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CAN/CGSB-43.146-2022

Supersedes CAN/CGSB-43.146-2016

Design, manufacture and use of intermediate bulk containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8 and 9

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NATIONAL STANDARD OF CANADA **CAN/CGSB-43.146-2022**

Supersedes CAN/CGSB-43.146-2016

Design, manufacture and use of intermediate bulk containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8 and 9

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE.

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Translation of this National Standard of Canada was conducted by the Government of Canada.

Preface

This National Standard of Canada CAN/CGSB-43.146-2022 supersedes the 2016 edition published in April 2016.

Changes since the previous edition

- Alignment with the 21st edition of the United Nations Recommendations on the *Transport of Dangerous Goods Model Regulations* (Orange Book).

- Updates related to the routine maintenance and repair of IBCs including:

  - Definition added for routine maintenance of IBCs (i.e. refurbishing);

  - Section added addressing damaged or defective IBCs and the routine maintenance and repair of damaged or defective IBCs (12.9) and requirement to successfully leak test a repaired IBC (C.6.4).

- Updates to IBC design, testing and marking requirements, including:

  - Updates to compliance markings including, requirement added to include the packing group marking (for which the design type has been tested) to the inner receptacle of composite IBCs [5.3.6 a) 2)];

  - Update to Table 3 representing minimal wall thickness of metal IBCs (6.16 b) 2) – Table 3);

  - Guidance added with respect to amount of emergency venting capacity required for metal IBCs (6.1.7.1 and Annex E);

  - Distinction added for modifications to an IBC, for a manufacturer to submit revised description of the modified IBC to the Director for review (8.1);

  - Definition added for protected IBCs (e.g. double wall);

  - Requirement clarified for leakproofness test of double wall IBC, that air pressure shall be maintained in the primary containment when secondary containment is leak tested (7.6.4).

- Updates to requirements on the use of plastic material, including:

  - Definition added for production plastic material (e.g. regrind);

  - Clarification of recycled plastics requirement for flexible, rigid plastic and inner plastic receptacles of composite IBCs – recycled plastics specific properties to be documented under quality management system (6.2.4, 6.3.4, 6.4.5);

  - Clarification to recycled plastic resin and representative testing required for recycled plastic resin (7.1.5);

  - Expansion of the quality management system requirements to capture resin specification test results of recycled plastic material properties [10.3.2 c)].

- Clarifications to Annex C, and new requirement for owner of IBC to provide copy of notice to user to leak test and inspection facility upon request (C.2.1.3).

The following definitions apply in understanding how to implement this standard:

- "shall" indicates a **requirement**;
- "should" indicates a **recommendation**;
- "may" is used to indicate that something is **permitted**;
- "can" is used to indicate that something is **possible**, for example, that an organization is able to do something.

Notes accompanying clauses do not include requirements or alternative requirements. The purpose of a note accompanying a clause is to separate explanatory or informative material from the text. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

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Introduction

This is the fourth edition of CAN/CGSB-43.146, *Design, manufacture and use of intermediate bulk containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8 and 9*. It supersedes the previous edition published in 2016, *Design, manufacture and use of intermediate bulk containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8 and 9*.

This standard is intended for incorporation by reference into the *Transportation of Dangerous Goods Regulations* (TDG Regulations). Where there are differences between the requirements of the TDG Regulations and this standard, the TDG Regulations prevail, unless specified otherwise, to the extent of the difference.

This standard contains requirements for:

- Design and manufacture of UN standardized IBCs;
- Selection and use of IBC for the transportation of Classes 3, 4, 5, 6.1, 8 and 9 dangerous goods;
- Registration of IBC design types and manufacturing facilities;
- Packing instructions;
- Periodic leak test and inspection requirements; and
- Registration of leak test and inspection facilities.

It is also based on the Recommendations on the *Transport of Dangerous Goods, Model Regulations*, 21st revised edition, published by the United Nations (UN).

This standard also provides requirements for a quality management system.

Design, manufacture and use of intermediate bulk containers for the transportation of dangerous goods, Classes 3, 4, 5, 6.1, 8 and 9

1 Scope

1.1 Organization and content

This standard sets out requirements for designing, manufacturing and marking of Intermediate Bulk Containers (IBCs) and for selecting and using means of containment for the transportation of dangerous goods of Classes 3, 4, 5, 6.1, 8 and 9. This standard consists of two parts and five annexes.

Part I contains the requirements for the design, manufacture and marking of UN standardized IBCs.

Part II contains the requirements for the selection and use of means of containment for the transportation of dangerous goods of Classes 3, 4, 5, 6.1, 8 and 9.

Annex A sets out the minimum requirements for the completion of a UN standardized IBC design type report submitted to the Director.

Annex B, Part 1 contains a list of packing instruction numbers for dangerous goods.

Annex B, Part 2 contains the detailed packing instruction information.

Annex C contains the periodic leak test and inspection registration process and requirements.

Annex D contains a table that provides examples of maximum vapour pressures for liquid dangerous goods transported in specified IBC design types.

Annex E contains guidance for minimum venting capacity for metal IBCs used for transporting liquids.

Note: Requirements on the packaging, handling, offering for transport and transport of explosives (Class 1) may be found in CAN/CGSB-43.151.

1.2 Application

This standard applies to both standardized and non-standardized means of containment as defined in the TDG Regulations.

1.3 Minimum requirements

This standard sets out certain minimum requirements regarding the design, construction, qualification, selection and use and testing of means of containment. It is essential to exercise competent technical and engineering judgment in conjunction with this standard.

It is the responsibility of the IBC manufacturer to ensure that the IBC will safely carry out its intended function within these constraints.

1.4 *Transportation of Dangerous Goods Act* and *Regulations* prevalence

The *Transportation of Dangerous Goods Act* (TDG Act), *1992* and the *Transportation of Dangerous Goods Regulations* (TDG Regulations) may call for additional requirements regarding the design, construction, qualification, selection, use, and testing of means of containment. Where there is an inconsistency between the requirements of this standard and those of the TDG Act or TDG Regulations, the Act or Regulations prevail to the extent of the inconsistency.

It should be noted that this standard, by itself, does not have the force of law unless it is officially adopted by a regulatory authority. It is recommended to read the standard in conjunction with the TDG Regulations.

1.5 Safety

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any applicable regulatory requirements prior to its use.

1.6 Units

Quantities and dimensions used in this standard are given in metric units from the International System of Units (SI units).

Note: Both °B (indicating Baumé scale) and USC units (indicating United States customary units) are used in the standard. SI or metric units are not available for these measurements.

1.7 Classification

Dangerous goods are classified in accordance with Part 2 of the TDG Regulations and the appropriate UN number, shipping name and description, class, packing group/category, as applicable, are assigned.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

Note: The contact information provided below was valid at the date of publication of this standard.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this method. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 Canadian General Standards Board (CGSB)

CAN/CGSB-43.150 — *Design, manufacture and use of UN Standardized drums, jerricans, boxes, bags, combination packaging, composite packaging and other packagings for the transport of dangerous goods, classes 3, 4, 5, 6.1, 8, and 9*

CAN/CGSB-43.151 — *Packaging, handling, offering for transport and transport of Explosives (Class 1)*

2.1.1 Contact information

The above may be obtained from the Canadian General Standards Board. Telephone: 1-800-665-2472. E-mail: ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site: www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html.

2.2 Transport Canada

Transportation of Dangerous Goods Act, 1992 (including amendments)

Transportation of Dangerous Goods Regulations (including amendments)

2.2.1 Contact information

The above may be obtained from the Publications page of the Transport Canada Web site at www.tc.gc.ca/eng/publications-menu.htm.

2.3 ASTM International

ASTM D685-17 — *Standard Practice for Conditioning Paper and Paper Products for Testing*

ASTM D999-08(2015) — *Standard Test Methods for Vibration Testing of Shipping Containers*

ASTM D1415-18 — *Standard Test Method for Rubber Property – International Hardness*

ASTM D2240-15 — *Standard Test Method for Rubber Property – Durometer Hardness*

ASTM D4332-14 — *Standard Practice for Conditioning Containers, Packages or Packaging Components for Testing*

ASTM D7387-13 — *Standard Test Method for Vibration Testing of Intermediate Bulk Containers (IBCs) Used for Shipping Liquid Hazardous Materials (Dangerous Goods)*

2.3.1 Contact information

The above may be obtained from ASTM International. Telephone: 610-832-9585, fax: 610-832-9555, Web site: www.astm.org, or from IHS Global Canada Ltd., telephone: 613-237-4250 or 1-800-267-8220, fax: 613-237-4251, Web site: www.global.ihs.com.

2.4 International Organization for Standardization (ISO)

ISO 535:2014 — *Paper and board – Determination of water absorptiveness – Cobb method*

ISO 3036:1975 — *Board – Determination of puncture resistance*

ISO 9001 — *Quality management systems – Requirements*

2.4.1 Contact information

The above may be obtained from IHS Global Canada Ltd., telephone: 613-237-4250 or 1-800-267-8220, fax: 613-237-4251, Web site: www.global.ihs.com.

2.5 Technical Association of the Pulp and Paper Industry (TAPPI)

T402 SP-13 — *Standard conditioning and testing atmospheres for paper, board, pulp handsheets and related products*

T410 om-19 — *Grammage of Paper and Paperboard (Weight per Unit Area)*

T441 om-20 — *Water absorptiveness of sized (Non-bibulous) paper, paperboard and corrugated fiberboard (Cobb Test)*

2.5.1 Contact information

The above may be obtained from Technical Association of the Pulp and Paper Industry, TAPPI Inc.. Telephone: 1-800-446-9431 (Canada), 1-800-332-8686 (U.S.A.), 770-446-1400 (Worldwide), fax: 770-209-7206, e-mail: memberconnection@tappi.org, Web site: www.tappi.org/, or from IHS Global Canada Ltd., telephone: 613-237-4250 or 1-800-267-8220, fax: 613-237-4251, Web site: www.global.ihs.com.

2.6 United Nations (UN)

Recommendations on the Transport of Dangerous Goods, Model Regulations (21st revised edition)

2.6.1 Contact information

The above may be obtained from distributors of United Nations Publications or from the United Nations Publications Customer Service. Telephone: 1-703-661-1571. Fax: 1-703-996-1010. E-mail: order@un.org. The publication can be viewed and downloaded at www.unece.org/trans/danger/publi/unrec/rev21/21files_e.html.

3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply. Where there is a conflict between a term or definition in this standard and that of the TDG Regulations, the term or definition in the TDG Regulations shall prevail.

body
receptacle of an IBC (for all categories of IBCs other than composite IBCs). (*corps*)

closed cargo transport unit
cargo transport unit which totally encloses the means of containment by permanent structures with complete and rigid surfaces. (*engin de transport fermé*)

Note: Cargo transport units with fabric sides or tops are not considered closed cargo transport units.

closure
device that closes an opening in a receptacle. (*fermeture*)

compatible material
material compatible with the dangerous goods is a material that does not react physically or chemically with the dangerous goods in a way that under normal conditions of handling or transportation would cause a condition or release of dangerous goods that could endanger public safety. Corrosion, environmental stress cracking, solvation, fusion are some of the examples of physical and chemical reactions of the material with the dangerous goods. (*matériau compatible*)

composite IBC
IBC that is an integrated single unit consisting of a rigid outer casing enclosing a plastic inner receptacle together with any service and structural equipment. (*GRV composite*)

cross-bottled IBC
remanufactured composite IBC in which an inner receptacle produced by one manufacturer is placed into an outer casing produced by another manufacturer. (*GRV croisé*)

CTC
Canadian Transport Commission. (*CCT*)

Note: This is the former name of the Canadian Transportation Agency.

director
The Executive Director, Regulatory Frameworks and International Engagement, Regulatory Affairs Branch, Transportation of Dangerous Goods Directorate, Transport Canada. (*directeur*)

DOT
U.S. Department of Transportation. (*DOT*)

fibreboard IBC
IBC consisting of a fibreboard body with or without separate top and bottom caps, service equipment, structural equipment and, if necessary, an inner liner (but no inner packagings). (*GRV en carton*)

flexible IBC
IBC consisting of a body made of film, woven fabric or any other flexible material or combination thereof, service equipment, handling devices, inserts and, if necessary, an inner coating or liner. (*GRV souple*)

grammage
mass of a unit area of paper or fibreboard determined by TAPPI test method T410 expressed in grams per square metre (also known as nominal basis weight). (*grammage*)

handling device
any sling, loop, eye or frame attached to the body of a flexible IBC or formed from a continuation of the flexible IBC body material. (*dispositif de manutention*)

IBC
see intermediate bulk container. (*GRV*)

inner receptacle
receptacle of a composite IBC that requires an outer casing in order to perform its containment function. (*récipient intérieur*)

intermediate bulk container
rigid or flexible portable means of containment, other than a bag, box, drum or jerrican, as defined in CAN/CGSB-43.150, and that is designed for mechanical handling and is resistant to the stresses produced in handling and transport, as determined by tests. (*grand récipient pour vrac*)

lightweight IBC
composite IBC with an outer casing made with light-gauge rigid material and plastic inner receptacle generally made by the blow-molding method. (*GRV léger*)

liner
separate tube or bag, including its openings and their closures, inserted into the body of an IBC but not forming an integral part of it. (*doublure*)

maximum capacity
maximum volume of water, expressed in litres (L), that the IBC can hold at 15 °C and at an absolute pressure of 101.3 kPa, when filled through the intended filling orifice with the IBC resting in its normal position of filling. (*contenance maximale*)

maximum permissible gross mass
sum of the mass of an IBC and any service or structural equipment, and the maximum permissible load. (*masse brute maximale admissible*)

maximum permissible load
maximum net mass of the dangerous goods for which an IBC is designed to be used. (*charge maximale admissible*)

metal IBC
IBC consisting of a metal body, service equipment and structural equipment. (*GRV en métal*)

mobile IBC
IBC that is designed to be:
- secured to the means of transport in accordance with the manufacturer's notice to user in 4.8.2 a), and
- filled, partially emptied and emptied while on a means of transport, but does not include the fuel tank of a vehicle that is used for its propulsion. (*GRV mobile*)

non-standardized IBC
IBC that does not conform to the requirements of Part 1 or clause 12.5 of this standard but that is designed, constructed, maintained, filled, closed, secured and maintained so that under normal conditions of transport, including handling, the dangerous goods will be protected from the elements and there will be no release of the dangerous goods that could endanger public safety. (*GRV non normalisé*)

plastic material
when used in connection with inner receptacles for composites IBCs, is taken to include other polymeric materials such as rubber. (*matière plastique*)

production plastic material
plastic material recovered from and returned to the same container manufacturing process. The recovered plastic material may include production residues or regrind from the same manufacturing process. (*matière plastique de production*)

protected IBC
a metal IBC that is provided with additional protection against impact. Such protection includes a multilayer or double-wall construction, or a framework with a metal lattice-work casing. A protected IBC may consist of an inner primary containment within an outer secondary containment. (*GRV protégé*)

receptacle
containment vessel for receiving and holding the dangerous goods, including the openings and their closures but not the liner or service equipment. (*récipient*)

recycled plastic material
plastic material recovered from used industrial containers. (*matière plastique recyclée*)

remanufactured IBC
metal, rigid plastic or composite IBC that is produced as a UN type from a non-UN type, or is converted from one UN design type to another UN design type. Remanufactured IBCs also include cross-bottled IBCs. (*GRV reconstruit*)

repaired IBC
metal, rigid plastic or composite IBC that, as a result of impact or for any other cause is restored so as to conform to the design type and to be able to withstand the design type tests. The bodies of rigid plastics IBCs, the inner receptacles of composite IBCs and flexible IBCs are not repairable. Replacement of the rigid inner receptacle of a composite IBC with one from the original manufacturer is considered a repair. Routine maintenance of IBCs is not considered a repair. (*GRV réparé*)

rigid plastic IBC
IBC consisting of a rigid plastic body, service equipment and structural equipment but does not include a flexible IBC with rigid fibreboard or plastic inserts. (*GRV en plastique rigide*)

routine maintenance (refurbishing)
The performance of one of the following operations:
- Cleaning;
- For IBCs other than flexible IBCs:
    - Removal and installation or replacement of body closures, service equipment and associated gaskets.
    - Restoration of structural components that do not directly perform a dangerous goods containment or discharge pressure retention function so as to conform to the design type (e.g. the straightening of legs or lifting attachments) provided that the containment function of the IBC is not affected;
- For flexible IBCs, replacement of non-integral components, such as non-integral liners and closure ties, with components conforming to the original manufacturer's specification. (*entretien courant*)

service equipment
devices attached to and forming part of an IBC that are necessary for filling, discharging, venting, pressure relief, vacuum relief, internal heating, sampling and measuring. Such devices include pressure-relief devices, valves, pumps and their hoses, piping, gaskets and sight tubes. (*équipement de service*)

sift-proof
impermeable to dry content, including any fine solid material produced during transport. (*étanche aux matières pulvérulentes*)

standardized IBC
IBC that conforms to the requirements of Part I or clause 12.5 of this standard. (*GRV normalisé*)

structural equipment
reinforcing, fastening, handling, protective or stabilizing members of the body of a metal, rigid plastic, composite, fibreboard and wooden IBC, including the pallet base for a composite, fibreboard and wooden IBC. (*équipement de structure*)

TC
Transport Canada. (*TC*)

TDG Act
Transportation of Dangerous Goods Act, 1992. (*Loi sur le TMD*)

TDG Regulations
Transportation of Dangerous Goods Regulations. (*Règlement sur le TMD*)

ULC
Underwriters' Laboratories of Canada. (*ULC*)

UN packaging symbol (*symbole d'emballage UN*)

UN standardized IBC
IBC manufactured to the same design specification as a UN standardized IBC design type, or an IBC designed and manufactured in a country other than Canada in accordance with that country's national regulations and the *Recommendations on the Transport of Dangerous Goods, Model Regulations*. (*GRV normalisé UN*)

UN standardized IBC design type
design specification for the prototype IBC successfully tested in accordance with Part I and as described in the UN standardized IBC design type report of Annex A. (*modèle type de GRV normalisé UN*)

UN standardized mobile IBC
mobile IBC that conforms to the requirements of Part I of this standard. (*GRV mobile normalisé UN*)

wooden IBC
IBC consisting of a rigid or collapsible wooden body, service equipment, structural equipment and a liner (but no inner packagings). (*GRV en bois*)

woven plastic
material made from stretched tapes or monofilaments of a plastic material. (*tissu de plastique*)

Part I

Design and manufacture of UN standardized IBCs

4 General requirements

4.1 General

A UN standardized IBC shall be designed and manufactured in accordance with the requirements in Part I of this standard.

4.2 IBC code

The IBC code shall consist of the following sequence of numbers and letters:

- a number as specified in 4.2 a); followed by
- a capital letter as specified in 4.2 b); followed by, if applicable,
- a capital letter as specified in 4.2 c) and followed, when specified in an individual clause or subclause, by
- a number indicating the category of IBC.

a) A number as specified in the following list that represents the rigidity, flexibility, method of filling or discharging of the IBC, and whether it is designed for transporting solid or liquid dangerous goods:

   1) the number 11 for an IBC that is rigid, designed for transporting solids, and filled or discharged by gravity;

   2) the number 21 for an IBC that is rigid, designed for transporting solids, and filled or discharged under a pressure of more than 10 kPa (0.1 bar);

   3) the number 13 for an IBC that is flexible, designed for transporting solids, and filled or discharged by gravity; or

   4) the number 31 for an IBC that is rigid, and designed for transporting liquids.

b) A capital letter as specified in the following list that represents the material of construction of the body of a metal, flexible, plastic, wooden or fibreboard IBC, or the material of construction of the inner receptacle of a composite IBC:

   A steel

   B aluminum

   C natural wood

   D plywood

   F reconstituted wood

   G fibreboard

   H plastic

   L textile

M paper, multiwall

N metal other than steel or aluminum.

c) In the case of a composite IBC, a capital letter as specified in the list in 4.2 b) that represents the material of construction of the outer casing.

4.3 IBC types by code

The IBC described in Column 1 of Table 1 having the design characteristics described in Column 2 shall be assigned the corresponding IBC Code in Column 3.

4.4 Use of the letter “W”

When assigned in accordance with the requirements of 11.10, the capital letter “W” shall follow the IBC Code.

4.5 Service equipment

The service equipment of an IBC shall be protected, or positioned in order to protect it, from damage during handling and transport. An IBC consisting of a body within a framework shall be constructed in such a way that the service equipment cannot be damaged by the relative movement or expansion of the framework and framework connections.

4.6 Bottom discharge valve

The bottom discharge valve of an IBC shall be designed so that it can be secured in the closed position and so that the open or closed position is readily visible. For IBCs containing liquids, a secondary means of sealing the outlet of the bottom discharge valve shall also be provided, e.g. by a blank flange, safety cap or equivalent device.

4.7 IBC design type report

A report shall be completed in accordance with Annex A for every IBC design type, and the report shall be submitted to the Director.

4.8 Notice to the user

4.8.1 General

The manufacturer and subsequent distributors shall provide a notice (in writing or by electronic means) to the initial user. The description shall include sufficient information to ensure the IBC is closed in the same manner it was tested and handled as it was designed to be handled. The notice shall include information on the types and dimensions of closures (including gaskets) and any other components needed to ensure that the IBCs as presented for transport are capable of passing the applicable performance tests.

A manufacturer or distributor selling more than one IBC of the same design to the same customer is only required to provide a notice at the time of initial sale as long as the design remains unchanged.

The container manufacturer or distributor shall make available the notice to user to a container user upon request.

4.8.2 Mobile IBC

For mobile IBCs, the notice shall also

a) include the detailed method used to secure the IBC on the means of transport as it was tested, and

b) identify all valves that shall be closed for transport, including sight tube valves.

4.9 Maximum capacity

Unless otherwise specified in the standard, the maximum capacity of an IBC shall not be more than:

a) 5.0 m^3 (5000 L) for flammable liquid dangerous goods of packing group III;

b) 3.0 m^3 (3000 L) for solids and liquids of packing groups II and III;

c) 3.0 m^3 for solids of packing group I when packed in metal IBCs; or

d) 1.5 m^3 for solids of packing group I when packed in flexible, rigid plastics, composite, fibreboard and wooden IBCs;

e) 1.25 m^3 (1250 L) for a code 31HZ2 IBC.

Table 1 — UN standardized IBCs

Column 1	Column 2	Column 3
IBC material	**Design characteristics**	**IBC code**
Steel	for solids, filled or discharged by gravity	11A
	for solids, filled or discharged under pressure	21A
	for liquids	31A
Aluminum	for solids, filled or discharged by gravity	11B
	for solids, filled or discharged under pressure	21B
	for liquids	31B
Metal other than steel or aluminum	for solids, filled or discharged by gravity	11N
	for solids, filled or discharged under pressure	21N
	for liquids	31N
Flexible plastic	woven plastic without coating and liner	13H1
	woven plastic, coated without liner	13H2
	woven plastic, with liner without coating	13H3
	woven plastic, coated with a liner	13H4
	plastic film	13H5

Column 1	Column 2	Column 3
IBC material	**Design characteristics**	**IBC code**
Flexible textile	without coating and liner	13L1
	coated without liner	13L2
	with liner without coating	13L3
	coated with liner	13L4
Flexible paper	multiwall	13M1
	multiwall, water-resistant	13M2
Rigid plastic	for solids, filled or discharged by gravity, fitted with structural equipment	11H1
	for solids, filled or discharged by gravity, free-standing	11H2
	for solids, filled or discharged under pressure, fitted with structural equipment	21H1
	for solids, filled or discharged by gravity, free-standing	21H2
	for liquids, fitted with structural equipment	31H1
	for liquids, free-standing	31H2
Composite	for solids, filled or discharged by gravity, with rigid plastic inner receptacle	11HZ1[a]
	for solids, filled or discharged by gravity, with flexible plastic inner receptacle	11HZ2[a]
	for solids, filled or discharged under pressure, with rigid plastic inner receptacle	21HZ1[a]
	for solids, filled or discharged under pressure, with flexible plastic inner receptacle	21HZ2[a]
	for liquids, with rigid plastic inner receptacle	31HZ1[a]
	for liquids, with flexible plastic inner receptacle	31HZ2[a]
Fibreboard	for solids, filled or discharged by gravity	11G
Natural wood	for solids, filled or discharged by gravity, with inner liner	11C
Plywood	for solids, filled or discharged by gravity, with inner liner	11D
Reconstituted wood	for solids, filled or discharged by gravity, with inner liner	11F

[a] If the capital letters “HZ” appear in an IBC code in this standard, the “Z” is replaced by the letter in the list in 4.2 b) that represents the material of construction of the outer casing of the composite IBC.

5 Compliance marks

5.1 General

The compliance marks applied to an IBC, the outer casing or the inner receptacle of a composite IBC shall remain legible for the life expectancy of the IBC.

5.2 Primary marks

5.2.1 Size, location, and content

The primary marks applied to an IBC shall be at least 12 mm in height, and readily visible. The marks shall appear on the body of the IBC or, in the case of a composite IBC, on the outer casing. The marks shall consist of the following sequence of numbers, letters and symbols:

a) The UN packaging symbol as defined in Section 3.

Note: For IBCs that have metal identification plates on which the marking is stamped or embossed, the capital letters “UN” may be applied instead of the symbol. Stencils and dot matrix printing are acceptable methods of marking the UN packaging symbol. When stenciling or similar techniques are used to apply the circle in the UN symbol, small gaps necessary for their application are permitted.

b) The IBC code as described in 4.2 and 4.3. The letter “W” shall follow the IBC code if it complies with 11.10.

c) A capital letter designating the packing group or groups for which the design type has been tested:

1) “X” for packing groups I, II and III; the container has been successfully tested to the packing group I performance level, at minimum;

2) “Y” for packing groups II and III; the container has been successfully tested to the packing group II performance level, at minimum; or

3) “Z” for packing group III; the container has been successfully tested to at least the packing group III performance level.

d) The month, designated numerically, and the last two digits of the year of manufacture. The date of manufacture of a rigid plastic IBC is the date the molding process is completed.

e) The three-letter country code: “CAN”.

Note: Denotes Canada as the country authorizing the allocation of the mark.

f) The name or symbol of the manufacturer and the design registration number.

g) The stacking test load in kilograms, as specified in 7.5. For IBCs not designed for stacking, the number “0” shall be displayed.

h) The maximum permissible gross mass or, for flexible IBCs, the maximum permissible load in kilograms (kg).

5.2.2 Maximum permissible gross mass and maximum permissible load

The maximum permissible gross mass and maximum permissible load may be rounded up to the next:

a) 0.1 kg if the maximum permissible gross mass or maximum permissible load is less than 25 kg;

b) 0.5 kg if the maximum permissible gross mass or maximum permissible load is between 25 kg and 50 kg;

c) 5 kg if the maximum permissible gross mass or maximum permissible load is between 50 kg and 950 kg;

d) 10 kg if the maximum permissible gross mass or maximum permissible load is between 950 kg and 2000 kg, or

e) 20 kg if the maximum permissible gross mass or maximum permissible load is above 2000 kg.

5.2.3 Change in the maximum permissible gross mass and maximum permissible load

The marked maximum permissible gross mass or maximum permissible load of a UN standardized IBC design type that has been changed in accordance with the requirements of 8.1.1 b) shall be changed to the maximum permissible gross mass or maximum permissible load of the modified IBC design.

5.2.4 Examples of primary marking

Examples of markings for various design types of UN standardized IBCs follow:

Examples of primary marks

Marks	Description
 11A/Y/04 19 CAN/ABC 4-01/ 5500/1500	A steel IBC for solids filled or discharged by gravity / for packing group II and III / manufactured in April 2019 / authorized by Canada / manufactured by ABC company / Design registration number 4-01 / the stacking test load in kg / the maximum permissible gross mass in kg.
 13H3/Z/04 19 CAN/ABC 4-02/ 0/1500	A flexible IBC for solids filled or discharged by gravity and made from woven plastic without coating with a liner / for packing group III / manufactured in April 2019 / authorized by Canada / manufactured by ABC company / Design registration number 4-02 / not designed to be stacked / the maximum permissible load in kg.
 31H1/Y/04 19 CAN/ABC 4-03/ 10800/1200	A rigid plastic IBC for liquids / for packing group II and III / manufactured in April 2019 / authorized by Canada / manufactured by ABC company / Design registration number 4-03 / the stacking test load in kg / the maximum permissible gross mass in kg.
 31HA1/Y/04 19 CAN/ABC 4-04/ 10800/1200	A composite IBC for liquids with a rigid plastic inner receptacle and steel outer casing / for packing group II and III / manufactured in April 2019 / authorized by Canada / manufactured by ABC company / Design registration number 4-04 / the stacking test load in kg / the maximum permissible gross mass in kg.

5.3 Additional marks

5.3.1 Location and content

In addition to the primary marks requirements in 5.2, every IBC of an IBC design type indicated by an “X” in Column 2 of Table 2 shall bear marks consisting of the corresponding information in Column 1 of Table 2.

5.3.2 Tare mass

The tare mass may be rounded up to the next:

a) 0.1 kg if the tare mass is less than 25 kg;

b) 0.5 kg if the tare mass is between 25 kg and 50 kg;

c) 1 kg if the tare mass is between 50 kg and 950 kg, or

d) 5 kg if the tare mass is between 950 kg and 2000 kg.

5.3.3 Capacity

The capacity may be rounded up to the next:

a) 5 L if the capacity is below 950 L;

b) 10 L if the capacity is between 950 L and 2000 L, or

c) 20 L if the capacity is above 2000 L.

5.3.4 Changes to the tare mass

The marked tare mass of an IBC design type that has been changed in accordance with the requirements of 8.1.1 b) shall be modified to the tare mass of the modified IBC design.

5.3.5 Flexible IBCs

A flexible IBC may bear a pictogram indicating the lifting method.

5.3.6 Composite IBCs

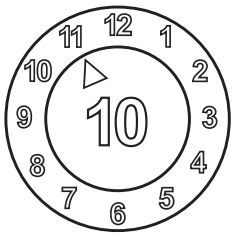
a) Inner receptacle — The inner receptacle of a composite IBC shall bear compliance marks that are readily accessible for inspection after assembling the inner receptacle in the outer casing. When the marks on the inner receptacle are not readily accessible for inspection due to the design of the outer casing, a duplicate of the required marks on the inner receptacle shall be placed on the outer casing preceded by the wording “Inner receptacle”. This duplicate shall be durable, legible and placed in a location so as to be readily accessible for inspection. The UN packaging symbol shall not be applied on the inner receptacle. The inner receptacle shall be marked with at least the following information in sequence:

   1) The code designating the type of IBC as described in Table 1;

   2) The mark indicated in 5.2.1 c);

   3) The month and year (last two digits) of manufacture of the plastic inner receptacle;

      i. The date of manufacture of the plastic inner receptacle may alternatively be marked near the main marking with a graphic symbol. For example, a dial is an appropriate marking method.



      ii. The date of manufacture of the inner receptacle may be different from the marked date of manufacture, repair or remanufacture of the composite IBC.

      iii. The date of manufacture of a plastic inner receptacle is the date the molding process is completed.

   4) The three-letter country code: “CAN”;

   5) The name or symbol of the manufacturer.

b) Detachable parts — When a composite IBC is designed in such a manner that the outer casing is intended to be dismantled for transport when empty (such as for return of the IBC for reuse to the original consignor), each of the parts intended to be detached when so dismantled shall be marked with:

1) The date of manufacture of the part (month and year). The month is designated numerically, and the year is designated by the last two digits of the year of manufacture.

2) The name or symbol of the manufacturer.

Table 2 — Additional marking

Column 1	Column 2					
Additional marking	IBC design type					
	Metal	Rigid plastic	Composite[a]	Fibreboard	Wooden	Flexible
Rated or maximum capacity[b] in litres _ /[c] at 20 °C	X	X	X	—	—	—
Tare mass in kg _ /[c]	X	X	X	X	X	—
Test (gauge) pressure, in kPa or bar _ /[c] if applicable	—	X	X	—	—	—
Maximum filling[e]/discharge pressure in kPa or bar _ /[c] if applicable	X[d]	X[d]	X[d]	—	—	—
Body material and its minimum thickness in mm _ /[c]	X	—	—	—	—	—
Marking of the last leak test and inspection	X	X	X	—	—	—
Serial number of the IBC	X	—	—	—	—	—

[a] The marking shall be displayed on the outer casing.

[b] When an IBC has multiple inner receptacles or multiple compartments, the capacity of each inner receptacle or inner compartment shall be listed.

[c] _ / means that the unit used shall be indicated.

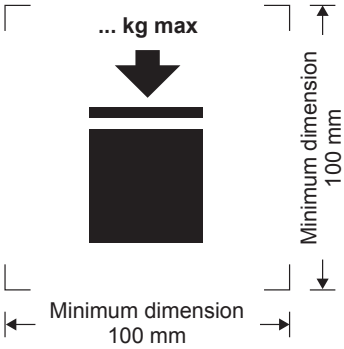
[d] Required for IBCs for solids, filled or discharged under pressure (21, 21H and 21HZ).

[e] Alternatively the word loading may be used.

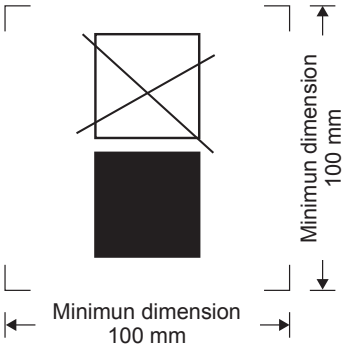
5.3.7 Maximum permissible stacking load or non-stackable IBC symbol

5.3.7.1 The maximum permitted stacking load applicable shall be displayed on a symbol as shown in 5.3.7.1.1 or 5.3.7.1.2. The symbol and lettering shall be applied against a background of suitably contrasting color. The length of any side of the symbol as displayed on an IBC shall be equal to or greater than 100 mm. The letters and numbers shall be at least 12 mm high.

5.3.7.1.1 The maximum permissible stacking load symbol shall appear as illustrated below, where "…kg max" is replaced with the actual maximum permissible stacking load followed by "kg max". The mass marked above the symbol shall not exceed the stacking test load divided by 1.8.



5.3.7.1.2 The non-stackable IBC symbol shall appear as illustrated below.



5.3.8 Mobile IBCs ─ Lift restriction

Mobile IBCs designed with lifting lugs or other top lifting devices for which a representative prototype has not been successfully top lift tested in accordance with 7.4 shall bear the following marks adjacent to the additional marking in 5.3:

a) "Mobile IBC – Do not lift when filled or partially filled with product" or

b) « GRV mobile — Ne pas soulever le contenant complètement ou partiellement rempli ».

5.3.9 Compliance marks on remanufactured IBCs (other than cross-bottled IBCs)

When a UN design type is converted to another UN design type, the original primary and additional markings specified in 5.2.1 and 5.3.1 shall be removed or made permanently illegible and new primary marking and additional markings shall be applied in accordance with this standard.

5.3.10 Compliance marks on remanufactured IBCs (cross-bottled IBCs)

The original primary and additional marking specified in 5.2.1 and 5.3.1 shall be removed from the outer cage or made permanently illegible and new primary marking and additional marking shall be applied to the outer cage. The inner receptacle shall keep its original marking in accordance with this standard.

5.3.11 Additional marking for recycled plastic material

IBCs manufactured from recycled plastic shall be marked "REC" near the primary marking.

5.3.12 Illegible or missing compliance marks

5.3.12.1 General

When the compliance mark on an IBC is illegible or missing, the owner, the manufacturer or a registered leak test and inspection facility shall replace the compliance mark in accordance with 5.3.12.2.

5.3.12.2 Supporting documentation

Prior to the installation of a replacement compliance mark:

a) the owner or the registered leak test and inspection facility shall have documented all the information on the compliance mark and can positively link the information to a specific IBC, or

b) the IBC manufacturer can unequivocally link the IBC to a set of data he has kept on IBCs manufactured under its control.

If no documentation can be obtained, a replacement mark shall not be applied.

6 Detailed requirements

6.1 Metal IBCs

6.1.1 General requirements

These requirements apply to metal IBCs for the transport of solids and liquids. There are three categories of metal IBCs:

a) Those for solids that are filled or discharged by gravity (11A, 11B, 11N);

b) Those for solids that are filled or discharged at a gauge pressure greater than 10 kPa (21A, 21B, 21N); and

c) Those for liquids (31A, 31B, 31N).

6.1.2 General construction

The body of the IBC shall be constructed of ductile metal. Low temperature performance shall be taken into account when applicable. Welds shall maintain the integrity of the body when the IBC is subjected to the test procedures required by this standard.

6.1.3 Aluminum IBC for flammable liquids

An IBC made of aluminum that is designed for transporting flammable liquids shall have no moveable parts, such as covers or closures, made of unprotected steel that is liable to rust.

6.1.4 General requirements

The IBC shall be made of ductile metal that meets the following requirements:

a) Steel — The minimum elongation as a percentage, at fracture under tensile stress shall be equal to or greater than the greater of

   1) 20% of the specimen used to determine the elongation;

   or

2) $\frac{10000}{R_m}$

where:

R_m = guaranteed minimum tensile strength of the steel to be used, in N/mm^2.

b) Aluminum — The elongation as a percentage, at fracture under tensile stress shall be equal to or greater than the greater of

1) 8% of the specimen used to determine the elongation;

or

2) $\frac{10000}{6R_m}$

where:

R_m = guaranteed minimum tensile strength of the aluminum to be used, in N/mm^2.

c) Specimens used to determine the elongation at fracture under tensile stress shall be taken transversely to the direction of rolling and secured so that

$L_0 = 5d$

or

$L_0 = 5.65 \times \sqrt{A}$

where:

L_0 = gauge length of the specimen before the test;

d = diameter;

A = cross-sectional area of test specimen.

6.1.5 Dissimilar metals

The IBC shall not be made of dissimilar metals that could cause deterioration by galvanic action due to their juxtaposition.

6.1.6 Minimum wall thickness

a) An IBC having a capacity listed in Table 3 and made of a reference steel having a product of $R_m \times A_0 = 10\,000$ shall have a wall thickness equal to or greater than the corresponding amount specified or calculated using the formula specified in Table 3,

where:

R_m = guaranteed minimum tensile strength of the steel to be used, in N/mm^2;

A_0 = minimum elongation, as a percentage, of the reference steel to be used on fracture under tensile stress, determined in accordance with 6.1.4 a).

b) For an IBC made of metal, other than the reference steel described in 6.1.6 a), the IBC shall have a wall thickness equal to the greater of

1) 1.5 mm, or

2) the thickness calculated using the formula:

$$e_1 = \frac{21.4 \times e_0}{\sqrt[3]{(R_{m_1} \times A_1)}}$$

where:

e_1 = required equivalent wall thickness of the metal to be used, in mm;

e_0 = required minimum wall thickness for the reference steel, in mm;

A_1 = minimum elongation, as a percentage, of the metal to be used at fracture under tensile stress, determined in accordance with 6.1.4 a);

R_{m_1} = guaranteed minimum tensile strength of the metal to be used, in N/mm^2, determined in accordance with 6.1.6 c).

Table 3 — Minimum wall thickness of metal IBCs

Capacity (C) of the IBC (L)	Minimum wall thickness of the IBC (mm)			
	IBC code 11A, 11B or 11N		IBC code 21A, 21B, 21N, 31A, 31B and 31N	
	Unprotected	Protected[a]	Unprotected	Protected[a]
Greater than 1500	C/2000 + 1.5	C/2000 + 1.0	C/1000 + 1.0	C/2000 + 1.5
[a] For the purposes of this table, “Protected” is as defined under section 3, protected IBC.				

c) For the calculation described in 6.1.6 b), the value of R_{m_1} is one of the following values:

1) R_{m_1} is equal to the minimum value specified in accordance with a national or an international materials standard.

2) R_{m_1} is equal to the minimum value for R_{m_1} certified in the materials inspection certificate if

i. that value is equal to or less than R_{m_1} specified in 6.1.6 c) 1) plus 15%; and

ii. the metal is austenitic steel.

3) If no national or international materials standard exists for the material in question, R_{m_1} is equal to the minimum value certified in the materials inspection certificate.

6.1.7 Emergency pressure-relief device

a) During a fire an IBC designed for transporting liquids shall be capable of releasing sufficient vapour to prevent the body from rupturing. This may be achieved by a reclosing pressure-relief device or by a non-reclosing pressure-relief device. The required pressure-relief device shall be fitted in the vapour space.

Annex E provides examples of minimum emergency venting capacity required for a metal IBC.

b) Pressure-relief devices shall

1) be located in the vapour space of the IBC; and

2) have a start-to-discharge pressure

i. equal to or less than 65 kPa (0.65 bar); and

ii. equal to or greater than the vapour pressure of the contents of the IBC plus the partial pressure of the air or other inert gases, minus 100 kPa (1 bar) at 55 °C, determined on the basis of a maximum degree of filling as defined in 12.3 b).

6.1.8 Mobile IBC

6.1.8.1 Stability of the means of transport

A mobile IBC that is to be transported partially filled shall be designed to control liquid sloshing that could compromise the IBC structural integrity and the stability of the means of transport.

6.1.8.2 Openings

Openings shall be located in the vapour space unless they are completely enclosed within the footprint of the mobile IBC or sufficiently protected on each side to prevent the loss of the dangerous good content in case of an accident. Openings shall be constructed of metal that is not subjected to deterioration by the dangerous good and closed by a plug, valve or other service equipment located as close to the body of the mobile IBC as practical.

6.1.8.3 Gauging devices

Mobile IBCs may be equipped with a gauging device that indicates the liquid content by volume or liquid level. Gauging devices such as sight tube shall be completely enclosed within the footprint of the IBC or sufficiently protected on each side. Tubes of sight tubes shall be made of strong and impact-resistant material. Sight tubes shall be equipped with a valve at each end and closed in transport.

6.1.8.4 Piping

Any piping on an opening located in the liquid space of the mobile IBC that extends the protection referred to in 6.1.8.2 shall be designed to act as a sacrificial device to protect the mobile IBC in case of an accident. The opening shall also be equipped with a valve located as close to the mobile IBC as practical and inboard of the sacrificial device.

6.1.8.5 Baffles

If the IBC is equipped with baffles, they shall be substantial enough and welded on enough of their length to ensure sufficient reinforcement of the mobile IBC under normal condition of transport.

6.1.8.6 Multiple compartments

Mobile IBCs designed with multiple compartments shall have interstitial spaces between each compartment. Interstitial spaces shall also have a drain at the bottom that is accessible for inspection. Drains shall be closed in transport.

6.2 Flexible IBCs

6.2.1 General requirements

These requirements apply to flexible IBCs for the transport of solids only.

6.2.2 Seams

The seams of the IBC shall be formed by stitching, heat sealing, gluing or an equally effective method that meets the requirements of 6.2.6. The ends of a stitched seam shall be secured.

6.2.3 Resistance to environmental degradation

The materials of construction shall provide resistance to aging and degradation caused by the external environment and, if required, by ultraviolet degradation, and shall be compatible with the dangerous goods for which the IBC is to be used. Substances that are added to the materials of construction to protect the IBC against ultraviolet radiation shall be compatible with the dangerous goods for which the IBC is to be used and shall be effective throughout the life of the body.

6.2.4 Recycled plastic

No used material shall be used in the body unless it is:

a) recycled plastic material, as defined in section 3, recycled plastic material;

b) production plastic material, as defined in section 3, production plastic material.

The specific properties of the recycled plastic material used for production of new IBCs shall be assured and documented under a quality management system meeting the requirement of 10.3.

6.2.5 Height to width ratio

When filled, the ratio of height to width of the IBC shall be equal to or less than 2:1.

6.2.6 Joints and closures

When the IBC is tested in accordance with the appropriate test procedures defined in section 7 of this standard, the joints and closures of the IBC shall be sift-proof and shall be capable of withstanding pressures and impacts.

6.2.7 Code 13M1 or 13M2 IBC

After complete immersion in water for at least 24 h, the materials used in the construction of a code 13M1 or 13M2 IBC shall retain at least 85% of their tensile strength, as measured originally on the material that was conditioned to equilibrium at 67% or less relative humidity (RH).

6.3 Rigid plastic IBCs

6.3.1 General requirements

These requirements apply to rigid plastic IBCs for the transport of solids and liquids. Rigid plastic IBCs are of the following types:

a) Those fitted with structural equipment designed to withstand the load when IBCs are stacked (11H1, 21H1 and 31H1); and

b) Those free-standing that are designed to transfer stacking load partially or completely through the body of the IBC (11H2, 21H2 and 31H2).

6.3.2 Material of construction

The body of the IBC shall be made of suitable plastic resin of known specifications.

6.3.3 Resistance to environmental degradation

The material of construction shall provide resistance to aging and degradation caused by the external environment and, if required, by ultraviolet radiation; and shall be compatible with the dangerous goods for which the IBC is to be used. If applicable, low-temperature performance shall be determined and incorporated into the design. Substances that are added to the material of construction to protect the IBC against ultraviolet radiation shall be compatible with the dangerous goods for which the IBC is to be used and shall be effective throughout the life cycle of the body.

6.3.4 Recycled plastic

No used material shall be used in the body unless it is:

a) recycled plastic material, as defined in section 3, recycled plastic material;

b) production plastic material, as defined in section 3, production plastic material.

The specific properties of the recycled plastic material used for production of new IBCs shall be assured and documented under a quality management system meeting the requirement of 10.3.

6.4 Composite IBCs

6.4.1 General requirements

These requirements apply to composite IBCs for the transport of solids and liquids. Composite IBCs are of the following types:

a) Those fitted with a rigid plastic inner receptacle (11HZ1, 21HZ1 and 31HZ1) that retains its general shape when empty without closures in place and without benefit of the outer casing; and

b) Those fitted with a flexible plastic inner receptacle (11HZ2, 21HZ2 and 31HZ2).

6.4.2 Outer casing

When tested in accordance with the appropriate test procedures in this standard, the outer casing of the IBC, including the pallet base if applicable, shall consist of rigid material that, under normal conditions of transport, is capable of protecting the inner receptacle from physical damage that would render the IBC unsafe for transport. The strength of the material and the construction of the outer casing shall be appropriate to the capacity of the composite IBC and its intended use.

a) Metal outer casing ─ If the outer casing of an IBC is made of steel or aluminum it shall be constructed of a suitable metal of adequate thickness.

b) Natural wood outer casing — If the outer casing of an IBC is made of natural wood, the wood shall be well seasoned, commercially dry and free from defects that would reduce the strength of any part of the casing. The tops and bottoms may be made of water-resistant reconstituted wood such as hardboard or particle board or other suitable type.

c) Plywood outer casing — If the outer casing of an IBC is made of plywood:

    1) the plywood shall be well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would reduce the strength of the outer casing;

    2) the adjacent plies shall be glued with a water-resistant adhesive;

    3) the walls of the outer casing shall be firmly fastened at the corners or ends; and

    4) other materials may be used with plywood for the construction of the outer casing.

d) Reconstituted wood outer casing — If the outer casing of an IBC is made of reconstituted wood, the reconstituted wood shall be water-resistant. Other parts of the casings may be made of other suitable materials.

e) Fibreboard outer casing — If the outer casing of an IBC is made of fibreboard:

   1) the fibreboard shall be strong and solid or double-faced corrugated fibreboard (single or multiwall);

   2) the water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over 30 min in accordance with the requirements of ISO 535 or TAPPI T441, is equal to or less than 155 g/m^2 when the full thickness is tested;

   3) the fibreboard shall be cut, creased without scoring and slotted to permit assembly without cracking, surface breaks or undue bending;

   4) the fluting of corrugated fibreboard shall be firmly glued to the facings;

   5) the ends of the outer casings may have a wooden frame or be made entirely of wood; and

   6) wooden battens may be used for reinforcement.

f) Plastic outer casing — If the outer casing of an IBC is made of plastic, the plastic shall conform to the relevant requirements of 6.4.4 and 6.4.5.

6.4.3 Inner receptacle

a) The inner receptacle of the IBC shall be made of suitable plastics of known specifications.

b) The inner receptacle is not intended to perform a containment function without its outer casing.

6.4.4 Resistance to environmental degradation

The materials of construction shall provide resistance to aging and degradation caused by the dangerous goods for which the IBC is to be used and, if required, by ultraviolet radiation and the external environment. If applicable, low-temperature performance shall be determined and incorporated into the design. Substances that are added to the materials to protect the IBC against ultraviolet radiation shall be compatible with the dangerous goods for which the IBC is to be used and shall be effective throughout the life cycle of the body.

6.4.5 Recycled plastic

No used material shall be used in the inner receptacle unless it is:

a) recycled plastic material, as defined in section 3, recycled plastic material;

b) production plastic material, as defined in section 3, production plastic material.

The specific properties of the recycled plastic material used for production of new IBCs shall be assured and documented under a quality management system meeting the requirement of 10.3.

6.4.6 Projections on an outer casing

The outer casing of the IBC shall be free from any projections that could damage the inner receptacle during handling and transport.

6.4.7 Joints of fibreboard outer casing

The joints of the outer casing of a composite IBC that is made of fibreboard shall be taped, lapped and glued, or lapped and stitched with metal staples. The adhesive of glued or taped joints shall be water-resistant.

6.4.8 Pallet base

An integral pallet base forming part of the IBC or a detachable pallet base shall be designed for mechanical handling with the IBC filled to its maximum permissible gross mass. If a detachable pallet base is used, the outer casing of the IBC shall be secured to the pallet to ensure stability during handling and transport. The integral pallet base or detachable pallet base shall be free from projections that could damage the IBC during handling and transport.

6.4.9 Stacking

An IBC designed for stacking shall have a bearing surface that evenly distributes the load and shall be designed so that the load is not supported by the inner receptacle. Strengthening devices used to increase the stacking performance of the IBC, shall be external to the inner receptacle.

6.4.10 Code 31HZ2 IBC

A code 31HZ2 IBC shall have a capacity that is equal to or less than 1250 L. The inner receptacle shall consist of a minimum three plies of film. The outer casing shall enclose the inner receptacle on all sides.

6.5 Fibreboard IBCs

6.5.1 General requirements

These requirements apply to fibreboard IBCs for the transport of solids which are filled or discharged by gravity.

6.5.2 Material of construction

The body of the IBC

a) shall be made of strong and solid or double-faced corrugated fibreboard (single or multiwall). The fibreboard shall be cut, creased without scoring, and slotted to permit assembly without cracking, surface breaks or undue bending;

b) shall have an outer surface that is water-resistant so that the increase in mass, as determined in a test carried out over 30 min in accordance with the requirements of ISO 535 or TAPPI T441, is equal to or less than 155 g/m^2 when the full thickness is tested; and

c) that is made of corrugated fibreboard shall have the fluting firmly glued to the facings.

6.5.3 Puncture resistance

The top, bottom and walls of the IBC shall have a minimum puncture resistance of 15 J when tested in accordance with the requirements of ISO 3036.

6.5.4 Joints in the fibreboard

The joints of the body of the IBC shall be lapped and taped, lapped and glued, lapped and stitched with metal staples, or made by another equally effective method. The adhesive of glued or taped joints shall be water-resistant. If a liner is used, metal staples shall pass completely through all fibreboard pieces and shall be protected to prevent any damage to the liner.

6.5.5 Liner

If a liner is used, the joints and closures of the liner shall be sift-proof when the IBC is tested in accordance with the appropriate test procedures in this standard.

6.5.6 Top-lifting device

The IBC shall not incorporate top-lifting devices.

6.5.7 Pallet base

An integral pallet base forming part of the IBC or a detachable pallet base shall be designed for mechanical handling with the IBC filled to its maximum permissible gross mass. If a detachable pallet base is used, the body of the IBC shall be secured to the pallet to ensure stability during handling and transport. The integral pallet base or detachable pallet base shall be free from projections that could damage the IBC during handling and transport.

6.5.8 Stacking

An IBC designed for stacking shall have a bearing surface that evenly distributes the load. Strengthening devices used to increase the stacking performance of the IBC, shall be external to the liner if a liner is used.

6.6 Wooden IBCs

6.6.1 General requirements

These requirements apply to wooden IBCs for the transport of solids which are filled or discharged by gravity. The IBC shall not incorporate top-lifting devices. The walls of the IBC shall be firmly fastened together. The strength of the materials used and the method of construction of the body shall be appropriate to the capacity and intended use of the IBC.

6.6.2 Natural wood body

If the body of the IBC is made of natural wood, the wood shall be well seasoned, commercially dry and free from defects that would reduce the strength of the IBC. The wood shall also consist of parts that are made of one piece or the equivalent. A part is equivalent to one piece when one or more parts are glued together to form a single unit. The parts shall be assembled using a Lindermann joint, a tongue and groove joint, a ship-lapped joint, a rabbet joint, and a butt joint with at least two corrugated metal fasteners at each joint.

6.6.3 Plywood body

If the body of the IBC is made of plywood:

a) the plywood shall be well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would reduce the strength of the casing;

b) the plywood shall consist of three or more plies and adjacent plies shall be glued with a water-resistant adhesive; and

c) other materials may be used with plywood for the construction of the outer casing.

6.6.4 Reconstituted wood body

If the body of the IBC is made of reconstituted wood, the wood shall be made of water-resistant reconstituted wood such as hardboard, particleboard or other suitable type.

6.6.5 Liner

The IBC shall have a liner. The joints and closures of the liner shall be sift-proof when tested in accordance with the appropriate test procedures in this standard.

6.6.6 Top-lifting device

The IBC shall not incorporate top-lifting devices.

6.6.7 Pallet base

An integral pallet base forming part of the IBC or a detachable pallet base shall be designed for mechanical handling with the IBC filled to its maximum permissible gross mass. If a detachable pallet base is used, the body of the IBC shall be secured to the pallet to ensure stability during handling and transport. The integral pallet base or detachable pallet base shall be free from projections that could damage the IBC during handling and transport.

6.6.8 Stacking

An IBC designed for stacking shall have a bearing surface that evenly distributes the load. Strengthening devices used to increase the stacking performance of the IBC shall be external to the liner.

7 Test requirements for IBCs

7.1 General requirements

7.1.1 Test samples

The relevant performance test requirements set out in this section shall be successfully performed on an IBC of every design type.

7.1.2 Variations

Tests shall be repeated after any modification of the design type, other than the modifications specified in section 8. Design variations shall be documented in the IBC design type report required and made available to the Director upon request. The Director may permit some or all of the tests in Part I to be waived for an IBC design that differs only in minor respects from a UN standardized IBC design type.

7.1.3 Test schedule

Submit one IBC of the design type and IBC code listed in Column 1 of Table 4 to all the applicable performance tests of Part I in the order specified by the ordinal number in the other columns of the table. A different IBC may be used for specific tests when specified in Table 4.

7.1.4 Additional testing

Successfully passing these tests along with complying with the other requirements set out in this standard are the minimum for conformity to this standard. Additional testing should be conducted to evaluate the container if the shipping experience, changes in technology or good engineering practice warrants it.

7.1.5 Recycled plastic

For containers made of recycled plastic, the test schedule set out in 7.1.3 shall be repeated when the recycled plastic resin properties tested in accordance with 10.3.2 c) are not equivalent to the properties of the recycled plastic resin used for the successfully tested design. Recycled plastic resin properties may fall within a documented range if it can be demonstrated the container also successfully passed the tests set out in 7.1.3 when manufactured with recycled plastic resin having properties that are at the documented minimum and maximum range. The recycled plastic resin properties, and as applicable, the recycled plastic resin properties range, shall be documented as part of the quality management system set out in 10.3.

7.2 Preparation for testing

7.2.1 Test media

Before testing in accordance with the applicable requirements in 7.3 to 7.13, fill the IBC with the dangerous goods intended for handling or transport. Alternatively, fill with a substitute that represents the dangerous goods intended for transport, unless filling with a substitute would invalidate the results of the tests. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total mass provided the materials are placed so that the test results are not affected. If a substitute is used for solids in the tests, it shall have the same physical characteristics, including mass and grain size, as the dangerous goods intended for transport.

7.2.2 Mobile IBCs

A mobile IBC shall be fitted with the filling, discharging and venting devices intended to be installed on the IBC during use or a substitute that represents the filling, discharging and venting devices including the maximum mass for the devices. For the leakproofness and hydraulic pressure tests, the vented closure shall be replaced according to 7.6.3 and 7.7.3 respectively.

7.2.3 Conditioning

7.2.3.1 Fibreboard conditioning

Condition fibreboard IBCs and composite IBCs with fibreboard outer casings in accordance with ASTM D685 or TAPPI T402. Condition for at least 24 h in an atmosphere having a controlled temperature and relative humidity (RH) with an average value in the range of one of the following:

a) 23 ± 2 °C and 50 ± 5% RH (see ASTM D4332);

b) 20 ± 2 °C and 65 ± 5% RH;

c) 27 ± 2 °C and 65 ± 5% RH.

7.2.4 Compatibility test

Compatibility of a code 31H or 31HZ IBC with the dangerous goods shall be demonstrated by successfully passing a compatibility test unless such compatibility is demonstrated by successful user experience.

This may be done, for example, by submitting sample IBCs to a preliminary test extending over a long period, for example six months, during which the samples would remain filled with the substances they are intended to contain or with substances which are known to have at least as severe a stress-cracking, weakening or molecular degradation influence on the plastics materials in question, and after which the samples shall be submitted to the applicable tests listed in Table 4.

Table 4 — IBC test requirements and test schedule

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
IBC code	Bottom lift test[a] (see 7.3)	Top lift test[a] (see 7.4)	Stacking test[b] (see 7.5)	Leak-proofness test (see 7.6)	Hydraulic pressure test (see 7.7)	Drop test[e] (see 7.8)	Tear test (see 7.9)	Topple test (see 7.10)	Righting test[c] (see 7.11)	Rollover test[d,e] (see 7.12)	Vibration test[e] (see 7.13)
Metal: 11A, 11B, 11N	1st	2nd	3rd	—	—	Any order	—	—	—	Any order	—
Metal: 21A, 21B, 21N	1st	2nd	3rd	4th	5th	Any order	—	—	—	Any order	—
Metal: 31A, 31B, 31N	1st	2nd	3rd	4th	5th	Any order	—	—	—	Any order	Any order
Flexible[f]	—	X[c]	X	—	—	X	X	X	X	—	—
Rigid plastic: 11H1, 11H2	1st	2nd	3rd	—	—	Any order	—	—	—	—	—
Rigid plastic: 21H1, 21H2	1st	2nd	3rd	4th	5th	Any order	—	—	—	—	—
Rigid plastic: 31H1, 31H2	1st	2nd	3rd	4th	5th	Any order	—	—	—	—	Any order
Composite: 11HZ1, 11HZ2	1st	2nd	3rd	—	—	Any order	—	—	—	—	—
Composite: 21HZ1, 21HZ2	1st	2nd	3rd	4th	5th	Any order	—	—	—	—	—
Composite: 31HZ1, 31HZ2	1st	2nd	3rd	4th	5th	Any order	—	—	—	—	Any order
Fibreboard	1st	—	2nd	—	—	Any order	—	—	—	—	—
Wooden	1st	—	2nd	—	—	Any order	—	—	—	—	—

[a] Conduct the test if the IBC is designed for this method of handling.

[b] Conduct the test if the IBC is designed to be stacked or, for mobile IBCs, support a load.

[c] Conduct the test if the IBC is designed to be lifted from the top or the side.

[d] This test applies only to a mobile IBC.

[e] Another IBC of the same design type may be used for the drop test, the rollover test or the vibration test.

[f] An “X” indicates that the tests are required. An IBC that has passed one test may be used for the other tests, in any order.

7.3 Bottom lift test

7.3.1 Scope

Conduct the test on an IBC of any design type that is fitted with a means of lifting from the base, including fibreboard or wooden IBC.

7.3.2 Preparation for testing

Before testing in accordance with 7.3.3, the IBC shall be filled and a load shall be added and evenly distributed. The mass of the filled IBC and the load shall be 1.25 times the maximum permissible gross mass.

7.3.3 Procedure

Raise and lower the IBC twice by a lift truck. Space the forks at a distance equal to three quarters of the direction of entry and centrally position them, unless the points of entry are fixed. Penetrate the forks to three quarters of the direction of entry. Repeat the test from each possible direction of entry.

7.3.4 Results

After testing, there shall be no permanent deformation of the structural equipment that renders the IBC unsafe for transport and no release of the contents.

7.4 Top lift test

7.4.1 Scope

Conduct the test on an IBC of any design type that is designed to be lifted from the top and on any flexible IBC that is designed to be lifted from the top or the side.

7.4.2 Preparation for testing

Before testing in accordance with 7.4.3, follow the steps below, as applicable.

a) Metal, rigid plastic and composite IBCs shall be filled to the rated capacity. A load shall be added and evenly distributed. The mass of the filled IBC and the load shall be twice the maximum permissible gross mass.

b) Flexible IBCs shall be filled to six times their maximum permissible load and evenly distributed.

7.4.3 Procedure

a) Lift a metal or flexible IBC in accordance with its designed lifting procedure until it clears the floor and hold for at least 5 min.

b) Lift and hold a rigid plastic or composite IBC for at least 5 min in accordance with the following requirements:

    1) in the first test, lift and hold by each pair of diagonally opposite lifting devices so that the hoisting forces are applied vertically; and

    2) for the second test, lift and hold by each pair of diagonally opposite lifting devices so that the hoisting forces are applied toward the centre at 45° to the vertical.

7.4.4 Results

Criteria for passing the test:

a) Flexible IBC: There shall be no damage to the body or its lifting devices which renders the IBC unsafe for transport or handling and no release of the contents.

b) Metal, rigid plastic and composite IBC: There shall be no observable permanent deformation of the structural equipment which renders the IBC unsafe for transport or release of the contents.

7.5 Stacking test

7.5.1 Scope

Conduct the test on an IBC of any design type that is designed to have other IBCs of the same design type stacked on it. In the case of a mobile IBC, conduct the test if the IBC is designed to support a load.

7.5.2 Preparation for testing

Before testing in accordance with 7.5.3, follow the steps below, as applicable.

a) Load a flexible IBC to its maximum permissible load. Distribute the load evenly.

b) Load an IBC other than a flexible IBC, to its maximum permissible gross mass.

7.5.3 Procedure

a) Place the IBC on its base on level, hard ground. Apply the test load specified in 7.5.3 b) to the top of the IBC for the time specified in 7.5.3 c) by one of the following methods:

    1) One or more IBCs of the same design type shall be filled to the maximum permissible gross mass or, in the case of a flexible IBC, the maximum permissible load and stacked on the test IBC.

    2) Weights shall be loaded on either a flat plate or a reproduction of the base of the IBC and stacked on the IBC under test.

b) Calculation of superimposed test load:

    1) IBC other than mobile IBC: the load to be placed on the IBC shall be 1.8 times the combined maximum permissible gross mass of the number of IBCs of the same IBC design type that are intended to be stacked on top of the IBC during transport, or

    2) Mobile IBC designed to support a load: the load to be placed on the IBC shall be 1.8 times the load that will be supported by the IBC during transport.

c) Subject the IBC to the test load for the applicable time below:

    1) Metal IBCs — 5 min;

    2) Code 11H2, 21H2, 31H2, 11HH1, 11HH2, 21HH1, 21HH2, 31HH1 or 31HH2 IBCs — 28 days at 40 °C; or

    3) Other IBCs — 24 h.

7.5.4 Results

Criteria for passing the test:

a) Flexible IBC: There shall be no deterioration of the body which renders the IBC unsafe for transport and no release of the contents.

b) Metal, rigid plastic and composite IBC: There shall be no observable permanent deformation of the structural equipment which renders the IBC unsafe for transport or release of the contents.

7.6 Leakproofness test

7.6.1 Scope

Conduct the test on an IBC of a design type used for liquids (code 31 IBC) or for solids that are filled or discharged under pressure (code 21 IBC).

7.6.2 Pressure gauge

The pressure shall be measured by use of a gauge that:

a) has a range of no less than 1.5 times the test pressure;

b) has a range of no more than 5 times the test pressure; and

c) is calibrated at least annually or in accordance with the gauge manufacturer recommendations.

Various means of pressure measurement calibration may be used. The facility shall develop a quality control procedure for ensuring that instruments are maintained and calibrated, and that they operate within suitable parameters.

7.6.3 Procedure

Perform the test before fitting any thermal insulation equipment. The interior of the IBC shall be sufficiently dry prior to performing the test.

Note: Any remaining liquid should not cover a valve, opening or seam that may cause a false positive.

Replace the vented closures with non-vented closures that are fastened in the closed position. Alternatively, remove the vented closures and plug their openings. Position the test gauge so that it reads the pressure within the IBC body or inner receptacle. Apply an air pressure of at least 20 kPa (0.2 bar) to the body or inner receptacle of the IBC. Hold the pressure for at least 10 min. During the test:

a) measures shall be taken to prevent overpressurization of the IBC;

b) observe the IBC for air leakage using a method of detection such as air-pressure differential, immersion of the IBC in water, coating the seams, joints, closures and valves with a soap solution and observing for bubbles, or another equally effective method. If the IBC is immersed in water, apply a correction factor for the hydrostatic pressure.

Note: Placing the pressure gauge on the pressure supply line may cause pressure readings to appear higher than actually found in the container.

7.6.4 Protected IBC

When a protected IBC consists of a double wall construction that acts as a secondary containment, and the secondary containment is leak tested, air pressure shall be maintained in the primary containment to protect it against damage from external pressure.

7.6.5 Mobile IBCs with multiple compartments

Interstitial spaces shall also undergo a leakproofness test in accordance with 7.6.3.

7.6.6 Results

There shall be no leakage of air from the body or inner receptacle of the IBC.

7.7 Hydraulic pressure test

7.7.1 Scope

Conduct the test on an IBC of a design type used for liquids (code 31 IBC) or for solids that are filled or discharged under pressure (code 21 IBC).

7.7.2 Pressure gauge

The pressure shall be measured by use of a gauge that:

a) has a range of no less than 1.5 times the test pressure;

b) has a range of no more than 5 times the test pressure; and

c) is calibrated at least annually or in accordance with the gauge manufacturer recommendations.

Various means of pressure measurement calibration may be used. The facility shall develop a quality control procedure for ensuring that instruments are maintained and calibrated, and that they operate within suitable parameters.

7.7.3 Procedure

Perform the test before fitting any thermal insulation equipment. Replace the vented closures with non-vented closures that are fastened in the closed position. Alternatively, remove the vented closures and plug their openings. Fill the IBC with water. Position the test gauge so that it reads the pressure within the IBC body or inner receptacle. During the test:

a) measures shall be taken to prevent overpressurization of the IBC;

b) apply the hydraulic pressure of at least that specified in Table 5, to the body or inner receptacle of the IBC.

Note: Placing the pressure gauge on the pressure supply line may cause pressure readings to appear higher than actually found in the container.

Table 5 — IBC test pressure

IBC code	Packing group	Pressure (gauge) kPa (bar)
21A, 21B or 21N	I	250 kPa (2.5 bar)
21A, 21B, 21N	II, III	200 kPa (2.0 bar)
31A, 31B or 31N	any	65 kPa (0.65 bar) for the first test and 200 kPa (2.0 bar) for the second test
21H1, 21H2, 21HZ1 or 21HZ2	any	75 kPa (0.75 bar)
31H1, 31H2, 31HZ1 or 31HZ2	any	An agreed pressure set by the user or see 7.7.3 c).

c) For a code 31H1, 31H2, 31HZ1 or 31HZ2 IBC, apply a test pressure of the greater of that calculated in accordance with 7.7.3 d) 1) or 2).

1) The pressure shall be

i. the total gauge pressure measured in the IBC (i.e., the vapour pressure of the filling substance and the partial pressure of the air or other inert gases minus 100 kPa) at 55 °C multiplied by a safety factor of 1.5; this total gauge pressure shall be determined on the basis of a maximum degree of filling in accordance with 13.2.1 and a filling temperature equal to 15 °C;

ii. 1.75 times the (absolute) vapour pressure at 50 °C of the dangerous goods to be transported minus 100 kPa, but with a minimum test pressure of 100 kPa gauge; or

iii. 1.5 times the (absolute) vapour pressure at 55 °C of the dangerous goods to be transported minus 100 kPa, but with a minimum test pressure of 100 kPa gauge.

2) The pressure shall be twice the static gauge pressure of the dangerous goods to be transported, but the minimum pressure shall be twice the static pressure of water.

d) Hold the pressure for at least 10 min.

7.7.4 Results

Criteria for passing the test:

a) Metal IBCs (code 21A, 21B or 21N) — There shall be no release of the contents.

b) Metal IBCs (code 31A, 31B or 31N):

1) After the first test at 65 kPa, there shall be no release of the contents or permanent deformation of the IBC that would render the IBC unsafe for transport; and

2) After the second test at 200 kPa, there shall be no release of the contents.

c) Rigid plastic and composite IBCs (code 31H1, 31H2, 31HZ1 or 31HZ2) — There shall be no release of the contents and no observable permanent deformation of the IBC that would render the IBC unsafe for transport.

7.8 Drop test

7.8.1 Scope

Conduct this test on an IBC of any design type.

7.8.2 Preparation for testing

Before testing in accordance with 7.8.3, follow the steps below, as applicable.

a) Fill a metal IBC to at least 95% of its maximum capacity for solids and at least 98% of its maximum capacity for liquids.

b) Fill a flexible IBC to its maximum permissible load. Distribute the load evenly.

c) Fill and prepare a rigid plastic or composite IBC as follows:

   1) Fill the IBC to at least 95% of its maximum capacity for solids and to at least 98% of its maximum capacity for liquids; and

   2) Ensure that the temperature of the IBC and its contents are equal to or less than -18 °C. If test samples of composite IBCs are conditioned in this way, the conditioning specified in 7.2.3.1 shall not apply. Test liquids shall be kept in the liquid state, if necessary, by using a substitute test medium that has a relative density similar to water (0.95 minimum at room temperature) and remains liquid at -18 °C. This conditioning may be disregarded if the materials in question are of sufficient ductility and tensile strength at low temperatures.

d) Fill a fibreboard or wooden IBC to at least 95% of its maximum capacity.

7.8.3 Procedure

a) Drop the unrestrained IBC using the height specified in 7.8.4 onto a rigid, non-resilient, smooth, flat, horizontal surface. The point of impact shall be that part of the base that would cause the most damage to the IBC.

b) During the test, replace the vented closures with similar non-vented closures that are fastened in the closed position. Alternatively, remove the vented closures and plug their openings. Pressure-relief devices shall be removed or rendered inoperative.

7.8.4 Drop height

7.8.4.1 Table 6 specifies the drop test height for solids or liquids. The test is performed with the solid or liquid to be transported or with another substance having essentially the same physical characteristics:

Table 6 — Drop test height for solids and liquids

State	Packing group I	Packing group II	Packing group III
Solids	1.8 m	1.2 m	0.8 m
Liquids	n/a[a]	1.2 m	0.8 m

[a] There is no drop test height listed under Packing Group I for liquids since there is no packing instruction for liquid dangerous goods of Packing Group I (see Annex B, Part 1).

7.8.4.2 For liquids if the test is performed with water:

a) Table 7A specifies the drop test height where the substances to be transported have a relative density not exceeding 1.2:

Table 7A — Drop test height for liquids if the test is performed with water

Packing group I	Packing group II	Packing group III
n/a[a]	1.2 m	0.8 m
[a] There is no drop test height listed under Packing group I for liquids since there is no packing instruction for liquid dangerous goods of Packing group I (see Annex B, Part 1).		

b) Table 7B specifies the drop test height when the substances that are to be transported have a relative density exceeding 1.2, the drop heights shall be calculated on the basis of the relative density, d, of the substance to be transported rounded up to the first decimal as follows:

Table 7B — Drop test height for higher density liquids if the test is performed with water

Packing group I	Packing group II	Packing group III
n/a[a]	d x 1.0 m	d x 0.67 m
[a] There is no drop test height listed under Packing group I for liquids since there is no packing instruction for liquid dangerous goods of Packing group I (see Annex B, Part 1).		

7.8.5 Results

Criteria for passing the test:

a) Metal IBC: There shall be no release of the contents.

b) Flexible IBC: There shall be no release of the contents. However, a slight release of contents upon impact from such locations as closures or stitch holes shall not be considered to be a failure of the IBC provided that no further leakage occurs after the IBC has been raised clear of the ground.

c) Rigid plastic, composite, fibreboard and wooden IBCs: There shall be no release of the contents. However, a slight release of contents upon impact from a closure shall not be considered to be a failure of the IBC provided that no further release occurs.

d) All IBCs: no damage which renders the IBC unsafe to be transported, and no loss of contents. In addition, IBCs, other than mobile IBCs, shall be capable of being lifted by an appropriate means until clear of the floor for 5 min.

7.9 Tear test

7.9.1 Scope

Conduct this test on an IBC of a flexible design type.

7.9.2 Preparation for testing

Before testing in accordance with 7.9.3, fill the IBC to at least 95% of its maximum capacity and to its maximum permissible load. Distribute the load evenly.

7.9.3 Procedure

a) Place the IBC on the ground and cut with a knife halfway between the bottom surface and the top level of the contents for a length of 100 mm. Completely penetrate the wall of a wide face at a 45° angle to the principal axis of the IBC. Subject the IBC to a uniformly distributed superimposed load equivalent to twice the maximum permissible load for at least 5 min.

b) For an IBC that is designed to be lifted from the top or the side, remove the load referred to in 7.9.3 a). Lift the IBC clear of the floor and hold in that position for at least 5 min.

7.9.4 Results

The original cut shall not have increased in length to more than 125 mm.

7.10 Topple test

7.10.1 Scope

Conduct this test on an IBC of a flexible design type.

7.10.2 Preparation for testing

Before testing in accordance with 7.10.3, load the IBC to at least 95% of its maximum capacity and to its maximum permissible load. Distribute the load evenly.

7.10.3 Procedure

Topple an unrestrained IBC from a raised platform at the height specified in Table 8 for the packing group for which the IBC is designed to be used. Ensure that the IBC lands on any part of its top onto a rigid, non-resilient, smooth, flat, horizontal surface.

Table 8 — Topple test height

Packing group I	Packing group II	Packing group III
1.8 m	1.2 m	0.8 m

7.10.4 Results

There shall be no release of the contents. However, a slight discharge from a closure or stitch hole, upon impact, shall not be considered to be a failure of the IBC provided that no further leakage occurs.

7.11 Righting test

7.11.1 Scope

Conduct this test on an IBC of a design type that is a flexible and designed to be lifted from the top or side.

7.11.2 Preparation for testing

Before testing in accordance with 7.11.3, load the IBC to at least 95% of its maximum capacity and to its maximum permissible load. Distribute the load evenly.

7.11.3 Procedure

Lay the IBC on its side and lift by one lifting device, or by two lifting devices if four lifting devices are provided. Lift at a speed equal to or greater than 0.1 m/s until the IBC is in the upright position and not resting on the ground.

7.11.4 Results

There shall be no damage to the IBC or its lifting devices.

7.12 Rollover test

7.12.1 Scope

Conduct this test on an IBC of a mobile design type.

7.12.2 Preparation for testing

Before testing in accordance with 7.12.3, secure the IBC to a platform using the method to be used during transport. The platform shall be constructed to withstand, without deformation, the stresses to which it is subjected during the test in 7.12.3. The edges of the platform shall extend a minimum of 300 mm beyond the horizontal outside dimensions of the IBC. Load the IBC with water to at least 95% of its maximum capacity.

7.12.3 Procedure

Place the IBC and its platform on a level concrete surface. Raise a long side of the platform, pivoting the assembly on the other long side until it passes the balance point and the assembly rolls unrestrained.

7.12.4 Results

a) There shall be no release of the contents from the body of the IBC. However, a discharge from the filling, discharging, venting devices or closure of the IBC upon impact shall not be considered to be a failure of the IBC provided that the discharge is equal to or less than 4 L.

b) There shall be no separation of the IBC from the platform.

7.13 Vibration test

7.13.1 Scope

Conduct this test on an IBC of a rigid design type used for liquids.

7.13.2 Preparation for testing

Before testing in accordance with 7.13.3,

a) load an IBC, other than a mobile IBC, to at least 98% of its maximum capacity with water; and

b) load a mobile IBC to at least 95% of its maximum capacity with water.

7.13.3 Procedure

a) Vibrate an IBC, other than a mobile IBC, in accordance with ASTM D7387 for at least 1 h. Use a double amplitude of 25 mm at a frequency that causes the IBC to rise from the floor of the testing table so that a piece of flat strap can be passed between the IBC and the vibration table. At least two corners of the IBC shall leave the test platform.

b) Secure a mobile IBC to a vibration table using the method by which it is intended to be secured during transport. Vibrate in accordance with the single container resonance test in ASTM D999, method B, at the test severity, time schedule and amplitude recommended in method B.

7.13.4 Results

There shall be no release of the contents or damage to the structural equipment of the IBC.

8 Modifications to an IBC

8.1 Modifications without retesting

The following changes may be made to an IBC or to a registered IBC design type without retesting the IBC design type if other design specifications remain unchanged. The manufacturer shall submit a revised description of the modified IBC to the Director.

8.1.1 Modifications applicable to any type of IBC design types:

a) An interior or exterior surface treatment (such as a protective coating, galvanizing or fluorination) may be added to an IBC provided the treatment does not affect the mechanical properties of the treated material.

b) Reduction/Increase in size:

1) Provided that the construction of the IBC design type remains the same, each overall dimension may be reduced in the same proportion, or the height of an IBC design type may be reduced provided, in each case, that the marked maximum permissible gross mass is reduced to the sum of the tare mass of the IBC and the proportionately lower net mass.

2) Provided that the shape of the base of the IBC remains the same; each overall dimension of the IBC may be reduced in a ratio that is not in proportion. Manufacturers wanting to take advantage of this modification shall submit a design justification to the Director for review. The justification will contain the construction details (such as the maximum space between baffles, the number of baffles per length, the thickness of the baffles) to ensure that the smaller models are as strong as the IBC design type. The capacity, tare mass and maximum permissible gross mass shall be modified as applicable.

3) Provided that the capacity of the IBC does not increase; a dimension can increase while another one decreases as long as the shape of the base of the IBC remains the same and the original test results are not believed to be invalidated. Manufacturers wanting to take advantage of this modification shall submit a design justification to the Director for review. The justification will contain the construction details (such as the maximum space between baffles, the number of baffles per length, the thickness of the baffles) to ensure that the smaller models are as strong as the IBC design type. The capacity, tare mass and maximum permissible gross mass shall be modified as applicable.

c) A non-integral liner that is made of a more flexible material than the body may be added to an IBC provided the mass of the liner is less than 2% of the tare mass and the liner does not affect the performance of the closure system.

d) Non-structural accessories, such as placard holders or protective plates, may be added to an IBC provided the change in tare mass of the IBC is equal to or less than 5%.

e) A pressure- or vacuum-relief device may be added to the vapour space of an IBC.

f) An IBC may have fewer or smaller openings than the tested design.

g) Additives may be included in the composition of the plastic of an IBC to improve resistance to aging or ultraviolet radiation provided the chemical and physical properties of the plastic are not adversely affected. For example, the impact strength of the plastic in the cold dart drop test should not vary more than 10% from that for the tested IBC.

h) A different gasket may be installed on an IBC provided the width and thickness of the gasket is the same as the original gasket and the material of construction of the gasket does not differ from the original gasket by more than 12% in hardness when measured in accordance with ASTM D1415-88 or ASTM D2240-00.

8.1.2 Modifications applicable to specific types of IBC design types:

8.1.2.1 Flexible IBC

a) A coating may be added to an uncoated tested flexible IBC.

b) A liner may be added to an unlined tested flexible IBC.

8.1.2.2 Metal IBC

a) Stainless steel may substitute for mild steel provided that minimal properties (tensile and elongation) of the stainless steel equal or exceed the properties of the mild steel used for the performance testing and welds properties are equal or superior to the material that was tested.

b) The body thickness of a metal IBC may be increased provided the increase does not exceed 5% of the original thickness and within the range permitted by the welding procedures. The capacity, tare mass and maximum permissible gross mass shall be modified as applicable.

c) A double wall may be added to a mobile IBC provided the lifting devices (if applicable) and the means of securement remain welded to the primary containment.

8.2 Modifications with testing

The following changes may be made to a registered IBC design type if the specific tests, as indicated, are conducted on the IBC. The test report and revised description of the modified IBC design type shall be submitted to the Director by the manufacturer.

a) The test pressure for a registered IBC design type may be increased provided a hydraulic test, at the higher pressure, is conducted on the IBC.

b) If 8.1.1 h) is not met, a different gasket or gaskets may be used on an IBC provided a hydraulic pressure test is conducted on an IBC fitted with the gasket or gaskets.

9 Production testing

9.1 Code 21 or 31 IBCs

Every IBC intended to contain solids filled or discharged by pressure (code 21 IBC) or intended to contain liquids (code 31 IBC) that is manufactured shall be subjected to the leakproofness test in 7.6 or to an alternative test method. The period over which the test is conducted shall be sufficient to detect leaks that would be identified by the design type test method. Manufacturers who employ an alternative test method shall be able to demonstrate that their leak detection system complies with the requirements of the standard. Alternative test methods shall be validated by the facility, the test equipment manufacturer or a third party. All validation data shall be retained for 36 months after the test method is no longer used by the facility.

9.2 Protected IBCs

Protected IBCs consisting of multi-layer or double wall construction, shall be leakproofness tested by a method best suited for the design. The test method shall meet the requirements of 9.1.

9.3 Mobile IBC with multiple compartments

Interstitial spaces shall also be subjected to the leak test referred in 9.1.

10 Quality management system

10.1 General

IBCs shall be manufactured and remanufactured under a quality management system capable of ensuring that the IBCs are in accordance with the tested and registered design specified in the design report and the requirements of this standard. Each manufacturing facility operated by the manufacturer shall have a quality management system that conforms to 10.2.

10.2 Quality standard

10.2.1 The quality management system shall conform to the requirements of ISO 9001 and be registered with a quality management system registrar accredited or recognized by the Standards Council of Canada (SCC), or a foreign quality assurance systems registrar recognized by the SCC.

10.2.2 Despite the requirement specified in 10.2.1, remanufacturers performing only cross-bottling activities are not required to be registered with a quality management system registrar accredited or recognized by the Standards Council of Canada (SCC), or a foreign quality assurance systems registrar recognized by the SCC. However, the facility shall adhere to a quality management system meeting the requirements specified in 10.2.3.

10.2.3 Specific elements and processes of the quality management system

The quality management system of a facility performing cross-bottling shall include all the following elements and processes:

10.2.3.1 Management commitment

Facility management shall appoint a member of management who, irrespective of other responsibilities, has the authority and responsibility for overseeing the quality management system of the facility, including:

a) Ensuring the quality management system is established and maintained;

b) Reporting to management on the performance of the quality management system;

c) Promoting awareness of the importance of the requirements of this standard and the TDG Regulations throughout the facility.

10.2.3.2 Human resources

A human resources management process that:

a) Assigns quality responsibilities to personnel deemed competent on the basis of applicable education, training, skills, and experience;

b) Determines personnel's competency needs affecting quality;

c) Provides effective training to ensure competency of personnel;

d) Creates and maintains records of educations, training, qualification and certification as required;

e) Creates and maintains awareness of the importance of the quality management system to all employees.

10.2.3.3 Purchasing

A purchasing control process shall be established and maintained to ensure that purchased parts conform to the requirements of this standard.

10.2.3.4 Program documentation manual

A program documentation manual shall be developed, with the following components:

a) Title page with the company name, facility location, and name and position of the person responsible for compliance with this standard.

b) Flow chart depicting the steps of the cross-bottling process.

c) Description of the process used for implementing and documenting the quality management system.

d) List of all procedures, where they are located in the facility and who is responsible for performing them. The instruction and procedures shall include all activities to ensure that the work performed conforms to this standard. They shall include but are not limited to the following:

    1) Procedure describing the process to ensure that the new outer casing and inner receptacle combination conforms to the specification of the outer casing and inner receptacle combination that were tested.

    2) Procedure describing the process of removing the original compliance mark and replacing it with the new compliance mark.

10.3 Recycled plastic material

10.3.1 The specific properties of recycled plastic material used for the manufacture of new IBCs shall be verified and documented regularly as part of a quality management system meeting the requirement specified in 10.3.2.

10.3.2 The quality management system shall enable the facility to identify:

a) the source of the recycled material (e.g. drums, IBCs);

b) the previous lading of the recycled containers, including identification of the dangerous goods, if applicable; and,

c) the results of the following resin specification tests to determine the resin properties: melt flow rate, density and tensile strength/elongation at break.

11 Transport Canada registration

11.1 General

UN standardized IBCs shall not be manufactured under this standard unless the manufacturing facility and the IBC design type have been registered with the Director. Remanufactured IBCs are subject to the same design and manufacturing requirements that apply to new IBCs and the design type shall be registered with the Director.

11.2 Certificate of registration

A manufacturer is registered upon issuance, by the Director, of a certificate of registration. The certificate of registration remains valid until its indicated expiry date or its revocation for cause.

11.3 Design registration number

An IBC design type is registered upon issuance, by the Director, of a design registration number. The design registration number remains valid until its revocation for cause.

11.4 Application for registration

11.4.1 Manufacturing facility

An application for registration of a manufacturer shall be submitted to the Director and, at a minimum, shall include the following information:

a) name, street address, and mailing address of the company or individual applying for registration;

b) name, title, address, email and telephone number of the corporate officer or other person responsible for compliance with this standard;

c) name, title, address, email and telephone number of the local contact person responsible for compliance with this standard, if different from item b);

d) if the applicant is not an individual, letters patent, certificates of incorporation, or other documents evidencing the legal existence of the applicant;

e) the facility locations where the IBC will be manufactured;

f) design reports prepared in accordance with Annex A for all IBC designs to be registered;

g) a description of the quality management system required in section 10. The description of the quality management system shall include the scope of the quality management system and a summary of operations and controls documented under the quality management system that are relevant to this standard; and

h) if the quality management system shall be registered with a quality management system registrar as required by 10.2.1, a copy of the quality management system certificate of registration.

11.4.2 IBC design type

An application to manufacture a new IBC design type shall be submitted to the Director and, at a minimum, shall include the following information:

a) The IBC manufacturer’s name and address;

b) The manufacturing facility locations where the IBC will be manufactured;

c) When different from the IBC manufacturer, the name and address of the company that has performed the performance testing;

d) The IBC information as required in 4.8 (Notice to user);

e) Proposed compliance mark as required in section 5;

f) The design report in accordance with Annex A;

g) Copy of the ISO certificate for each manufacturing facility as required by section 10 (Quality system);

h) A statement declaring that all requirements of this standard have been met, including the date and signature of the officer responsible for compliance to this standard on behalf of the IBC manufacturer. If the manufacturer did not perform the testing, the statement shall also be signed and dated by the responsible officer of the company that has performed the performance testing.

11.4.3 Cross-bottled IBC design type

An application to manufacture a cross-bottled IBC design type shall be submitted to the Director and, at a minimum, shall include the following information:

a) The IBC remanufacturer's name and address;

b) The name and address of the inner receptacle manufacturer and the name and address of the outer casing manufacturer;

c) The manufacturing facility locations where the IBC will be assembled;

d) When different from the IBC remanufacturer, the name and address of the company that has performed the performance testing;

e) The IBC information as required in 4.8 (Notice to user);

f) Proposed compliance mark as required in section 5;

g) The design report in accordance with Annex A;

h) Procedure established by the remanufacturer to ensure that the inner receptacle and the outer casing combination conforms to the specification of the inner receptacle and outer casing combination that were tested;

i) A statement declaring that all requirements of this standard have been met, including the date and signature of the officer responsible for compliance to this standard on behalf of the IBC remanufacturer. If the remanufacturer did not perform the testing, the statement shall also be signed and date by the responsible officer of the company that has performed the testing.

11.5 Record retention

11.5.1 The manufacturer shall keep a copy of every application for registration of the manufacturing facility for as long as UN standardized IBCs are manufactured and at least two years thereafter.

11.5.2 The manufacturer shall keep a copy of every application to manufacture a new IBC design type or a new cross-bottled IBC design type for as long as UN standardized IBCs is manufactured and at least two years thereafter.

11.6 Registration and compliance

A certificate of registration and design registration number shall be issued by the Director, for a manufacturing facility if the Director is satisfied that:

a) the IBCs manufactured and marked are representative of the registered IBC design type;

b) the IBC manufacturer conforms to the applicable requirements of this standard; and

c) the manufacturer is capable of consistently complying with the requirements of this standard.

11.7 Revocation for cause

11.7.1 Certificate of registration

The Director may revoke a certificate of registration if the Director is satisfied that:

a) the IBCs as manufactured are not representative of the registered IBC design types or do not comply to the applicable requirements of this standard;

b) the manufacturer is not capable of complying with the requirements of this standard; or

c) the manufacturer is not complying with the requirements of this standard.

11.7.2 Design registration number

The Director may revoke a design registration number if the Director is satisfied that:

a) the IBCs as manufactured are not representative of the registered IBC design type as described in the design report; or

b) the IBCs do not comply with the requirements of this standard.

11.8 Expiry of certificate of registration

A certificate of registration remains valid past the expiry date if:

a) an application for renewal in accordance with 11.4 is received by the Director at least 90 calendar days prior to the expiry date;

b) a new certificate of registration has not been issued;

c) an application for renewal has not been rejected by the Director; and

d) a certificate of registration due to expire has not been revoked by the Director.

11.9 Application for renewal

An application for renewal of a certificate of registration is subjected to the same process and conditions as the initial application for certificate of registration relating to the manufacturer. The application for renewal shall also include a list of all currently registered IBC design types identified either as actively being manufactured or to be discontinued.

11.10 Equivalent specification (“W” marking)

The Director may issue a registration number for an IBC design type that, although of a type described in Table 1, is manufactured to a different specification if the Director is satisfied that the IBC is equivalent to an IBC that conforms to the requirements of this standard. The Director shall assign the capital letter “W” to the IBC code.

11.11 Design modifications

When the modification is within the permitted design variations such that no new testing is required, the manufacturer shall submit a revised description of the modified IBC to the Director.

11.12 Transition period

A certificate of registration issued in accordance with CAN/CGSB-43.146-2016 standard for an IBC design type shall be deemed to be registered as a manufacturing facility and for IBC design pursuant to section 10 of this standard unless the certificate has expired or been revoked.

Part II

Selection and use of IBCs for the handling, offering for transport, or transporting of classes 3, 4, 5, 6.1, 8 and 9 dangerous goods

12 General requirements

12.1 Selection and use

12.1.1 The dangerous goods described in Columns 1, 2, 3, 4 and 5 of the table in Part 1 of Annex B, shall be handled, offered for transport, and transported

a) in accordance with the requirements of the Packing instruction number specified in Column 6 of Part 1 of Annex B;

b) where IBC codes are listed in the packing instructions, in an IBC that is a UN standardized IBC or an equivalent specification tank and it is marked accordingly;

c) if a UN standardized IBC is prescribed in the packing instruction, in an IBC marked with the performance level represented by:

   1) the capital letter “X” if the dangerous goods are in packing groups I, II or III;

   2) the capital letter “Y” if the dangerous goods are in packing groups II or III; or

   3) the capital letter “Z” if the dangerous goods are in packing group III.

12.2 Before filling an IBC

An IBC shall not be filled with dangerous goods unless the following conditions are fulfilled:

a) The IBC is free of any visible defect that shows signs of reduced strength compared with the registered design type;

b) The service equipment, including body closures are functioning as intended and are free of visible defects or damage that may render them unsafe for transport;

c) Code 21 and 31 IBCs ─ The IBC has been leak tested and inspected in accordance with 12.6;

d) Code 31H and 31HZ IBCs:

   1) The IBC is made of a material that is compatible with the dangerous goods in accordance with the requirements in 7.2.4 and the external environment (including low temperatures);

   2) The IBC is within the prescribed period of use. The maximum prescribed period of use for body of a rigid plastic IBCs and plastic inner receptacle of composite IBCs is 60 months past the manufacturing date except where a shorter period of use is prescribed because of the nature of the substance to be transported.

e) Mobile IBCs:

   1) All flexible hoses and their coupling have been visually inspected to ensure mechanical fitness, integrity and compatibility with the dangerous good. A hose may continue to be used if the reinforcement is exposed as long as there is no evidence of wear, deterioration or other damage in the exposed reinforcement.

   2) mobile IBCs shall not be filled with dangerous goods other than UN1203, UN1202, UN1863, UN1223 or UN1268.

12.3 Filling and closing an IBC

The following requirements shall apply:

a) The filling limits (capacity, maximum permissible gross mass or maximum permissible load, as applicable) specified in the marking of an IBC shall not be exceeded.

b) If the IBC is for liquids, the outage left in the IBC shall be sufficient to ensure that

   1) no release of the dangerous goods or permanent distortion of the IBC occurs as a result of an expansion of the liquid caused by temperatures likely to be encountered during normal handling and transport;

   2) the IBC is not completely full at a temperature of 55 °C; and

   3) at the mean bulk temperature of 50 °C the contents of the IBC (other than a mobile IBC) do not exceed 98% of its water capacity and the contents of a mobile IBC do not exceed 95% of its water capacity.

c) The IBC shall be closed as instructed in the information provided by the IBC manufacturer or distributor in accordance with 4.8.

d) Where pressure may develop in an IBC by the evolution of gas from the dangerous good, the IBC shall be equipped with a vent provided that any gas emitted will not cause danger to public safety. The vent shall be designed so that when the IBC is in the position in which it is intended to be transported, leakage of liquid and penetration of foreign substances are prevented under normal conditions of transport.

e) Electrostatic discharge

   1) Liquid dangerous goods that have a flash point equal to or less than 60 °C (closed cup) shall be loaded into and unloaded from an IBC in a manner that will prevent a dangerous electrostatic discharge.

   2) Dangerous goods that are powders, which could cause a dust explosion, shall be loaded into and unloaded from an IBC in a manner that will prevent a dangerous electrostatic discharge.

f) If the dangerous goods are loaded into an IBC that has two or more closure systems, the closure system nearest to the contents of the IBC shall be closed first; and

g) Unless otherwise specified in this standard, an IBC may be partially filled with dangerous goods provided the IBC was designed for partial filling.

12.4 Before offering for transport and transporting

An IBC containing dangerous goods shall be secured to or within the means of transport to prevent movement of the IBC that could damage the IBC, the other products in means of transport, or the means of transport itself.

12.5 Equivalent specifications

12.5.1 Standardized IBC equivalent specification: specification 56 portable tank

a) The dangerous goods may be transported in a TC, CTC or DOT specification 56 portable tank instead of the standardized IBCs below if the portable tank conforms to the requirements in 12.5.1 b):

   1) a code 11A IBC if the portable tank is made of steel;

   2) a code 11B IBC if the portable tank is made of aluminum; or

   3) a code 11N IBC if the portable tank is made of a metal other than steel or aluminum.

b) The portable tank that is substituted for the standardized IBC in 12.5.1 a) shall display the mark:

1) “TC 56”;

2) “CTC 56”; or

3) “DOT 56”.

12.5.2 Standardized IBC or standardized mobile IBC equivalent specification: specification 57 portable tank

a) The dangerous goods may be transported in a TC, CTC or DOT specification 57 portable tank instead of the standardized IBCs below if the portable tank meets the requirements in 12.5.2 b):

1) a code 31A IBC, including a UN standardized mobile IBC, if the portable tank is made of steel;

2) a code 31B IBC, including a UN standardized mobile IBC, if the portable tank is made of aluminum; or

3) a code 31N IBC if the portable tank is made of a metal other than steel or aluminum.

b) The portable tank that is substituted for the standardized IBC in 12.5.2 a) shall display the mark:

1) “TC 57”;

2) “CTC 57”; or

3) “DOT 57”.

12.5.3 Standardized mobile IBC equivalent specification

The dangerous goods may be transported:

a) in a code 31A or 31B IBC instead of a UN standardized mobile IBC if the IBC was manufactured before January 1, 2003;

b) in a ULC standardized mobile refueling tank instead of a UN standardized mobile IBC if the tank was manufactured before January 1, 2003 and the following information is set out on a metal label in a holder welded to the tank:

1) the name of the tank’s manufacturer;

2) the metal thickness of the tank in millimetres;

3) the capacity of the tank in litres;

4) the year that the tank was manufactured;

5) the label of the Underwriters’ Laboratories of Canada (ULC);

6) the words “Mobile Refuelling Tank – ULC/ORD-C142.13”;

7) the words “Not Authorized for Transport of Dangerous Goods Requiring a Specification Tank”;

8) in the case of a tank designed for mounting on a truck or trailer platform, the words “This Tank Shall Be Secured to the Truck or Trailer Platform by the Means Provided By the Tank Manufacturer”; and

9) in the case of a skid-equipped tank that provides clearances of at least 300 mm to grade, the words “Suitable for Towing over Graded Surfaces Only”.

12.6 Periodic leak test and inspection

12.6.1 Periodic leak test and inspection: IBCs other than lightweight IBCs and mobile IBCs

a) An IBC for liquids (code 31 IBC), or for solids which is filled or discharged under pressure (code 21 IBC) shall not be used in transport unless the IBC has been successfully leak tested and inspected in accordance with Annex C within the previous 30 months.

b) However, an IBC filled with dangerous goods prior to the date of expiry of the last periodic test and inspection may be transported for a period not to exceed 12 months beyond the date of expiry of the last periodic test and inspection.

c) An IBC for solids, filled or discharged by gravity (code 11 IBC), may be leak tested and inspected in accordance with Annex C and marked accordingly. When a code 11 IBC is marked in accordance with Annex C, the requirements of 12.6.1 b) shall apply.

12.6.2 Periodic leak test and inspection: Lightweight IBC

A lightweight IBC for liquids shall not be used in transport unless the IBC has been successfully leak tested and inspected in accordance with Annex C before it is filled or partially filled.

A lightweight IBC that has been successfully leak tested and inspected may be filled once with dangerous goods and transported for a period not to exceed 30 months beyond the date of the last periodic test and inspection provided it is within the prescribed period of use.

12.6.3 Periodic leak test and inspection: mobile IBCs

A mobile IBC shall not be used in transport unless the IBC has been successfully leak tested and inspected in accordance with Annex C within the previous 60 months.

However, an IBC filled with dangerous goods prior to the date of expiry of the last periodic test and inspection may be transported for a period not to exceed 12 months beyond the date of expiry of the last periodic test and inspection.

12.6.4 Periodic leak test and inspection: Outside of Canada

The requirements of 12.6.1, 12.6.2 or 12.6.3 have been complied with if an IBC has been leak tested and inspected in a country other than Canada in accordance with that country's national regulations and with Chapter 6.5 of the UN Recommendations.

12.6.5 First leak test and inspection for codes 31H and 31HZ IBCs

Regarding 12.6.1 to 12.6.4, the date from which the first leak test and inspection period is measured for a code 31H or 31HZ IBC shall be the date of manufacture of the body of the IBC or, in the case of a composite IBC, the inner receptacle.

12.7 Additional requirements for liquids

12.7.1 Maximum vapour pressure for liquids in rigid plastic or composite IBCs

Unless otherwise permitted in the standard, a code 31H or 31HZ IBC shall be loaded only with liquid dangerous goods having an absolute vapour pressure:

a) so that the total gauge pressure in the IBC (i.e., the absolute vapour pressure of the filling substance plus the partial pressure of air or other inert gases minus 100 kPa) at 55 °C, when loaded in accordance with 12.3 b) at a temperature of 15 °C, is equal to or less than two thirds of the test pressure marked on the IBC;

b) that at 50 °C is equal to or less than four sevenths of the sum of the test pressure marked on the IBC plus 100 kPa; or

c) that at 55 °C is equal to or less than two thirds of the sum of the test pressure marked on the IBC plus 100 kPa.

Table D.1 provides examples of various maximum vapour pressures for liquid dangerous goods and is presented for information in Annex D.

12.8 Additional requirements for solids

12.8.1 Solids that may become liquid in transport

a) Solid dangerous goods of packing group I that may become liquid at temperatures likely to be encountered during handling or transport shall not be transported in an IBC;

b) Solid dangerous goods of packing group II and III that may become liquid at temperatures likely to be encountered during handling or transport shall not be transported in:

   1) Wooden IBC (11C, 11D and 11F);

   2) Fibreboard IBC (11G);

   3) Flexible IBC (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 and 13M2);

   4) Composite IBC (11HZ2 and 21HZ2).

c) Solid dangerous goods that may become liquid at temperatures likely to be encountered during handling or transport shall be transported in an IBC capable of containing the dangerous goods in the liquid state.

12.9 Damaged or defective IBCs

An IBC that has visible defects and shows signs of reduced strength compared with the registered design type shall be:

a) repaired, as defined in section 3, repaired IBC, if the damage or defects are located on the body or is on structural component that is an integral part of the body, or

b) undergo routine maintenance, as defined in section 3, routine maintenance (refurbishing), if the damage or defects are not located on a component that directly performs a dangerous goods containment or discharge pressure retention function, such as the body or any structural component that is an integral part of the body.

12.9.1 Repair of damaged or defective IBCs

A repaired IBC shall be leak tested and inspected in accordance with Annex C before it is returned to service.

12.9.2 Routine maintenance on IBCs

Leaktightness shall be verified following the removal and installation or replacement of body closures, service equipment and associated gaskets.

Annex A
(normative)

UN standardized IBC design report

A.1 The following information for the successfully tested IBC design shall be provided in the UN standardized IBC design report (see 4.7). Information provided in the report shall only be used for assessing conformance to the requirements of this standard by the Director.

A.2 Contents

A.2.1 General

The report shall contain the following general information:

a) a unique identification number;

b) the date of the report;

c) the contact name, address, telephone and fax number of

   1) the applicant;

   2) the facilities at which the IBC testing was performed;

   3) the facilities at which the IBC will be manufactured;

d) the proposed IBC code;

e) the maximum capacity or maximum permissible gross mass of the IBC;

f) the standard to which the IBC is designed and its edition or publication date; and

g) notice to user (see 4.8).

A.2.2 Performance Testing

The report shall contain the following testing information:

a) the tests that were conducted on the IBC;

b) the date that the tests were conducted;

c) a description of the equipment used for testing the IBC;

d) the test media;

e) a description of the method for each test; and

f) the results of each test.

A.3 Description of the IBC design type

A.3.1 Body, inner receptacle, outer casing

The report shall include:

a) the tare mass and the rated and maximum capacity of the IBC;

b) a drawing of the assembly of the body, inner receptacle and outer casing of the IBC including dimensions, materials list, and location of openings and fittings; and

c) the fabrication method of the IBC including the type, specification, and number and location of joints, seams and fasteners.

A.3.2 Drawings

Drawings submitted with the report shall include the date of the drawing, a unique drawing number, any revision number and the name of the manufacturer.

A.3.3 Other components

The report shall describe the components of the IBC, other than the body, inner receptacle and outer casing, including gaskets, liners, filling and discharge devices, including pressure and vacuum relief devices, and pallet base. The description shall include the dimensions and the materials of construction of the components.

A.3.4 Materials of construction

The report shall describe the materials of construction of all structural components of the IBC, including the body, inner receptacle, outer casing and liner.

A.3.5 Material specification

The description of the materials in A.3.4 shall include the following information:

a) for metal: type, specification (ASTM or ISO standard) and nominal thickness;

b) for plastic, moulded: resin type, density, nominal thickness of the body or inner receptacle, and tare mass;

c) for plastic, woven: resin type, fabric (warp/weft) tapes per 100 mm, mass per unit area and material strength;

d) for plastic film: resin type, nominal thickness and material strength;

e) for fibreboard, solid: number of plies, minimum combined mass of plies, average values for the burst test or edge crush test, and the Cobb Test;

f) for fibreboard, corrugated: board style, grammage of facings and medium; average values for the bursting test or edge crush test, and the Cobb Test, the flute type; and adhesive type;

g) for natural wood: species and thickness;

h) for plywood: species, adhesive type, thickness and number of plies; and

i) for reconstituted wood: type, thickness an adhesive type.

A.4 Quality system

A.4.1 The report shall include a copy of the current quality system certificate of registration in accordance with 10.2.

A.5 Certification statement

A.5.1 The report shall include a statement certifying that the IBC design type conforms to the requirements of this standard. The statement shall be signed by a representative of the IBC manufacturer, by the person who conducted the IBC tests, and by his or her employer if the employer is different from the IBC manufacturer.

Annex B
(normative)

Part 1 – Packing instruction numbers for dangerous goods

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
Class 3 – Flammable liquids					
Any	**All Dangerous Goods of Class 3 and Packing group I**	**3**	**Any or none**	**I**	**11**
Any	**All Dangerous Goods of Class 3 and Packing group II, except those listed below:**	**3**	**Any or none**	**II**	**2**
1162	DIMETHYLDICHLOROSILANE	3	8	II	11
1196	ETHYLTRICHLOROSILANE	3	8	II	11
1250	METHYLTRICHLOROSILANE	3	8	II	11
1261	NITROMETHANE	3	—	II	11
1298	TRIMETHYLCHLOROSILANE	3	8	II	11
1305	VINYLTRICHLOROSILANE, STABILIZED	3	8	II	11
1308	ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3	—	II	11
2359	DIALLYLAMINE	3	6.1, 8	II	11
2985	CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	II	11
3064	NITROGLYCERINE, SOLUTION IN ALCOHOL with more than 1% but not more than 5% nitroglycerine	3	—	II	11
3248	MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S.	3	6.1	II	11
3269	POLYESTER RESIN KIT, liquid base material	3	—	II	11
3286	FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S.	3	6.1, 8	II	11
3357	NITROGLYCERINE MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30 % nitroglycerine, by mass	3	—	II	11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
Any	**All Dangerous Goods of Class 3 and Packing group III, except those listed below:**	**3**	**Any or none**	**III**	**3**
1308	ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3	—	III	11
3248	Medicine, Liquid, Flammable, Toxic, N.O.S.	3	6.1	III	11
3256	Elevated Temperature Liquid, Flammable, N.O.S. with a flash point above 60°C, at or above its flash point	3	—	III	1
3269	POLYESTER RESIN KIT	3	—	III	11
Any	**Dangerous Goods with no assigned Packing group**	**3**	**—**	**—**	**11**
Class 4.1 — Flammable solids, self-reactive substances and solid de-sensitized explosives					
Any	**All Dangerous Goods of Class 4.1 and Packing group I**	**4.1**	**Any or none**	**I**	**11**
Any	**All Dangerous Goods of Class 4.1 and Packing group II, except those listed below:**	**4.1**	**Any or none**	**II**	**6**
Any	**Any SELF-REACTIVE LIQUID or SELF-REACTIVE SOLID**	**4.1**	**Any or none**	**II**	**11**
Any	**Any SELF-REACTIVE LIQUID, TEMPERATURE CONTROLLED or SELF-REACTIVE SOLID, TEMPERATURE CONTROLLED**	**4.1**	**Any or none**	**II**	**11**
1309	ALUMINIUM POWDER, COATED	4.1	—	II	8
1323	FERROCERIUM	4.1	—	II	8
1325	FLAMMABLE SOLID, ORGANIC, N.O.S.	4.1	—	II	8
1333	CERIUM, slabs, ingots or rods	4.1	—	II	8
1339	PHOSPHORUS HEPTASULPHIDE, free from yellow and white phosphorus	4.1	—	II	4
1341	PHOSPHORUS SESQUISULPHIDE, free from yellow and white phosphorus	4.1	—	II	4

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instruction
1343	PHOSPHORUS TRISULPHIDE, free from yellow and white phosphorus	4.1	—	II	4
1345	RUBBER SCRAP or RUBBER SHODDY, powdered or granulated, not exceeding 840 microns and rubber content exceeding 45%	4.1	—	II	8
1437	ZIRCONIUM HYDRIDE	4.1	—	II	4
1871	TITANIUM HYDRIDE	4.1	—	II	4
2555	NITROCELLULOSE WITH WATER (not less than 25 % water, by mass)	4.1	—	II	11
2556	NITROCELLULOSE WITH ALCOHOL (not less than 25 % alcohol, by mass, and not more than 12.6 % nitrogen, by dry mass)	4.1	—	II	11
2557	NITROCELLULOSE, with not more than 12.6% nitrogen, by dry mass, MIXTURE WITH or WITHOUT PLATICIZER, WITH or WITHOUT PIGMENT	4.1	—	II	11
2989	LEAD PHOSPHITE, DIBASIC	4.1	—	II	8
3089	METAL POWDER, FLAMMABLE, N.O.S.	4.1	—	II	8
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	II	11
3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1	—	II	11
3178	FLAMMABLE SOLID, INORGANIC, N.O.S.	4.1	—	II	8
3181	METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S.	4.1	—	II	8
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1	—	II	4
3229	SELF-REACTIVE LIQUID TYPE F	4.1	—	II	11
3230	SELF-REACTIVE SOLID TYPE F	4.1	—	II	11
3242	AZODICARBONAMIDE	4.1	—	II	11
3270	NITROCELLULOSE MEMBRANE FILTERS, with not more than 12.6% nitrogen, by dry mass	4.1	—	II	11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
3319	NITROGLYCERIN MIXTURE DESENSITIZED, SOLID, N.O.S. with more than 2% but not more than 10 % nitroglycerine by mass	4.1	—	II	11
3344	PENTAERYTHRITE TETRANITRATE (PENTAERYTHRITOL TETRANITRATE; PETN) MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 10% but not more than 20 % PETN, by mass	4.1	—	II	11
3527	POLYESTER RESIN KIT, solid base material	4.1	—	II	11
Any	**All Dangerous Goods of Class 4.1 and Packing group III, except those listed below:**	**4.1**	**Any or none**	**III**	**8**
Any	**Any SELF-REACTIVE LIQUID or SELF-REACTIVE SOLID**	**4.1**	**Any or none**	**III**	**11**
Any	**Any SELF-REACTIVE LIQUID, TEMPERATURE CONTROLLED or SELF-REACTIVE SOLID, TEMPERATURE CONTROLLED**	**4.1**	**Any or none**	**III**	**11**
1313	CALCIUM RESINATE	4.1	—	III	6
1314	CALCIUM RESINATE, FUSED	4.1	—	III	4
1318	COBALT RESINATE, PRECIPITATED	4.1	—	III	6
1324	FILMS, NITROCELLULOSE BASE, gelatin coated, except scrap	4.1	—	III	11
1330	MANGANESE RESINATE	4.1	—	III	6
1331	MATCHES, ‘STRIKE ANYWHERE’	4.1	—	III	11
1944	MATCHES, SAFETY (book, card or strike on box)	4.1	—	III	11
1945	MATCHES, WAX ‘VESTA’	4.1	—	III	11
2000	CELLULOID in block, rods, rolls, sheets, tubes, etc., except scrap	4.1	—	III	11
2254	MATCHES, FUSEE	4.1	—	III	11
2304	NAPHTHALENE, MOLTEN	4.1	—	III	11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instruction
2448	SULPHUR, MOLTEN	4.1	—	III	1
2623	FIRELIGHTERS, SOLID with flammable liquid	4.1	—	III	11
2714	ZINC RESINATE	4.1	—	III	6
2715	ALUMINUM RESINATE	4.1	—	III	6
2858	ZIRCONIUM, DRY, coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns)	4.1	—	III	11
2925	FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.	4.1	8	III	6
2926	FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.	4.1	6.1	III	6
2956	5-tert-BUTYL-2,4,6-TRINITRO-m-XYLENE (MUSK XYLENE)	4.1	—	III	11
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	III	11
3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1	—	III	1
3179	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.	4.1	6.1	III	6
3180	FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.	4.1	8	III	6
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1	—	III	4
3251	ISOSORBIDE-5-MONONITRATE	4.1	—	III	11
3527	POLYESTER RESIN KIT, solid base material	4.1	—	III	11
3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED, N.O.S.	4.1	—	III	7
3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1	—	III	3
3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.	4.1	—	III	7

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1	—	III	3
Any	**Dangerous Goods with no assigned Packing group**	**4.1**	—	—	**11**
1327	BHUSA, HAY or STRAW	**4.1**	—	—	**8**
Class 4.2 — Substances liable to spontaneous combustion					
Any	**All Dangerous Goods of Class 4.2 and Packing group I**	**4.2**	**Any or none**	**I**	**11**
Any	**All Dangerous Goods of Class 4.2 and Packing group II, except those listed below:**	**4.2**	**Any or none**	**II**	**6**
Any	**All Dangerous Goods of Class 4.2 and Subsidiary Class 6.1 or Subsidiary Class 8**	**4.2**	**6.1 or 8**	**II**	**5**
1374	FISH MEAL (FISH SCRAP), UNSTABILIZED	4.2	—	II	8
1378	METAL CATALYST, WETTED with a visible excess of liquid	4.2	—	II	1
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	II	11
3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2	—	II	2
3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	II	2
3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	II	2
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2	—	II	2
3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	II	2
3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	II	2
3313	ORGANIC PIGMENTS, SELF-HEATING	4.2	—	II	8
Any	**All Dangerous Goods of Class 4.2 and Packing group III, except those listed below:**	**4.2**	**Any or none**	**III**	**8**

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
1372	FIBRES, ANIMAL, burnt, wet or damp or FIBRES, VEGETABLE, burnt, wet or damp	4.2	—	III	11
1387	WOOL WASTE, WET	4.2	—	III	11
1857	TEXTILE, WASTE, WET	4.2	—	III	11
2006	PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S.	4.2	—	III	11
2009	ZIRCONIUM, DRY, finished sheets, strip or coiled wire	4.2	—	III	11
2210	MANEB or MANEB PREPARATION with not less than 60% maneb	4.2	4.3	III	6
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	III	11
3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2	—	III	2
3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	III	2
3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	III	2
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2	—	III	2
3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	III	2
3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	III	2
	Dangerous Goods with no assigned Packing group	**4.2**	**Any or none**	**—**	**11**
1856	RAGS, OILY	4.2	—	—	8
Class 4.3 — Substances which in contact with water, emit flammable gases					
Any	**All Dangerous Goods of Class 4.3 and Packing group I, except those listed below:**	**4.3**	**Any or none**	**I**	**11**
1402	CALCIUM CARBIDE	4.3	—	I	4
1407	CAESIUM	4.3	—	I	4

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
1415	LITHIUM	4.3	—	I	4
1423	RUBIDIUM	4.3	—	I	4
1428	SODIUM	4.3	—	I	4
2257	POTASSIUM	4.3	—	I	4
2806	LITHIUM NITRIDE	4.3	—	I	4
Any	**All Dangerous Goods of Class 4.3 and Packing group II, except those listed below:**	**4.3**	**Any or None**	**II**	**7**
1340	PHOSPHORUS PENTASULPHIDE, free from yellow and white phosphorus	4.3	4.1	II	4
1395	ALUMINUM FERROSILICON POWDER	4.3	6.1	II	5
1409	METAL HYDRIDES, WATER-REACTIVE, N.O.S.	4.3	—	II	4
1418	MAGNESIUM POWDER or MAGNESIUM ALLOYS POWDER	4.3	4.2	II	5
2805	LITHIUM HYDRIDE, FUSED SOLID	4.3	—	II	4
2835	SODIUM ALUMINUM HYDRIDE	4.3	—	II	4
3129	WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.	4.3	8	II	1
3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.	4.3	6.1	II	1
3131	WATER-REACTIVE SOLID, CORROSIVE, N.O.S.	4.3	8	II	6
3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S	4.3	4.1	II	4
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	II	11
3134	WATER-REACTIVE SOLID, TOXIC, N.O.S.	4.3	6.1	II	5
3135	WATER-REACTIVE SOLID, SELF-HEATING, N.O.S.	4.3	4.2	II	5
3148	WATER-REACTIVE LIQUID, N.O.S.	4.3	—	II	1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
3209	METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S.	4.3	4.2	II	5
3395	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE	4.3	—	II	4
3396	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE	4.3	4.1	II	4
3397	ORGANOMETALLIC SUBSTANCE, SOLID, WATER-REACTIVE, SELF-HEATING	4.3	4.2	II	4
3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3	—	II	1
3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	II	1
Any	**All Dangerous Goods of Class 4.3 and Packing group III, except those listed below:**	**4.3**	**Any or none**	**III**	**8**
3129	WATER-REACTIVE LIQUID, CORROSIVE N.O.S.	4.3	8	III	2
3130	WATER-REACTIVE LIQUID, TOXIC, N.O.S.	4.3	6.1	III	2
3132	WATER-REACTIVE SOLID, FLAMMABLE, N.O.S	4.3	4.1	III	6
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	III	11
3148	WATER-REACTIVE LIQUID, N.O.S.	4.3	—	III	2
3395	ORGANOMETALLIC SUSTANCE, SOLID, WATER-REACTIVE	4.3	—	III	6
3396	ORGANOMETALLIC SUSTANCE, SOLID, WATER-REACTIVE, FLAMMABLE	4.3	4.1	III	6
3397	ORGANOMETALLIC SUSTANCE, SOLID, WATER-REACTIVE, SELF-HEATING	4.3	4.2	III	6
3398	ORGANOMETALLIC SUSTANCE, LIQUID, WATER-REACTIVE	4.3	—	III	2
3399	ORGANOMETALLIC SUSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	III	2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
	Any Dangerous Goods of Class 4.3 with no assigned Packing group	**4.3**	**Any or none**	**—**	**11**
Class 5.1 — Oxidizing substances					
Any	**All Dangerous Goods of Class 5.1 and Packing group I, except those listed below:**	**5.1**	**Any or none**	**I**	**11**
1479	OXIDIZING SOLID, N.O.S.	5.1	—	I	5
1491	POTASSIUM PEROXIDE	5.1	—	I	6
1504	SODIUM PEROXIDE	5.1	—	I	5
2466	POTASSIUM SUPEROXIDE	5.1	—	I	6
2547	SODIUM SUPEROXIDE	5.1	—	I	6
Any	**All Dangerous Goods of Class 5.1 and Packing group II or III, except those listed below:**	**5.1**	**Any or none**	**II or III**	**8**
1442	AMMONIUM PERCHLORATE	5.1	—	II	6
1445	BARIUM CHLORATE, SOLID	5.1	6.1	II	6
1447	BARIUM PERCHLORATE, SOLID	5.1	6.1	II	6
1448	BARIUM PERMANGANATE	5.1	6.1	II	6
1449	BARIUM PEROXIDE	5.1	6.1	II	6
1455	CALCIUM PERCHLORATE	5.1	—	II	6
1456	CALCIUM PERMANGANATE	5.1	—	II	6
1457	CALCIUM PEROXIDE	5.1	—	II	6
1461	CHLORATES, INORGANIC, N.O.S.	5.1	—	II	6
1462	CHLORITES, INORGANIC, N.O.S.	5.1	—	II	6
1470	LEAD PERCHLORATE, SOLID	5.1	6.1	II	6
1472	LITHIUM PEROXIDE	5.1	—	II	6
1475	MAGNESIUM PERCHLORATE	5.1	—	II	6
1476	MAGNESIUM PEROXIDE	5.1	—	II	6

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instruction
1481	PERCHLORATES, INORGANIC, N.O.S.	5.1	—	II	6
1482	PERMANGANATES, INORGANIC, N.O.S.	5.1	—	II	6
1483	PEROXIDES, INORGANIC, N.O.S.	5.1	—	II	6
1489	POTASSIUM PERCHLORATE	5.1	—	II	6
1502	SODIUM PERCHLORATE	5.1	—	II	6
1503	SODIUM PERMANGANATE	5.1	—	II	6
1508	STRONTIUM PERCHLORATE	5.1	—	II	6
1509	STRONTIUM PEROXIDE	5.1	—	II	6
1515	ZINC PERMANGANATE	5.1	—	II	6
1516	ZINC PEROXIDE	5.1	—	II	6
2014	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 20% but not more than 60% hydrogen peroxide (stabilized as necessary)	5.1	8	II	2
2427	POTASSIUM CHLORATE, AQUEOUS SOLUTION	5.1	—	II or III	2
2428	SODIUM CHLORATE, AQUEOUS SOLUTION	5.1	—	II or III	2
2429	CALCIUM CHLORATE, AQUEOUS SOLUTION	5.1	—	II or III	2
2573	THALLIUM CHLORATE	5.1	6.1	II	6
2626	CHLORIC ACID, AQUEOUS SOLUTION with not more than 10% chloric acid	5.1	—	II	2
2984	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)	5.1	—	III	2
3085	OXIDIZING SOLID, CORROSIVE, N.O.S.	5.1	8	II	6
3087	OXIDIZING SOLID, TOXIC, N.O.S.	5.1	6.1	II	6
3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	8	II	1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instruction
3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	8	III	2
3099	OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	6.1	II	1
3099	OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	6.1	III	2
3100	OXIDIZING SOLID, SELF-HEATING, N.O.S.	5.1	4.2	II	11
3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	4.3	II	11
3139	OXIDIZING LIQUID, N.O.S.	5.1	—	II or III	2
3149	HYDROGEN PEROXIDE AND PEROXYACETIC ACID MIXTURE with acid(s), water and not more than 5% peroxyacetic acid, STABILIZED	5.1	8	II	2
3210	CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	II or III	2
3211	PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	II or III	2
3213	BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	II or III	2
3214	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	II	2
3216	PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	2
3218	NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	II or III	2
3219	NITRITES INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	II	1
3219	NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	2
3375	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blastic explosive	5.1	—	II or III	11
3405	BARIUM CHLORATE SOLUTION	5.1	6.1	II or III	2
3406	BARIUM PERCHLORATE SOLUTION	5.1	6.1	II or III	2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
3407	CHLORATE AND MAGNESIUM CHLORIDE MIXTURE SOLUTION	5.1	—	II or III	2
3408	LEAD PERCHLORATE SOLUTION	5.1	6.1	II or III	2
	Any Dangerous Goods of Class 5.1 with no assigned Packing group	**5.1**	**Any or none**	**—**	**11**
Class 5.2 — Organic Peroxides					
Any	**All Dangerous Goods of Class 5.2, except those listed below:**	**5.2**	**—**	**Any or none**	**11**
3109	ORGANIC PEROXIDE, TYPE F, LIQUID	5.2	—	II	10
3110	ORGANIC PEROXIDE, TYPE F, SOLID	5.2	—	II	10
3119	ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED	5.2	—	II	10
3120	ORGANIC PEROXIDE, TYPE F, SOLID, TEMPERATURE CONTROLLED	5.2	—	II	10
Class 6.1 — Toxic substances					
Any	**All Dangerous Goods of Class 6.1 and Packing group I, except those listed below:**	**6.1**	**Any or none**	**I**	**11**
1544	ALKALOIDS, SOLID, N.O.S. or ALKALOID SALTS, SOLID, N.O.S.	6.1	—	I	7
1557	ARSENIC COMPOUND, SOLID, N.O.S., inorganic, including: Arsenates, n.o.s.; Arsenites, n.o.s.; and Arsenic sulphides, n.o.s.	6.1	—	I	7
1565	BARIUM CYANIDE	6.1	—	I	7
1570	BRUCINE	6.1	—	I	7
1575	CALCIUM CYANIDE	6.1	—	I	7
1588	CYANIDES, INORGANIC, SOLID, N.O.S.	6.1	—	I	7
1601	DISINFECTANT, SOLID, TOXIC, N.O.S.	6.1	—	I	7
1626	MERCURIC POTASSIUM CYANIDE	6.1	—	I	7
1655	NICOTINE COMPOUND, SOLID, N.O.S. or NICOTINE PREPARATION, SOLID, N.O.S.	6.1	—	I	7

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instruction
1680	POTASSIUM CYANIDE, SOLID	6.1	—	I	7
1689	SODIUM CYANIDE, SOLID	6.1	—	I	7
1692	STRYCHNINE or STRYCHNINE SALTS	6.1	—	I	7
1713	ZINC CYANIDE	6.1	—	I	7
2025	MERCURY COMPOUND, SOLID, N.O.S.	6.1	—	I	7
2026	PHENYLMERCURIC COMPOUND, N.O.S.	6.1	—	I	7
2316	SODIUM CUPROCYANIDE, SOLID	6.1	—	I	7
2471	OSMIUM TETROXIDE	6.1	—	I	7
2570	CADMIUM COMPOUND	6.1	—	I	7
2628	POTASSIUM FLUOROACETATE	6.1	—	I	7
2629	SODIUM FLUOROACETATE	6.1	—	I	7
2630	SELENATES or SELENITES	6.1	—	I	7
2642	FLUOROACETIC ACID	6.1	—	I	7
2757	CARBAMATE PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2759	ARSENICAL PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2761	ORGANOCHLORINE PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2763	TRIAZINE PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2771	THIOCARBAMATE PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2775	COPPER BASED PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2777	MERCURY BASED PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2779	SUBSTITUTED NITROPHENOL PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2781	BIPYRIDILIUM PESTICIDE, SOLID, TOXIC	6.1	—	I	7

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
2783	ORGANOPHOSPHORUS PESTICIDE, SOLID, TOXIC	6.1	—	I	7
2786	ORGANOTIN PESTICIDE, SOLID, TOXIC	6.1	—	I	7
3027	COUMARIN DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1	—	I	7
3048	ALUMINUM PHOSPHIDE PESTICIDE	6.1	—	I	7
3143	DYE, SOLID, TOXIC, N.O.S. or DYE INTERMEDIATE, SOLID, TOXIC, N.O.S.	6.1	—	I	7
3146	ORGANOTIN COMPOUND, SOLID, N.O.S.	6.1	—	I	7
3283	SELENIUM COMPOUND, SOLID, N.O.S.	6.1	—	I	7
3284	TELLURIUM COMPOUND, N.O.S.	6.1	—	I	7
3285	VANADIUM COMPOUND, N.O.S.	6.1	—	I	7
3345	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC	6.1	—	I	7
3349	PYRETHROID PESTICIDE, SOLID, TOXIC	6.1	—	I	7
3439	NITRILES, SOLID, TOXIC, N.O.S.	6.1	—	I	7
3450	DIPHENYLCHLOROARSINE, SOLID	6.1	—	I	7
3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	6.1	—	I	7
3464	ORGANOPHOSPHORUS COMPOUND, SOLID, TOXIC, N.O.S.	6.1	—	I	7
3465	ORGONOARSENIC COMPOUND, SOLID, N.O.S.	6.1	—	I	7
3466	METAL CARBONYLS, SOLID, N.O.S.	6.1	—	I	7
3467	ORGANOMETALLIC COMPOUND, SOLID TOXIC, N.O.S.	6.1	—	I	7
Any	**All Liquid Dangerous Goods of Class 6.1 and Packing group II, except those listed below:**	**6.1**	**Any or none**	**II**	**2**

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
1569	BROMOACETONE	6.1	3	II	11
1600	DINITROTOLUENES, MOLTEN	6.1	—	II	11
1851	MEDICINE, LIQUID, TOXIC, N.O.S.	6.1	—	II	11
2312	PHENOL, MOLTEN	6.1	—	II	11
2742	CHLOROFORMATES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	3, 8	II	1
2743	n-BUTYL CHLOROFORMATE	6.1	3, 8	II	11
2744	CYCLOBUTYL CHLOROFORMATE	6.1	3, 8	II	1
3073	VINYLPYRIDINES, STABILIZED	6.1	3, 8	II	1
3250	CHLOROACETIC ACID, MOLTEN	6.1	8	II	11
3279	ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, N.O.S.	6.1	3	II	11
3361	CHLOROSILANES, TOXIC, CORROSIVE, N.O.S	6.1	8	II	11
3362	CHLOROSILANES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	3, 8	II	11
3535	TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S.	6.1	4.1	II	8
Any	**All Liquid Dangerous Goods of Class 6.1 and Packing group III, except those listed below:**	**6.1**	**Any or none**	**III**	**3**
1851	MEDICINE, LIQUID, TOXIC, N.O.S.	6.1	—	III	11
3411	beta-NEPHTHYLAMINE	6.1	—	III	2
3424	AMONIUM DINITRO-o-CRESOLATE, SOLUTION	6.1	—	III	2
Any	**All Solid Dangerous Goods of Class 6.1 and Packing group II or III, except those listed below:**	**6.1**	**Any or none**	**II or III**	**8**
2727	THALLIUM NITRATE	6.1	5.1	II	6

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
2928	TOXIC SOLID, CORROSIVE, ORGANIC, N.O.S.	6.1	8	II	6
3086	TOXIC SOLID, OXIDIZING, N.O.S.	6.1	5.1	II	6
3124	TOXIC SOLID, SELF-HEATING, N.O.S.	6.1	4.2	II	6
3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.	6.1	4.3	II	6
3243	SOLIDS CONTAINING TOXIC LIQUID, N.O.S.	6.1	—	II	2
3249	MEDICINE, SOLID, TOXIC, N.O.S.	6.1	—	II or III	11
3290	TOXIC SOLID, CORROSIVE INORGANIC, N.O.S.	6.1	8	II	6
	Any Dangerous Goods of Class 6.1 with no assigned Packing Group	**6.1**	**Any or none**	**—**	**11**
Class 8 — Corrosive substances					
Any	**All Dangerous Goods of Class 8 and Packing group I, except those listed below:**	**8**	**Any or none**	**I**	**11**
1759	CORROSIVE SOLID, N.O.S.	8	—	I	7
1905	SELENIC ACID	8	—	I	7
2430	ALKYLPHENOLS, SOLID, N.O.S. (including C2-C12 homologues)	8	—	I	7
3147	DYE, SOLID, CORROSIVE, N.O.S. or DYE INTERMEDIATE, SOLID, CORROSIVE, N.O.S.	8	—	I	7
3259	AMINES, SOLID, CORROSIVE, N.O.S. or POLYAMINES, SOLID, CORROSIVE, N.O.S.	8	—	I	7
3260	CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S.	8	—	I	7
3261	CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S.	8	—	I	7
3262	CORROSIVE SOLID, BASIC, INORGANIC, N.O.S.	8	—	I	7
3263	CORROSIVE SOLID, BASIC, ORGANIC, N.O.S.	8	—	I	7

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
Any	**All Liquid Dangerous Goods of Class 8 and Packing group II, except those listed below:**	**8**	**Any or none**	**II**	**2**
1724	ALLYLTRICHLOROSILANE, STABILIZED	8	3	II	11
1728	AMYLTRICHLOROSILANE	8	—	II	11
1747	BUTYLTRICHLOROSILANE	8	3	II	11
1753	CHLOROPHENYLTRICHLOROSILANE	8	—	II	11
1762	CYCLOHEXENYLTRICHLOROSILANE	8	—	II	11
1763	CYCLOHEXYLTRICHLOROSILANE	8	—	II	11
1766	DICHLOROPHENYLTRICHLOROSILANE	8	—	II	11
1767	DIETHYLDICHLOROSILANE	8	3	II	11
1769	DIPHENYLDICHLOROSILANE	8	—	II	11
1771	DODECYLTRICHLOROSILANE	8	—	II	11
1781	HEXADECYLTRICHLOROSILANE	8	—	II	11
1784	HEXYLTRICHLOROSILANE	8	—	II	11
1799	NONYLTRICHLOROSILANE	8	—	II	11
1800	OCTADECYLTRICHLOROSILANE	8	—	II	11
1801	OCTYLTRICHLOROSILANE	8	—	II	11
1804	PHENYLTRICHLOROSILANE	8	—	II	11
1816	PROPYLTRICHLOROSILANE	8	3	II	11
1818	SILICON TETRACHLORIDE	8	—	II	11
2434	DIBENZYLDICHLOROSILANE	8	—	II	11
2435	ETHYLPHENYLDICHLOROSILANE	8	—	II	11
2437	METHYLPHENYLDICHLOROSILANE	8	—	II	11
2439	SODIUM HYDROGENDIFLUORIDE	8	—	II	8

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
2442	TRICHLOROACETYL CHLORIDE	8	—	II	11
2576	PHOSPHORUS OXYBROMIDE, MOLTEN	8	—	II	11
2683	AMMONIUM SULPHIDE SOLUTION	8	3, 6.1	II	1
2826	ETHYL CHLOROTHIOFORMATE	8	3	II	11
2986	CHLOROSILANES, CORROSIVE, FLAMMABLE, N.O.S.	8	3	II	11
2987	CHLOROSILANES, CORROSIVE, N.O.S.	8	—	II	11
3094	CORROSIVE LIQUID, WATER-REACTIVE, N.O.S.	8	4.3	II	11
3301	CORROSIVE LIQUID, SELF-HEATING, N.O.S.	8	4.2	II	11
Any	**All Liquid Goods of Class 8 and Packing group III, except those listed below:**	**8**	**Any or none**	**III**	**3**
1793	ISOPROPYL ACID PHOSPHATE	8	—	III	2
2215	MALEIC ANHYDRIDE, MOLTEN	8	—	III	11
2803	GALLIUM	8	—	III	11
2809	MERCURY	8	6.1	III	11
Any	**All Solid Goods of Class 8 and Packing group II or III except those listed below:**	**8**	**Any or none**	**II or III**	**8**
1774	FIRE EXTINGUISHER CHARGES, corrosive liquid	8	—	II	11
2028	BOMBS, SMOKE, NON-EXPLOSIVE with corrosive liquid, without initiating device	8	—	II	11
3084	CORROSIVE SOLID, OXIDIZING, N.O.S.	8	5.1	II	6
3095	CORROSIVE SOLID, SELF-HEATING, N.O.S.	8	4.2	II	6
3096	CORROSIVE SOLID, WATER-REACTIVE, N.O.S.	8	4.3	II	6
3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.	8	—	II	5

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	**Dangerous goods**	**Class**	**Sub-class**	**Packing group**	**Packing instruction**
	Any Dangerous Goods of Class 8 with no assigned packing group	**8**	**Any or none**	**—**	**11**
Class 9 — Miscellaneous substances and articles					
Any	**All Dangerous Goods of Class 9 and Packing group I**	**9**	**Any or none**	**I**	**11**
Any	**All Liquid Dangerous Goods of Class 9 and Packing group II**	**9**	**Any or none**	**II**	**2**
Any	**All Liquid Dangerous Goods of Class 9 and Packing group III, except those listed below:**	**9**	**Any or none**	**III**	**3**
1941	DIBROMODIFLUOROMETHANE	9	—	III	11
3257	ELEVATED TEMPERATURE LIQUID, N.O.S, at or above 100°C and below its flash point (including molten metals, molten salts, etc.)	9	—	III	1
Any	**All Solid Dangerous Goods of Class 9 and Packing group II or III, except those listed below:**	**9**	**Any or none**	**II or III**	**8**
2807	MAGNETIZED MATERIAL	9	—	III	11
3258	ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C	9	—	III	11
3316	CHEMICAL KIT or FIRST AID KIT	9		II or III	11
	Any Dangerous Goods of Class 9 with no assigned Packing group	**9**	**Any or none**	**—**	**11**
3496	BATTERIES, NICKEL-METAL HYDRIDE	9	—	—	08
3509	PACKAGINGS DISCARDED, EMPTY, UNCLEANED	9	—	—	08

Part 2 – Detailed packing instructions

Note: If the capital letters “HZ” appears in an IBC Code in this standard, the “Z” is replaced by the letter in the list in 4.2 b) that represents the material of construction of the outer casing of the composite IBC.

PACKING INSTRUCTION 1
The dangerous goods shall be offered for transport and transported in the following IBC: Metal (31A, 31B and 31N). Additional requirement: 1. Dangerous goods in Packing group I or II that have a primary hazard of Class 6.1 and that meet the criteria for inhalation toxicity in accordance with Section 2.28 of the TDG Regulations, shall not be handled, offered for transport, or transported in an IBC that has a bottom outlet.

PACKING INSTRUCTION 2
The dangerous goods shall be offered for transport and transported in the following IBCs: Metal (31A, 31B and 31N); Rigid Plastic (31H1 and 31H2); or Composite (31HZ1). Additional requirements: 1. If the liquid dangerous good is offered for transport or transported in a rigid plastic IBC or a composite IBC, see 12.7.1. 2. Dangerous goods in Packing group I or II that have a primary hazard of Class 6.1 and that meet the criteria for inhalation toxicity in accordance with Section 2.28 of the TDG Regulations, shall not be handled, offered for transport, or transported in an IBC that has a bottom outlet. Special packing provisions: 1. Liquid dangerous goods, UN1164, 1234, 1265, 1278, 1891, 2246, 2288, 2460, 2612, and 2622, with a vapour pressure greater than 110 kPa at 50 °C or 130 kPa at 55 °C, shall not be offered for transport or transported in the IBC. 2. If dangerous goods UN1791, 2014, 2984 or 3149 are offered for transport and transported, the IBC shall have a device to allow venting during transport. The inlet to the venting device shall be located in the vapour space of the IBC under maximum filling conditions during transport. 3. If dangerous goods UN1222 or 1865 are offered for transport or transported, the IBC shall have a capacity equal to or less than 450 L. 4. If dangerous good UN2031 with more than 55% nitric acid is offered for transport or transported in a rigid plastic IBC or a composite IBC with a rigid plastic inner receptacle, they shall not be used for more than two years from their date of manufacture. 5. If dangerous goods UN1203, 1230, 1863 or 1268 are offered for transport or transported, the IBC may be a mobile IBC (or a substitute specification referred in 12.5.2 and 12.5.3) having a capacity equal to or less than 3000 L.

PACKING INSTRUCTION 3
The dangerous goods shall be offered for transport and transported the following IBCs: Metal (31A, 31B and 31N); Rigid plastic (31H1 and 31H2); or Composite (31HZ1, 31HA2, 31HB2, 31HN2, 31HD2 and 31HH2). Additional requirement: 1. If the liquid dangerous good is offered for transport or transported in a rigid plastic IBC or a composite IBC, see 12.7.1. Special packing provisions: 1. Liquid dangerous goods, UN1593, with a vapour pressure greater than 110 kPa at 50 °C, or 130 kPa at 55 °C, shall not be offered for transport or transported in the IBC. 2. Ammonia Solutions, UN2672, that exceed 29.4 % concentration by mass of NH_3 (26.0 °B at 15.6 °C) shall not be offered for transport or transported in the IBC. Note: °B indicates Baumé scale. A scale used to measure the density of liquids (SI or metric units are not available for these measurement units). 3. If dangerous goods, UN1202, 1223, 1268 or 1863, are offered for transport or transported, the IBC may be a mobile IBC (or a substitute specification referred in 12.5.2 and 12.5.3) having a capacity equal to or less than 5000 L. 4. If dangerous goods, UN3532 or 3534, are offered for transport or transported, the IBC shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization.

PACKING INSTRUCTION 4
The dangerous goods shall be offered for transport and transported in the following IBC: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N). Special packing provision: 1. If the dangerous goods are in Packing group I, the IBC shall be transported in a closed cargo transport unit.

PACKING INSTRUCTION 5
The dangerous goods shall be offered for transport and transported in the following IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastic (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); or Composite (11HZ1, 21HZ1 and 31HZ1). Additional requirement: 1. If the liquid dangerous good is offered for transport or transported in a rigid plastic IBC or a composite IBC see 12.7.1. Special packing provisions: 1. If the dangerous goods are in Packing group I, the IBC shall be transported in a closed cargo transport unit. 2. If solid dangerous goods, other than UN3244, are in Packing group II and are contained in a composite IBC, the IBC shall be transported in a closed cargo transport unit.

PACKING INSTRUCTION 6
The dangerous goods shall be offered for transport and transported in the following IBCs: Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N); Rigid plastic (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2); or Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2 and 31HZ1). Additional Requirements: 1. If the solid dangerous good may become liquid during transport, see 12.8.1. 2. If liquid dangerous good is offered for transport or transported in a rigid plastic IBC or a composite IBC, see 12.7.1. 3. Dangerous goods in packing group I or II that have a primary hazard of Class 6.1 and that meet the criteria for inhalation toxicity in accordance with Section 2.28 of the TDG Regulations, shall not be handled, offered for transport, or transported in an IBC that has a bottom outlet. Special packing provisions : 1. If the dangerous goods are in packing group I, the IBC shall be transported in a closed cargo transport unit. 2. If solid dangerous goods, other than UN1361, 2004 and 3400, are in packing group II and are contained in a composite IBC, the IBC shall be transported in a closed cargo transport unit. 3. For UN2907, IBCs shall meet the packing group II performance level. IBCs meeting the test criteria of packing group I shall not be used.

PACKING INSTRUCTION 7

The dangerous goods shall be offered for transport and transported in the following IBCs:

Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N);

Rigid plastic (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2);

Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2 and 31HZ1); or

Wooden (11C, 11D and 11F).

Additional requirements:

1. If the solid dangerous good may become liquid during transport, see 12.8.1.
2. Liners of wooden IBCs shall be sift-proof.
3. If the liquid dangerous good is offered for transport or transported in a rigid plastic IBC or a composite IBC, see 12.7.1.
4. Dangerous goods in packing group I or II that have a primary hazard of Class 6.1 and that meet the criteria for inhalation toxicity in accordance with Section 2.28 of the TDG Regulations, shall not be handled, offered for transport, or transported in an IBC that has a bottom outlet.

Special packing provisions:

1. If the dangerous goods are in packing group I, the IBC shall be transported in a closed cargo transport unit.
2. If solid dangerous goods are in packing group II and are contained in a composite or wooden IBC, the IBC shall be transported in a closed cargo transport unit.
3. If dangerous goods, UN3531 or 3533, are offered for transport or transported, the IBC shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the IBCs in the event of loss of stabilization.

PACKING INSTRUCTION 8

The dangerous goods shall be offered for transport and transported in the following IBCs:

Metal (11A, 11B, 11N, 21A, 21B, 21N, 31A, 31B and 31N);

Rigid plastic (11H1, 11H2, 21H1, 21H2, 31H1 and 31H2);

Composite (11HZ1, 11HZ2, 21HZ1, 21HZ2 and 31HZ1);

Fiberboard (11G);

Wooden (11C, 11D and 11F); or

Flexible (13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 and 13M2).

Additional requirements:

1. If the solid dangerous good may become liquid during transport, see 12.8.1.
2. If the liquid dangerous good is offered for transport or transported in a rigid plastic IBC or a composite IBC, see 12.7.1.
3. Dangerous goods in packing group I or II that have a primary hazard of Class 6.1 and that meet the criteria for inhalation toxicity in accordance with Section 2.28 of the TDG Regulations, shall not be handled, offered for transport, or transported in an IBC that has a bottom outlet.

Special packing provisions:

1. Dangerous goods UN1327, 1363, 1364, 1365, 1386, 1408, 1841, 1856, 2211, 2217, 2793, 3314 or 3496 may be offered for transport and transported in a non-standardized IBC.
2. If dangerous goods of packing group III, other than UN1396, 1398, 1403, 1405, 1408, 1418, 1435, 1436, 1748, 2813, 2844, 2880, 2950, 2968, 3089, 3131, 3134, 3135, 3170, 3208, 3209 and 3487, are offered for transport or transported in a flexible IBC, the IBC shall be sift-proof and water resistant or shall have a liner that is water resistant and sift-proof.
3. If solid dangerous goods of packing group II are contained in a flexible, composite, wooden or fibreboard IBC, the IBC shall be transported in a closed cargo transport unit.
4. If the dangerous goods of packing group II and some of the dangerous goods of packing group III (UN1396, 1398, 1403, 1405, 1408, 1418, 1435, 1436, 1748, 2813, 2844, 2880, 2950, 2968, 3089, 3131, 3134, 3135, 3170, 3208, 3209 and 3487), are transported in a flexible, fibreboard or wooden IBC, the IBC shall be sift-proof and water resistant or shall have a liner that is water-resistant and sift-proof.
5. Dangerous goods UN3509, IBCs and their parts shall be transported in leakproof and sift-proof containers. IBCs or rigid inner receptacles which are transported closed and do not leak may be transported unpackaged.

PACKING INSTRUCTION 10

1. This packing instruction applies to organic peroxides and self-reactive substances of type F.
2. Dangerous Goods in Class 5.2 shall be transported at or below the control temperature and the emergency temperature.
3. The IBC shall have a device to allow venting during transport. The inlet to the venting device shall be located in the vapour space of the IBC under maximum filling conditions during transport.
4. To prevent explosive rupture of metal IBCs or composite IBCs with complete metal casing, the IBC shall be equipped with an emergency pressure relief device designed to vent all the decomposition products and vapours evolved during self-accelerating decomposition or during a period of not less than one hour of complete fire-engulfment as calculated by the formula in 4.2.1.13.8 in the UN Recommendations.

UN No.	Organic peroxide	Type of IBC	Maximum quantity (L)	Control temperature (°C)	Emergency temperature (°C)
3109	tert-Butyl hydroperoxide, not more than 72% with water	31A 31HA1	1250 1000	—	—
	tert-Butyl peroxyacetate, not more than 32% in diluent type A	31A 31HA1	1250 1000	—	—
	tert-Butyl peroxybenzoate, not more than 32% in diluent type A	31A	1250	—	—
	tert-Butyl peroxy-3,5,5-trimethylhexanoate, not more than 37% in diluent type A	31A 31HA1	1250 1000	—	—
	Cumyl hydroperoxide, not more than 90% in diluent type A	31HA1	1250	—	—
	Dibenzoyl peroxide, not more than 42% as a stable dispersion	31H1	1000	—	—
	2,5-Dimethyl-2,5-di(tert-butylperoxy)hexane, not more than 52% in diluent type A	31HA1	1000	—	—
	Di-tert-butyl peroxide, not more than 52% in diluent type A	31A 31HA1	1250 1000	—	—
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 37% in diluent type A	31A	1250	—	—
	1,1-Di-(tert-butylperoxy)cyclohexane, not more than 42% in diluent type A	31H1	1000	—	—

	Dilauroyl peroxide, not more than 42%, stable dispersion, in water	31HA1	1000	—	—
	Isopropylcumyl hydroperoxide, not more than 72% in diluent type A	31HA1	1250	—	—
	p-Menthyl hydroperoxide, not more than 72% in diluent type A	31HA1	1250	—	—
	Peroxyacetic acid, stabilized, not more than 17%	31H1 31H2 31HA1 31A	1500 1500 1500 1500	—	—
	3,6,9-Triethyl-3,6,9-trimethyl-1,4,7-triperoxonane not more than 27% in diluent type A	31HA1	1000	—	—
3110	**ORGANIC PEROXIDE, TYPE F, SOLID**			—	—
	Dicumyl peroxide	31A 31H 31HA1	2000	—	—
3119	**ORGANIC PEROXIDE, TYPE F, LIQUID, TEMPERATURE CONTROLLED**			—	—
	tert-Amyl peroxypivalate, not more than 42% as a stable dispersion in water	31HA1	1000	+10 °C	+15 °C
	tert-Butyl peroxypivalate, not more than 42% in a diluent type A	31HA1 31A	1000 1250	+10 °C +10 °C	+15 °C +15 °C
	tert-Amyl peroxypivalate, not more than 32% in diluent type A	31A	1250	+10 °C	+15 °C
	tert-Butyl peroxy-2-ethylhexanoate, not more than 32% in diluent type B	31HA1 31A	1000 1250	+30 °C +30 °C	+35 °C +35 °C
	tert-Butyl peroxyneodecanoate, not more than 32% in diluent type A	31A	1250	0 °C	+10 °C
	tert-Butyl peroxyneodecanoate, not more than 42% stable dispersion, in water	31A	1250	- 5 °C	+5 °C
	tert-Butyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	-5 °C	+5 °C

	tert-Butyl peroxypivalate, not more than 27% in diluent type B	31HA1 31A	1000 1250	+10 °C +10 °C	+15 °C +15 °C
	Cumyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	- 15 °C	- 5 °C
	Di-(4-tert-butylcyclohexyl) peroxydicarbonate, not more than 42%, stable dispersion, in water	31HA1	1000	+30 °C	+35 °C
	Dicetylperoxydicarbonate, not more than 42%, stable dispersion, in water	31HA1	1000	+30 °C	+35 °C
	Dicyclohexylperoxydicarbonate, not more than 42% as a stable dispersion, in water	31A	1250	+10 °C	+15 °C
	Di-(2-ethylhexyl) peroxydicarbonate, not more than 62%, stable dispersion, in water	31A 31HA1	1250 1000	-20 °C -20 °C	-10 °C -10 °C
	Diisobutyryl peroxide, not more than 28% as a stable dispersion in water	31HA1 31A	1000 1250	-20 ºC -20 ºC	-10 ºC -10 ºC
	Diisobutyryl peroxide, not more than 42% as a stable dispersion in water	31HA1 31A	1000 1250	-25 ºC -25 ºC	-15 ºC -15 ºC
	Dimyristyl peroxydicarbonate, not more than 42%, stable dispersion, in water	31HA1	1000	+15 °C	+20 °C
	Di-(2-neodecanoylperoxyisopropyl)benzene, not more than 42%, stable dispersion, in water	31A	1250	-15 °C	-5 °C
	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 52% in diluent type A	31HA1 31A	1000 1250	+10 °C +10 °C	+15 °C +15 °C
	Di-(3,5,5-trimethylhexanoyl) peroxide, not more than 52%, stable dispersion, in water	31A	1250	+10 °C	+15 °C
	3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A	1250	-15 °C	-5 °C
	tert-Amyl peroxy-2-ethylhexanoate, not more than 62% in diluent type A	31HA1	1000	+15 °C	+20 °C
	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate, not more than 67%, in diluent type A	31HA1	1000	+15 °C	+20 °C

	1,1,3,3-Tetramethylbutyl peroxyneodecanoate, not more than 52%, stable dispersion, in water	31A 31HA1	1250 1000	-5 °C -5 °C	+5 °C +5 °C
3120	**ORGANIC PEROXIDE, TYPE F, SOLID, TEMPERATURE CONTROLLED**	—	—	—	—

PACKING INSTRUCTION 11
1. The dangerous goods shall not be offered for transport or transported in an IBC.

Annex C
(normative)

Periodic leak test and inspection

C.1 Transport Canada registration

C.1.1 Registration

A facility that conducts the periodic leak test and inspection of IBCs as required by 12.6 shall be registered with the Director.

C.1.2 Certificate of registration

A periodic leak test and inspection facility is registered upon issuance, by the Director, of a certificate of registration. The certificate of registration remains valid until its indicated expiry date or its revocation for cause.

C.1.3 Application for registration

C.1.3.1 An application for registration of a periodic leak test and inspection facility shall be submitted to the Director and, at a minimum, shall include the following information:

a) The facility's name and address;

b) The address from which the mobile IBC leak test and inspection units are controlled and where all documentation is kept, and the number of mobile units controlled from that location, if applicable;

c) A copy of the quality manual in accordance with C.1.5.3.4;

d) A sample of the proposed marking as required in C.7; and

e) A sample of a leak test and inspection record as required in C.8, if applicable.

C.1.4 Revocation for cause

The Director may revoke the certificate of registration of the facility if the Director is satisfied that the person is not capable of consistently complying with the applicable requirements of this annex.

C.1.5 Quality management system

C.1.5.1 Application

Each facility conducting the periodic leak test and inspection shall have and adhere to a quality management system.

C.1.5.2 General requirements

The quality management system shall, at minimum, include the elements listed in C.1.5.3.

C.1.5.3 Specific elements and processes of the quality management system

The quality management system of a leak test and inspection facility shall include all of the following elements and processes.

C.1.5.3.1 Management Commitment

Facility management shall appoint a member of management who, irrespective of other responsibilities, has the authority and responsibility for overseeing the quality management system of the facility, including:

a) ensuring the quality management system is established and maintained;

b) reporting to management on the performance of the quality management system;

c) promoting awareness of the importance of the requirements of this standard and the TDG Regulations throughout the facility.

C.1.5.3.2 Human Resources

A human resources management process:

a) assigns quality responsibilities to personnel deemed competent on the basis of applicable education, training, skills, and experience;

b) determines personnel's competency needs affecting quality;

c) provides effective training to ensure competency of personnel;

d) creates and maintains records of education, training, qualification and certification as required;

e) creates and maintains awareness of the importance of the quality management system to all employees.

C.1.5.3.3 Purchasing

When applicable, a purchasing control process shall be established and maintained to ensure that purchased replacement parts conform to the requirements of this standard and the TDG Regulations.

C.1.5.3.4 Quality manual

A quality manual shall be developed, with the following components:

a) **Title page** with the company name, facility location, and name and position of the person responsible for compliance with this standard;

b) **Flow chart** depicting the operation of the facility with specific reference to the equipment and its use, inspection and test points, and sequence of operations. The flow chart is intended to supplement the written procedures and provide a visually representation of the actual sequence of operations;

c) **Description of the process** used for implementing and documenting the quality management system;

d) **List of all written instructions or procedures**, where they are located in the facility and who is responsible for performing them. The instructions and procedures shall include all activities to ensure that the work performed conforms to this standard. They shall include but are not limited to the following:

    1) Pre-test inspection;

    2) Internal inspection;

    3) Leak testing and external inspection;

    4) Calibration of testing equipment;

5) Statement concerning how IBCs that do not conform to the requirements of this standard are to be handled;

6) Statement indicating who is responsible for keeping the program documentation manual up to date and the procedure for initiating and implementing a change in the manual.

C.2 Preparation

C.2.1 General requirement

C.2.1.1 IBC eligibility

An IBC shall not be accepted for the periodic leak test and inspection if

a) the compliance markings are removed or illegible, unless they can be replaced in accordance with 5.3.12;

b) for plastic IBCs, it is passed the prescribed period in 12.2 d) 2);

c) it last transported explosives and was not decontaminated in accordance with C.2.2.3.

C.2.1.2 Mobile IBCs

Unless contained in equipment or fully enclosed in a means of transport, mobile IBCs shall be removed from the means of transport so that all accessible surfaces are examined for damage or evidence of leakage.

C.2.1.3 Notice to user

The IBC owner shall provide a copy of the notice to user to the leak test and inspection facility upon request.

C.2.2 Cleaning

C.2.2.1 Cleaning of IBCs other than IBCs in explosive service and mobile IBCs

The cleaning process shall consist of the steps below. Steps need not be performed in the sequence specified.

1) Thoroughly drained of all previous ladings;

2) Interior washed to remove previous ladings;

3) Interior rinsed to remove washing materials;

4) Interior dried to remove liquids; and

5) Exterior washed to remove previous ladings, foreign material, labels (other than the compliance markings) and adhesives from all exterior components of the IBC.

C.2.2.2 Cleaning of mobile IBCs

C.2.2.2.1 Interior cleaning

A mobile IBC is not required to be drained and the interior of the IBC is not required to be cleaned. When a protected IBC consists of a double wall construction that acts as a secondary containment, the secondary containment shall be drained prior to inspection and remain open during the test and inspection. The interstitial spaces on an IBC with multi compartments shall be drained prior to inspection and remain open during the test and inspection.

C.2.2.2.2 Exterior cleaning

Unless contained in equipment or fully enclosed in a means of transport, the exterior of the mobile IBCs shall be washed to remove previous ladings and foreign material from all exterior components of the IBC.

C.2.2.3 IBCs in explosives service

An IBC that has last transported explosives shall be decontaminated prior to the periodic leak test and inspection. The decontamination shall be done in accordance with the requirements of CAN/CGSB-43.151.

C.2.3 Vents

Vents or vented closures shall be replaced by non-vented closures, fastened in the closed position, or removed and their openings plugged during the leak test.

C.3 Pre-test inspection

C.3.1 General

All IBCs shall be inspected prior to the leak test.

C.3.2 Procedure

Pre-test inspection shall include the following:

a) Inspecting the interior of a metal IBC for dents, defective welds, corrosion and loss of protective coating. Mobile IBCs do not require to be inspected internally.

b) Inspecting the interior of a rigid plastic IBC or the inner receptacle of a composite IBC for excessive crazing, cracks, swelling, gouges, permanent deformation and degradation from ultraviolet light.

c) Inspecting the fittings, closures, structural components, vents, valves, pumps, hoses, lids and gaskets of the IBC for defects. Defective gaskets shall be replaced with new gaskets equivalent in performance to the original and suitable for the intended use.

d) Every reclosing pressure-relief device that is an emergency relief device shall be externally inspected for any corrosion or damage and shall also be tested to open within the required set pressure range in accordance with 6.1.7 b).

e) Inspecting the exterior of a metal IBC and the metal outer casing of a composite IBC for dents, defective welds, corrosion and loss of protective coating.

f) Inspecting the exterior of a rigid plastic IBC, the inner receptacle and the plastic outer casing of a composite IBC, for excessive crazing, cracks, swelling, gouges, permanent deformation and degradation from ultraviolet light. The inner receptacle shall be removed from the outer casing for the purpose of inspecting the exterior of the inner receptacle.

C.3.3 Results

Inspection of the IBC in accordance with C.3.2 shall show no defects that could render the IBC unsafe for transporting dangerous goods. An IBC having defects shall be:

a) repaired and re-inspected before being leak tested in accordance with C.4; or

b) removed from dangerous goods service.

C.4 Leak test

C.4.1 General

A leak test shall be conducted in conjunction with the external inspection requirements of C.5. The leak test shall be conducted in accordance with this section. An alternative test method that is at least equally effective may be used provided documented evidence shows that it will effectively detect at the same level of sensitivity as the design type test method in 7.6. Alternative test methods shall be validated by the facility, the test equipment manufacturer or a third party. All validation data shall be retained for 36 months after the test method is no longer used by the facility. The validation data shall be made available to the Director upon request.

C.4.2 Test pressure

A test pressure equal to or greater than 20 kPa shall be applied to the body or inner receptacle of the IBC. During the test, measures shall be taken to prevent overpressurization of the IBC.

C.4.3 Pressure gauge

The pressure shall be measured by use of a gauge that:

a) has a range of no less than 1.5 times the test pressure;

b) has a range of no more than 5 times the test pressure, and

c) is calibrated at least annually or in accordance with the gauge manufacturer recommendations.

Various means of pressure measurement calibration may be used. The facility shall develop a quality control procedure [see C.1.5.3.4 d) 4)] for ensuring that instruments are maintained and calibrated, and that they operate within suitable parameters.

The pressure gauge shall be positioned so that it reads the pressure within the IBC body or inner receptacle.

Note: Placing the pressure gauge on the pressure supply line may cause pressure readings to appear higher than actually found in the container.

C.4.4 Test duration

The pressure shall be held for at least 10 min unless an alternative method is used in accordance with C.4.1. The duration required for different type and size of IBCs shall be documented in the quality management system [see C.1.5.3.4 d) 4)].

C.4.5 Procedure

C.4.5.1 IBCs other than mobile IBCs

The IBC shall be observed for leakage during the test period by any effective means such as coating the seams, joints and flange seals of the IBC with a soapy solution or by submersing the IBC in water and observing for bubbles or by measuring a drop in pressure. In the case of water submersion or hydraulic pressure, the test pressure may be adjusted to take into account the hydrostatic pressure.

C.4.5.2 Mobile IBCs

C.4.5.2.1 Mobile IBCs accessible for complete external inspection

C.4.5.2.1.1 General

This section applies to IBCs that are accessible for complete external inspection and to the primary containment of a protected IBC.

a) Unprotected IBCs – IBCs shall be observed for leakage during the test period by coating the seams, joints and flange seals with soapy solution or by measuring a pressure drop.

b) Protected IBCs – IBCs shall be observed for leakage during the test period by measuring a pressure drop in the primary containment.

c) IBCs with multiple compartments – IBCs shall be observed for leakage during the test period by measuring a pressure drop in each containment. All visible seams, joints and flange seals may also be coated with soapy solution and observed for leakage during the test period. Interstitial spaces shall be open to the atmosphere during this test.

Note: For a protected IBC consisting of a double wall construction that acts as a secondary containment, if the secondary containment is leak tested, air pressure may be maintained in the primary containment to protect it against possible damage from external pressure.

C.4.5.2.2 Mobile IBCs not accessible for complete external inspection

C.4.5.2.2.1 General

This subclause applies to IBCs contained in equipment or fully enclosed in a means of transport and to primary containments of a protected IBC.

a) Unprotected IBCs – IBCs shall be observed for leakage during the test period by measuring a pressure drop.

b) Protected IBCs – IBCs shall be observed for leakage during the test period by measuring a pressure drop in the primary containment.

c) IBCs with multiple compartments ─ IBCs shall be observed for leakage during the test period by measuring a pressure drop in each compartment. Interstitial spaces shall be open to the atmosphere during this test.

Note: For a protected IBC consisting of a double wall construction that acts as a secondary containment, if the secondary containment is leak tested, air pressure may be maintained in the primary containment to protect it against possible damage from external pressure.

C.4.6 Test media

Test medium can be one of the following:

a) the normal lading of the IBC (mobile IBC only);

b) inert gas; or

c) air.

The tester shall be aware of the need for proper purging and ensure that there is no possibility of creating a mixture of product and air within the explosive limits of the product.

The tester shall be aware of the need for proper filling to avoid electrical discharge as required in 12.3 e). During the test, measures shall be taken in case of a release of the test medium.

C.4.7 Results

Testing of the IBC in accordance with C.4.4 shall not result in the leakage of air, gas or liquid from the IBC. An IBC having defects shall be:

a) repaired and successfully leak tested and inspected before it is marked in accordance with C.7; or

b) removed from dangerous goods service.

C.5 External inspection

C.5.1 General

The external inspection shall be conducted on the IBC while pressure is being applied. In the case of a composite IBC, the inner receptacle may be removed from the outer casing and pressure applied while the inspection is being conducted. In the case of a lightweight IBC, the inner receptacle may remain inside the outer casing.

C.5.2 Procedure

External inspection shall include the following:

a) Inspecting the fittings, closures, valves, pumps, lids and gaskets of the IBC for defects or leaks.

b) Inspecting the exterior of a metal IBC for cracks, weld defects, leaks, bulging or permanent deformation.

c) Inspecting the exterior of a rigid plastic IBC and the inner receptacle of a composite IBC, for excessive crazing, cracks, swelling or permanent deformation.

C.5.3 Results

Inspection of the IBC in accordance with C.5.2 shall show no defects that could render the IBC unsafe for transporting dangerous goods. An IBC having defects shall be:

a) repaired and successfully leak tested and inspected before it is marked in accordance with C.7; or

b) removed from dangerous goods service.

C.6 Repair

C.6.1 Original specification

If a standardized IBC is repaired or replacement parts are installed on the IBC, the repairs and replacement parts shall be of the same specification as the original unless otherwise permitted by the applicable standard.

C.6.2 Compliance marks

C.6.2.1 If the compliance marks on an IBC is damaged or difficult to read as a result of the cleaning, routine maintenance or repair process, the marks shall be reproduced on the IBC and remain legible for the life expectancy of the IBC.

C.6.2.2 Missing or illegible compliance marks shall be replaced in accordance with 5.3.12.

C.6.2.3 IBCs shall also be marked in accordance with 5.3.7 if they were manufactured before the maximum permissible stacking load or non-stackable IBC symbol was required.

C.6.3 Inner receptacle of a composite IBC

If the plastic inner receptacle of a composite standardized IBC is replaced, the replacement receptacle shall be a receptacle of the same specification as the original. If inner receptacles of the same specification are no longer manufactured, a receptacle of a design that is comparable to and has the same outer dimensions as the original receptacle shall be used provided the inner receptacle is from the same manufacturer as the original. If the inner receptacle is not from the same manufacturer as the original, the requirements for cross-bottled IBCs will apply.

C.6.4 Leak test and inspection of a repaired IBC

A repaired IBC shall be successfully leak test in accordance with C.4.

C.7 Leak test and inspection marks

C.7.1 General

An IBC that has been successfully leak tested and inspected shall be marked with the letter “R,” followed by the month, designated numerically, and the last two digits of the year of the leak test and inspection, followed by the Transport Canada registration number of the periodic leak test and inspection facility. Each section may be separated by a space, dash or slash.

The leak test and inspection marks shall:

a) remain legible until the next periodic leak test and inspection;

b) be placed on the body or, in the case of a composite IBC, on the outer casing and readily accessible for inspection.

C.7.2 Example of leak test and inspection marks

For an IBC that has passed the leak test and inspection in March 2019 by the facility holding the registration number 33-xx, the leak test and inspection marks will be:

R 0319 33-xx.

C.8 Leak test and inspection records for metal IBCs

C.8.1 Content

Every successful leak test and inspection of a metal IBC shall be recorded, and a copy of the record shall be retained by the person in charge of the leak test and inspection facility and by the owner of the IBC subjected to C.8.2. The record shall include the type of IBC, the owner’s name and address, the date of the leak test and inspection, the serial number of the IBC, the name, address and certificate of registration number of the leak test and inspection facility, and the results of the leak test and inspection.

C.8.2 Retention period

C.8.2.1 Facility’s retention period

C.8.2.1.1 IBC other than a mobile IBC

The minimum record retention period is 30 months.

C.8.2.1.2 Mobile IBC

The minimum record retention period is 60 months.

C.8.2.2 Owner's retention period

C.8.2.2.1 The owner of the IBC shall keep the record until the next leak test and inspection unless the IBC is permanently removed from dangerous goods service.

Annex D
(informative)

Maximum vapour pressure for liquid dangerous goods transported in a code 31H or 31HZ IBC

Table D.1 — Maximum vapour pressure for liquid dangerous goods transported in a code 31H or 31HZ IBC

Test pressure marked on the IBC (kPa)	Maximum V_{p50}[a] (kPa)	Maximum V_{p55}[a] (kPa)
40	80	93
60	91	106
93 or more	110	130
[a] V_{p50} = vapour pressure at 50 °C, and V_{p55} = vapour pressure at 55 °C.		
Note: Approximate absolute vapour pressure at 50 °C for some liquids: gasoline: 155 kPa naphtha: 43 kPa aviation fuel: 74 kPa toluene: 20 kPa		

Annex E
(informative)

Minimum venting capacity for metal IBCs used for transporting liquids

Venting capacity should be marked on the individual pressure vent device.

Table E.1 — Examples of emergency venting capacity

Wetted area m^2 (ft^2)	Minimum venting capacity[a] N m^3/h (SCF/h)	Minimum opening, nominal pipe size mm (inches)
1.86 (20)	447-597 (15,800-21,100)	50.8 (2)
2.79 (30)	671-895 (23,700-31,600)	50.8 (2)
3.72 (40)	895-1,192 (31,600-42,100)	76.2 (3)
4.65 (50)	1,119-1,492 (39,500-52,700)	76.2 (3)
5.57 (60)	1,342-1,790 (47,400-63,200)	76.2 (3)
6.50 (70)	1,566-2,087 (55,300-73,700)	101.6 (4)
7.43 (80)	1,792-2,384 (63,300-84,200)	101.6 (4)
8.36 (90)	2,016-2,684 (71,200-94,800)	101.6 (4)
9.29 (100)	2,240-2,973 (79,100-105,000)	101.6 (4)
11.15 (120)	2,687-3,568 (94,900-126,000)	127 (5)
13.01 (140)	3,135-4,163 (110,700-147,000)	127 (5)
14.86 (160)	3,582-4,757 (126,500-168,000)	127 (5)
16.72 (180)	4,029-5,380 (142,300-190,000)	127 (5)
18.58 (200)	4,477-5,975 (158,100-211,000)	152.4 (6)
23.23 (250)	5,751-6,768 (203,100-239,000)	152.4 (6)
27.87 (300)	6,374-7,504 (225,100-265,000)	152.4 (6)
32.52 (350)	6,957-8,155 (245,700-288,000)	203.2 (8)
37.16 (400)	7,504-8,155 (265,000-312,000)	203.2 (8)

Wetted area m^2 (ft^2)	Minimum venting capacity[a] N m^3/h (SCF/h)	Minimum opening, nominal pipe size mm (inches)
46.45 (500)	8,512-10,024 (300,600-354,000)	203.2 (8)
55.74 (600)	9,438-11,100 (333,300-392,000)	203.2 (8)
65.03 (700)	10,299-12,119 (363,700-428,000)	203.2 (8)
74.32 (800)	11,106-13,082 (392,200-462,000)	203.2 (8)
83.61 (900)	11,873-13,960 (419,300-493,000)	203.2 (8)
92.90 (1000)	12,601-14,838 (445,000-524,000)	254 (10)

[a] Minimum venting capacity was tabulated from various sources and typically falls within the range presented; higher venting capacity is not precluded.

Note: Interpolate for intermediate values.
In all cases, the total venting required is a combination of the capacity of the normal pressure vent together with the capacity of the emergency vent.

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