	"
Boxes (non-paper, non-fibreboard, non-metal)	Dimensions	Once per 500 units
	Correct assembly	"
	Mounting of closures	"
	Surface treatment/liners	"
Fibreboard boxes	Dimensions	Once per 10 000 units
	Appearance of beads (creases) and joints	"
Bags	Dimensions	Twice per shift
	Appearance of seams and joints	"
Metal IBCs	Dimensions	Once per shift
	Tare mass	"
	Surface treatment	"
	Proper installation of gaskets/sealing/closures	"
Plastics IBCs and plastic inners of composite IBCs	Dimensions, wall thickness distribution	Once per shift
	Appearance of seams	Twice per shift
	Tare mass	"

Table D.1 (*continued*)

Wooden IBCs	Dimensions	Once per 250 units
	Correct assembly (e.g. nailing pattern)	"
	Mounting of closures	"
	Surface treatment/liners	"
Fibreboard IBCs	Dimensions	Once per lot
	Appearance of beads (creases) and joints	"
FIBCs	Dimensions	Once per 250 units
	Appearance of seams and joints	"

[a] For light gauge metal packagings with a capacity of more than 10 l, a frequency of once per 5 000 units should be acceptable.

The correctness and legibility of UN marking is verified for all types of packagings and IBCs during production at adequate intervals, relevant to the technique of marking.

Table D.2 — Typical frequencies for the performance validation of completed packagings and IBCs designed to carry liquids

Type of packaging/IBC	Performance verification	Frequencies
Metal jerricans and drums	Drop test	Once per month
	Leakproofness test	Every unit
	Hydraulic pressure test	Once per month
Plastics jerricans and drums	Drop testing (–18 °C)	Once per month
	Leakproofness test	Every unit
	Hydraulic pressure test	Once per month
	Dynamic compression test	Once per week
Metal IBCs	Leakproofness test	Every unit
	Hydraulic pressure test	Once per month
	Non-destructive testing (e.g. dye penetrant) of the welds	Once per 100 units
Plastics and composite IBCs	Leakproofness test	Every unit
	Hydraulic pressure test	Once every 3 months

Table D.3 — Typical frequencies for the performance validation of completed packagings for solids/articles and IBCs for solids

Type of packaging/IBC	Performance verification	Frequencies
Metal drums	Drop test	Once per month
Plastics drums	Drop test (–18 °C)	Once per month
	Dynamic compression test	Once per week
Boxes, fibreboard	Drop test	3 units per lot
	Compression or stacking test	5 units per lot
Bags	Drop test	3 units per lot
Metal IBCs	Non-destructive testing (e.g. dye penetrant) of the welds	Once per week
	Function test of service equipment (if assembled with the manufacturer)	Every unit
Plastics and composite IBCs	Drop test	Once every 3 months or, at least, once per 1 000 units
	Function test of service equipment (if assembled with the manufacturer)	Every unit
Fibreboard and wooden IBCs	Drop test	Once every 3 months
	Stacking test	“
FIBCs	Drop test	Once per 1 000 units
	Top lift test	Once every 3 months or, at least, once per 1 000 units

Bibliography

[1] United Nations Recommendations on the Transport of Dangerous Goods — Model Regulations. ST/SG/A.C. 10/1/Rev.14. Geneva: United Nations, 2005

NOTE These recommendations have been developed by the United Nations Committee of experts on the transport of dangerous goods, 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 recommendations cover

— principles of classification;

— 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 specific classes of goods (in particular, explosives).

Each of the following regulations [2]–[5] is revised regularly and the latest edition should be used. Test facilities should be in possession of at least one of the documents or, alternatively, the respective national legislation which includes the relevant UN provisions.

[2] European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). Geneva: United Nations

[3] Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID). Berne: Organisation intergouvernementale pour les transports ferroviaires (OTIF)

[4] International Maritime Dangerous Goods Code (IMDG). London: International Maritime Organisation

[5] Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TI),. Montreal: International Civil Aviation Organization

[6] ISO 16104:2003, *Packaging — Transport packaging for dangerous goods — Test methods*

[7] ISO 16467:2003, *Packaging — Transport packages for dangerous goods — Test methods for IBCs*

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