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CAN/CGSB-43.150-2020

Supersedes CAN/CGSB-43.150-1997
Incorporating Corrigendum No. 1



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

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NATIONAL STANDARD OF CANADA

CAN/CGSB-43.150-2020

Supersedes CAN/CGSB-43.150-1997
Incorporating Corrigendum No. 1

**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**

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS
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PREFACE

This National Standard of Canada CAN/CGSB-43.150-2020 supersedes the 1997 edition and Corrigendum No. 1.

Changes since the previous edition

- Transport Canada standard TP 14850 replaced CAN/CGSB-43.150 in 2010.
- This new edition of CAN/CGSB-43.150 now replaces TP 14850.

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Introduction

This edition of 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 supersedes the previous edition published in 1997, Corrigendum No. 1 published in January 1999 and subsequent editions of TP14850 in use prior to this edition.

The standard was updated in order to maintain consistency with and to incorporate language from other CGSB and Transport Canada publications that pertain to the *Transportation of Dangerous Goods Regulations* (TDG Regulations). This was done in order to facilitate compatibility with the other TDG standards referenced in the TDG Regulations.

This standard is intended for incorporation by reference into the 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.

The standard sets out requirements for

- design, manufacture and marking of UN Standardized small containers in Canada;
- selection and use of small containers for handling, offering for transport, or transporting dangerous goods in Class 3, 4, 5, 6.1, 8 and 9;
- Quality Management System applicable to UN Standardized small containers;
- registration applicable to facilities performing design and manufacture or qualification of UN Standardized small containers;
- selection and use of containers; including salvage containers, cylinders and spheres, and
- additional requirements for Class 4.1, Self reactive substances and Class 5.2, Organic peroxides.

The CGSB Committee on Small Containers for Transport of Dangerous Goods is comprised of members having responsibility and expertise in the design, manufacture and use of small containers including 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. The Committee considers this standard, developed by consensus, to be practical, current with respect to technology and industry practices, useful and acceptable to all interested parties.

It is the intent of the CGSB Committee to maintain this standard in a manner that meets the needs of Canada.

This standard was prepared by the CGSB Committee on Small Containers for Transport of Dangerous Goods and has been formally approved by the Committee.

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

1 Scope

1.1 Organization and content

This standard sets out requirements for designing, manufacturing, and marking UN Standardized drums, jerricans, boxes, bags, combination packaging and composite packaging (UN Standardized small containers) and for selecting and using small containers for the transportation of dangerous goods in Classes 3, 4, 5, 6.1, 8 and 9. This standard consists of two parts and two annexes.

Part I contains the requirements for the design, manufacture and marking of UN Standardized small containers in Canada.

Part II contains the requirements for the selection and use of small containers for handling, offering for transport, or transporting dangerous goods in Classes 3, 4, 5, 6.1, 8 and 9.

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

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

Annex B provides general guidance on the temperature control of organic peroxides and self-reactive substances during transportation.

The requirements of this standard may be called for in the explosives packing instructions (EP) of the CAN/CGSB-43.151 standard.

1.2 Application

This standard applies to both standardized and non-standardized means of containment as defined by the *Transportation of Dangerous Goods Regulations* (TDG Regulations).

1.3 Minimum requirements

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

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

1.4 Additional requirements

1.4.1 Conflict

The *Transportation of Dangerous Goods Act, 1992* (TDG Act) and the *Transportation of Dangerous Goods Regulations* (TDG Regulations) may set out additional requirements regarding the design, construction, qualification, selection, and use, or 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 TDG Act or TDG 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.

1.4.2 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 standard 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.

1.4.3 Units

Quantities and dimensions used in this standard are given in SI units. Pressures of all kinds relating to containers (such as test pressure and internal pressure) are indicated in gauge pressure unless specifically noted otherwise. The vapour pressure of substances is indicated in absolute pressure unless specifically noted otherwise.

1.4.4 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 addresses provided below were 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 standard. 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-43.126 — *Reconditioning, Remanufacturing and Repair of Drums for the Transportation of Dangerous Goods.*

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

2.1.1 Source

The above may be obtained from the Canadian General Standards Board, Sales Centre, Gatineau, QC K1A 1G6 Canada. Telephone: 819-956-0425 or 1-800-665-2472. Fax: 819-956-5740. E-mail: ncr.ongc-cgsb@tpsgc-pwgsc.gc.ca. Web site: www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html.

2.2 Canadian Standards Association (CSA)

CSA B339 — *Cylinders, spheres, and tubes for the transportation of dangerous goods.*

CSA B340 — *Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2.*

CSA B341 — *UN pressure receptacles and multiple-element gas containers for the transport of dangerous goods.*

CSA B342 — *Selection and use of UN pressure receptacles, multiple-element gas containers, and other pressure receptacles for the transport of dangerous goods, Class 2.*

2.2.1 Source

The above may be obtained from CSA Group, Standards Sales, 178 Rexdale Blvd., Toronto, ON M9W 1R3 Canada, telephone: 416-747-4000 or 1-800-463-6727, fax: 416-747-2473, E-mail: sales@csagroup.org, Web site: shopcsa.ca.

2.3 Canadian Nuclear Safety Commission (CNSC)

Packaging and Transport of Nuclear Substances Regulations, 2015.

2.3.1 Source

The above may be obtained from the Canadian Nuclear Safety Commission, 280 Slater Street, P.O. Box 1046, Station B, Ottawa, ON Canada K1P 5S9. Telephone: 613-995-5894 or 1-800-668-5284. Web site: www.nuclearsafety.gc.ca/eng/index.cfm.

2.4 Transport Canada (TC)

Transportation of Dangerous Goods Act, 1992, including amendments.

Transportation of Dangerous Goods Regulations, including amendments.

TP 14850 — *Small Containers for Transport of Dangerous Goods, Classes 3, 4, 5, 6.1, 8, and 9, a Transport Canada Standard*, October 2010.

2.4.1 Source

The above may be obtained from the Publishing and Depository Services, Public Services and Procurement Canada, Ottawa, ON K1A 0S5 Canada. Telephone: 613-941-5995 or 1-800-635-7943. Fax: 613-954-5779 or 1-800-565-7757. E-mail: publications@tpsgc-pwgsc.gc.ca. Web site: www.publications.gc.ca.

2.5 Natural Resources Canada (NRCan)

Explosives Act (R.S.C., 1985, c. E-17), including amendments.

Explosives Regulations, 2013 (SOR/2013-211), including amendments.

2.5.1 Source

The above may be obtained from Natural Resources Canada, Minerals and Metals Sector, 580 Booth Street, Ottawa, ON K1A 0E4 Canada. Telephone: 613-943-8236 (Publishing Program) or 613-947-6580. Teletype: 613-996-4397. Fax: 613-947-4198 (Publishing Program) or 613-952-7501 (General Inquiry). The above may also be obtained from the Publishing and Depository Services, Public Services and Procurement Canada, Ottawa, Canada K1A 0S5. Telephone: 613-941-5995 or 1-800-635-7943. Fax: 613-954-5779 or 1-800-565-7757. E-mail: publications@tpsgc-pwgsc.gc.ca. Web site: publications.gc.ca.

2.6 ASTM International

D445-17a — *Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity).*

D1200-10(2014) — *Standard Test Method for Viscosity by Ford Viscosity Cup.*

D1415-06(2012) — *Standard Test Method for Rubber Property—International Hardness.*

D2240-15e1 — *Standard Test Method for Rubber Property—Durometer Hardness.*

D3078-02(2013) — *Standard Test Method for Determination of Leaks in Flexible Packaging by Bubble Emission.*

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

D4577-05(2010) — *Standard Test Method for Compression Resistance of a Container Under Constant Load.*

D4991-07(2015) — *Standard Test Method for Leakage Testing of Empty Rigid Containers by Vacuum Method.*

D5276-98(2017) — *Standard Test Method for Drop Test of Loaded Containers by Free Fall.*

D7660-10(2018) — *Standard Guide for Conducting Internal Pressure Tests on United Nations (UN) Packagings*

E4-15 — *Standard Practices for Force Verification of Testing Machines.*

2.6.1 Source

The above may be obtained from the ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A., telephone: 610-832-9585, fax: 610-832-9555, Web site: www.astm.org, or from IHS Global Canada Ltd., 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone: 613-237-4250 or 1-800-854-8220, fax: 613-237-4251, Web site: www.global.ihs.org.

2.7 International Organization for Standardization (ISO)

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

ISO 2431:2011 — *Paints and varnishes - Determination of flow time by use of flow cups.*

ISO 3574:2012 — *Cold-reduced carbon steel sheet of commercial and drawing qualities.*

ISO 9001:2015 — *Quality management systems - Requirements.*

ISO 16162:2012 — *Cold-rolled steel sheet products - Dimensional and shape tolerances.*

2.7.1 Source

The above may be obtained from the International Organization for Standardization, 1, ch. De La Voie-Creuse CP 56, CH-1211, Geneva 20, Switzerland. Telephone: +41 22 749 01 11. Web site: www.iso.org, or from IHS Global Canada Ltd., 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone: 613-237-4250 or 1-800-267-8220, fax: 613-237-4251, Web site: www.global.ihs.com.

2.8 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-13 — *Grammage of paper and paperboard (weight per unit area).*

T441 OM-13 — *Water absorptiveness of sized (non-bibulous) paper, paperboard, and corrugated fiberboard (Cobb test).*

T802 OM-12 — *Drop test for fiberboard shipping containers.*

2.8.1 Source

The above may be obtained from the Technical Association of the Pulp and Paper Industry, 15 Technology Parkway South, Norcross, GA 30092, U.S.A. Telephone: 1-800-446-9431, fax: 1-770-209-7206, Email: press@tappi.org. Web site: www.tappi.com, or from IHS Global Canada Ltd., 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone: 613-237-4250 or 1-800-267-8220, fax: 613-237-4251, Web site: www.global.ihs.com.

2.9 United Nations (UN)

UN Recommendations on the Transport of Dangerous Goods, Model Regulations.

2.9.1 Source

The above may be obtained from the United Nations, 2 United Nations Plaza, Room DC2-853, New York, NY 10017, USA. Telephone: 1-800-253-9646. Web site: www.unece.org/trans/danger/danger.htm.

3 Terms and definitions

In addition to the definitions, terms and abbreviations given in the *Transportation of Dangerous Goods Act and Regulations*, the following definitions and abbreviations apply in this standard.

3.1

bag (sac)

flexible container made of paper, plastic film, textiles, woven material or other suitable materials.

3.2

basis weight (*masse de base*)

see grammage.

3.3

box (*caisse*)

container with complete rectangular or polygonal faces, made of metal, wood, plywood, reconstituted wood, fibreboard, plastic or other suitable material.

3.4

Certificate of Registration (*certificat d'inscription*)

document issued by the Director to a Manufacturer or Fleet Operator for the purpose of registering that Manufacturer or Fleet Operator pursuant to the applicable requirements of this standard.

3.5

chime (*rebord*)

circumferential edge at the top or bottom of a drum or jerrican where the head and body material meet. Typically comprised of the combined thickness of material from which the head and the body are constructed.

3.6

closure (*fermeture*)

device that closes an opening in a container.

3.7

closed cargo transport unit (*engin de transport fermé*)

cargo transport unit which totally encloses the container or article by permanent structures with complete and rigid surfaces. Cargo transport units with fabric sides or tops are not considered closed cargo transport units.

3.8

combination packaging (*emballage combiné*)

container consisting of one or more inner packagings or articles contained in an outer packaging for transport.

3.9

composite packaging (*emballage composite*)

container consisting of an outer packaging and an inner receptacle so constructed that the inner receptacle and the outer packaging form an integral container. Once assembled it remains thereafter an integrated single unit; it is filled, stored, shipped and emptied as a single container.

3.10

container (*contenant*)

small means of containment as defined in the TDG Regulations.

3.11

crate (*caisse à claire-voie ou harasse*)

rigid container with incomplete surfaces.

3.12

dangerous goods (*marchandises dangereuses*)

dangerous goods as defined in the TDG Act, and includes dangerous goods listed in Part A of Annex A.

3.13

Design Registration Number (*numéro d'inscription du modèle*)

number issued by the Director to a Manufacturer certifying that the design of the UN standardized packaging meets all applicable requirements of this standard.

3.14

Director (*directeur*)

Executive Director, Regulatory Frameworks and International Engagement, Regulatory Affairs Branch, Transport Dangerous Goods Directorate, Transport Canada.

3.15

drum (*fût*)

flat-ended or convex-ended cylindrical container made of metal, fibreboard, plastic, plywood or other suitable material. This definition includes containers of other shapes such as pail-shaped or round with a tapered neck, but does not include a wooden barrel or jerrican (that is, a container of rectangular or polygonal cross-section).

3.16

Fleet Operator (*exploitant de contenants*)

person, corporation, or partnership that operates and has full control of a fleet of containers in accordance with clause 14.4 and that is registered with the Director pursuant to Section 10.

3.17

filling ratio (*taux de remplissage*)

ratio of the mass of gas to the mass of water at 15 °C that would fill completely a container.

3.18

grammage (*grammage*)

mass of a unit area of paper or fibreboard determined by TAPPI test method T410, expressed in grams per square meter (g/m²). (Also known as basis weight)

3.19

inner packaging (*emballage intérieur*)

container in direct contact with its contents, for which an outer packaging is required for transport.

NOTE The inners of combination packagings are always referred to as inner packagings.

3.20**inner receptacle (*réceptient intérieur*)**

portion of a composite packaging that is in direct contact with its contents.

3.21**intermediate packaging (*emballage intermédiaire*)**

container that is used to contain one or more inner packagings or articles, for which an outer packaging is required for transport.

3.22**jerrican (*bidon*)**

metal or plastic container of rectangular or polygonal cross-section.

3.23**leakage (*fuite*)**

release of product from a filled container.

3.24**liner (*doublure*)**

tube or bag inserted into a container but not forming an integral part of the container, including the closures of its openings.

3.25**manufacturer (*fabricant*)**

person, corporation, partnership, or facility that holds Design Registration Numbers and that is registered with the Director pursuant to Section 10.

3.26**mark (*marquage*)**

compliance marks on a container that indicate compliance with this standard.

3.27**maximum capacity (*capacité maximale*)**

maximum volume of water, normally expressed in litres (L), that the container can hold at 15 °C and at an absolute pressure of 101.3 kPa, excluding the portion of the container that remains empty when the container is filled in its normal position for filling through the intended filling orifice.

3.28**mobile process unit (MPU) (*unité de fabrication mobile*)**

road vehicle that is used at a factory, satellite site or client site to carry out an explosives manufacturing operation in accordance with the *Explosives Regulations, 2013*.

3.29**net mass (*masse nette*)**

mass of contents in a single packaging or the combined gross mass of inner packagings carried in one combination packaging, normally expressed in kilograms (kg).

3.30**nonwoven fabric (*tissu non tissé*)**

textile structure produced by bonding or interlocking fibres (or both) in a random web or mat by mechanical, chemical, thermal or solvent means, or combinations thereof.

3.31**outer packaging (*emballage extérieur*)**

outer protection of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings.

3.32

permanent mark (*marquage permanent*)

compliance mark on a container that remains legible throughout the life of the container and is not removed in any container reconditioning process. (An example of permanent marking is embossing).

3.33

plastic fabric (*tissu en plastique*)

material made from woven or nonwoven fabric of a plastic material.

3.34

quality management system (*système de management de la qualité*)

systematic programme of controls, inspections and documented activities aimed at providing confidence that conformity to this standard is consistently achieved in practice.

3.35

recycled plastic material (*matière plastique recyclée*)

plastic material recovered from used industrial containers.

3.36

salvage container (*contenant de secours*)

container into which damaged, defective, leaking or non-conforming dangerous goods containers, or articles that have spilled or leaked, are placed for purposes of transport for recovery or disposal.

3.37

single packaging (*emballage simple*)

container, other than a combination packaging.

3.38

sift-proof container (*contenant étanche aux pulvérulents*)

container that is impermeable to dry contents, including any fine solid material produced during transport.

3.39

textile (*textile*)

products made from staple fibres and filaments or yarns or both by interlacing in any manner including weaving, knitting, tufting and braiding and including such products as cloths, woven goods, knitted goods, nets, webbing and nonwoven fabrics. Reinforced plastics and papers are not included.

3.40

TC (*TC*)

Transport Canada.

3.41

TDG Act (*Loi sur le TMD*)

Transportation of Dangerous Goods Act, 1992, as amended from time to time.

3.42

TDG Regulations (*Règlement sur le TMD*)

Transportation of Dangerous Goods Regulations, as amended from time to time.

3.43

UN packaging symbol (*symbole d'emballage de l'ONU*)



3.44**UN standardized container (*contenant normalisé UN*)**

UN standardized means of containment, as defined in the TDG regulations, but for the purpose of this standard containing a net mass equal to or less than 400 kg (for solids and combination packagings) or having a maximum capacity equal to or less than 450 L (for liquids).

3.45**viscous liquid (*liquide visqueux*)**

liquid that has a dynamic viscosity greater than 2500 centipoises (cP) at 25 °C.

NOTE The following methods may be used to determine the viscosity of a liquid: ASTM Method D445, ASTM Method D1200 or ISO 2431.

3.46**woven plastics (*plastique tissé*)**

material made from stretched tapes or monofilaments of a plastic material.

PART 1 Design, test and manufacture of containers

4 General

4.1 Design, test and manufacture

A container shall not be designed, tested or manufactured unless these activities are done in accordance with Part I of this standard.

4.1.1 Reports

The reports required by this standard shall be legible, in English or French and prepared in accordance with either the English or French version of this standard.

4.2 Compliance marks

Marks shall not be applied on a container unless:

- a) compliance marks conform to the requirements of Section 5;
- b) container was designed in accordance with 4.3 and Section 6;
- c) representative prototype of the container has been successfully tested in accordance with the requirements of Section 7 and Table 3;
- d) container was manufactured under a quality management system in accordance with Section 9; and
- e) container design and container manufacturer are registered with the Director in accordance with the requirements of Section 10.

4.3 Container design

4.3.1 Performance

A container shall conform to a registered design for which a representative prototype has been tested and found to meet the applicable performance requirements set out in Section 7 and Table 3, except for design variations permitted in Section 8 or Part II.

4.3.2 Inner packaging

For a combination packaging, the inner packaging shall be designed, constructed, filled, closed, secured and maintained in an outer packaging so that under normal conditions of transport, including handling, there will be no release of dangerous goods that could endanger public safety. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain, stoneware or frangible plastic materials, etc., shall be secured in outer packagings with cushioning material capable of preventing puncture and breakage of the inner packaging. The closures of inner packagings shall be designed to prevent any leakage of contents.

4.3.3 Leaking between parts or layers of the container

A container shall be designed so that when closed, the contents cannot enter between the lining and other parts of the container or between different layers of the container including inner and outer packaging or into the recesses or seams of joints. Cushioning material and outer packaging shall be of such design and materials that their protective properties are not impaired by any leakage of contents from the inner packaging.

4.3.4 Net mass and maximum capacity limits

Unless otherwise specified in Part II, the net mass of a container for solids and combination packagings shall be equal to or less than 400 kg. The maximum capacity of a container for liquids shall be equal to or less than 450 L.

4.4 Container information

4.4.1 The container manufacturer or distributor shall document the following information in relation to each container design:

- a) instructions for assembling and closing the container with all required components and materials (e.g., closures, gaskets, binding) so the container can be prepared for transport in a manner that, under normal conditions of transport, including handling, there will be no release of dangerous goods that could endanger public safety;
- b) maximum capacity of any inner packaging, as applicable;
- c) for containers designed with a handle or other lifting feature, the container information shall include instructions on the proper use of the lifting feature, including whether it is intended for lifting the container empty or full; and
- d) tare weight, maximum gross mass and maximum capacity of the container, as applicable.

4.4.2 The container manufacturer or distributor shall transmit the container information listed in 4.4.1 a) to d) to each container purchaser upon the purchaser's initial purchase of the corresponding container. Container information may be provided in written or electronic form.

4.4.3 The container manufacturer or distributor shall make available the container information listed in 4.4.1 a) to d) to a container user upon request.

5 Compliance marks

5.1 General

5.1.1 Required marks

5.1.1.1 The marks applied to a container shall be durable, legible, and placed in a location and of such a size as to be readily visible. The marks shall remain legible for the life of the container or until the container is reconditioned or remanufactured. Embossed or moulded marks are not required to appear in contrasting colours to the background of the container.

5.1.1.2 When the container is liable to undergo a reconditioning process which might obliterate the marks on the container, the marks required in 5.2 a), b), c), d) and e) shall be permanent. For containers other than those referred to in 5.4.1 and 5.4.2, these permanent marks may replace the corresponding durable marks prescribed in 5.1.1.1.

5.1.2 Location of marks

5.1.2.1 For a container of 30 L maximum capacity or 30 kg net mass or less, the marks (or a duplicate thereof) shall appear on the top, bottom or side of the container except that for removable head drums and jerricans with fully removable covers, the marks shall appear on a side or the bottom of the container.

5.1.2.2 For a container of more than 30 L maximum capacity or 30 kg net mass, the marks (or a duplicate thereof) shall appear on the top or side of the container except that for removable head drums and jerricans with fully removable covers, the marks shall appear on a side of the container.

5.1.3 Size of marks

Letters, numerals and symbols comprising the marks shall be at least 12 mm high, except that:

- a) marks on containers of 30 L maximum capacity or 30 kg net mass or less shall be at least 6 mm high; and
- b) marks on containers of 5 L maximum capacity or 5 kg net mass or less shall be at least 3 mm high.

5.2 Content, sequence and requirements of marks

The following marks are required and shall be displayed in the following sequence with each of the elements clearly separated from one another (*e.g., the marks may be separated by a slash or space*):

- a) UN packaging symbol as defined in Section 3. The UN packaging symbol may be substituted with the letters “UN” on metal containers requiring embossed marks. 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) packaging code listed in Table 1 and, when applicable, the letter “V”, “T”, or “W” assigned to the packaging code in accordance with 5.3.1;
- c) capital letter (“X”, “Y” or “Z”) designating the packing group(s) performance level for which the design prototype has been successfully tested, followed by the gross mass or relative density in accordance with 5.3.2:

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

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

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

- d) letter “S” for containers intended for solids, viscous liquids or inner packagings or the internal test pressure for single packagings intended for liquids.

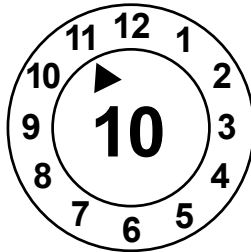
The letter “S” shall not be marked on a container unless a representative prototype of the container was successfully tested in accordance with Section 7 with solids, viscous liquids or inner packagings.

The internal test pressure shall not be marked on a container unless:

- i) container is a single packaging intended for liquids;
 - ii) representative prototype of the container was successfully tested in accordance with Section 7 for liquids; and
 - iii) marked internal test pressure is equal to or less than the test pressure to which the representative prototype was successfully tested in accordance with clause 7.6, in kilopascals (kPa) and rounded down to the nearest 10 kPa;
- e) last two digits of the year of manufacture of the container:

Container types 1H and 3H shall also show the month of manufacture; this may be marked on the container in a different place from the remainder of the mark. If the year and month are displayed within a set of consecutive numerals, the first two digits shall be the last two digits of the year of manufacture followed by the two digits representing the month of manufacture;

NOTE An acceptable method to display the month of manufacture is a clock diagram, where the last two digits of the year of manufacture are shown in the inner circle. Other methods that provide the minimum required information in a durable, visible and legible form are also acceptable.



- f) “CAN”, which denotes Canada as the country authorizing the use of the UN mark;
- g) name or symbol of the manufacturer, as submitted to and registered with the Director, and
- h) Design Registration Number issued in accordance with 10.4.4.

Table 1 – Packaging codes

Type	Material	Category	Packaging code	Maximum capacity or maximum net mass	Reference clause
1. Drums	A. Steel	non-removable head	1A1	450 L	6.1
		removable head	1A2	450 L/400 kg	
	B. Aluminum	non-removable head	1B1	450 L	6.2
		removable head	1B2	450 L/400 kg	
	D. Plywood	—	1D	250 L/400 kg	6.3
	G. Fibre	—	1G	400 kg	6.4
	H. Plastic	non-removable head	1H1	450 L	6.5
		removable head	1H2	450 L/400 kg	
	N. Metal, other than steel or aluminum	non-removable head	1N1	450 L	6.6
		removable head	1N2	450 L/400 kg	
2. (reserved)	—	—	—	—	—
3. Jerricans	A. Steel	non-removable head	3A1	60 L	6.7
		removable head	3A2	60 L/120 kg	
	B. Aluminum	non-removable head	3B1	60 L	6.8
		removable head	3B2	60 L/120 kg	
	H. Plastic	non-removable head	3H1	60 L	6.9
		removable head	3H2	60 L / 120 kg	

Type	Material	Category	Packaging code	Maximum capacity or maximum net mass	Reference clause
4. Boxes	A. Steel	—	4A	400 kg	6.10
	B. Aluminum	—	4B	400 kg	6.11
	C. Natural wood	ordinary	4C1	400 kg	6.12
		with sift-proof walls	4C2		
	D. Plywood	—	4D	400 kg	6.13
	F. Reconstituted wood	—	4F	400 kg	6.14
	G. Fibreboard	—	4G	400 kg	6.15
	H. Plastic	expanded	4H1	60 kg	6.16
		solid	4H2	400 kg	
	N. Metal, other than steel or aluminum	—	4N	400 kg	6.17
5. Bags	H. Woven plastics	without inner liner or coating	5H1	50 kg	6.18
		sift-proof	5H2		
		water resistant	5H3		
	H. Plastics film	—	5H4	50 kg	6.19
	L. Textile	without inner liner or coating	5L1	50 kg	6.20
		sift-proof	5L2		
		water resistant	5L3		
	M. Paper	multiwall	5M1	50 kg	6.21
		multiwall, water resistant	5M2		

Type	Material	Category	Packaging code	Maximum capacity or maximum net mass	Reference clause
6. Composite packagings	H. Plastic inner receptacle	in steel drum	6HA1	250 L/400 kg	6.22
		in steel crate or box	6HA2	60 L/75 kg	
		in aluminum drum	6HB1	250 L/400 kg	
		in aluminum crate or box	6HB2	60 L/75 kg	
		in wooden box	6HC	60 L/75 kg	
		in plywood drum	6HD1	250 L/400 kg	
		In plywood box	6HD2	60 L/75 kg	
		in fibre drum	6HG1	250 L/400 kg	
		in fibreboard box	6HG2	60 L/75 kg	
		in plastic drum	6HH1	250 L/400 kg	
		in solid plastics box	6HH2	60 L/75 kg	
	P. Glass, porcelain or stoneware inner receptacle	in steel drum	6PA1	60 L/75 kg	6.23
		in steel crate or box	6PA2		
		in aluminum drum	6PB1		
		in aluminum crate or box	6PB2		
		in wooden box	6PC		
		in plywood drum	6PD1		
		in wickerwork hamper	6PD2		
		in fibre drum	6PG1		
		in fibreboard box	6PG2		
		in expanded plastics outer packaging	6PH1		
		in solid plastics outer packaging	6PH2		

NOTE 1 The packaging codes in Table 1 are used to designate the type, material of construction and category of each container.

NOTE 2 For combination packagings, only the packaging code for the type of outer packaging (drum, box, etc.) is used.

NOTE 3 For composite packagings, the material designation for the inner receptacle appears in the second position in the packaging code, followed by the material designation for the outer packaging.

5.3 Additional specific requirements relative to marks

5.3.1 Letter assigned to the packaging code (“V”, “T”, or “W” mark)

5.3.1.1 The letter “V”, identifying a special container, shall not be assigned to the packaging code unless:

- a) container is a combination packaging;
- b) representative prototype of the outer packaging has been successfully drop tested in accordance with 7.4 with glass inner packagings to the Packing Group I performance level;
- c) empty representative prototype of the outer packaging has been successfully compression tested in accordance with 7.5. The stacking test load shall be based on the combined mass of the filled inner packagings used for the drop test; and
- d) marked gross mass required by 5.2 c) is marked in accordance with 5.3.2.1 c).

5.3.1.2 The letter “T”, identifying a salvage container, shall not be assigned to the packaging code unless:

- a) representative prototype was successfully tested to the packing group I or II performance level. The container shall be qualified to receive the letters “X” or “Y” performance level marks in accordance with 5.2 c);
- b) representative prototype was prepared as for a combination packaging in accordance with 7.2.4 and successfully tested in accordance with Section 7 with water; and
- c) container has passed the leakproofness test set out in 7.7 at a test pressure of 30 kPa.

5.3.1.3 The letter “W”, identifying that the container is manufactured to a different specification and is considered equivalent, shall not be assigned to the packaging code unless it was assigned in accordance with 10.4.8.

5.3.2 Gross mass or relative density

5.3.2.1 The gross mass shall not be marked on a container unless:

- a) representative prototype was successfully tested in accordance with Section 7 with solids, viscous liquids or inner packagings;
- b) gross mass is equal to or less than the gross mass of the representative prototype that was successfully tested in accordance with Section 7; and
- c) for containers marked with the letter “V” assigned to the packaging code, the gross mass is the sum of the mass of the outer packaging plus one-half of the mass of the inner packaging(s) as used for the drop test in 7.4.

5.3.2.2 The gross mass shall be in kilograms (kg) and rounded to the nearest decimal for a gross mass less than or equal to 30 kg, or rounded to the nearest kilogram for a gross mass greater than 30 kg.

5.3.2.3 The relative density shall not be marked on a container unless:

- a) container is a single packaging intended for liquids;
- b) representative prototype was successfully tested in accordance with Section 7 for liquids; and
- c) relative density is equal to or less than the relative density for which the representative prototype has been successfully tested in accordance with Section 7. The relative density marked is the higher of the relative density of the test media or the relative density that was used to calculate the drop height in the second row of Table 4 (see 7.4.3.4).

5.3.2.4 The relative density shall be rounded down to the first decimal.

5.3.2.5 The relative density mark may be omitted when the relative density is equal to or less than 1.2.

5.4 Additional marks for drums

5.4.1 Metal drums

In addition to the marks in 5.2, a new metal drum having a maximum capacity greater than 100 L shall bear the marks specified in 5.2 a) to e) in permanent form on the bottom, with an indication of the nominal thickness (in mm, rounded to the nearest decimal) of the metal used in the body. When the nominal thickness of either head of the metal drum is different from that of the body, permanent marks of the nominal thickness of the top head, body and bottom head shall appear on the bottom of the drum (e.g., 1.0/0.8/1.0). Nominal thickness of metal shall be determined according to the applicable ISO standard (e.g., ISO 3574, ISO 16162 for steel drums). For a metal drum of long-lasting material (e.g., stainless steel or nickel-copper alloys drums) designed to be re-used repeatedly, the marks specified in 5.2 f), g) and h) may be permanent marks.

5.4.2 Plastic drums

In addition to the marks in 5.2, a new plastic drum having a maximum capacity greater than 150 L shall bear permanent marks indicating the drum body nominal thickness (in mm, rounded to the nearest decimal).


5.5 Additional marks for recycled plastic material

Containers manufactured from recycled plastic material (as defined in Section 3) shall be marked “REC” near the marks required by 5.2.

5.6 Additional marks for salvage containers

Salvage containers shall additionally be marked with the word “SALVAGE” or “SECOURS” near the marks specified in 5.2. The lettering of the “SALVAGE” or “SECOURS” mark shall be at least 12 mm high.







Table 2 – Compliance mark sequence and requirements

Content and requirements	5.2 a)	5.2 b)		5.2 c)		5.2 d)	5.2 e)	5.2 f)	5.2 g)	5.2 h)
Additional requirements	—	Table 1	5.3.1	—	5.3.2	—	—	—	—	10.4.4
 ____ / ____ / ____ / ____ / CAN / ____										


5.7 Examples of marks

The marks, for which examples are given in clauses 5.7.1 to 5.7.4, may be applied in a single line or in multiple lines if the correct sequence is respected.


5.7.1 New containers

 4G/Y24.5/S/18 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new fibreboard box, for PG II or III, 24.5 kg maximum gross mass, to contain solids (including articles) or inner packagings, manufactured in 2018. The design was registered in Canada, by the manufacturer identified as ABC under the registration number 2-9999.
 1H1/Y1.4/150/19 06 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new plastic drum, non-removable head, for PG II or III, to contain liquids with relative density of 1.4 max., tested at 150 kPa, manufactured in June of 2019 (<i>Note: the mark "06" designating the month of manufacture may also be marked elsewhere on the drum instead of in the compliance mark</i>).
 1H2/Y/60/19 CAN/ABC 2-9999 (with additional mark "06" elsewhere on the drum)	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new plastic drum, removable head, for PG II or III, to contain liquids with relative density of 1.2 max., tested at 60 kPa, manufactured in June of 2019.
 1A2/Z150/S/18 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new steel drum, removable head, for PG III, to contain solids, viscous liquids or inner packagings, 150 kg maximum gross mass, manufactured in 2018.
 5H2/Y10.0/S/19 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new sift-proof woven plastics bag for PG II or III, 10.0 kg maximum gross mass, to contain solids, manufactured in 2019.
 6HA1/Y1.6/100/18 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new composite Packaging with plastic inner receptacle in a steel drum, for PG II or III, to contain liquids with relative density of 1.6 max., tested at 100 kPa, manufactured in 2018.


5.7.2 Special containers ("V" marks)

 4GV/X10.0/S/18 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a special container (fibreboard box), for PG I, II or III, 10.0 kg maximum gross mass, to contain inner packagings for solids or liquids, manufactured in 2018.
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5.7.3 Equivalent specification ("W" marks)

 4H1W/Y136/S/19 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a new expanded plastic box of equivalent specification, for PG II or III, 136 kg maximum gross mass, for solids or inner packagings, manufactured in 2019.
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5.7.4 Salvage containers (“T” marks)

 1A2T/Y300/S/16 CAN/ABC 2-9999	as in 5.2 a, b, c, d, e as in 5.2 f, g, h	For a steel salvage drum, removable head, PG II or III, 300 kg maximum gross mass, for containers or articles, manufactured in 2016.
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6 Construction**6.1 Steel Drums (1A1 non-removable head, 1A2 removable head)****6.1.1 Material**

The body and heads shall be constructed of steel or steel alloy.

6.1.2 Seams

6.1.2.1 Body seams shall be welded on drums intended to contain more than 40 L of liquid. Body seams shall be mechanically seamed or welded on drums intended to contain solids or 40 L or less of liquid.

6.1.2.2 Chime seams shall be welded or mechanically seamed. Separate reinforcing rings may be applied.

6.1.3 Rolling hoops

The body of a drum may have rolling hoops. Drums with rolling hoops shall have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If separate rolling hoops are used, they shall fit tightly on the body and be firmly secured in place so that they cannot shift. Spot welding of separate rolling hoops is prohibited.

6.1.4 Openings

The diameter of openings for filling, emptying or venting in the bodies or heads of non-removable head (1A1) drums shall be equal to or less than 70 mm. Drums with larger openings are considered to be of the removable head type (1A2).

6.1.5 Closures

6.1.5.1 Closures for openings in the bodies and heads of drums shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof. Closure flanges may be mechanically inserted or welded in place.

6.1.5.2 Closures of non-removable head drums (1A1) shall be either of the screw-thread type or fastened by a screw thread or other device at least as effective.

6.1.5.3 Closure devices for removable head drums (1A2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads (1A2).

6.2 Aluminum drums (1B1 non-removable head, 1B2 removable head)**6.2.1 Material**

Body and heads shall be of aluminum or of aluminum alloy.

6.2.2 Seams

All seams shall be welded. Chime seams, if any, shall be reinforced by the application of separate reinforcing rings.

6.2.3 Rolling hoops

The body of a drum may have rolling hoops. Drums with rolling hoops shall have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If separate rolling hoops are used, they shall fit tightly on the body and be firmly secured in place so that they cannot shift. Spot welding of separate rolling hoops is prohibited.

6.2.4 Openings

The diameter of openings for filling, emptying or venting in the bodies or heads of non-removable head (1B1) drums shall be equal to or less than 70 mm. Drums with larger openings are considered to be of the removable head type (1B2).

6.2.5 Closures

6.2.5.1 Closures for openings in the bodies and heads of drums shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof. Closure flanges and other devices shall be welded in place so that the weld provides a leakproof seam.

6.2.5.2 Closures of non-removable head drums (1B1) shall be either of the screw-thread type or fastened by a screw thread or other device at least as effective.

6.2.5.3 Closure devices for removable head drums (1B2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads (1B2).

6.3 Plywood drums (1D)

6.3.1 Material

6.3.1.1 The wood used shall be well seasoned, commercially dry and free from defects that would lessen the effectiveness of the drum for its intended purpose.

6.3.1.2 If material other than plywood is used for the construction of heads, the material shall have qualities at least equivalent to those of plywood heads.

6.3.1.3 At least 2-ply plywood shall be used for the body and at least 3-ply plywood for heads. All adjacent plies shall be firmly glued together cross-grained with a water-resistant adhesive.

6.3.2 Design

The body, heads and seams shall be designed in relation to the drum's maximum capacity and to the service it is required to perform. The strength of the body at the seams shall be as great as in its other parts.

6.3.3 Lining

In order to prevent sifting of the contents, lids shall be lined with kraft paper or some other equivalent material which shall be securely fastened to the lid and extend to the outside along its full circumference.

6.3.4 Maximum capacity and net mass limits

The maximum capacity of plywood drums shall be equal to or less than 250 L and the maximum net mass shall be equal to or less than 400 kg.

6.4 Fibre drums (1G)

6.4.1 Material

6.4.1.1 The body of a drum shall consist of multiple plies of heavy paper or fibreboard (without corrugations), firmly laminated or glued together. The plies may include one or more protective barriers of bitumen, waxed kraft paper, metal foil or plastic material.

6.4.1.2 The heads shall be of natural wood, fibreboard, metal, plywood, plastic or other suitable material and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

6.4.2 Design

The body, heads and seams shall be designed in relation to the drum's maximum capacity and the service that it is required to perform. The strength of the body at the seams shall be as great as in its other parts.

6.4.3 Water resistance

The assembled drum shall be sufficiently water-resistant to prevent de-lamination under normal conditions of transport.

6.5 Plastic drums (1H1 non-removable head, 1H2 removable head)

6.5.1 Material

6.5.1.1 Drums shall be made from plastic resin that has not been used previously, recycled plastic material or plastic regrind from the same production process.

6.5.1.2 Drums shall be adequately resistant to aging and to degradation caused either by the substance contained or by ultraviolet radiation.

6.5.1.3 If ultraviolet light protection is required, it shall be provided by impregnation of the material with carbon black or other suitable pigments or inhibitors that remain effective throughout the life of the container.

6.5.1.4 The wall thickness at every point of the container shall be appropriate to its maximum capacity and intended use, taking into account the stresses to which each point is liable to be exposed.

6.5.2 Openings

The diameter of openings for filling, emptying or venting in the bodies or heads of non-removable head drums (1H1) shall be equal to or less than 70 mm. Drums with larger openings are considered to be of the removable head type (1H2).

6.5.3 Closures

6.5.3.1 Closures for openings in the bodies and heads of drums shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.5.3.2 Closures for non-removable head drums (1H1) shall be either of the screw-thread type or fastened by a screw-thread or other device at least as effective, the sectional shape of the thread being such that the cap is held firmly in place when tightened.

6.5.3.3 Closure devices for removable head drums (1H2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads unless the drum design is such that, where the removable head is properly secured, the drum is inherently leakproof.

6.6 Drums of metal other than steel or aluminum (1N1 non-removable head, 1N2 removable head)

6.6.1 Material

The body and heads shall be constructed of a metal or of a metal alloy other than steel or aluminum.

6.6.2 Seams

Chime seams, if any, shall be reinforced by the application of separate reinforcing rings. All seams, if any, shall be welded, soldered, brazed or joined by an equivalent joining method.

6.6.3 Rolling hoops

The body of a drum may have rolling hoops. Drums with rolling hoops shall have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. Separate rolling hoops shall fit tightly on the body and be firmly secured in place so they cannot shift. Spot welding of separate rolling hoops is prohibited.

6.6.4 Openings

The diameter of openings for filling, emptying and venting in the bodies or heads of non-removable head drums (1N1) shall be equal to or less than 70 mm in diameter. Drums with larger openings are considered to be of the removable head type (1N2).

6.6.5 Closures

6.6.5.1 Closures for openings in the bodies and heads of drums shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof. Closure flanges shall be welded, soldered, brazed or joined by an equivalent joining method so that the seam joint is leakproof.

6.6.5.2 Closures of non-removable head drums (1N1) shall be either of the screw-thread type or fastened by a screw thread or other device at least as effective.

6.6.5.3 Closure devices for removable head drums (1N2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads (1N2).

6.7 Steel jerricans (3A1 non-removable head, 3A2 removable head)

6.7.1 Material

Body and heads shall be constructed of steel or steel alloy.

6.7.2 Seams

6.7.2.1 Chimes shall be mechanically seamed or welded.

6.7.2.2 Body seams of steel jerricans intended to contain more than 40 L of liquid shall be welded. Body seams of steel jerricans intended to contain 40 L or less shall be mechanically seamed or welded.

6.7.3 Openings

The diameter of openings for filling, emptying or venting in the bodies or heads of non-removable head jerricans (3A1) shall be equal to or less than 70 mm. Jerricans with larger openings are considered to be of the removable head type (3A2).

6.7.4 Closures

6.7.4.1 Steel jerrican closures shall be either of the screw-threaded type or fastened by a screw thread or other device at least as effective. All closures shall be designed so they can be effectively secured. Closure flanges and flange spouts of 3A1 jerricans shall be mechanically inserted or secured in a manner at least as effective.

6.7.4.2 Closures for openings in the bodies and heads of jerricans shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.7.4.3 Closure devices for removable head jerricans (3A2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads (3A2) unless the jerrican design is such that, where the removable head is properly secured, the jerrican is inherently leakproof.

6.7.5 Maximum capacity and net mass limits

The maximum capacity of steel jerricans shall be equal to or less than 60 L and the maximum net mass shall be equal to or less than 120 kg.

6.8 Aluminum jerricans (3B1 non-removable head, 3B2 removable head)

6.8.1 Material

Body and heads shall be constructed of aluminum or of an aluminum alloy.

6.8.2 Seams

All seams shall be welded. Chime seams, if any, shall be reinforced by the application of a separate reinforcing ring.

6.8.3 Openings

The diameter of openings for filling, emptying or venting in the bodies or heads of non-removable head jerricans (3B1) shall be equal to or less than 70 mm. Jerricans with larger openings are considered to be of the removable head type (3B2).

6.8.4 Closures

6.8.4.1 Closures for openings in the bodies and heads of jerricans shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.8.4.2 Closures of non-removable head jerricans (3B1) shall be either of the screw-threaded type or fastened by screw thread or other device at least as effective.

6.8.4.3 Closure devices for removable head jerricans (3B2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads (3B2) unless the jerrican design is such that, where the removable head is properly secured, the jerrican is inherently leakproof.

6.8.5 Maximum capacity and net mass limits

The maximum capacity of aluminum jerricans shall be equal to or less than 60 L and the maximum net mass shall be equal to or less than 120 kg.

6.9 Plastic jerricans (3H1 non-removable head, 3H2 removable head)

6.9.1 Material

6.9.1.1 Jerricans shall be made from plastic resin that has not been used previously, recycled plastic material or plastic regrind from the same production process.

6.9.1.2 Jerricans shall be adequately resistant to aging and to degradation caused by ultraviolet radiation.

6.9.1.3 If ultraviolet light protection is required, it shall be provided by impregnation of the material with carbon black or other suitable pigments or inhibitors that remain effective throughout the life of the container.

6.9.1.4 The wall thickness at every point of the container shall be appropriate to its maximum capacity and intended use, taking into account the stresses to which each point is liable to be exposed.

6.9.2 Openings

The diameter of openings for filling, emptying or venting in the bodies or heads of non-removable head jerricans (3H1) shall be equal to or less than 70 mm. Jerricans with larger openings are considered to be of the removable head type (3H2).

6.9.3 Closures

6.9.3.1 Closures for openings in the bodies and heads of jerricans shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with closures, unless the closure is inherently leakproof.

6.9.3.2 Closures for non-removable head jerricans (3H1) shall be either of the screw-threaded type or fastened by screwthread or other device at least as effective, the sectional shape of the thread being such that the cap is held firmly in place when tightened.

6.9.3.3 Closure devices for removable head jerricans (3H2) shall be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements shall be used with all removable heads (3H2) unless the jerrican design is such that, where the removable head is properly secured, the jerrican is inherently leakproof.

6.9.4 Maximum capacity and net mass limits

The maximum capacity of plastic jerricans shall be equal to or less than 60 L and the maximum net mass shall be equal to or less than 120 kg.

6.10 Steel boxes (4A)

6.10.1 Material

Boxes shall be constructed of steel or of a steel alloy.

6.10.2 Design

6.10.2.1 Boxes shall be welded, double-seamed or riveted. If double seaming is used in the construction, steps shall be taken to prevent the ingress of the contents, particularly explosives, into the recesses of the seams.

6.10.2.2 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.10.3 Lining

Boxes shall be lined with fibreboard, felt or other suitable material, or shall have an inner liner or coating of suitable material.

6.10.4 Closures

Closures shall be designed to remain secure under normal conditions of transportation.

6.11 Aluminum boxes (4B)**6.11.1 Material**

Boxes shall be constructed of aluminum or aluminum alloy.

6.11.2 Design

6.11.2.1 Boxes shall be welded, double-seamed or riveted. If double seaming is used in the construction, steps shall be taken to prevent the ingress of the contents, particularly explosives, into the recesses of the seams.

6.11.2.2 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.11.3 Lining

Boxes shall be lined with fibreboard, felt or other suitable material, or shall have an inner liner or coating of suitable material.

6.11.4 Closures

Closures shall be designed to remain secured under normal conditions of transport.

6.12 Boxes of natural wood (4C1 ordinary, 4C2 with sift-proof walls)**6.12.1 Material**

6.12.1.1 Boxes shall be constructed of well-seasoned, commercially dry wood that is free from defects that would lessen the strength of any part of the box.

6.12.1.2 Tops and bottoms may be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

6.12.1.3 Fastenings shall be resistant to vibration experienced under normal conditions of transport. End grain nailing shall be avoided whenever practicable. Joints, which are likely to be highly stressed, shall be made using screws, clenched or annular ring nails or equivalent fastenings.

6.12.2 Design

6.12.2.1 Each part of a 4C2 box shall be one piece or equivalent. Parts are considered equivalent to one piece when one of the following methods of glued assembly is used: Linderman joint, tongue-and-groove joint, ship lap or rabbet joint, butt joint with at least two corrugated metal fasteners at each joint, or when other methods at least equally effective are used.

6.12.2.2 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.13 Plywood boxes (4D)

6.13.1 Material

6.13.1.1 Boxes shall be constructed of plywood made of 3 plies or more and made from well-seasoned rotary cut, sliced or sawn veneer. The veneer shall be commercially dry and free from defects that would lessen the strength of the box. All adjacent plies shall be glued with water-resistant adhesive.

6.13.1.2 Other suitable material may be used together with plywood in the construction of boxes.

6.13.2 Design

6.13.2.1 The plywood boxes shall be nailed or fastened to corner posts or ends or assembled with other equally suitable devices.

6.13.2.2 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.14 Reconstituted wood boxes (4F)

6.14.1 Material and design

6.14.1.1 Boxes shall be made of securely fastened water-resistant particle board or hardboard or other suitable type panels.

6.14.1.2 Other parts of the boxes may be made of other suitable material.

6.14.1.3 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.15 Fibreboard boxes (4G)

6.15.1 Material

Boxes shall be made of solid fibreboard, single or multi-wall corrugated fibreboard that meets the water resistance requirement of clause 7.8 and has proper folding qualities. The fluting of the fibreboard shall be firmly glued to the facing.

6.15.2 Design

6.15.2.1 Fibreboard boxes shall be cut, scored and slotted so as to permit assembly without cracking, surface breaks or folding. Slit scores are not permitted except in interior components.

6.15.2.2 The ends of the fibreboard boxes may have a wooden frame or be entirely of wood, or other suitable material.

6.15.2.3 Reinforcements of wooden battens may be used. The design of the boxes shall provide a good fit for the contents.

6.15.2.4 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.15.3 Manufacturer's Joint

Manufacturer's joints in the body of boxes shall be:

- a) taped;
- b) lapped and glued with water-resistant adhesive; or
- c) lapped and stitched with metal staples.

6.15.4 Closure

Water-resistant adhesive and tape shall be used when the box is closed by gluing or taping. An adhesive used in a fibreboard box manufacturers joint or closure shall be considered to be water-resistant if, when set, it is not dissolved by water after immersion in water at 23 ± 2 °C for 24 hours.

6.16 Plastic boxes (4H1 expanded plastic boxes, 4H2 solid plastic boxes)

6.16.1 Material

Boxes shall be adequately resistant to aging and to degradation caused either by the substance contained in them or by ultraviolet radiation.

6.16.2 Expanded Plastic Boxes (4H1)

6.16.2.1 Expanded plastic boxes (4H1) shall consist of two parts of moulded expanded plastic material: a bottom section with cavities for the inner packaging and a top section that covers and interlocks with the bottom section. The cavities may extend into the top section. Both the bottom and top sections of the boxes shall be designed to provide a good fit for the inner packagings.

6.16.2.2 The closure cap for the inner packaging(s) shall not be in contact with the inside of the top section of the box.

6.16.2.3 For transport, an expanded plastic box (4H1) shall be closed with a self-adhesive tape having sufficient tensile strength to prevent the box from opening. The adhesive tape shall be weather resistant and its adhesive compatible with the expanded plastic material of the box. Other closing devices at least equally effective may be used.

6.16.2.4 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.16.3 Solid Plastic Boxes (4H2)

6.16.3.1 Solid plastic boxes (4H2) shall be made from plastic resin that has not been used previously, recycled plastic material or plastic regrind from the same production process.

6.16.3.2 When required, ultra-violet light protection shall be provided by impregnating the material with carbon black or other suitable pigments or inhibitors that remain effective during the life of the box.

6.16.3.3 Solid plastic boxes (4H2) shall have closure devices that prevent the box from unintentional opening during normal conditions of transport.

6.16.3.4 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not protrude from the outer container.

6.16.4 Net mass limit

The maximum net mass of the expanded plastic boxes (4H1) shall be equal to or less than 60 kg and that of the solid plastic boxes (4H2) shall be equal to or less than 400 kg.

6.17 Boxes of metal other than steel or aluminum (4N)

6.17.1 Material

Boxes shall be constructed of a metal or of a metal alloy other than steel or aluminum.

6.17.2 Design

6.17.2.1 Boxes shall be welded, double-seamed or riveted. If double seaming is used in the construction, steps shall be taken to prevent the ingress of the contents, particularly explosives, into the recesses of the seams.

6.17.2.2 Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the container during transport and any inner container does not ingress from the outer container.

6.17.3 Lining

Boxes shall be lined with fibreboard, felt or other suitable material, or shall have an inner liner or coating of suitable material.

6.17.4 Closures

Closures shall be designed to remain secured under normal conditions of transport.

6.18 Woven plastics bags (5H1 without inner liner or coating, 5H2 sift-proof, 5H3 water resistant)

6.18.1 Material

6.18.1.1 Bags made of flat woven fabric shall be formed by closing the bottom and one side. Bags made of tubular woven fabric shall be formed by closing the bottom. Closure shall be done by sewing or other equally strong method.

6.18.1.2 Bags shall be made from stretched tapes or monofilaments of a suitable plastic material.

6.18.2 Plastic fabric bags (5H2)

Code 5H2 plastic fabric bags shall be made sift-proof by means of paper bonded to the inner surface, plastic film bonded to the inner surface, or one or more separate inner liners of paper or plastic.

6.18.3 Plastic fabric bags (5H3)

Code 5H3 plastic fabric bags shall be made water-resistant to prevent the entry of moisture by means of separate inner liners of water-resistant paper such as waxed kraft paper, double tarred kraft paper, or plastic coated kraft paper, plastic bonded to the inner surface, or one or more separate inner liners of plastic.

6.18.4 Net mass limit

The maximum net mass of the bag shall be equal to or less than 50 kg.

6.19 Plastic film bags (5H4)**6.19.1 Seams**

Seams shall be sufficiently strong to resist the pressure and shocks that occur under normal conditions of transport.

6.19.2 Closures

Bags closed by a self-sealing valve shall remain sift-proof under normal conditions of transport by the application of a positive means of closure or by using multiple flaps.

6.19.3 Net mass unit

The maximum net mass of the bag shall be equal to or less than 50 kg.

6.20 Textile bags (5L1 without inner liner or coating, 5L2 sift-proof, 5L3 water resistant)**6.20.1 Textile bags (5L2)**

Code 5L2 textile bags shall be made sift-proof by means of paper bonded to the inner surface by a water-resistant adhesive such as bitumen, plastic film bonded to the inner surface, or one or more separate inner liners of paper or plastic.

6.20.2 Textile bags (5L3)

Code 5L3 textile bags shall be made water-resistant to prevent the entry of moisture by means of separate inner liners of water-resistant paper such as waxed kraft paper, tarred paper or plastic coated kraft paper, plastic film bonded to the inner surface, or one or more separate inner plastic liners.

6.20.3 Net mass unit

The maximum net mass of the bag shall be equal to or less than 50 kg.

6.21 Paper bags (5M1 multiwall, 5M2 multiwall, water resistant)**6.21.1 Material**

Paper bags shall be made of at least three plies of kraft or equivalent paper, the middle ply of which may be net-cloth with adhesive bonding to the outer ply.

6.21.2 Seams

Seams and closures shall be sift-proof.

6.21.3 Multiwall, water-resistant bags (5M2)

6.21.3.1 A bag made of four or more plies shall be made water-resistant by the use of either a water-resistant ply as one of the two outermost plies or a water-resistant barrier made of suitable protective material between the two outermost plies.

6.21.3.2 A bag made of three plies shall be made water-resistant by using a water-resistant ply as the outermost ply.

6.21.3.3 Where the content may react with moisture or is packed in a damp condition, the innermost ply of water-resistant multiwall paper bags shall also be made waterproof (eg. double-tarred kraft paper, plastic-coated kraft paper, plastic film bonded to the inner surface of the bag, or one or more inner plastic liners). Seams and closures shall be secured so as to be waterproof.

6.21.4 Net mass limit

The maximum net mass of the bag shall be equal to or less than 50 kg.

6.22 Composite packagings with plastic inner receptacle (6H)

6.22.1 Inner receptacle

6.22.1.1 Plastic inner receptacles shall meet the closure and material requirements in clause 6.5 or 6.9, except for ultraviolet protection in clause 6.5.1.3 or 6.9.1.3.

6.22.1.2 Plastic inner receptacles shall fit snugly inside the outer packaging, which shall be free from any projection, which might abrade or puncture the plastic material.

6.22.1.3 The maximum capacity of plastic inner receptacles in steel drums (6HA1), aluminum drums (6HB1), plywood drums (6HD1), fibre drums (6HG1) or plastic drums (6HH1) shall be equal to or less than 250 L and their maximum net mass shall be equal to or less than 400 kg.

6.22.1.4 The maximum capacity of plastic inner receptacles in outer steel crates or boxes (6HA2), aluminum crates or boxes (6HB2), wooden boxes (6HC), plywood boxes (6HD2), fibreboard boxes (6HG2) or solid plastic boxes (6HH2) shall be equal to or less than 60 L and their maximum net mass shall be equal to or less than 75 kg.

6.22.2 Outer packaging

6.22.2.1 Steel drums (6HA1) – 6.1 applies to steel drums used as outer packagings.

6.22.2.2 Steel crate or box (6HA2) – 6.10 applies to steel boxes used as outer packagings and the relevant requirements of 6.10 apply to steel crates used as outer packagings.

6.22.2.3 Aluminum drum (6HB1) – 6.2 applies to aluminum drums used as outer packagings.

6.22.2.4 Aluminum crate or box (6HB2) – 6.11 applies to aluminum boxes used as outer packaging and the relevant requirements of 6.11 apply to aluminum crates used as outer packagings.

6.22.2.5 Wooden box (6HC) – 6.12 applies to wooden boxes used as outer packagings.

6.22.2.6 Plywood drum (6HD1) – 6.3 applies to plywood drums used as outer packagings.

6.22.2.7 Plywood box (6HD2) – 6.13 applies to plywood boxes used as outer packagings.

6.22.2.8 Fibre drum (6HG1) – 6.4 applies to fibre drums used as outer packagings.

6.22.2.9 Fibreboard box (6HG2) – 6.15 applies to fibreboard boxes used as outer packagings.

6.22.2.10 Plastic drum (6HH1) – 6.5 applies to plastic drums used as outer packagings.

6.22.2.11 Solid plastic box (6HH2) – 6.16.1 and 6.16.3 apply to solid plastic boxes used as outer packagings.

6.23 Composite packagings with glass, porcelain or stoneware inner receptacle (6P)

6.23.1 Inner receptacle

6.23.1.1 Glass, porcelain and stoneware inner receptacles shall be cylindrical or pear-shaped and be free from any defect that could impair their strength. The walls shall be sufficiently thick at every point. The inner receptacles shall be firmly secured in the outer packagings by means of cushioning or absorbent material and shall not protrude from the outer packaging.

6.23.1.2 Screw-threaded plastic closures, ground-glass stoppers or closures at least equally effective shall be used as closures for inner receptacles.

6.23.1.3 Closures shall be fitted so as to be leakproof and shall be secured to prevent any loosening under normal conditions of transport. Vented closures, where used, shall conform to the requirements set out in 12.8.8.

6.23.1.4 The maximum capacity of inner glass, porcelain or stoneware inner receptacles shall be equal to or less than 60 L and the maximum net mass shall be equal to or less than 75 kg.

6.23.2 Outer packaging

6.23.2.1 Steel drum (6PA1) – 6.1 applies to steel drums used as outer packagings. The removable lid required for steel drums may be in the form of a cap.

6.23.2.2 Steel crate or box (6PA2) – 6.10 applies to steel crates or boxes used as outer packagings.

6.23.2.3 Aluminum drum (6PB1) – 6.2 applies to aluminum drums used as outer packagings.

6.23.2.4 Aluminum crate or box (6PB2) – 6.11 applies to aluminum crates or boxes used as outer packagings.

6.23.2.5 Wooden box (6PC) – 6.12 applies to wooden boxes used as outer packagings.

6.23.2.6 Plywood drum (6PD1) – 6.3 applies to plywood drums used as outer packagings.

6.23.2.7 Wickerwork hamper (6PD2) – Wickerwork hampers used as outer packagings shall be fitted with a protective cover (cap) so as to prevent damage to the receptacle.

6.23.2.8 Fibre drum (6PG1) – 6.4 applies to fibre drums used as outer packagings.

6.23.2.9 Fibreboard box (6PG2) – 6.15 applies to fibreboard boxes used as outer packagings.

6.23.2.10 Expanded plastic box (6PH1) – 6.16.1 and 6.16.2 apply to expanded plastic boxes used as outer packagings.

6.23.2.11 Solid plastic box (6PH2) – 6.16.1 and 6.16.3 apply to solid plastic boxes used as outer packaging. Boxes may be closed by a cap.

7 Testing

7.1 General requirements

7.1.1 Each representative prototype of the container shall pass the required tests prescribed in Section 7.

7.1.2 Provided the validity of the test results is not affected, several tests may be made on one sample.

7.1.3 If an inner treatment or coating is required for safety reasons, it shall retain its protective properties even after the tests.

7.1.4 Test schedule

Containers selected for testing shall be representative of the design intended for production. The tests required for each container type are set out in 7.4 to 7.8 and in Table 3.

7.1.5 Production testing

Every container intended to contain liquids, other than inner packagings, and every salvage container that is manufactured shall be subjected to the leakproofness test specified in 7.7 or to an alternative test method accepted by Transport Canada. 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 use an alternative test method shall be able to demonstrate that their leak detection system is at least equivalent to performing a leakproofness test. 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.

7.1.6 Periodic retest of container design

Subject to 10.4.10, a Manufacturer shall retest a representative set of samples of a registered container design at an interval of no more than five years. The representative set of samples of a container shall pass the required tests prescribed by Section 7. The required number of containers specified by the applicable tests shall be used. The results of the tests shall be captured in a report that includes the information required by 11.3. The Director may permit some or all of the tests prescribed by Section 7 to be waived for registered container designs that differ only in minor respects from registered container designs that have been retested in accordance with this clause. This clause does not apply to manufacturers of registered container designs of code 1A, 1B, 1H, 1N, 3A, 3B, 3H, 6HA, 6HB and 6HH and who have in place a quality management system in accordance with 9.2.

Table 3 – Test requirements for different types of containers

Container type	Tests				
	Drop	Compression resistance (stacking)	Internal pressure (if intended for liquids)	Leakproofness (if intended for liquids)	Water resistance (fibreboard only)
Drums: - steel, aluminum or plastic	x ¹	x	x	x	—
- plywood and fibre	x	x	—	—	—
Jerricans , steel or plastic	x ¹	x	x	x	—
Boxes: - steel, aluminum, plywood, natural or reconstituted wood, plastic	x ^{1,2}	x	—	—	—
- fibreboard	x ¹	x	—	—	x
Bags , all types	x	—	—	—	—
Composite packagings - inner receptacles	—	—	—	—	—
- outer packaging with inner receptacles	x ¹	x	x	x	x
Combination packagings: - outer packaging	x ^{1,3}	x ³	—	—	—
- inner packaging	—	—	x ⁴	—	x

¹ For plastic drums, jerricans, composite packagings with plastic inner receptacles and combination packagings with plastic inner packagings other than plastic bags, the drop tests shall be performed at low and ambient temperatures.

² For plastic boxes, the drop test shall be performed at ambient temperature for expanded plastic and at ambient and low temperature for solid plastic.

³ Tested as a complete package with inner packaging(s) assembled in the outer packaging in the same manner as for transport.

⁴ This test only applies for inner packagings containing liquids, such as bottles, jars, cans, tins or tubes, intended for air transport. Refer to 7.6 and 12.5.

7.1.7 Variations

Tests shall be repeated after each variation of the design, material or manner of construction of a container unless the variations are permitted in Section 8. Design variations shall be documented in the design report required by Section 11 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 a container design that differs only in minor respects from a UN standardized container design type.

7.1.8 Recycled plastic

For containers made of recycled plastic, the test schedule set out in 7.1.4 shall be repeated for each batch of recycled plastic material except that repeat compression resistance (stacking) tests on plastic drums, plastic jerricans and composite packagings 6HH1 and 6HH2 for liquids may be conducted with containers conditioned at ambient temperature in accordance with 7.3.1. These shall be tested by one of the prescribed methods for a duration of 24 hours or by the dynamic compression method in accordance with 7.5.7. The Director may permit some or all of the tests to be waived for different batches of recycled plastic material where the variation in the composition of the recycled plastic is minimal.

7.1.9 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.

7.2 Preparation for testing

7.2.1 Preparation

7.2.1.1 Unless otherwise specified, fill and close the containers for testing, including the inner packagings of combination packagings, in the same manner as for transport. All closures shall be installed as specified by the closure manufacturer or container manufacturer.

7.2.1.2 Removable head containers for liquids shall not be drop tested until at least 24 hours after filling and closing to allow for any possible gasket relaxation.

7.2.2 Containers for liquids

Fill containers intended for liquids to not less than 98% of their maximum capacity with the substance being transported or a substitute of similar relative density and viscosity for subsequent testing at normal and high temperatures. It is also permissible to fill the containers with water at 23 ± 2 °C for the drop test under the conditions set out in 7.4.3.3 and 7.4.3.4. When containers are conditioned at low temperature, the container shall be filled with a substitute test medium that has a relative density similar to water (0.95 minimum at room temperature) and remains liquid at -18 °C. The test medium may be kept in the liquid state by the addition of antifreeze, if necessary.

7.2.3 Containers for solids

Unless otherwise specified, fill containers, other than bags, intended for solids or inner packagings to not less than 95% of their maximum capacity with the intended contents or with another test medium with similar physical properties (mass, particle size, etc.). Bags shall be filled to the maximum mass at which they may be used. It is permissible to use additives such as bags of metal shot or pellets to achieve the desired gross mass if they are placed in a manner that is representative of the intended use and so that the test results are not affected.

7.2.4 Combination packagings

Fill the inner packagings as required by 7.2.2 for liquids and 7.2.3 for solids.

7.3 Conditioning

7.3.1 Ambient temperature conditioning

Containers requiring ambient temperature conditioning shall be conditioned in accordance with ASTM D4332 at standard conditioning atmosphere. Paper, fibre or fibreboard containers shall be conditioned in accordance with TAPPI T 402.

7.3.2 Low temperature conditioning

Containers requiring low temperature conditioning shall be conditioned at a maximum temperature of -18 °C in accordance with ASTM D4332.

7.3.3 High temperature conditioning

Containers requiring high temperature conditioning shall be conditioned at a temperature of not less than 40 °C in accordance with ASTM D4332.

7.4 Drop test

All container types shall be subjected to the applicable drop test in accordance with this clause.

7.4.1 Test method

7.4.1.1 Perform the drop test in accordance with ASTM D5276 using the appropriate drop orientation as specified in 7.4.4 to 7.4.8. Where more than one orientation is possible for a given drop test, the orientation most likely to result in failure of the container shall be used.

7.4.1.2 For combination and composite packagings, use the appropriate drop orientation and number of samples as required for the outer packaging in 7.4.4 to 7.4.8.

7.4.1.3 For fibreboard boxes (4G), the drop test may be conducted in accordance with TAPPI T 802.

7.4.1.4 Except for flat drops, the centre of gravity shall be vertically over the point of impact.

7.4.1.5 The test containers shall be dropped on a rigid, non-resilient, flat and horizontal surface.

7.4.1.6 The drop test shall be performed with the containers in the conditioning atmosphere, specified in 7.4.4 to 7.4.9, or immediately following removal from the conditioning atmosphere.

7.4.2 Procedure

7.4.2.1 Following the drop, except for inner packagings of combination packagings, vent down the containers tested with liquids until they are at equilibrium with the surrounding atmosphere. Venting shall not be accomplished by opening a closure.

7.4.2.2 Examine the exterior of each container, as well as the inner packagings of combination packagings, for evidence of leakage.

7.4.3 Drop height

7.4.3.1 Containers shall be dropped from the height specified in Table 4.

7.4.3.2 For combination packagings for solids, the minimum drop height is given in the first row of Table 4.

7.4.3.3 For single packagings and certain combination packagings for liquids, the minimum drop height is given in the first row of Table 4 when tested with the solid or liquid to be transported or with another test medium having essentially the same physical characteristics or with water substituting a liquid that has a relative density of 1.2 or less.

7.4.3.4 For single packagings and certain combination packagings for liquids, the minimum drop height is given in the second row of Table 4 when tested with water but where the liquid to be transported has a relative density, (d), greater than 1.2. The calculated drop height shall be rounded to the first decimal.

Table 4 – Drop heights required for containers

Type of material to be transported	Drop height (m)		
	PG I performance level “X” mark	PG II performance level “Y” mark	PG III performance level “Z” mark
Solids and certain liquids (clauses 7.4.3.2 and 7.4.3.3)	1.8	1.2	0.8
Liquids with higher densities (clause 7.4.3.4)	$d \times 1.5$	$d \times 1.0$	$d \times 0.67$
Note: d = actual relative density.			

7.4.4 Steel Drums (1A1, 1A2), Aluminum Drums (1B1, 1B2), Plywood Drums (1D), Metal Drums (other than aluminum or steel) (1N1, 1N2), Steel Jerricans (3A1, 3A2), Aluminum Jerricans (3B1, 3B2)

7.4.4.1 Non-removable head containers

Condition six containers at ambient temperature in accordance with 7.3.1. Drop each container once as follows:

- **containers 1, 2 & 3** – diagonally on the top chime with the largest opening of the top head at point of impact.
- **containers 4, 5 & 6** – flat on the body with the longitudinal seam at the point of impact.

7.4.4.2 Removable head Containers

Condition six containers at ambient temperature in accordance with 7.3.1. Drop each container once as follows:

- **containers 1, 2 & 3** – diagonally on the bottom chime with the intersection of the longitudinal side seam (T-zone) at the point of impact.
- **containers 4, 5 & 6** – diagonally on the bolt ring or lever closure if so equipped, otherwise on the weakest part not tested by the first series.

7.4.5 Fibre drums (1G)

7.4.5.1 Condition six fibre drums at ambient temperature in accordance with 7.3.1. Drop each drum once as follows:

- **drums 1, 2 & 3** – diagonally on the chime or, if the container has no chime, on a circumferential seam or edge.
- **drums 4, 5 & 6** – on the weakest part not tested by the first drop (e.g., a closure).

7.4.6 Plastic Drums (1H1, 1H2), Plastic Jerricans (3H1, 3H2)

7.4.6.1 Condition six containers at ambient temperatures in accordance with 7.3.1. Drop each container once as follows:

- **containers 1, 2 & 3** – diagonally on the chime or, if the container has no chime, on a circumferential seam or edge.
- **containers 4, 5 & 6** – on the weakest part not tested by the first drop (e.g., a closure).

7.4.6.2 Condition six containers at low temperatures in accordance with 7.3.2. Drop each container once as follows:

- **containers 1, 2 & 3** – diagonally on the chime or, if the container has no chime, on a circumferential seam or edge.
- **containers 4, 5 & 6** – on the weakest part not tested by the first drop (e.g., a closure).

7.4.7 Boxes (4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2)

7.4.7.1 Condition five boxes at ambient temperature in accordance with 7.3.1.

7.4.7.2 For solid plastic boxes only, in addition to 7.4.7.1, condition five boxes at low temperatures in accordance with 7.3.2.

7.4.7.3 Drop each box once as follows:

- **box 1** – flat on the bottom.
- **box 2** – flat on the top.
- **box 3** – flat on one long side.
- **box 4** – flat on one short side.
- **box 5** – diagonally on the corner most likely to fail. Fibreboard boxes shall be dropped on the manufacturer's joint bottom corner.

7.4.8 Bags (Plastic, Paper or Textile)

7.4.8.1 Condition three bags at ambient temperature in accordance with 7.3.1. Subject all bags to the following drops:

- **First drop** – flat on a wide face.
- **Second drop** – on an end of the bag (valve end if applicable).
- **Third drop** – flat on a narrow face, for all single-ply bags with side seam.

7.4.9 Composite and Combination Packagings

Test containers as specified for the outer packaging. However, combination packagings containing plastic inner packagings, other than plastic bags, and composite packagings with plastic inner receptacle (6H) shall be conditioned at ambient temperature in accordance with 7.3.1 and at low temperature in accordance with 7.3.2 using the specified number of specimens at each temperature.

7.4.10 Criteria for a successful test

7.4.10.1 The filling substance shall not leak from the inner or outer packagings except for a slight discharge from the closure(s) upon impact if no further leakage occurs.

7.4.10.2 The container shall not exhibit any damage liable to affect safety during handling, offering for transport or transport.

7.4.10.3 All inner packagings, inner receptacles or articles shall be retained within the outer packaging. A minor exposure of the inner packaging, inner receptacle or article is acceptable if it is not possible to withdraw it.

7.4.10.4 Containers that have been vented as specified in clause 7.4.2.1 shall not leak when equilibrium has been reached between the internal and external pressures.

7.4.10.5 For solids, the closure on an inner packaging or inner receptacle shall retain its containment function. However, it is acceptable that the closure is no longer sift-proof after the container is dropped on its top face.

7.5 Compression resistance (stacking) test

All containers except bags shall be subjected to the compression resistance test in accordance with this clause.

7.5.1 Test method

7.5.1.1 The compression resistance test shall be conducted with the container under constant load in accordance with ASTM D4577, except for the number of containers, or shall be performed with the actual stacked load.

7.5.1.2 If a compression-testing machine is used, it shall be capable of applying a constant force to an accuracy of $\pm 1\%$ when determined in accordance with ASTM E4.

7.5.2 Procedure

7.5.2.1 Prepare three containers in accordance with 7.2 and condition them at ambient temperature in accordance with 7.3.1, except that plastic drums, plastic jerricans and composite packagings 6HH1 and 6HH2 for liquids shall be conditioned at high temperature in accordance with 7.3.3.

7.5.2.2 Subject the top of each container to a force or load specified in 7.5.3 or 7.5.4 for a time given in 7.5.5. Measure the deflection during the test and prior to removal of the load. The forces or loads calculated for the stacking test are a minimum, based on top loading of similar containers. Consideration should be given to using a stacking force based on actual shipping experience.

7.5.2.3 Examine the container for evidence of leakage, spillage, damage or deformation upon removal of the force or constant load.

7.5.2.4 Plastic containers shall be cooled to ambient temperature before the assessment for a successful test.

7.5.3 Constant force

Where a constant force is used, the force applied shall be equal to or greater than the force calculated using the following formula:

$$F = \frac{9.8m(3000 - h)}{h}$$

where:

m = gross mass of the container (as tested) in kg;

h = height of the container in mm; and

F = force in N.

7.5.4 Constant Load

Where a constant load is used, the mass of the constant load shall be equal to or greater than the load calculated using the following formula:

$$M = \frac{m(3000 - h)}{h}$$

where:

m = gross mass of the container (as tested) in kg;

h = height of the container in mm; and

M = mass of constant load in kg.

7.5.5 Duration of test

Apply the force or constant load for a period of 24 hours for all containers except plastic drums, plastic jerricans and composite packagings 6HH1 and 6HH2 for liquid substances. For plastic drums, plastic jerricans and composite packagings 6HH1 and 6HH2 for liquid substances, apply the force or constant load for a period of 28 days at $40 \pm 2^\circ\text{C}$.

7.5.6 Criteria for a successful test

The containers shall not show deformation likely to reduce their strength or integrity significantly or to cause instability. The filling substance shall not leak from the container, the inner receptacles or the inner packagings.

7.5.7 Dynamic compression testing

7.5.7.1 Representative samples retested in accordance with 7.1.6 or 7.1.8 may be retested using a dynamic compression testing machine. If this test method is used to retest representative samples, then the requirements of 7.5.1 to 7.5.6 do not apply.

7.5.7.2 Condition three samples of a container at ambient temperature in accordance with 7.3.1. For single packagings and the outer packaging of special containers marked with the letter "V", the test shall be conducted on an empty, unsealed container. For combination packagings, other than special containers, the test shall be conducted on empty inner packagings assembled in the outer packaging. The test sample shall be centered on the bottom platen of the testing machine. The top platen shall be lowered until it comes in contact with the test sample. Compression shall be applied in the direction in which the container is intended to be stacked. The speed of the compression tester shall be 12.7 mm plus or minus 6.35 mm per minute. An initial preload of 222 N shall be applied to ensure definite contact between the test sample and the platens. The distance between the platens at this time shall be recorded as zero deformation.

7.5.7.3 The force to be used in dynamic compression testing shall be calculated as follows:

$$F_{dc} = \frac{9.8m1.5(3000 - h)}{h}$$

where:

F_{dc} = force applied in N

h = height of the container in mm

m = gross mass of the container (to be marked on container) in kg;

1.5 = compensation factor that converts the static load of the stacking test into load suitable for dynamic compression testing.

7.5.7.4 Criteria for a successful test: A container is considered to have passed the dynamic compression testing, if after application of the required force specified in 7.5.7.3, there is no buckling of the side-walls sufficient to cause damage to its expected contents. The maximum deflection shall not exceed 25.4 mm.

7.6 Internal pressure (hydraulic) test

Containers intended for liquids shall be subjected to the internal pressure test. The guide outlined in ASTM D7660 may be used to perform the test as long as all requirements of this section are met. This test is not required for inner packagings of a combination packaging unless the container is intended for air transport.

7.6.1 Pressure gauge

The pressure gauge used in the internal pressure test shall have an accuracy equivalent to $\pm 0.25\%$ for a scale range of 100 kPa and the graduations shall be equal to or less than 5 kPa. For a scale range higher than 100 kPa, the graduation shall be equal to or less than 5% of the scale range.

7.6.2 Support

The container shall be supported during testing in a manner that does not invalidate the test.

7.6.3 Test pressure

7.6.3.1 The test pressure shall be applied continuously and it shall be kept constant throughout the test period as specified in 7.6.6.

7.6.3.2 The minimum test pressure required is dependent on the actual liquid to be transported and shall be determined by one of the following methods:

- total gauge pressure measured in the container (i.e. the vapour pressure of the filling liquid 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 such that the container shall not become liquid full at 55 °C and a filling temperature of 15 °C;
- 1.75 times the vapour pressure at 50 °C of the liquid to be transported, minus 100 kPa, with a minimum test pressure of 100 kPa;
- 1.5 times the vapour pressure at 55 °C of the liquid to be transported, minus 100 kPa, with a minimum test pressure of 100 kPa; or
- pressure set by the manufacturer or an agreed pressure set by the user.

7.6.3.3 In addition, containers intended to contain liquid substances of Packing Group I ("X" mark), except inner packagings of combination packagings, shall be subjected to a minimum test pressure of 250 kPa.

7.6.4 Test preparation

Three container samples shall be prepared for the internal pressure test as follows:

- a) install an appropriate pressure fitting into three containers, so that the performance of the container is not affected;
- b) replace vented closures with non-vented closures or seal the vented closures. Fill each container completely with water, eliminating all air pockets;
- c) close the containers and condition them at ambient temperature in accordance with 7.3.1, except that containers fabricated in part of fibreboard (e.g., 6HG1 and 6HG2) shall be conditioned in accordance with TAPPI T 402;
- d) connect the internal pressure supply to the test fitting in the container, making sure the system is completely filled with water;
- e) dry all external surfaces of the container completely; and
- f) position the container in the centre of a sheet of dry absorbent paper, extending at least 300 mm in all directions beyond the base of the container.

7.6.5 Procedure

7.6.5.1 Hydrostatically pressurize the three containers at a maximum rate of 25 kPa/minute to the required pressure set out in 7.6.3 and maintain for the time specified in 7.6.6. Additional flow may be required to maintain the test pressure for the duration of the test if the container continues to expand. Final pressure should be measured without flow to the test container (i.e. an equilibrium pressure is to be achieved).

7.6.5.2 At the end of the specified time and before the pressure is released, carefully inspect the containers for evidence of leakage. Release the pressure and carefully inspect the paper and the bottom of the containers for evidence of leakage.

7.6.5.3 An alternative method of pressure testing, such as the vacuum chamber, may be used if written procedures properly describe the test method and there is suitable data to validate the test method. If the vacuum chamber method is used, then the tests shall be performed in accordance with ASTM D3078 or D4991.

7.6.6 Duration of test pressure

Subject the metal containers and composite packagings with glass, porcelain or stoneware inner receptacles including their closures to the test pressure for 5 minutes. Subject the plastic containers and composite packagings with plastic inner receptacles including their closures to the test pressure for 30 minutes.

7.6.7 Criteria for a successful test

Containers shall not show signs of leakage on any external surface of the container or on the paper placed underneath it.

7.7 Leakproofness test

Containers intended for liquids and salvage containers shall be subjected to a leakproofness test. However, this test is not required for inner packagings of a combination packaging.

7.7.1 Inner receptacle

The inner receptacle of composite packagings may be tested without the outer packaging if the test results are not affected.

7.7.2 Pressure gauge

The pressure gauge used in the leakproofness test shall have an accuracy equivalent to $\pm 0.25\%$ for a scale range of 100 kPa and the graduations shall be equal to or less than 5 kPa.

7.7.3 Procedure

7.7.3.1 Install an appropriate fitting into three containers or inner receptacles in such a manner that the performance of the container is not affected.

7.7.3.2 Replace vented closures with non-vented closures or seal the vented closures.

7.7.3.3 Restrain the containers, including their closures, just under the surface of water for a period of 5 minutes while the air pressure given in Table 5 is applied. The restraints shall not affect the results of the test. For salvage containers, an air pressure of not less than 30 kPa in accordance with 5.3.2.1 c), shall be applied.

7.7.3.4 Examine all surfaces and seams of the container/receptacles for leakage as evidenced by the formation of bubbles while the container is under water and under constant air pressure.

7.7.3.5 An alternative method of leakproof testing may be used if written procedures properly describe the test method and there is suitable data to validate the test method.

Table 5 – Air pressures required for leakproofness test

Air pressure (gauge)		
PG I performance level “X” mark	PG II performance level “Y” mark	PG III performance level “Z” mark
Not less than 30 kPa (0.3 bar)	Not less than 20 kPa (0.2 bar)	Not less than 20 kPa (0.2 bar)

7.7.4 Criteria for a successful test

Tested containers shall not leak.

7.8 Water absorptiveness test (Cobb Test)

Fibreboard containers shall be subjected to the water absorptiveness test in accordance with this clause.

7.8.1 Test method

The water absorptiveness of at least one sample shall be determined in accordance with ISO 535 or TAPPI T 441 by exposing the outer facings of the fibreboard to distilled or de-ionized water for 30 minutes. To achieve a good ring seal, the flutes of the test specimen may be crushed with a heavy roller or other suitable means.

7.8.2 Criteria for a successful test

The fibreboard shall not absorb more than 155 g/m² of water.

8 Permitted design variations

8.1 Design variation requiring no testing

8.1.1 Single packaging

8.1.1.1 Size and number of openings – The size of openings and the number of the openings may be reduced if the openings and closures remain of the same type and design.

8.1.1.2 Coatings or treatments – Coatings or treatments may be added or changed to parts of a container, including closures and liners that are in direct contact with the dangerous good if they satisfy the requirements of 12.1.2 c).

8.1.1.3 Overall size – A container size may be reduced if the dimensions are all reduced in the same proportion so that the shape of the container remains the same. The marked gross mass shall be reduced in proportion to the reduction of maximum capacity.

8.1.1.4 Height – The height may be reduced if the marked gross mass is reduced in proportion to the reduction of maximum capacity.

8.1.1.5 Width of code 5H film bags – The bag width of code 5H film bags may be reduced if the marked gross mass is reduced in proportion to the reduction in maximum capacity.

8.1.1.6 Thickness of Code 1A steel drums – The thickness of the head, bottom or body may be increased by up to 10%.

8.1.1.7 Rolling hoops on drums:

Number of hoops – The number of rolling hoops may be increased.

Style of hoops – If qualified with round rolling hoops, then it is permissible to change to different style (e.g., W), provided the number of rolling hoops remains the same or is increased.

8.1.1.8 Pre-tested closures

A closure may be replaced by a substitute closure of different design, material or thickness if the substitute closure was successfully tested to the same or higher level of performance on a container with same opening design and having the same opening material specification.

8.1.1.9 Pre-tested opening design

An opening design may be changed to a substitute opening design if the substitute opening design was successfully tested to the same or higher level of performance on a container having the same body material specification and thickness. An opening design is defined by whether it is welded, mechanically seamed, permanently attached to the container or machined into the container. The closure is the removable part used to seal the opening. Permitted variations to opening designs do not imply permission to change closure type.

8.1.1.10 Plastic containers

For plastic containers, carbon black, pigments or inhibitors may be added to the plastic material if the carbon black content is equal to or less than 2% by mass or the pigment content is equal to or less than 3% by mass. The content of inhibitors of ultra-violet radiation is not limited. Material for purposes other than protection from ultraviolet light may be added to the components of plastic material if they do not adversely affect the chemical and physical properties of the plastic material.

8.1.1.11 Gasket material

A different gasket may be installed on a container if the dimensions are 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 or ASTM D2240. The measured hardness of the new gasket may be 12% higher or 12% lower than the measured hardness of the original gasket from the successfully tested design.

8.1.1.12 Steel Containers

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.

8.1.2 Combination packaging

8.1.2.1 Quantity of inner packagings

A lesser number of inner packagings may be assembled in an outer packaging if:

- a) sufficient additional cushioning material is used to prevent contact between the inner packagings and to take up void spaces, where necessary, to prevent significant movement of the inner packagings;
- b) inner packagings are assembled in the outer packaging in such a way that it does not affect the stacking balance; and
- c) stacking strength of the combination packaging is not significantly affected.

8.1.2.2 Type of inner packaging

Where several designs of combination packaging have been tested which differ only in the type of inner packaging, a variety of such inner packagings may be assembled in that outer packaging if sufficient additional cushioning material is used to prevent contact between the inner packagings and to take up void spaces, where necessary, to prevent significant movement of the inner packagings.

8.1.2.3 Inner packaging size and material

A different inner packaging of equivalent or smaller size may be used if:

- a) inner packagings are of similar design (e.g., shape — round, rectangular, etc.) to the tested inner packagings;
- b) material of construction (glass, plastic, metal, etc.) of the inner packagings offers the same or greater resistance to impact and stacking forces as the originally tested inner packaging;
- c) inner packagings have the same or smaller openings and the closure is of similar design and made with same or equivalent material;
- d) inner packagings are arranged within the outer packagings in the same manner as in the tested container;
- e) total number of inner packagings does not exceed that originally tested; and
- f) cushioning thickness between the inner packagings and the outer packaging is not reduced and sufficient additional cushioning material is used to prevent contact between the inner packagings and to take up void spaces, where necessary, to prevent significant movement of the inner packagings.

8.1.2.4 Outer packaging size

The length and width of the outer packaging may be less than the corresponding dimensions of the tested design type if the length is reduced in proportion to the reduction in width and the marked gross mass is reduced in proportion to the reduction of maximum capacity.

8.1.2.5 Outer packaging height

The height of the outer packaging may be reduced if the marked gross mass is reduced in proportion to the reduction of maximum capacity.

8.1.2.6 Combined variations

The variations permitted in 8.1.2.1, 8.1.2.2, 8.1.2.3, 8.1.2.4 and 8.1.2.5 may be combined.

8.1.2.7 Gasket material

A different gasket may be installed on a container if the dimensions are 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 or ASTM D2240. The measured hardness of the new gasket may be 12% higher or lower than the measured hardness of the original gasket from the successfully tested design.

8.1.2.8 Plastic outer packaging

For plastic containers, carbon black, pigments or inhibitors may be added to the plastic material if the carbon black content is equal to or less than 2% by mass or the pigment content is equal to or less than 3% by mass. The content of inhibitors of ultra-violet radiation is not limited. Material for purposes other than protection from ultraviolet light may be added to the components of plastic material if they do not adversely affect the chemical and physical properties of the plastic material.

8.2 Design variations requiring limited testing

The variations to a tested design listed in 8.2.1.1 and 8.2.2.1 are permitted if the prescribed limited testing is successfully conducted.

8.2.1 Single packaging and composite packaging**8.2.1.1 Closures or closure gaskets**

A different closure or closure gasket may substitute the original closure or closure gasket if the modified container successfully passes the drop test in the orientation which most severely affects the integrity of the new closure and gasket. If the new closure of a container comes into contact with a superimposed container while stacked, then the container shall successfully pass the compression resistance (i.e. stacking) test in accordance with 7.5. For containers intended for liquids, the modified container shall successfully pass the internal pressure test in accordance with 7.6.

8.2.2 Combination packaging**8.2.2.1 Quantity of inner packagings**

A lesser number of inner packagings that significantly contribute to the stacking strength of the container may be used if the modified container undergoes the compression resistance (i.e. stacking) test in accordance with 7.5.

9 Quality management system

9.1 General

Containers shall be manufactured under a quality management system capable of ensuring that the containers are in accordance with the tested and registered design specified in the design report, the requirements of this standard and the TDG Regulations. Non-registered quality management systems are acceptable, provided the Manufacturer is not manufacturing containers listed in 9.2. A copy of the quality management system documentation shall be made available to the Director upon request.

9.2 Quality standard

The quality management system for codes 1A, 1B, 1H, 1N, 3A, 3B, 3H, 6HA, 6HB and 6HH containers shall conform to the requirements of ISO 9001 and be registered with a quality management system registrar (Registration Organization) accredited by the Standards Council of Canada (SCC), or a foreign quality management system registrar recognized by the SCC.

9.3 Quality standard for fleet operators

9.3.1 A Fleet Operator shall adhere to a quality management system that addresses the following elements and processes.

9.3.1.1 Management commitment

A member of management shall be appointed who, irrespective of other responsibilities, has the authority and responsibility for overseeing the quality management system including:

- a) ensuring the quality management system is established and maintained;
- b) reporting to management on the performance of the quality management system; and
- c) promoting awareness of the importance of the requirements of this standard and the TDG Regulations.

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

9.3.1.3 Program documentation manual

A program documentation manual shall be developed. It shall contain the following components:

- a) title page with the company name, company address and name and position of the person responsible for compliance with this standard;
- b) description of the process used for implementing and documenting the quality management system; and

- c) list of all procedures, where they are located 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 and the TDG Regulations. They shall include but are not limited to the following:
 - i) procedure describing the use of containers in the fleet to ensure that they are only used as permitted by this standard; and
 - ii) procedure describing the maintenance and inspection of containers to ensure that those containers showing evidence of cracking, crazing, swelling, gouges, permanent deformation, degradation from ultraviolet light or any other damage that may render the container unsafe for transport, are removed from service.

10 Registration

10.1 Certificate of Registration

A Manufacturer or Fleet Operator is registered upon issuance, by the Director, of a Certificate of Registration. The Certificate of Registration remains valid until its expiry or its revocation for cause.

10.2 Design Registration Number

A container design is registered upon issuance, by the Director, of a Design Registration Number. The Design Registration Number remains valid until its revocation for cause.

10.3 Transition from TP 14850 (2010)

A Certificate of Registration issued in accordance with the TP 14850 (2010) Standard shall be deemed to be registered as a Manufacturer and of container design pursuant to Section 10 of this standard unless the Certificate of Registration has expired or been revoked.

10.4 Registration as a manufacturer

10.4.1 General

A container shall not be manufactured under this standard unless the Manufacturer and the container design have been registered with the Director.

10.4.2 Application for registration

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) manufacturing facility locations where the container will be produced;
- f) design reports prepared in accordance with Section 11 for all container designs to be registered;

- g) description of the quality management system required in Section 9. 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 9.2, a copy of the ISO 9001 quality management system Certificate of Registration.

10.4.3 Record retention

The Manufacturer shall keep a copy of:

- a) every application for registration, including design reports, for as long as UN standardized containers are manufactured and at least two years thereafter; and
- b) test report of the periodic retest of container design required by clause 7.1.6 for at least five years or until the container is retested.

10.4.4 Registration and compliance

A Certificate of Registration and Design Registration Number shall be issued by the Director, for a manufacturer if the Director is satisfied that:

- a) containers manufactured and tested are representative of the registered design;
- b) container manufacturer conforms to the applicable requirements of this standard; and
- c) container manufacturer is capable of consistently complying with the requirements of this standard.

10.4.5 Revocation for cause

10.4.5.1 Certificate of Registration

The Director may revoke a Certificate of Registration if the Director has determined that:

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

10.4.5.2 Design Registration Number

The Director may revoke a Design Registration Number if the Director has determined that:

- a) container as manufactured is not representative of the registered design as described in the Design Report;
- b) container has not been retested in accordance with 7.1.6; or
- c) container does not comply with the requirements of this standard.

10.4.6 Expiry of Certificate of Registration

Manufacture of containers shall not continue past the expiry date of the Certificate of Registration, unless:

- a) application for renewal is received by the Director at least 90 calendar days prior to the expiry date;
- b) new Certificate of Registration has not been issued;
- c) application for renewal has not been rejected by the Director; and

- d) Certificate of Registration due to expire has not been revoked by the Director.

10.4.7 Application for amendment or renewal of Certificate of Registration

An application for amendment or renewal of a Certificate of Registration is subject 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 the test report for the periodic retest of container design required by 7.1.6, when applicable.

10.4.8 Equivalent specification (“W” mark)

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

10.4.9 Design modifications

Any change in a container design that results in the information of the previously submitted design report to no longer be accurate shall be submitted to the Director as an application to manufacture a new container design. If the new design is within the permitted design variations included in Section 8 such that no new testing is required, the application shall identify the previously tested design. If limited testing of the modified design is required, the design report shall include the relevant results.

10.4.10 Transition period for the periodic retest of container design

Starting 24 months after this standard comes into force, 7.1.6 applies.

10.5 Registration as a Fleet Operator for use of containers permitted by 14.4

10.5.1 General

A container permitted by 14.4 shall not be used unless the Fleet Operator is registered with the Director.

10.5.2 Application for registration

An application for registration as a Fleet Operator 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) if the applicant is not an individual, letters patent, certificates of incorporation, or other documents evidencing the legal existence of the applicant;
- d) type, size and maximum number of containers in the fleet;
- e) dangerous goods that the fleet of containers is dedicated to transporting;
- f) quality assurance information in conformance with the requirements of 9.3.

10.5.3 Registration and compliance

A Certificate of Registration shall be issued by the Director, to a Fleet Operator, if the Director is satisfied that:

- a) containers conform to the applicable requirements of this standard;
- b) operator of the fleet of containers conforms to the applicable requirements of this standard; and
- c) operator of the fleet of containers is capable of consistently complying with the requirements of this standard.

10.5.4 Revocation for cause

The Director may revoke a Certificate of Registration if the Director has determined that:

- a) Fleet Operator's containers do not comply with the applicable requirements of this standard;
- b) Fleet Operator is not capable of complying with the requirements of this standard; or
- c) Fleet Operator is not complying with the requirements of this standard.

10.5.5 Expiry of Certificate of Registration

Use of the containers shall not continue past the expiry date of the Certificate of Registration, unless:

- a) application for renewal is received by the Director at least 90 calendar days prior to the expiry date;
- b) new Certificate of Registration has not been issued;
- c) application for renewal has not been rejected by the Director; and
- d) Certificate of Registration due to expire has not been revoked by the Director.

10.5.6 Application for Amendment or Renewal of Certificate of Registration

An application for amendment or renewal of a Certificate of Registration is subject to the same process and conditions as the initial application for Certificate of Registration relating to the Fleet Operator.

11 Design report

11.1 Date and design report number

The design report shall be dated and include a unique identification number.

11.2 Design description

The design report shall include a detailed description of the design of the container that was tested in accordance with this standard. That description shall be detailed enough to identify containers in production as representing those that were tested. The description shall include:

- a) dimensions of the container, material thickness and maximum capacity of the container including those of the inner packagings. Material thickness may be represented as shot weight for plastics and grammage for paper or fibreboard;
- b) drawings that show the location of openings, closures, joints, fasteners, liners, valves, vents, spouts, gaskets, cushions, dividers and any other component that is part of the container, as tested;
- c) method of manufacture and specifications such as laminated, moulded, blow moulded, extruded shape, forged, rolled, formed, welded, glued, etc., as applicable;

- d) material type and mechanical properties of the material, as applicable, that constitutes the container, including inner packagings;
- e) material type of the container components or a list of components with supplier name and part number;
- f) list of variations in the container design permitted under Section 8 that were not included in the representative prototype design that was successfully tested. Supplemental information shall be added in the design report to properly describe such variations; and
- g) any other pertinent information that, if altered, may invalidate the test results or affects the performance of the container.

11.3 Tests and results

The following performance test information shall be included in the design report.

11.3.1 Testing facility

When different from the manufacturer, the name, address and contact information of the person, corporation, partnership or facility that has performed testing in accordance with Section 7 shall be provided.

11.3.2 Tests required

The report shall list the tests performed with references to the applicable clauses of this standard.

11.3.3 Test methods and equipment

11.3.3.1 Specify test methods and test equipment used. Specify any variations from the test methods prescribed by this standard. Describe the test specimen replicates, including contents (e.g., viscosity, relative density and temperature of test medium for liquids and particle size for solids), net and gross mass as tested. Include a statement that the specimens tested were randomly selected (if selected from production) and represent the containers intended for manufacture and the type of contents intended for supply.

11.3.3.2 Test procedures which include test methods and a description of the test equipment may be kept in a separate document and need not be included with each design report, provided the design report refers to the appropriate procedure number and revision date. The test procedures shall be made available to the Director upon request.

11.3.4 Test results

Provide test results in terms of the pass/fail criteria of each specific test and each tested sample container (results may be displayed in a tabular form). Describe damage in detail. Give results in a sequence corresponding to 11.3.2. Photographs of each sample container after testing are desirable. The date that the tests were conducted shall be identified.

11.4 Proposed compliance mark

The design report shall include the proposed compliance mark as required by Section 5.

11.5 Certification statement

The design report shall include 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 and on behalf of the manufacturing facility. The statement shall also be signed by a representative of the manufacturer, by the person who conducted the tests, and by his or her employer if the employer is different from the manufacturer.

PART II Selection and use of containers

12 General requirements

12.1 Selection and use

12.1.1 Except as permitted in Sections 13, 14 and 15, a container shall not be used to handle, offer for transport or transport dangerous goods unless:

- a) requirements for selection and use set out in Part II and Annex A specify that the container is permitted to contain the dangerous goods;
- b) container is prescribed in the Packing Instructions listed in Column 6 of the Table in Part A of Annex A for the appropriate dangerous goods described in Column 1 to 5 of the Table in Part A of Annex A;
- c) container conforms to the requirements of the applicable packing instructions;
- d) where packaging codes are listed in the packing instructions, the container is a UN standardized container of that packaging code and it is marked accordingly;
- e) for cylinders and spheres, they are selected and used in accordance with Section 15;
- f) for Packing Group I dangerous goods, when a UN standardized container is prescribed in the packing instructions, the container is marked with the letter “X” in accordance with 5.2 c);
- g) for Packing Group II dangerous goods, when a UN standardized container is prescribed in the packing instructions, the container is marked with the letter “X” or “Y” in accordance with 5.2 c);
- h) for Packing Group III dangerous goods, when a UN standardized container is prescribed in the packing instructions, the container is marked with the letter “X”, “Y” or “Z” in accordance with 5.2 c);
- i) container is loaded with solid or viscous liquid dangerous goods to a gross mass not exceeding the maximum gross mass as marked, unless permitted by 12.8.5.5 or 12.8.5.6; and
- j) container is loaded with liquid dangerous goods having a relative density not exceeding the relative density as marked or, if not marked, in accordance with 5.3.2.5, unless permitted by 12.8.6.2 or 12.8.6.3.

12.1.2 A container shall not be used to handle, offer for transport or transport dangerous goods unless:

- a) applicable general containment requirements set out in 12.8 are met;
- b) for dangerous goods that are liquids, the container has a resistance to the internal pressure that may develop under normal conditions of transport and meets the requirements set out in 12.8.6;
- c) parts of the container, including closures, liners, coatings and surface treatments in direct contact with the dangerous goods, are compatible with the dangerous goods. Coatings or surface treatments shall retain their protective properties under normal conditions of transport. Suitable internal protective coatings or treatments may be applied on parts of the container, including closures and liners that are not in themselves compatible with the dangerous goods; and
- d) for containers that are used more than once, be in such condition, including closure devices and cushioning materials, that they conform to all applicable requirements of this standard.

12.2 Before filling a container

A container shall not be filled with dangerous goods, unless the following conditions are met:

- a) container, the inner packaging or the inner receptacle is compatible with the dangerous goods. This can be shown through testing in accordance with the requirements of 12.9 or by having sufficient user experience with the container and dangerous goods;
- b) container is free from corrosion, contamination or other damage that may render the container unsafe for transport. Any container that shows signs of reduced strength compared with the registered design shall not be used;
- c) container is within the prescribed period of use. The maximum prescribed period of use for plastic drums and jerricans is 60 months past the manufacturing date, unless permitted by 14.4;
- d) if the container is a steel or plastic drum and has a capacity equal to or greater than 150 L, the drum shall not be reused to handle, offer for transport, or transport dangerous goods that are liquid in classes 3, 4, 5, 6.1, 8 or 9 unless:
 - i) steel drum has been reconditioned in accordance with Part II of CAN/CGSB-43.126 before reuse; or
 - ii) plastic drum has been reconditioned in accordance with Part III of CAN/CGSB-43.126 before reuse;
- e) 12.2 d) does not apply if:
 - i) dangerous goods to be transported are for disposal, recycling or any other reclamation process;
 - ii) drums are eligible for reconditioning in accordance with CAN/CGSB-43.126;
 - iii) drums have a capacity equal to or less than 220 L;
 - iv) drums are visually inspected prior to being refilled to ensure that they are free from corrosion, contamination or other damage that may render them unsafe for transport;
 - v) drums are refilled only with the dangerous goods that were originally contained within the drum with no other dangerous goods present other than those from the process in which the dangerous goods were used;
 - vi) drums may be reused only once and shall be reconditioned in accordance with CAN/CGSB-43.126 before subsequent use;
- f) if the container is a salvage container, refer to 13.3; and
- g) if the container is a cylinder or sphere, refer to 15.2.

12.3 Filling and closing

12.3.1 If the container is intended for liquids, sufficient ullage (outage) shall be left in the container to ensure that neither leakage nor permanent distortion of the container occurs as a result of expansion of the liquid caused by temperatures likely to occur during transport. The container shall not become liquid full at a temperature of 55 °C.

12.3.2 Assembling or closing a container

The following requirements apply:

- a) container shall be assembled and closed as instructed in the information provided or made available by the container manufacturer or distributor in accordance with 4.4; and

- b) no quantity of dangerous goods are adhering to the outside of the outer packaging, the inner packaging or the inner receptacle.

12.4 Before offering for transport and transporting

A container containing dangerous goods shall not be offered for transport or transported unless:

- a) no dangerous goods are adhering to it; and
- b) outside of the container is free from corrosion, dents, gouges or other damage that may render the container unsafe for transport.

12.5 Air transport

Dangerous goods shall not be handled, offered for transport or transported in a container by aircraft unless it is done in accordance with the applicable requirements set out in Part 12 of the TDG Regulations.

12.6 Marine transport

Dangerous goods shall not be handled, offered for transport or transported in a container by vessel unless it is done in accordance with the applicable requirements set out in Part 11 of the TDG Regulations.

12.7 Special containers (“V” mark)

A combination packaging, marked in accordance with 5.2 b) and 5.3.1.1 with the letter “V”, may be assembled and transported with articles or inner packagings of any type, for solids or liquids, if:

- a) thickness of cushioning material between inner packagings and between the inner packaging(s) and the outer package, has not been reduced compared to the successfully tested design. When either a fewer number of inner packagings or smaller inner packagings are used (as compared to the inner packagings used in the drop test), sufficient additional cushioning material shall be used to take up void spaces;
- b) inner packagings containing liquid are completely surrounded with a sufficient quantity of absorbent material to absorb the entire liquid contents of the inner packagings. Absorbent material shall be compatible with the dangerous goods; and
- c) for an outer packaging that is not sift-proof or leakproof, a leakproof liner, plastic bag, or other equally effective means is used to contain any release of solids or liquids, as applicable, from the inner packaging. For containers containing liquids, the absorbent material required in 12.7 b) shall be placed inside the means (e.g., leakproof liner) inserted in the outer packaging to contain any release of liquids. Absorbent material shall be compatible with the dangerous goods.

12.8 General containment requirements

12.8.1 Dangerous goods that are wetted or diluted substances

Containers used for wetted or diluted substances shall have closures that are vapour tight or appropriately sealed so as to prevent vapour from escaping the container such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.

12.8.2 Dangerous goods that are powdery or granular substances

Containers used for powdery or granular substances shall be sift-proof or shall be provided with a sift-proof liner.

12.8.3 Dangerous goods that are solids, which may become liquid

A container intended for liquids shall be used for solids that may become liquid at temperatures likely to be encountered during transport.

12.8.4 Combining dangerous goods

Dangerous goods shall not be offered for transport together with other dangerous goods or non-dangerous goods in the same container if the combining of those goods could:

- a) result in an evolution of heat or gas, or produce a corrosive effect or the formation of unstable substances that could endanger the integrity of the container; or
- b) cause a discharge, emission or escape of the dangerous goods from the container that could constitute a danger to public safety.

12.8.5 Dangerous goods that are solids

12.8.5.1 A container prescribed for liquids may be used to transport solids if the mass of the container filled with the solid does not exceed the maximum capacity of the container, in litres, multiplied by the relative density marked on the container in accordance with 5.2 c) or by a factor of 1.2 if there is no marked relative density.

12.8.5.2 In addition, a container intended for liquids marked with the letters “X” in accordance with 5.2 c) may be filled with a packing group II or III dangerous good that is a solid, to a gross mass exceeding the gross mass permitted by 12.8.5.1 if:

- a) for packing group II dangerous goods, the dangerous good has a gross mass not exceeding the maximum capacity of the container in litres, multiplied by 1.5, multiplied by the relative density marked on the packaging, or 1.2 if not marked;
- b) for packing group III dangerous goods, the dangerous good has a gross mass not exceeding the maximum capacity of the container in litres, multiplied by 2.25, multiplied by the relative density marked on the packaging, or 1.2 if not marked; and
- c) container has successfully passed the compression resistance test in accordance with 7.5 at the higher gross mass.

12.8.5.3 Also, a container intended for liquids marked with the letters “Y” in accordance with 5.2 c) may be filled with a packing group III dangerous good that is a solid, to a gross mass exceeding the gross mass permitted by 12.8.5.1 if:

- a) for packing group III dangerous goods, the dangerous good has a gross mass not exceeding the maximum capacity of the container in litres, multiplied by 1.5, multiplied by the relative density marked on the packaging, or 1.2 if not marked; and
- b) container has successfully passed the compression resistance test in accordance with 7.5 at the higher gross mass.

12.8.5.4 A container prescribed for liquids may be used as the outer packaging of a combination packaging if the mass of all the inner packagings does not exceed the maximum capacity of the container, in litres, multiplied by the relative density marked on the container in accordance with 5.2 c) or by a factor of 1.2 if there is no marked relative density.

12.8.5.5 A container intended for solids marked with the letter “X” in accordance with 5.2 c) may be filled with a packing group II or III dangerous good that is a solid to a higher gross mass than is marked on the container if:

- a) for packing group II dangerous goods, the dangerous good has a gross mass not exceeding 1.5 times the marked gross mass on the container;
- b) for packing group III dangerous goods, the dangerous good has a gross mass not exceeding 2.25 times the marked gross mass on the container; and
- c) container has successfully passed the compression resistance test in accordance with 7.5 at the higher gross mass.

12.8.5.6 A container intended for solids marked with the letter “Y” in accordance with 5.2 c) may be filled with a packing group III dangerous good that is a solid to a higher gross mass than is marked on the container if:

- a) dangerous good has a gross mass not exceeding 1.5 times the marked gross mass on the container; and
- b) container has successfully passed the compression resistance test in accordance with clause 7.5 at the higher gross mass.

12.8.5.7 A salvage container marked with the letter “T” or the mark “SALVAGE” or “SECOURS” in accordance with the requirements of 5.2 b) and 5.6 may be used to transport solid dangerous goods.

12.8.6 Dangerous goods that are liquids

12.8.6.1 A container, other than inner packagings, shall not be filled with a liquid unless the container is marked with the internal test pressure in accordance with clause 5.2 d), and the container is filled with a liquid having a vapour pressure:

- a) such that the total gauge pressure in the container (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55 °C, determined on the basis of a maximum degree of filling and a filling temperature of 15 °C, will not exceed two-thirds of the marked test pressure;
- b) at 50 °C of less than four-sevenths of the sum of the marked test pressure plus 100 kPa (e.g., see Column 2 of Table 6); or
- c) at 55 °C of less than two-thirds of the sum of the marked test pressure plus 100 kPa (e.g., see Column 3 of Table 6).

Table 6 – Examples of minimum test pressure required for containers that may be used for dangerous goods of certain vapour pressure

Common Container Test Pressure (kPa)	V _{p50} of the Dangerous Good (kPa)	V _{p55} of the Dangerous Good (kPa)
60	91	106
100	114	133
150	142	166
200	171	200
250	200	233
330	242	283
350	257	300

12.8.6.2 A container intended for liquids marked with the letters “X” in accordance with 5.2 c) may be filled with a packing group II or III dangerous good that is a liquid of a higher relative density than is marked on the container if:

- a) for packing group II dangerous goods, the dangerous good has a maximum relative density of 1.5 times the marked relative density on the container or 1.8 if there is no marked relative density;
- b) for packing group III dangerous goods, the dangerous good has a maximum relative density of 2.25 times the marked relative density on the container or 2.7 if there is no marked relative density; and
- c) container has successfully passed the compression resistance test in accordance with 7.5 at the higher density.

12.8.6.3 A container intended for liquids marked with the letters “Y” in accordance with 5.2 c) may be filled with a packing group III dangerous good that is a liquid of a higher density than is marked on the container if:

- a) dangerous good has a maximum density of 1.5 times the marked relative density on the container or 1.8 if there is no marked relative density; and
- b) container has successfully passed the compression resistance test in accordance with 7.5 at the higher density.

12.8.7 Dangerous goods that are viscous liquids

A drum, jerrican or composite packaging intended for solids may be used for viscous liquids.

12.8.8 Venting

Where pressure may develop in a container by the evolution of gas from the contents, the container may be equipped with a vent if any gas emitted will not cause danger to public safety. The vent shall be designed so that when the container 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.

12.8.9 Dangerous goods included in Class 4.1 or 5.2

Dangerous goods included in Class 4.1 self-reactive substances and Class 5.2 organic peroxides shall be handled and transported at or below the control temperature referenced in Part 2 of the TDG Regulations. Additional requirements for containers containing self-reactive substances and organic peroxides are given in Sections 16 and 17, respectively.

12.9 Compatibility test

Compatibility of the container with the dangerous goods shall be demonstrated by successfully passing the compatibility test unless such compatibility is demonstrated by successful user experience.

12.9.1 Preparation

Fill the number of test containers as specified in Section 7 to perform the drop tests, the stacking test and where applicable, the hydrostatic and leakproofness tests. The actual dangerous goods and concentrations to be transported shall be used for testing. Close the container in accordance with the manufacturer or distributor's instructions. Weigh each container and record the initial gross mass. Inner packagings shall be placed in outer packagings.

12.9.2 Procedure

12.9.2.1 Store the test containers filled with the dangerous goods:

- a) at not less than 18 °C for at least 180 days;

- b) at not less than 50 °C for 28 days;
- c) at not less than 60 °C for 14 days; or
- d) store at not over 18 °C for 180 days any dangerous goods likely to become unstable at elevated temperatures. Appropriate precautions shall be taken to address potential dangerous goods release during the testing.

12.9.2.2 After the storage period, the containers shall meet the compression resistance requirements set out in 7.5.

12.9.2.3 At the end of the storage period examine the exterior and interior of each container for evidence of leakage or damage. (For information purposes only, weigh each container and record the gross mass after storage. Calculate the percentage gross mass loss or gain as a percentage of the original gross mass.)

12.9.2.4 Remove the dangerous goods, refill and re-close the containers as specified in 7.2 and perform the drop tests, stacking test, and where applicable, the internal pressure and leakproofness tests in accordance with 7.4, 7.5, 7.6 and 7.7.

12.9.3 Criteria for a successful test

The tested containers shall not show signs of stress cracking or crazing, oxidation, embrittlement, vapour pressure build-up, collapse of walls, seepage or other defects likely to cause or indicate premature failure after storage. The tested containers shall successfully pass the drop, stacking, and where applicable, internal pressure and leakproofness tests in accordance with the requirements of Section 7.

13 Salvage containers

13.1 Application

Damaged, defective, leaking or non-conforming containers, including inner receptacles and inner packagings, or articles that have spilled or leaked may be transported in a salvage container marked with the letter “T” or the mark “SALVAGE” or “SECOURS” in accordance with the requirements of 5.2 b) and 5.6.

13.2 Securement within salvage container

Appropriate measures shall be taken to prevent excessive movement of the damaged or leaking containers and articles within a salvage container and to ensure that there is no dangerous build-up of pressure.

13.3 Before filling a salvage container

Before a salvage container is filled with containers or articles, the user shall inspect the salvage container to ensure that it is free from corrosion, contamination or other damage that may render the container unsafe for transport. Any salvage container, other than a steel or plastic drum, that shows signs of reduced strength as compared with the registered design shall no longer be used. If the salvage container is a steel or plastic drum that shows signs of reduced strength as compared with the registered design, it shall be repaired and reconditioned in accordance with CAN/CGSB-43.126, before reuse.

13.4 Container capacity

The maximum capacity of a salvage container may exceed by 20% the prescribed maximum capacity given in 4.3.4 and Table 1.

13.5 Liquids in salvage containers

When the salvage container contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid at the time the salvage container is closed. All cushioning and absorbent material used in the salvage container shall be compatible with the dangerous goods contained in the damaged or leaking containers and the contents of any articles.

13.6 Combining dangerous goods

Combinations of different dangerous goods within the salvage container shall be in accordance with 12.8.4.

14 Special cases

14.1 Transport of dangerous goods intended for disposal, recycling or any other reclamation process in quantity or concentration available to the general public

Dangerous goods intended for disposal, recycling or any other reclamation process in a quantity or concentration available to the general public may be handled, offered for transport or transported if:

- a) dangerous goods are in inner packagings having a maximum capacity equal to or less than 30 L;
- b) inner packaging does not leak, or if the inner packaging is damaged or leaking, it is placed into a leakproof intermediate packaging or made leakproof by another equally effective means;
- c) inner packaging and, if applicable, the intermediate packaging, are placed into a leakproof outer packaging or an outer packaging that is made leakproof by another equally effective means;
- d) dangerous goods in each outer packaging all have the same primary class; and
- e) dangerous goods are transported for disposal, recycling or any other reclamation process.

14.2 Transport of dangerous goods intended for disposal, recycling or any other reclamation process in quantity or concentration not available to the general public

Dangerous goods intended for disposal, recycling or any other reclamation process in a quantity or concentration not available to the general public may be handled, offered for transport or transported if:

- a) dangerous goods are in inner packagings having a maximum capacity equal to or less than 30 L;
- b) inner packaging does not leak, or if the inner packaging is damaged or leaking, it is placed into a leakproof intermediate packaging or made leakproof by another equally effective means;
- c) inner packagings, and, if applicable, the intermediate packaging, are tightly packed in an outer packaging with enough cushioning material to prevent damage or breakage of the inner packagings in normal conditions of transport;
- d) outer packaging contains sufficient inert absorbent material to eliminate the presence of any free liquid that may leak from the inner packagings or intermediate packagings;
- e) outer packaging is a UN Standardized container that is rigid and leakproof;
- f) dangerous goods in each outer packaging all have the same primary class; and
- g) dangerous goods are transported for disposal, recycling or any other reclamation process.

14.3 Liquid dangerous goods transported in a Mobile Process Unit

Dangerous goods of Class 5.1, 6.1, 8 or 9 with any or no subsidiary class and included in Packing Group II or III, that are integral to licenced Mobile Process Units may be transported in a welded metal container, if the container:

- a) is permanently mounted on a vehicle or skid authorized as a Mobile Process Unit that is designed to transport, manufacture and load explosives into boreholes in conformance with an explosives licence or certificate issued under the *Explosives Act* and *Explosives Regulations* by the Minister of Natural Resources;
- b) is completely contained within the length and width of the vehicle or skid on which it is mounted;
- c) is constructed of impermeable, non-absorbent materials that will not be corroded by the dangerous goods contained;
- d) is designed to facilitate cleaning and decontamination;
- e) is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no release of the dangerous goods that could endanger public safety;
- f) is watertight, leakproof, designed for the transport of liquids and capable of withstanding any internal pressure likely to be encountered under normal conditions of transport; and
- g) has a maximum capacity equal to or less than 450 L.

14.4 Use of UN standardized plastic drums and jerricans beyond 60 months from the date of manufacture

Dangerous goods may be handled, offered for transport or transported in UN standardized plastic drums and jerricans which are past 60 months from their date of manufacture but not exceeding 120 months (ten years) from their date of manufacture if:

- a) container is part of a fleet of containers under the full control of a Fleet Operator;
- b) container is dedicated to transporting a single dangerous goods that is a liquid included in Class 3, 6.1, 8, 9 of Packing Group II or III, except UN2031;
- c) container has a capacity less than 150 L;
- d) container does not show any evidence of cracking, crazing, swelling, gouges, permanent deformation, degradation from ultraviolet light or any other damage that may render the container unsafe for transport;
- e) container is capable of passing the performance tests required of a new container bearing the same marks; and
- f) containers are only used by the Fleet Operator that is registered with the Director in accordance with 10.5.

15 Use of cylinders and spheres for liquids and solids

15.1 Selection

15.1.1 A cylinder or sphere shall not be used to handle, offer for transport or transport dangerous goods that are solids or liquids unless the packing instruction in Part B of Annex A allows a cylinder or sphere for those dangerous goods.

15.1.2 A cylinder or sphere shall not be used to handle, offer for transport or transport dangerous goods that are solids or liquids unless:

15.1.2.2 the cylinder or sphere:

- a) is permitted for use in accordance with CSA B340 and Part 5 of the TDG Regulations for the handling, offering for transport or transporting any dangerous goods included in Class 2, except for cylinders for acetylene service;
- b) has a test pressure of equal to or greater than 600 kPa (6 bar) unless otherwise specified in the packing instruction;
- c) if due for requalification, is requalified in accordance with the requirements of:
 - i) CSA B339 by a facility registered with Transport Canada, where the requalification is performed in Canada;
 - ii) Part 180 of 49 CFR by a facility approved by the U.S. Department of Transportation, where the requalification is performed in the United States; or
 - iii) Either CSA B339 by a facility registered with Transport Canada or Part 180 of 49 CFR by a facility approved by the U.S. Department of Transportation, where the requalification is performed outside of both Canada and the United States; and
- d) shall be subjected to requalification every five years unless otherwise specified in the packing instruction.

15.1.2.2 The cylinder or sphere:

- a) is permitted for use in accordance with CSA B342 and Part 5 of the TDG Regulations for the handling, offering for transport or transporting any dangerous goods included in Class 2, except for cylinders for acetylene service and adsorbed gases;
- b) has a test pressure of equal to or greater than 600 kPa (6 bar) unless otherwise specified in the packing instruction;
- c) if due for periodic inspection and test, is periodically inspected and tested in accordance with the requirements of:
 - i) CSA B341 by a facility registered with Transport Canada, where the periodic inspection and test is performed in Canada;
 - ii) Part 180 of 49 CFR by a facility approved by the U.S. Department of Transportation, where the periodic inspection and test is performed in the United States; or
 - iii) either CSA B341 by a facility registered with Transport Canada or Part 180 of 49 CFR by a facility approved by the U.S. Department of Transportation, where the periodic inspection and test is performed outside of both Canada and the United States; and
- d) shall be subjected to a periodic inspection and test every five years unless otherwise specified in the packing instruction.

15.1.3 A cylinder or sphere shall not be used to handle, offer for transport or transport dangerous goods that are solids or liquids if the dangerous goods are explosive, thermally unstable, organic peroxide, self-reactive, dangerous goods that may cause significant pressure to develop by evolution of chemical reaction or a radioactive material, unless otherwise mentioned in the packing instructions.

15.2 Before filling

A cylinder or sphere shall not be filled with dangerous goods that are solids or liquids unless the following conditions are met:

- a) marks for the date of manufacture and the date of previous requalification or periodic inspection or test, as applicable, are verified to ensure that the cylinder or sphere is not due for requalification or periodic inspection and test, as applicable, or is not beyond its service life; and
- b) inspection of the cylinder or sphere as required in CSA B340 or CSA B342, as applicable, is performed.

15.3 After filling

After filling, shut-off valves shall be closed and provided with a means of protection in accordance with the requirements in CSA B340. The cylinders and spheres as prepared for transport shall not be leaking. Shut-off valves shall remain closed during transport. A cylinder or sphere filled with dangerous goods prior to the date of expiry of the last requalification or periodic inspection and test, as applicable, shall not be refilled but may continue to be transported. In no case shall a cylinder or sphere continue in use past its service life limitation as specified in CSA B339.

15.4 Filling limit

The level of filling shall be equal to or less than 95% of the capacity of the cylinder or sphere at 50 °C and be such that the cylinder or sphere shall not become liquid full at a temperature of 55 °C.

15.5 Refillable cylinders and spheres

A cylinder or sphere shall not be filled with dangerous goods different from that previously contained unless the necessary operations for change of service have been performed.

16 Additional requirements for class 4.1, self-reactive substances

16.1 Packing method

In addition to the applicable requirements of Section 12, the self-reactive dangerous goods listed in the table of the UN Recommendations referenced by Part 2 of the TDG Regulations shall be packed in accordance with the corresponding OP packing method listed in packing instruction 520 in Part B of Annex A. The quantities specified for each packing method are the maximum quantities authorized per package.

16.2 Compatibility

Containers shall be constructed so that contact with the contents will not catalyze or otherwise dangerously affect the properties of their contents. For combination packagings, cushioning material shall not be readily combustible and shall not cause decomposition of the dangerous goods that are self-reactive if leakage occurs.

16.3 General requirements

16.3.1 For self-reactive dangerous goods meeting the requirements of Class 1 (explosives):

- a) nails, staples and other closure devices made of metal having no protective cover shall not penetrate to the inside of the outer packaging unless the inner packaging adequately protects the dangerous goods against contact with the metal; and

- b) inner packagings, fittings and cushioning material and the placing of the dangerous goods or articles in a container shall be such as to prevent movement within the container during transport.

16.3.2 Self-reactive dangerous goods of Class 4.1 shall not be handled, offered for transport or transported if the total quantity of the dangerous goods, the type and number of containers and the stacking arrangement creates an explosion hazard.

16.4 Other self-reactive dangerous goods

For dangerous goods that are self-reactive and are not listed in the table of the UN Recommendations referenced by Part 2 of the TDG Regulations, the procedure in 2.4.2.3.3 and 2.4.2.3.4 of the UN Recommendations shall be used to assign the appropriate packing method. For new self-reactive substances or new formulations of currently assigned self-reactive substances, the procedure in 4.1.7.1.4 of the UN Recommendations shall be used to assign the appropriate packing method. Guidelines for the transportation of temperature-controlled organic peroxides and self-reactive substances are provided in Annex B.

17 Additional requirements for class 5.2, organic peroxides

17.1 Packing method

In addition to the applicable requirements of Section 12, the organic peroxides in Class 5.2 listed in the table of the UN Recommendations referenced by Part 2 of the TDG Regulations shall be packed in accordance with the corresponding OP packing method listed in packing instruction 520 in Part B of Annex A. The quantities specified for each packing method are the maximum quantities authorized per package.

17.2 Compatibility

Containers shall be constructed so that contact with the contents will not catalyze or otherwise dangerously affect the properties of their contents. For combination packagings, cushioning material shall not be readily combustible and shall not cause decomposition of the dangerous goods if leakage occurs.

17.3 General requirements

17.3.1 For organic peroxides meeting the requirements for Class 1 (explosives):

- a) nails, staples and other closure devices made of metal having no protective cover shall not penetrate to the inside of the outer packaging unless the inner packaging adequately protects the dangerous goods against contact with the metal; and
- b) inner packagings, fittings and cushioning materials and the placing of the dangerous goods or articles in a container shall be such as to prevent inadvertent movement within the container during transport.

17.3.2 Organic peroxides in Class 5.2, shall not be handled, offered for transport or transported if the total quantity of the dangerous goods, the type and number of containers and the stacking arrangement creates an explosion hazard.

17.4 Other organic peroxides

For dangerous goods that are organic peroxides not listed in the table of the UN recommendations referenced by Part 2 of the TDG Regulations the procedure in Paragraphs 2.5.3.3 and 2.5.3.4 of the UN Recommendations shall be used to assign the appropriate packing method. For new organic peroxides or new formulations of currently assigned organic peroxides, the procedure in 4.1.7.1.4 of the UN Recommendations shall be used to assign the appropriate packing method. Guidelines for the transportation of temperature-controlled organic peroxides and self-reactive substances are provided in Annex B.

Annex A

(normative)

Dangerous goods list and packing instructions (including substance specific provisions)

Part A: Dangerous goods list with packing instructions numbers

Description of Table

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
UN number assigned to the dangerous goods	Shipping names and description of dangerous goods	Primary class in accordance with the TDG Regulations	Subsidiary class in accordance with the TDG Regulations	Packing group classification in accordance with the TDG Regulations	Packing instructions that apply to the dangerous goods

A.1 Prior to using this table, dangerous goods shall be classified in accordance with the TDG Regulations.

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
Class 3 – Flammable liquids					
Any	Dangerous Goods of Class 3 and Packing Group I, except those listed below:	3	Any or None	I	1
3165	AIRCRAFT HYDRAULIC POWER UNIT FUEL TANK (containing a mixture of anhydrous hydrazine and methylhydrazine) (M86 fuel)	3	6.1, 8	I	301
3379	DESENSITIZED EXPLOSIVE, LIQUID, N.O.S.	3		I	11
Any	Dangerous Goods of Class 3 and Packing Group II and III, except those listed below:	3	Any or None	II or III	1
1162	DIMETHYLDICHLOROSILANE	3	8	II	10
1196	ETHYLTRICHLOROSILANE	3	8	II	10
1250	METHYLTRICHLOROSILANE	3	8	II	10
1298	TRIMETHYLCHLOROSILANE	3	8	II	10
1305	VINYLTRICHLOROSILANE	3	8	II	10

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
2985	CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	II	10
3064	NITROGLYCERIN, SOLUTION IN ALCOHOL with more than 1% but not more than 5% nitroglycerin	3		II	300
3256	ELEVATED TEMPERATURE LIQUID, FLAMMABLE, N.O.S. with flash point above 60 °C, at or above its flash point	3		III	11
3269	POLYESTER RESIN KIT, liquid base material	3		II	302
				III	302
3357	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30% nitroglycerin, by mass	3		II	11
Any	Dangerous Goods Class 3 and no assigned Packing Group, except those listed below:	3	Any or none	None	11
3343	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, FLAMMABLE, N.O.S. with not more than 30% nitroglycerin, by mass	3			11
3528	ENGINE, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or ENGINE, FUEL CELL, FLAMMABLE LIQUID POWERED or MACHINERY, INTERNAL COMBUSTION, FLAMMABLE LIQUID POWERED or MACHINERY, FUEL CELL, FLAMMABLE LIQUID POWERED	3			5
3473	FUEL CELL CARTRIDGES containing flammable liquids; FUEL CELL CARTRIDGES CONTAINED IN Equipment, containing flammable liquids; or FUEL CELL CARTRIDGES PACKED WITH Equipment, containing flammable liquids	3	—	—	4
Class 4.1 – Flammable solids					
Any	Dangerous Goods of Class 4.1 and Packing Group I, except those listed below:	4.1	Any or None	I	406
3380	DESENSITIZED EXPLOSIVE, SOLID, N.O.S.	4.1		I	11
Any	Dangerous Goods of Class 4.1 and Packing Group II and III, except those listed below:	4.1	Any or None	II & III	2

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
1326	HAFNIUM POWDER, WETTED with not less than 25% water (a visible excess of water shall be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns	4.1		II	410
1331	MATCHES, 'STRIKE ANYWHERE'	4.1		III	407
1338	PHOSPHORUS, AMORPHOUS	4.1		III	410
1339	PHOSPHORUS HEPTASULPHIDE, free from yellow and white phosphorus	4.1		II	410
1341	PHOSPHORUS SESQUISULPHIDE, free from yellow and white phosphorus	4.1		II	410
1343	PHOSPHORUS TRISULPHIDE, free from yellow and white phosphorus	4.1		II	410
1352	TITANIUM POWDER, WETTED with not less than 25% water (a visible excess of water shall be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced particle size less than 840 microns	4.1		II	410
1353	FIBRES or FABRICS IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S.	4.1		III	410
1358	ZIRCONIUM POWDER, WETTED with not less than 25% water (a visible excess of water shall be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced particle size less than 840 microns	4.1		II	410
1437	ZIRCONIUM HYDRIDE	4.1		II	410
1871	TITANIUM HYDRIDE	4.1		II	410
1944	MATCHES, SAFETY (book, card or strike on box)	4.1		III	407
1945	MATCHES, WAX 'VESTA'	4.1		III	407
2254	MATCHES, FUSEE	4.1		III	407
2304	NAPHTHALENE, MOLTEN	4.1		IIII	11
2448	SULPHUR, MOLTEN	4.1		III	11

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
2555	NITROCELLULOSE WITH WATER (not less than 25% water, by mass)	4.1		II	406
2556	NITROCELLULOSE WITH ALCOHOL (not less than 25% alcohol, by mass, and not more than 12.6% nitrogen, by dry mass)	4.1		II	406
2557	NITROCELLULOSE, with not more than 12.6% nitrogen, by dry mass, MIXTURE WITH or WITHOUT PLASTICIZER, WITH or WITHOUT PIGMENT	4.1		II	406
2907	ISOSORBIDE DINITRATE MIXTURE with not less than 60% lactose, mannose, starch or calcium hydrogen phosphate	4.1		II	406
2956	5-tert-BUTYL-2,4,6-TRINITRO-m-XYLENE (MUSK XYLENE)	4.1		III	409
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	III	11
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
3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1		III	11
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1		II	410
				III	2
3241	2-BROMO-2-NITROPROPANE-1,3-DIOL	4.1		III	520
3242	AZODICARBONAMIDE	4.1		II	409
3251	ISOSORBIDE-5-MONONITRATE	4.1		III	409
3270	NITROCELLULOSE MEMBRANE FILTERS, with not more than 12.6% nitrogen, by dry mass	4.1		II	411
3319	NITROGLYCERIN MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 2% but not more than 10% nitroglycerin, by mass	4.1		II	11

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3344	PENTAERYTHRITE TETRANITRATE 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	412
				III	412
3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1		III	1
3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1		III	1
Any	Dangerous Goods of Class 4.1 and no assigned Packing Group except those listed below:	4.1	Any or none	None	11
3221, 3222, 3223, 3224, 3225, 3226, 3227, 3228, 3229, 3230, 3231, 3232, 3233, 3234, 3235, 3236, 3237, 3238, 3239, 3240	All SELF-REACTIVE SOLID or SELF-REACTIVE LIQUID, all types, Temperature controlled or not	4.1		None	520
Class 4.2 – Substances liable to spontaneous combustion					
Any	Dangerous Goods of Class 4.2 and Packing Group I, except those listed below:	4.2	Any or None	I	404 for solids 400 for liquids
1380	PENTABORANE	4.2	6.1	I	601
1381	PHOSPHORUS, WHITE or YELLOW, DRY or UNDER WATER or IN SOLUTION	4.2	6.1	I	405
2447	PHOSPHORUS, WHITE, MOLTEN	4.2	6.1	I	11
2870	ALUMINUM BOROHYDRIDE IN DEVICES	4.2	4.3	I	11
3255	tert-BUTYL HYPOCHLORITE	4.2	8	I	11
Any	Dangerous Goods of Class 4.2 and Packing Group II, except those listed below:	4.2	Any or None	II	410 for solids 402 for liquids

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
1361	CARBON, animal or vegetable origin	4.2		II	2
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	1
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2		II	1
3313	ORGANIC PIGMENTS, SELF-HEATING	4.2		II	2
3341	THIOUREA DIOXIDE	4.2		II	2
3342	XANTHATES	4.2		II	2
Any	Dangerous Goods of Class 4.2 and Packing Group III, except those listed below:	4.2	Any or None	III	2 for solids 1 for liquids
1363	COPRA	4.2		III	3
1364	COTTON WASTE, OILY	4.2		III	3
1365	COTTON, WET	4.2		III	3
1373	FIBRES or FABRICS, ANIMAL or VEGETABLE or SYNTHETIC, N.O.S. with oil	4.2		III	410
1379	PAPER, UNSATURATED OIL TREATED, incompletely dried (including carbon paper)	4.2		III	410
1386	SEED CAKE with more than 1.5% oil and not more than 11% moisture	4.2		III	3
2793	FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS in a form liable to self-heating	4.2		III	3
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	III	11
Any	Dangerous Goods of Class 4.2 and no assigned Packing Group	4.2	Any or none	None	11
Class 4.3 – Water-reactive Substances					
Any	Dangerous Goods of Class 4.3 and Packing Group I	4.3	Any or None	I	403 for solids 402 for liquids

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
Any	Dangerous Goods of Class 4.3, subsidiary Class 3 and second subsidiary class 8, Packing Group I	4.3	3 and 8	I	401
Any	Dangerous Goods of Class 4.3 and Packing Group II, except those listed below:	4.3	Any or None	II	410 for solids 402 for liquids
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	II	11
3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3		II	1
3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	II	1
Any	Dangerous Goods of Class 4.3 and Packing Group III, except those listed below:	4.3	Any or None	III	410 for solids 1 for liquids
1408	FERROSILICON with 30% or more but less than 90% silicon	4.3	6.1	III	3
1435	ZINC ASHES	4.3		III	2
2968	MANEB, STABILIZED or MANEB PREPARATION, STABILIZED against self-heating	4.3		III	2
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	III	11
3170	ALUMINUM SMELTING BY-PRODUCTS or ALUMINUM REMELTING BY-PRODUCTS	4.3		III	2
Any	Dangerous Goods of Class 4.3 and no assigned Packing Group, except those listed below:	4.3	Any or None	None	11
3292	BATTERIES, CONTAINING SODIUM, or CELLS, CONTAINING SODIUM	4.3			408
3476	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing water-reactive substances	4.3			4

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
Class 5.1 – Oxidizing Substances					
Any	Dangerous Goods of Class 5.1, subsidiary Class 6.1 and second subsidiary Class 8 and packing group I	5.1	6.1 and 8	I	200
Any	Dangerous Goods of Class 5.1 and packing group I, except those listed below:	5.1	Any or None	I	503 for solids 502 for liquids
2015	HYDROGEN PEROXIDE, STABILIZED or HYDROGEN PEROXIDE, AQUEOUS SOLUTION, STABILIZED with more than 60% hydrogen peroxide	5.1	8	I	501
3100	OXIDIZING SOLID, SELF-HEATING, N.O.S.	5.1	4.2	I	11
3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	4.3	I	11
3137	OXIDIZING SOLID, FLAMMABLE, N.O.S.	5.1	4.1	I	11
Any	Dangerous Goods of Class 5.1 and packing group II and III, except those listed below:	5.1	Any or None	II and III	2 for solids 504 for liquids
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
3375	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives	5.1		II	11
3405	BARIUM CHLORATE SOLUTION	5.1	6.1	III	1
3406	BARIUM PERCHLORATE SOLUTION	5.1	6.1	III	1
3408	LEAD PERCHLORATE SOLUTION	5.1	6.1	III	1
Any	Dangerous Goods of Class 5.1 and no assigned packing group, except those listed below:	5.1	Any or none	None	11
2426	AMMONIUM NITRATE, LIQUID (hot concentrated solution), with not more than 0.2% combustible material, in a concentration exceeding 80%	5.1			11

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3356	OXYGEN GENERATOR, CHEMICAL	5.1			500
Class 5.2 – Organic Peroxides					
Any	Dangerous Goods of Class 5.2	5.2	Any or none	Any	520
Class 6.1 – Toxic substances					
Any	Dangerous Goods of Class 6.1 and packing group I, except those listed below:	6.1	Any or none	I	2 for solids 1 for liquids
1051	HYDROGEN CYANIDE, STABILIZED containing less than 3% water	6.1	3	I	200
1092	ACROLEIN, STABILIZED	6.1	3	I	601
1098	ALLYL ALCOHOL	6.1	3	I	602
1135	ETHYLENE CHLOROHYDRIN	6.1	3	I	602
1143	CROTONALDEHYDE; or CROTONALDEHYDE, STABILIZED	6.1	3	I	602
1163	DIMETHYLHYDRAZINE, UNSYMMETRICAL	6.1	3, 8	I	602
1182	ETHYL CHLOROFORMATE	6.1	3, 8	I	602
1185	ETHYLENEIMINE, STABILIZED	6.1	3	I	601
1238	METHYL CHLOROFORMATE	6.1	3, 8	I	602
1239	METHYL CHLOROMETHYL ETHER	6.1	3	I	602
1244	METHYLHYDRAZINE	6.1	3, 8	I	602
1251	METHYL VINYL KETONE, STABILIZED	6.1	3, 8	I	601
1259	NICKEL CARBONYL	6.1	3	I	601
1510	TETRANITROMETHANE	6.1	5.1	I	602
1541	ACETONE CYANOHYDRIN, STABILIZED	6.1		I	602
1560	ARSENIC TRICHLORIDE	6.1		I	602
1580	CHLOROPICRIN	6.1		I	601

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
1583	CHLOROPICRIN MIXTURE, N.O.S.	6.1		I	602
1595	DIMETHYL SULPHATE	6.1	8	I	602
1605	ETHYLENE DIBROMIDE	6.1		I	602
1613	HYDROCYANIC ACID, AQUEOUS SOLUTION (HYDROGEN CYANIDE, AQUEOUS SOLUTION) with not more than 20% hydrogen cyanide	6.1		I	601
1614	HYDROGEN CYANIDE, STABILIZED, containing less than 3% water and absorbed in a porous inert material	6.1		I	11
1647	METHYL BROMIDE AND ETHYLENE DIBROMIDE MIXTURE, LIQUID	6.1		I	602
1649	MOTOR FUEL ANTI-KNOCK MIXTURE	6.1		I	602
1670	PERCHLOROMETHYL MERCAPTAN	6.1		I	602
1672	PHENYLCARBYLAMINE CHLORIDE	6.1		I	602
1695	CHLOROACETONE, STABILIZED	6.1	3, 8	I	602
1752	CHLOROACETYL CHLORIDE	6.1	8	I	602
1809	PHOSPHORUS TRICHLORIDE	6.1	8	I	602
1810	PHOSPHORUS OXYCHLORIDE	6.1	8	I	602
1834	SULPHURYL CHLORIDE	6.1	8	I	602
1838	TITANIUM TETRACHLORIDE	6.1	8	I	602
1892	ETHYLDICHLOROARSINE	6.1		I	602
1994	IRON PENTACARBONYL	6.1	3	I	601
2232	2-CHLOROETHANAL	6.1		I	602
2249	DICHLORODIMETHYL ETHER, SYMMETRICAL	6.1	3	I	11
2334	ALLYLAMINE	6.1	3	I	602
2337	PHENYL MERCAPTAN	6.1	3	I	602
2382	DIMETHYLHYDRAZINE, SYMMETRICAL	6.1	3	I	602

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
2407	ISOPROPYL CHLOROFORMATE	6.1	3, 8	I	602
2474	THIOPHOSGENE	6.1		I	602
2477	METHYL ISOTHIOCYANATE	6.1	3	I	602
2480	METHYL ISOCYANATE	6.1	3	I	601
2481	ETHYL ISOCYANATE	6.1	3	I	602
2482	n-PROPYL ISOCYANATE	6.1	3	I	602
2483	ISOPROPYL ISOCYANATE	6.1	3	I	602
2484	tert-BUTYL ISOCYANATE	6.1	3	I	602
2485	n-BUTYL ISOCYANATE	6.1	3	I	602
2486	ISOBUTYL ISOCYANATE	6.1	3	I	602
2487	PHENYL ISOCYANATE	6.1	3	I	602
2488	CYCLOHEXYL ISOCYANATE	6.1	3	I	602
2521	DIKETENE, STABILIZED	6.1	3	I	602
2605	METHOXYMETHYL ISOCYANATE	6.1	3	I	602
2606	METHYL ORTHOSILICATE	6.1	3	I	602
2644	METHYL IODIDE	6.1		I	602
2646	HEXACHLOROCYCLO-PENTADIENE	6.1		I	602
2668	CHLOROACETONITRILE	6.1	3	I	602
2740	n-PROPYL CHLOROFORMATE	6.1	3, 8	I	602
3023	2-METHYL-2-HEPTANETHIOL	6.1	3	I	602
3079	METHOXYMETHYL ISOCYANATE	6.1	3	I	602
3123	TOXIC LIQUID, WATER-REACTIVE, N.O.S.	6.1	4.3	I	11
3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.	6.1	4.3	I	11
3246	METHANESULPHONYL CHLORIDE	6.1	8	I	602

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3281	METAL CARBONYLS, LIQUID, N.O.S.	6.1		I	601
3294	HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45% hydrogen cyanide	6.1	3	I	601
3315	CHEMICAL SAMPLE, TOXIC	6.1		I	11
3381	TOXIC BY INHALATION LIQUID, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1		I	601
3382	TOXIC BY INHALATION LIQUID, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1		I	602
3383	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	3	I	601
3384	TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	3	I	602
3385	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	4.3	I	601
3386	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	4.3	I	602
3387	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	5.1	I	601
3388	TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	5.1	I	602

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3389	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	8	I	601
3390	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	8	I	602
3483	MOTOR FUEL ANTI-KNOCK MIXTURE, FLAMMABLE	6.1	3	I	602
3488	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	3, 8	I	601
3489	TOXIC BY INHALATION LIQUID, FLAMMABLE, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	3, 8	I	602
3490	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 200 mL/m ³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	4.3, 3	I	601
3491	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 1000 mL/m ³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	4.3, 3	I	602
3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile excepted	6.1	7, 8	I	603
Any	Dangerous Goods of Class 6.1 and packing group II & III, except those listed below:	6.1	Any or none	II and III	2 for solids 1 for liquids
1569	BROMOACETONE	6.1	3	II	602
1600	DINITROTOLUENES, MOLTEN	6.1		II	11
1700	TEAR GAS CANDLES	6.1	4.1		600

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
2312	PHENOL, MOLTEN	6.1		II	11
3250	CHLOROACETIC ACID, MOLTEN	6.1	8	II	11
3361	CHLOROSILANES, TOXIC, CORROSIVE, N.O.S.	6.1	8	II	10
3362	CHLOROSILANES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S.	6.1	3, 8	II	10
Any	Dangerous Goods of Class 6.1 and no assigned packing group, except those listed below:	6.1	Any or none	None	11
2016	AMMUNITION, TOXIC, NON-EXPLOSIVE without burster or expelling charge, non-fuzed	6.1			600
2017	AMMUNITION, TEAR-PRODUCING, NON-EXPLOSIVE without burster or expelling charge, non-fuzed	6.1	8		600
Class 8 – Corrosive substances					
Any	Dangerous Goods of Class 8 and packing group I, except those listed below:	8	Any or none	I	2 for solids 1 for liquids
1052	HYDROGEN FLUORIDE, ANHYDROUS	8	6.1	I	200
1744	BROMINE or BROMINE SOLUTION	8	6.1	I	804
1790	HYDROFLUORIC ACID, with more than 60% hydrogen fluoride	8	6.1	I	802
1798	NITROHYDROCHLORIC ACID	8		I	802
1828	SULPHUR CHLORIDES	8		I	602
1831	SULPHURIC ACID, FUMING	8	6.1	I	602
1836	THIONYL CHLORIDE	8		I	802
2032	NITRIC ACID, RED FUMING	8	5.1, 6.1	I	602
2444	VANADIUM TETRACHLORIDE	8		I	802
2692	BORON TRIBROMIDE	8		I	602
Any	Dangerous Goods of Class 8 and packing group II & III, except those listed below:	8	Any or none	II and III	2 for solids 1 for liquids

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
1724	ALLYTRICHLOROSILANE, STABILIZED	8	3	II	10
1728	AMYLTRICHLOROSILANE	8		II	10
1747	BUTYLTRICHLOROSILANE	8	3	II	10
1753	chlorophenyltrichlorosilane	8		II	10
1762	CYCLOHEXENYLTRICHLOROSILANE	8		II	10
1763	CYCLOHEXYLTRICHLOROSILANE	8		II	10
1766	DICHLOROPHENYLTRICHLOROSILANE	8		II	10
1767	DIETHYLDICHLOROSILANE	8	3	II	10
1769	DIPHENYLDICHLOROSILANE	8		II	10
1771	DODECYLTRICHLOROSILANE	8		II	10
1781	HEXADECYLTRICHLOROSILANE	8		II	10
1784	HEXYLTRICHLOROSILANE	8		II	10
1799	NONYLTRICHLOROSILANE	8		II	10
1800	OCTADECYLTRICHLOROSILANE	8		II	10
1801	OCTYLTRICHLOROSILANE	8		II	10
1804	PHENYLTRICHLOROSILANE	8		II	10
1816	PROPYLTRICHLOROSILANE	8	3	II	10
1818	SILICON TETRACHLORIDE	8		II	10
2028	BOMBS, SMOKE, NON-EXPLOSIVE with corrosive liquid, without initiating device	8		II	803
2215	MALEIC ANHYDRIDE, MOLTEN	8		III	11
2434	DIBENZYLDICHLOROSILANE	8		II	10
2435	ETHYLPHENYLDICHLOROSILANE	8		II	10
2437	METHYLPHENYLDICHLOROSILANE	8		II	10

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
2576	PHOSPHORUS OXYBROMIDE, MOLTEN	8		II	11
2803	GALLIUM	8		III	800
2809	MERCURY	8	6.1	III	800
2986	CHLOROSILANE, CORROSIVE, FLAMMABLE, N.O.S.	8	3	II	10
2987	CHLOROSILANE, CORROSIVE, N.O.S.	8		II	10
Any	Dangerous Goods listed below of Class 8 and no assigned Packing Group, except those listed below:	8	Any or none	None	11
2794	BATTERIES, WET, FILLED WITH ACID, electric storage	8			801
2795	BATTERIES, WET, FILLED WITH ALKALI, electric storage	8			801
2800	BATTERIES, WET, NON-SPILLABLE, electric storage	8			3
3028	BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage	8			801
3477	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing corrosive substances	8			4
3506	MERCURY CONTAINED IN MANUFACTURED ARTICLES	8	6.1		3
Class 9 – Miscellaneous Products, Substances or Organisms					
Any	Dangerous Goods of Class 9 and packing group I	9	Any or none	I	11
Any	Dangerous Goods of Class 9 and packing group II, except those listed below:	9	Any or none	II	906
2212	ASBESTOS , AMPHIBOLE (actinolite, amosite, anthophyllite, crocidolite, tremolite), when not fixed in a natural or artificial binder material or included in a manufactured product	9		II	2

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
2969	CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE	9		II	2
3316	CHEMICAL KIT or FIRST AID KIT	9		II	901
Any	Dangerous Goods of Class 9 and packing group III, except those listed below:	9	Any or none	III	2 for solids 1 for liquids
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	11
3258	ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C	9		III	11
3316	CHEMICAL KIT or FIRST AID KIT	9		III	901
Any	Dangerous Goods of Class 9 and no assigned Packing Group, except those listed below:	9	Any or none	None	11
1845	CARBON DIOXIDE, SOLID (DRY ICE)	9			3
2990	LIFE-SAVING APPLIANCES, SELF-INFLATING	9			905
3072	LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment	9			905
3090	LITHIUM METAL BATTERIES (including lithium alloy batteries)	9			903, 908, 909, 910
3091	LITHIUM BATTERIES CONTAINED IN EQUIPMENT (including lithium alloy batteries) or LITHIUM BATTERIES PACKED WITH EQUIPMENT (including lithium alloy batteries)	9			903, 908, 909, 910
3268	SAFETY DEVICES, electrically initiated	9			902
3316	CHEMICAL KIT or FIRST AID KIT	9			901
3363	DANGEROUS GOODS IN ARTICLES, DANGEROUS GOODS IN MACHINERY or DANGEROUS GOODS IN APPARATUS	9			907
3480	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	9			903, 908, 909, 910

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN Number	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3481	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)	9			903, 908, 909, 910
3499	CAPACITOR, electric double layer (with an energy storage capacity greater than 0.3 Wh)	9			3
3508	CAPACITOR, ASYMMETRIC (with an energy storage capacity greater than 0.3 Wh)	9			3
3509	PACKAGINGS, DISCARDED, EMPTY, UNCLEARED	9			3
3530	ENGINE, INTERNAL COMBUSTION or MACHINERY, INTERNAL COMBUSTION	9			5

Part B: Packing Instructions (including substance specific provisions)**PACKING INSTRUCTION 1**

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging;
 - b. a code 1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 6H or 6P single packaging; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

			Maximum Net Mass/Capacity		
			Packing Group I	Packing Group II	Packing Group III
Combination Packaging					
Inner Packaging		Outer Packaging			
	Maximum Capacity	1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4N	250 kg	400 kg	400 kg
glass	10 L	1D, 4C1, 4C2, 4D, 4H2	150 kg	400 kg	400 kg
plastic	30 L	1G, 4F, 4G	75 kg	400 kg	400 kg
metal	40 L	4H1	60 kg	60 kg	60 kg
		3A1, 3A2, 3B1, 3B2, 3H1, 3H2	120 kg	120 kg	120 kg
Single Packaging					
1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2,			250 L	450 L	450 L
3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PB1, 6PD1, 6PG1, 6PH1, 6PH2, 6PA2, 6PB2, 6PC, 6PG2, 6PD2			60 L	60 L	60L
6HA1, 6HB1, 6HH1			250 L	250 L	250 L
6HD1, 6HG1			120 L	250 L	250 L

3. Dangerous goods included in packing group I shall have a kinematic viscosity of more than $2.00 \times 10^{-4} \text{ m}^2/\text{s}$ (or 200 centistokes (cSt)) at 20 °C if they are handled, offered for transport or transported in removable head drums (1A2, 1B2, 1H2, 1N2) and removable head jerricans (3A2, 3B2, 3H2).

Substance Specific Provisions:

UN1131: The container shall be hermetically sealed.

UN1133, UN1210, UN1263, UN1866, and adhesives, printing inks, printing ink related materials, paints, paint related materials and resin solutions which are assigned to UN3082: For dangerous goods included in packing group II and III, a non-UN Standardized metal or plastic container may be used if its maximum capacity is equal to or less than 5 L and the container is transported:

- a. in palletized loads, a pallet box or unit load device (e.g., individual containers placed or stacked and secured by strapping, shrink or stretch-wrapping or other suitable means to a pallet), or
- b. as an inner packaging of a combination packaging with a maximum net mass that is equal to or less than 40 kg.

UN1204: Cylinders and spheres are not permitted. The containers shall be so constructed that explosion is not possible by reason of increased internal pressure.

UN1308: For dangerous goods included in packing group I and II, only combination packagings with a maximum gross mass equal to or less than 75 kg are permitted.

UN1774: Containers shall meet the packing group II performance level.

UN1790: For dangerous goods included in packing group I with more than 60% but not more than 85% hydrogen fluoride, the prescribed period of use of plastic drums and jerricans as single packagings shall be two years from their date of manufacture.

UN1791: For dangerous goods included in packing group II, sealed packagings shall be fitted with a venting device.

UN1999: This dangerous good may be transported in a non-standardized welded metal container if the container:

- a. is used for the application of liquid tar to pavement, concrete or metallic structures and is fitted with the appropriate application equipment;
- b. is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no release of the dangerous goods that could endanger public safety; and
- c. has a maximum capacity equal to or less than 450 L.

UN2031: For dangerous goods with more than 55% nitric acid, the prescribed period of use of plastic drums and jerricans as single packagings shall be two years from their date of manufacture.

Glass inner packagings shall be packed in tightly-closed, non-reactive intermediate packagings, cushioned with a non-reactive absorbent material, when placed in wooden or fibreboard outer packagings.

UN3065: Non-standardized wooden barrels having a maximum capacity equal to or less than 250 L are permitted.

UN3532, UN3534: Containers shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the containers in the event of loss of stabilization.

PACKING INSTRUCTION 2

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic, metal, paper or fibre inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging;
 - b. a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N, 5H3, 5H4, 5L3, 5M2, 6H or 6P single packaging; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum net mass given in the following Table:

		Maximum Net Mass			
		Packing Group I	Packing Group II	Packing Group III	
Combination Packaging					
Inner Packaging		Outer Packaging			
	Maximum Net mass	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4N	400 kg	400 kg	400 kg
glass	10 kg				
plastic	50 kg	4C1, 4C2, 4D, 4H2	250 kg	400 kg	400 kg
metal	50 kg	4F, 4G	125 kg	400 kg	400 kg
paper	50 kg	4H1	60 kg	60 kg	60 kg
fibre	50 kg	3A1, 3A2, 3B1, 3B2, 3H1, 3H2	120 kg	120 kg	120 kg
Single Packaging					
1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1		400 kg	400 kg	400 kg	
3A1, 3A2, 3B1, 3B2, 3H1, 3H2		120 kg	120 kg	120 kg	
4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N		Not permitted	400 kg	400 kg	
5H3, 5H4, 5L3, 5M2		Not permitted	50 kg	50 kg	
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PB1, 6PD1, 6PG1, 6PA2, 6PB2, 6PC, 6PD2, 6PG2, 6PH1, 6PH2		75 kg	75 kg	75 kg	

3. Plastic, paper and fibre inner packagings shall be sift-proof.
4. Paper and fibre inner packagings shall not be used for substances of packing group I.

5. When a substance being transported may become liquid during transport, paper inner packaging, fibre inner packaging and the following single packagings are not permitted:
 - a. fibre drums (1G) and plywood drums (1D);
 - b. boxes (4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N) and Bags (5H3, 5H4, 5L3, 5M2); and
 - c. composite packagings (6HD1, 6HG1, 6HD2, 6HG2, 6PD1, 6PG1, 6PG2, 6PD2 and 6PH2).
6. In addition to the single packagings listed in point 5, when a substance of packing group I being transported may become liquid during transport, the following single packagings are not permitted:
 - a. removable head drums (1A2, 1B2, 1H2, 1N2) and removable head jerricans (3A2, 3B2, 3H2).

Substance Specific Provisions:

UN1309: For packing group II, bags are permitted only in closed cargo transport units.

For packing group III, 5H1, 5L1 or 5M1 bags are permitted if the bags are contained in plastic bags and stacked on a pallet and wrapped in shrink or stretch wrap.

UN1361, UN2213, UN3077: 5H1, 5L1 or 5M1 bag are permitted only in closed cargo transport units.

UN1362: 5H1, 5L1 or 5M1 bags are permitted if the bags are contained in plastic bags and stacked on a pallet and wrapped in shrink or stretch wrap.

UN1748, UN2208, UN2880, UN3485, UN3486, UN3487: When bags are used as a single packaging, they shall be adequately separated to allow for the dissipation of heat.

UN2000: The dangerous goods may be handled, offered for transport or transported unpackaged on pallets, wrapped in plastic film and secured by appropriate means, such as steel bands as a full load in a closed cargo transport unit. Each pallet shall be equal to or less than 1000 kg.

UN2002: Cylinders and spheres are not permitted. The containers shall be so constructed that explosion is not possible by reason of increased internal pressure.

UN2211, UN2698, UN3314: Non-UN standardized containers are permitted.

UN2212, UN2590: 5M1 bags are permitted. All bags of any type shall be transported in a closed cargo transport unit or placed in a closed rigid enclosure.

UN2217: Non-UN standardized and sift-proof containers are permitted.

UN2471: Paper or fibre inner packagings are not permitted.

UN2870: Only combination packagings meeting the packing group I performance level are permitted.

UN2969 (as whole beans): 5H1, 5L1 or 5M1 bags are permitted.

UN3175: Containers intended for solids may be used when the liquids are fully absorbed in solid material contained in sealed bags.

UN3531, UN3533: Containers shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the containers in the event of loss of stabilization.

PACKING INSTRUCTION 3

1. The dangerous goods shall be handled, offered for transport or transported in a container designed and constructed to prevent inadvertent discharge of articles during normal conditions of transport.

Substance Specific Provisions:

UN1363, UN1386, UN1408, UN2793: The container shall be sift-proof.

UN1364, UN1365: The dangerous goods may be handled, offered for transport or transported as bales.

UN1845: The container shall be designed and constructed to permit the release of carbon dioxide gas to prevent a build-up of pressure that could rupture the container.

UN2800: Batteries shall be protected from short circuit.

UN3506: Sealed inner liners or bags of strong leak-proof and puncture-resistant material impervious to mercury and which will prevent the escape of the substance irrespective of the position or orientation of the container shall be used.

UN3509: Inner packagings, flexible inner receptacles, inner liners and parts of containers shall be transported in leakproof and sift-proof containers. Containers or rigid inner receptacles which are transported closed and do not leak may be transported unpackaged.

PACKING INSTRUCTION 4

This instruction applies to UN3473, UN3476, UN3477.

1. Fuel cell cartridges shall be handled, offered for transport or transported in:
 - a. a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N packaging that meets the packing group II performance level.
2. Fuel cell cartridges which are packed with equipment* may be handled, offered for transport or transported in an outer packaging and meet the following requirements:
 - a. They shall be packed in inner packagings or placed in the outer packaging with cushioning material or divider(s) so that the fuel cell cartridges are protected against damage that may be caused by the movement or placement of the contents within the outer packaging.
 - b. The equipment shall be secured against movement within the outer packaging.

**For the purpose of this packing instruction, "equipment" means apparatus requiring the fuel cell cartridges with which it is packed for its operation.*

3. Fuel cell cartridges contained in equipment may be handled, offered for transport or transported in a strong outer packaging and shall be protected against short circuit or inadvertent operation.
4. Large robust equipment containing fuel cell cartridges may be transported unpackaged. The entire system shall be protected against short circuit and inadvertent operation.

PACKING INSTRUCTION 5

This instruction applies to UN3528, UN3530.

1. The dangerous goods shall be handled, offered for transport or transported in a strong outer packaging.
2. Dangerous goods may be transported unpackaged if the fuel contained in the engine or piece of machinery is contained in a receptacle that is designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no release of the fuel that could endanger public safety.

PACKING INSTRUCTION 10

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass or steel inner packaging(s) and a code 1A1, 1A2, 1D, 1G, 1H1, 1H2, 4A, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging;
 - b. a code 1A1, 3A1 or 6HA1 single packaging; or
 - c. a steel cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following Table.

Combination Packaging			
Inner Packaging		Outer Packaging	
Maximum Capacity		Maximum Net Mass	
glass	1 L	1A1, 1A2, 1D, 1G, 1H1, 1H2, 4A, 4C1, 4C2, 4D, 4F, 4G, 4H2	400 kg
steel	40 L	4H1	60 kg
Single Packaging			
			Maximum Capacity
1A1			450 L
3A1			60 L
6HA1			250 L

PACKING INSTRUCTION 11

1. These dangerous goods shall not be handled, offered for transport or transported.

PACKING INSTRUCTION 200

1. The dangerous goods shall be offered for transport and transported in a cylinder or sphere meeting the requirements in Section 15.
2. Each cylinder or sphere shall be initially pressure tested at 1000 kPa (10 bar) and periodically tested at the same pressure within five years of the previous test.
3. For toxic dangerous goods with an LC_{50} equal or less than 200 mL/m³ (ppm):
 - a. valve outlets shall be fitted with pressure retaining gas tight plugs or caps having threads that match those of the valve outlets;
 - b. each cylinder within a bundle shall be fitted with an individual valve that is closed during transport. After filling, the manifold shall be evacuated, purged and plugged;
 - c. cylinders and individual cylinders in a bundle shall have a test pressure greater than or equal to 20 000 kPa (200 bar);
 - d. for cylinders or spheres with a minimum wall thickness of less than 3.5 mm for aluminum alloy or 2 mm for steel, the cylinder or sphere shall be transported in a rigid outer packaging that meets the packing group I performance level and adequately protects the cylinder or sphere and its fittings;
 - e. cylinders and spheres shall not be fitted with a pressure relief device;
 - f. the capacity of cylinders and individual cylinders in a bundle shall be equal to or less than 85 L;
 - g. each valve shall have a taper threaded connection directly to the cylinder or sphere and be capable of withstanding the test pressure of the cylinder or sphere;
 - h. each valve shall either be of the packless type with non-perforated diaphragm, or be of a type which prevents leakage through or past the packing;
 - i. each cylinder or sphere shall be tested for leakage after filling; and
 - j. the level of filling shall be equal to or less than 92% of the capacity of a cylinder or sphere.

Substance Specific Provisions:

UN1051: The dangerous goods shall be handled, offered for transport or transported in a cylinder or sphere initially pressure tested at 10 000 kPa (100 bar) and periodically tested at the same pressure within five years of the previous test. The filling ratio shall be 0:55.

UN1052: The dangerous goods shall not be handled, offered for transport or transported in aluminum alloy cylinders or spheres. The wall thickness of the cylinder or sphere shall not be less than 3 mm. Prior to transport, it shall be ensured that the pressure has not risen due to potential hydrogen generation. The filling ratio shall be 0:84.

PACKING INSTRUCTION 300

This instruction applies to UN3064.

1. The dangerous goods shall be handled, offered for transport or transported in a combination packaging comprising of one or more metal inner packaging(s) and a 4C1, 4C2, 4D or 4F outer packaging.
2. The maximum capacity of the inner packaging shall be equal to or less than 1 L.
3. The total amount of dangerous goods in the outer packaging shall be equal to or less than 5 L.
4. The inner packagings shall be completely surrounded with absorbent cushioning material.
5. Wooden boxes shall be completely lined with a suitable material impervious to water and nitroglycerin.

PACKING INSTRUCTION 301

This instruction applies to UN3165.

1. The dangerous goods shall be handled, offered for transport or transported in an aluminum cylinder comprising of a primary containment and an outer receptacle.
2. For cylinders made from tubing and having welded heads:
 - a. the primary containment shall consist of a welded aluminum bladder having an internal volume that is equal to or less than 46 L;
 - b. the outer receptacle shall have a minimum design pressure of 1275 kPa (12.75 bar) and a minimum burst pressure of 2755 kPa (27.55 bar);
 - c. each receptacle shall be leakproof and tested as such during manufacture and before shipment;
 - d. the receptacle shall be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging, which will adequately protect all fittings; and
 - e. the quantity of fuel per cylinder shall be equal to or less than 42 L.
3. For other types of cylinders:
 - a. the primary containment shall consist of a welded vapour tight fuel compartment with an elastomeric bladder having an internal volume that is equal to or less than 46 L;
 - b. the outer receptacle shall have a minimum design pressure of 2680 kPa (26.8 bar) and a minimum burst pressure of 5170 kPa (51.7 bar);
 - c. each receptacle shall be leakproof and tested as such during manufacture and before shipment;
 - d. the receptacle shall be securely packed in non-combustible cushioning material such as vermiculite, in a strong outer tightly closed metal packaging, which will adequately protect all fittings; and
 - e. the quantity of fuel per cylinder shall be equal to or less than 42 L.

PACKING INSTRUCTION 302

This instruction applies to UN3269.

1. The dangerous good shall be handled, offered for transport or transported in:
 - a. combination packaging comprising of one or more inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging.
2. The base material and the activator (organic peroxide) shall be each separately packed in inner packagings.
3. The components may be placed in the same outer packaging provided they will not interact dangerously in the event of a leakage.
4. The activator (organic peroxide) shall have a maximum quantity of 125 mL per inner packaging if liquid, and 500 g per inner packaging if solid.

PACKING INSTRUCTION 400

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass or metal inner packaging(s) in a metal can intermediate packaging and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4N outer packaging;
 - b. a combination packaging comprising of one or more sealed metal can inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 4A, 4B, 4N outer packaging; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. Maximum capacity or net mass:
 - a. For the combination packaging mentioned in 1a, the maximum capacity of the inner packaging shall be equal to or less than 1 L and the maximum net mass of the outer packaging shall be equal to or less than 125 kg net mass.
 - b. For the combination packaging mentioned in 1b, the maximum capacity of the inner packaging shall be equal to or less than 4 L and the maximum net mass of the outer packaging shall be equal to or less than 150 kg.
3. Inner packagings shall not be filled to more than 90% of their maximum capacity.
4. Metal cans mentioned in 1a and 1b shall be hermetically sealed.
5. Inner packagings shall have closures with gaskets which shall either be threaded or physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport. Inner packagings shall be cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents. For the combination packaging mentioned in 1b, each layer of inner packagings shall be separated by a dividing partition in addition to the cushioning material.
6. Cylinders or spheres shall be made of steel and shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 1000 kPa (10 bar) (gauge pressure). During transport, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

Substance Specific Provisions:

UN3392, UN3394: Air shall be eliminated from the vapour space by nitrogen or other means.

PACKING INSTRUCTION 401

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, metal or plastic inner packaging(s) in a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N outer packaging; or
 - b. a cylinder or sphere meeting the requirements of Section 15.
2. For the packaging mentioned in 1a, the maximum capacity of the inner packaging shall be equal to or less than 1 L and the net mass of the outer packaging shall be equal to or less than 30 kg.
3. Inner packagings shall have threaded closures and be cushioned on all sides with dry, inert, absorbent material in a quantity sufficient to absorb the entire contents.
4. Cylinders or spheres shall be made of steel and shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 600 kPa (6 bar) (gauge pressure). During transport, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

PACKING INSTRUCTION 402

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, metal or plastic inner packaging(s) in a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, or 4N outer packaging;
 - b. a code 1A1, 6HA1 or 6HB1 single packaging; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging			
Inner Packaging		Outer Packaging	
Maximum Net Mass		Maximum Net Mass	
glass	10 kg	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	125 kg
plastic	15 kg	4H1	60 kg
metal	15 kg	3A1, 3A2, 3B1, 3B2, 3H1, 3H2	120 kg
Single Packaging			
			Maximum Capacity
1A1, 6HA1, 6HB1			250 L

3. Inner packagings shall have threaded closures and be cushioned on all sides with dry, inert, absorbent material in a quantity sufficient to absorb the entire contents.
4. Cylinders or spheres shall be made of steel and shall be subjected to an initial test and periodic tests every 10 years at a pressure of not less than 600 kPa (6 bar) (gauge pressure). During transport, the liquid shall be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

PACKING INSTRUCTION 403

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging;
 - b. a code 1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, or 6H single packaging; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum net mass given in the following Table:

Combination Packaging			
Inner Packaging		Outer Packaging	
Maximum Net Mass		Maximum Net Mass	
glass	2 kg	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4N	400 kg
plastic	15 kg	3A1, 3A2, 3B1, 3B2, 3H1, 3H2	120 kg
metal	20 kg	4C1, 4C2, 4D, 4H2	250 kg
		4F, 4G	125 kg
		4H1	60 kg
Single Packaging			
			Maximum Net Mass
1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2, 6HA1, 6HB1			250 kg
3A1, 3A2, 3B1, 3B2, 3H1, 3H2			120 kg
6HA2, 6HB2, 6HC, 6HD1, 6HD2, 6HG1, 6HG2, 6HH1, 6HH2			75 kg

3. Inner packagings shall be hermetically sealed (e.g., by taping or threaded closures).

PACKING INSTRUCTION 404

This instruction applies to pyrophoric solids: UN1383, UN1854, UN1855, UN2008, UN2441, UN2545, UN2546, UN2846, UN2881, UN3200, UN3391, UN3393

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - b. a combination packaging comprising of one or more glass inner packaging(s) in one or more metal can intermediate packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - c. a code 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 6HA1 or 6HB1 single packaging; or
 - d. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum net mass given in the following Table:

Combination Packaging			
Inner Packaging		Outer Packaging	
Maximum Net Mass		Maximum Net Mass	
glass	1 kg	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	125 kg
metal	15 kg		
Single Packaging			
			Maximum Net Mass
1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 6HA1, 6HB1			150 kg

3. Metal inner packagings listed in 1a shall be hermetically sealed.
4. Metal intermediate packagings listed in 1b shall be hermetically sealed.
5. Glass inner packagings listed in 1b shall have closures with gaskets and be cushioned on all sides.
6. Inner packagings shall have threaded closures or closures physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport.

Substance Specific Provisions:

UN3391, UN3393: Air shall be eliminated from the vapour space by nitrogen or other means.

PACKING INSTRUCTION 405

This packing instruction applies to UN1381.

For UN1381, phosphorous wet:

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more metal or glass inner packaging(s) and a code 4A, 4B, 4C1, 4C2, 4D, 4F or 4N outer packaging; or
 - b. a code 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 3A1 or 3B1 single packaging.
2. The maximum net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum net mass given in the following Table:

Combination Packaging			
Inner Packaging		Outer Packaging	
Maximum Net Mass		Maximum Net Mass	
glass	2 kg	4A, 4B, 4C1, 4C2, 4D, 4F, 4N	75 kg
metal	15 kg		
Single Packaging			
			Maximum Capacity
1A1, 1A2, 1B1, 1B2, 1N1, 1N2			400 kg
3A1, 3B1			120 kg

3. Inner packagings shall be hermetically sealed.
4. Glass inner packagings shall be cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents.
5. Single packagings shall meet the performance requirements for packagings intended for liquids at packing group II performance level.

For UN1381, dry phosphorous:

1. The dangerous goods, when fused, shall be handled, offered for transport or transported in a code 1A2, 1B2, or 1N2 single packaging with a maximum net mass of 400 kg.

PACKING INSTRUCTION 406

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more water-resistant inner packaging(s) and a code 1D, 1G, 1H1, 1H2, 3H1, 3H2, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging; or
 - b. a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N, 6HA1, 6HA2, 6HB1, 6HB2, 6HC, 6HG1, 6HG2, 6HH1, 6HH2, 6HD1 or 6HD2, single packaging.
2. Inner packagings and single packagings shall be designed, constructed and closed in manner that renders it vapour tight or appropriately sealed so as to prevent vapour from escaping the container, such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.
3. Code 1D, 1H2, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G and 4H2, 4N single packagings shall be constructed with a water resistant inner bag, plastic film lining or water resistant coating.
4. Packagings shall be so constructed and closed so as to avoid an explosive over pressure or pressure build-up of more than 300 kPa (3 bar).

Substance Specific Provisions:

UN1310, UN1320, UN1321, UN1322, UN1344, UN1348, UN1349, UN1517, UN3317, UN3376: The packaging shall be lead free.

UN1347: The net mass of an outer packaging or a single packaging shall be equal to or less than 15 kg. The packaging shall be lead free.

UN2852, UN3364, UN3365, UN3366, UN3367, UN3368, UN3369: The net mass of an outer packaging or a single packaging shall be equal to or less than 0.5 kg.

UN2907: Packagings meeting the packing group I performance level are not permitted. Packagings meeting the packing group II performance level shall be used. The packaging shall be lead free.

UN3370: The net mass of an outer packaging or a single packaging shall be equal to or less than 11.5 kg.

UN3474: Metal inner packagings or metal single packagings shall not be used. Packagings of other material with a small amount of metal, for example closures or other metal fittings, are not considered metal containers.

PACKING INSTRUCTION 407

This instruction applies to UN1331, UN1944, UN1945, UN2254.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprised of one or more inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N, 3A1, 3A2, 3B1, 3B2, 3H1 or 3H2 outer packaging that meets the packing group III performance level.
2. The net mass of the combination packaging shall be equal to or less than 45 kg, except that a combination packaging with a fibreboard box outer packaging, the net mass shall be equal to or less than 30 kg.
3. Matches shall be tightly packed in securely closed inner packagings to prevent accidental ignition under normal conditions of transport.

Substance Specific Provisions:

UN1331: Strike-anywhere matches shall not be packed in the same outer packaging with any other dangerous goods, other than safety matches or wax Vesta matches, which shall be packed in separate inner packagings. Inner packagings shall not contain more than 700 strike-anywhere matches.

PACKING INSTRUCTION 408

This instruction applies to UN3292.

1. The dangerous goods shall be handled, offered for transport or transported in:
2. For Cells:
 - a. a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N, 3A2, 3B2, 3H2 packaging that meets the packing group II performance level.
 - b. Cells shall be packed with sufficient cushioning to prevent contact between cells and between cells and the internal surfaces of the outer packaging and to ensure that no dangerous movement of the cells within the outer packaging occurs in transport.
3. Batteries may be transported unpackaged or in protective enclosures (e.g., fully enclosed or wooden slatted crates). The terminals shall not support the weight of other batteries or materials packed with the batteries.
4. Cells and batteries shall be protected against short circuit and shall be isolated in such a manner as to prevent short circuits.

PACKING INSTRUCTION 409

This instruction applies to UN2956, UN3242, UN3251.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. combination packaging comprising of one plastic bag inner packaging and a code 4G outer packaging;
 - b. a combination packaging comprising of one or more plastic inner packaging(s) and a code 4G or 1G outer packaging; or
 - c. a code 1G single packaging.
2. The net mass of the combination packaging or single packaging shall be equal to or less than 50 kg.

PACKING INSTRUCTION 410

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic, metal, paper or fibre inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging;
 - b. a code 1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N, 5H3, 5H4, 5L3, 5M2, 6H or 6P single packaging; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single mentioned in 1a and 1b shall be equal to or less than the maximum net mass given in the following Table:

		Maximum Net Mass	
		Packing Group II	Packing Group III
Combination Packaging			
Inner Packaging		Outer Packaging	
Maximum Net mass			
		1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4H2, 4F, 4G, 4N,	400 kg
glass	10 kg		400 kg
plastic	30 kg	4H1	60 kg
metal	40 kg	3A1, 3A2, 3B1, 3B2, 3H1, 3H2	120 kg
paper	10 kg		
fibre	10 kg		
Single Packaging			
1A1, 1A2, 1B1, 1B2, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N, 6HA1, 6HB1, 6HD1, 6HG1, 6HH1		400 kg	400 kg
3A1, 3A2, 3B1, 3B2, 3H1, 3H2		120 kg	120 kg
5H3, 5H4, 5L3, 5M2		50 kg	50 kg
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PB1, 6PD1, 6PG1, 6PA2, 6PB2, 6PC, 6PD2, 6PG2, 6PH1, 6PH2		75 kg	75 kg

3. Plastic, paper and fibre inner packagings and 1G and 4G outer packagings shall be sift-proof.
4. When a substance being transported may become liquid during transport, the following inner packaging or single packaging are not permitted:
 - a. paper and fibre inner packaging;
 - b. 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N, 5H3, 5H4, 5L3 and 5M2 single packaging.

5. Singles packaging code 5H3, 5H4, 5L3 and 5M2 used for packing group II dangerous goods shall be transported in a closed cargo transport unit.

Substance Specific Provisions:

UN1326, UN1352, UN1358, UN1437, UN1871, UN3182: 5H, 5L and 5M bags are not permitted for dangerous goods included in packing group II.

UN1378: Metal containers shall be vented.

PACKING INSTRUCTION 411

This instruction applies to UN3270.

1. The dangerous goods may be handled, offered for transport or transported in:
 - a. a code 1A2, 1B2, 1N2, 1H2, 1D, 1G, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N, 3A2, 3B2, 3H2 single packaging.
2. The containers shall be constructed such that an explosion is not possible by reason of increased internal pressure.
3. The net mass of the container shall be equal to or less than 30 kg.

PACKING INSTRUCTION 412

This instruction applies to UN3527.

1. The dangerous good shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging.
2. The base material and the activator (organic peroxide) shall be each separately packed in inner packagings.
3. The components may be placed in the same outer packaging provided they will not interact dangerously in the event of a leakage.
4. The activator (organic peroxide) shall have a maximum quantity of 125 mL per inner packaging if liquid, and 500 g per inner packaging if solid.

PACKING INSTRUCTION 500

This instruction applies to UN3356.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N single packaging that meets the packing group II performance level.

PACKING INSTRUCTION 501

This packing instruction applies to UN2015.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4H2 or 4N outer packaging;
 - b. a combination packaging comprising of one or more plastic or metal inner packaging(s) and a code 1G or 4G outer packaging; or
 - c. a code 1A1, 1B1, 1H1, 1N1, 3A1, 3B1, 3H1, 6H or 6P single packaging.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging (1a)			
Inner Packaging		Outer Packaging	
Maximum capacity		Maximum Net Mass	
Glass, plastic or metal	5 L	1A1, 1A2, 1B1, 1B2, 1D, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4H2, 4N	125 kg
Combination Packaging (1b)			
Plastic or metal	2 L	1G, 4G	50 kg
Single Packaging (1c)			
			Maximum Capacity
1A1, 1B1, 1H1, 1N1, 6HA1, 6HB1, 6HD1, 6HG1, 6HH1			250 L
3A1, 3B1, 3H1, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2, 6PG1, 6PG2, 6PH1, 6PH2			60 L

3. The level of filling shall be equal to or less than 90% of the maximum capacity of a single packaging or inner packaging.
4. Inner packaging in a code 1G or 4G outer packaging shall each be packed in a plastic bag.
5. Containers shall be vented.

PACKING INSTRUCTION 502

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging; or
 - b. a code 1A1, 1B1, 1H1, 3A1, 3B1, 3H1, 6H or 6P single packaging.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging (1a)			
Inner Packaging		Outer Packaging	
Maximum capacity		Maximum Net Mass	
Glass, plastic or metal	5 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	125 kg
		4H1	60 kg
Single Packaging (1b)			
Maximum Capacity			
1A1, 1B1, 1H1, 6HA1, 6HB1, 6HD1, 6HG1, 6HH1			250 L
3A1, 3B1, 3H1, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2, 6PG1, 6PG2, 6PH1, 6PH2			60 L

Substance Specific Provisions:

UN1873: The parts of containers which are in direct contact with perchloric acid shall be constructed of glass or plastic.

PACKING INSTRUCTION 503

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging; or
 - b. a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1N1 or 1N2 single packaging.
2. The net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum net mass given in the following Table:

Combination Packaging (1a)			
Inner Packaging		Outer Packaging	
Maximum net mass		Maximum net mass	
Glass, plastic or metal	5 kg	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4H2, 4N	125 kg
		4G	40 kg
		4H1	60 kg
Single Packaging (1b)			
			Maximum Net Mass
1A1, 1A2, 1B1, 1B2, 1N1, 1N2			250 kg
1D, 1G			200 kg

3. The fibreboard drum (1G) and plywood drum (1D) outlined in 1b shall be fitted with an inner liner.

PACKING INSTRUCTION 504

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging; or
 - b. a code 1A1, 1B1, 1H1, 1N1, 3A1, 3B1, 3H1, 6H or 6P single packaging.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging (1a)			
Inner Packaging		Outer Packaging	
Maximum capacity		Maximum Net Mass	
Glass	5 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	75 kg
Plastic	30 L		
Combination Packaging			
Metal	40 L	1A1, 1A2, 1B1, 1B2, 1D, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4H2, 4N	225 kg
		1G, 4F, 4G	125 kg
Single Packaging			
			Maximum Capacity
1A1, 1B1, 1H1, 1N1, 6HA1, 6HB1			250 L
6HD1, 6HG1, 6HH1			120 L
3A1, 3B1, 3H1, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2, 6PG1, 6PG2, 6PH1, 6PH2			60 L

Substance Specific Provisions:

UN2014, UN3149: The container shall be vented.

PACKING INSTRUCTION 520

This instruction applies to organic peroxides of Class 5.2 and self-reactive substances of Class 4.1.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, plastic, fibreboard or metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging; or
 - b. a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2 or 6H single packaging.
2. The maximum capacity or net mass of the combination packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following tables for the corresponding packing method (OP1 to OP8) associated to the specific dangerous good referenced in Part 2 of the TDG Regulations. For organic peroxides or self-reactive substances or new formulations, the packing method shall comply with Section 16.

	Packing Method OP1 to OP7						
	OP1	OP2	OP3	OP4	OP5	OP6	OP7
Combination packaging							
Inner packaging (for solids & liquids)	0.5 kg	0.5 kg	5 kg	5 kg	25 kg	50 kg	50 kg
Outer packaging	0.5 kg	10 kg	5 kg	25 kg	25 kg	50 kg	50 kg
Single packaging							
(for solids)	0.5 kg	0.5 kg	5 kg	5 kg	25 kg	50 kg	50 kg
(for liquids)	0.5 L	-	5 L	-	30 L	60 L	60 L

Packing Method OP8			
Combination packaging			
Outer Packaging			Maximum net mass
1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2			400 kg
3A1, 3A2, 3B1, 3B2, 3H1, 3H2			60 kg
4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N			200 kg
Combination packaging			
Inner	Maximum net mass	Outer	Maximum net mass
Plastic, fibre	25 kg	4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N	400 kg
Single packaging			Maximum net mass/capacity
3A1, 3A2, 3B1, 3B2, 3H1, 3H2			60 kg (for solids) 60 L (for liquids)
1A1, 1A2, 1B1, 1B2, 1D, 1H1, 1H2, 6HA1, 6HB1, 6HD1, 6HG1, 6HH1			400 kg (for solids) 225 L (for liquids)
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2			75 kg (for solids) 60 L (for liquids)

3. Inner packagings made of glass shall have a maximum capacity equal to or less than 0.5 L or a net mass equal to or less than 0.5 kg.
4. Metal packagings, including inner packagings of combination packagings and outer packagings of combination or composite packagings are not permitted for packing methods OP1, OP2, OP3, OP4, OP5 and OP6.
5. Viscous liquids shall be treated as solids.
6. In combination packagings, cushioning materials shall not be readily combustible.
7. Containers for self-reactive/organic peroxides dangerous goods shall meet the packing group II performance level.

Substance Specific Provisions:

For certain self-reactive substances of type B or C, UN3221, UN3222, UN3223, UN3224, UN3231, UN3232, UN3233, and UN3234: a smaller container than that allowed by packing methods OP5 and OP6 respectively shall be used.

UN3241: The maximum capacity or net mass of the combination packaging or single packaging shall be equal to or less than the capacity or net mass given in packing method OP6.

PACKING INSTRUCTION 600

This instruction applies to UN1700, UN2016, UN2017.

1. The dangerous goods shall be handled, offered for transport or transported in a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging that meets the packing group II performance level.
2. The articles shall be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material to prevent inadvertent discharge during normal conditions of transport.
3. The net mass of the packaging shall be equal to or less than 75 kg.

PACKING INSTRUCTION 601

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass inner packaging(s) in one or more metal intermediate packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - b. a combination packaging comprising of one or more metal or plastic inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - c. a drum in a drum combination packaging comprising of a code 1A1, 1B1, 1H1, 1N1 or 6HA1 inner packaging that is packed in a code 1A1, 1A2, 1H1 or 1H2 outer packaging; or
 - d. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging (1a)				
Inner Packaging		Intermediate Packaging	Outer Packaging	
Maximum capacity			Maximum Net Mass	
Glass	1 L	Metal	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	15 kg
Combination Packaging (1b)				
Inner Packaging		Outer Packaging		
Maximum capacity		Maximum Net Mass		
Metal or plastic	5 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N		75 kg
Drum in a Drum Combination Packaging (1c)				
Inner Packaging		Outer Packaging		
Maximum capacity		Maximum Net Mass		
1A1, 1B1, 1H1, 1N1, 6HA1	125 L	1A1, 1A2, 1H1, 1H2		400 kg

3. All containers shall be hermetically sealed.
4. Inner packagings shall be closed with a closure that is physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport.

5. Inner packagings mentioned in 1a and 1b shall:
 - a. not be filled to more than 90% of their maximum capacity; and
 - b. be individually packaged with cushioning and absorbent material sufficient to absorb the entire contents of the inner packagings.
6. Inner packagings mentioned in 1c shall:
 - a. meet the packing group I performance level and be rated for an internal pressure test at a pressure equal to or greater than 300 kPa (3 bar);
 - b. have a threaded type closure with a cap seal; and
 - c. be isolated from the outer packaging by the use of inert shock-mitigating cushioning material that surrounds the inner packaging on all sides.
7. The outer and inner packagings mentioned in 1c shall be periodically reconditioned in accordance with standard CAN/CGSB-43.126, at intervals of not more than three years.
8. Cylinders and spheres mentioned in 1d shall:
 - a. be subjected to an initial and periodic test every 10 years at a pressure of not less than 1000 kPa (10 bar);
 - b. not be equipped with a pressure relief device;
 - c. not be manifolded or interconnected; and
 - d. be packed in an outer packaging if its wall thickness at any point is less than 2 mm or it does not have any valve protection.
9. Cylinders and spheres containing a toxic by inhalation liquid with a LC_{50} less than or equal to 200 mL/m³ (ppm) shall be closed with a plug or valve conforming to the following:
 - a. each plug or valve shall have a taper-threaded connection directly to the cylinder or sphere and be capable of withstanding the test pressure of the pressure receptacle without damage or leakage;
 - b. each valve shall be of the packless type with non-perforated diaphragm, except that, for corrosive substances, a valve may be of the packed type with an assembly made gas-tight by means of a seal cap with gasket joint attached to the valve body or the cylinder or sphere to prevent loss of substance through or past the packing;
 - c. each valve outlet shall be sealed by a threaded cap or threaded solid plug and inert gasket material; and
 - d. the materials of construction for the cylinder or sphere, valves, plugs, outlet caps, luting and gaskets shall be compatible with each other and with the contents.

PACKING INSTRUCTION 602

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass inner packaging(s) in one or more metal intermediate packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - b. a combination packaging comprising of one or more metal or plastic inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - c. a code 1A1, 1B1, 1H1, 1N1, 6HA1 or 6HH1 single packaging; or
 - d. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging (1a)				
Inner Packaging		Intermediate Packaging	Outer Packaging	
Maximum capacity			Maximum Net Mass	
Glass	1 L	Metal	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	15 kg
Combination Packaging (1b)				
Inner Packaging		Outer Packaging		
Maximum capacity		Maximum Net Mass		
Metal or plastic	5 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N		75 kg
Single Packaging (1c)				
				Maximum Capacity
1A1, 1B1, 1H1, 1N1, 6HA1, 6HH1				450 L

3. All containers shall be hermetically sealed.
4. Inner packagings and single packagings shall be closed with a closure that is physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport.

5. Inner packagings mentioned in 1a and 1b shall:
 - a. not be filled to more than 90% of their maximum capacity; and
 - b. be individually packaged with cushioning and absorbent material sufficient to absorb the entire contents of the inner packagings.
6. Single packagings mentioned in 1c shall:
 - a. meet the packing group I performance level and be rated for an internal pressure test equal to or greater than 300 kPa (3 bar); and
 - b. have a threaded type closure with a cap seal.
7. Cylinders and spheres mentioned in 1d shall:
 - a. be subjected to an initial and periodic test every 10 years at a pressure of not less than 1000 kPa (10 bar);
 - b. not be equipped with a pressure relief device;
 - c. not be manifolded or interconnected; and
 - d. be packed in outer packagings if its wall thickness at any point is less than 2 mm or it does not have any valve protection.
8. Cylinders and spheres containing a toxic by inhalation liquid with a LC_{50} less than or equal to 200 mL/m³ (ppm) shall be closed with a plug or valve conforming to the following:
 - a. each plug or valve shall have a taper-threaded connection directly to the cylinder or sphere and be capable of withstanding the test pressure of the cylinder or sphere without damage or leakage;
 - b. each valve shall be of the packless type with non-perforated diaphragm, except that, for corrosive substances, a valve may be of the packed type with an assembly made gas-tight by means of a seal cap with gasket joint attached to the valve body or the cylinder or sphere to prevent loss of substance through or past the packing;
 - c. each valve outlet shall be sealed by a threaded cap or threaded solid plug and inert gasket material; and
 - d. the materials of construction for the cylinder or sphere, valves, plugs, outlet caps, luting and gaskets shall be compatible with each other and with the contents.

PACKING INSTRUCTION 603

This instruction applies to UN3507.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. combination packaging comprising of one or more metal or plastic primary receptacle(s) in one or more leakproof rigid secondary packaging(s) in a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging.
2. Primary inner receptacles shall be packed in secondary packagings in a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging.
3. If multiple primary receptacles are placed in a single secondary packaging, they shall be individually wrapped or separated to prevent any contact between them.
4. Secondary packagings shall be secured in outer packagings with suitable cushioning material to prevent movement.
5. The dangerous goods and the container shall meet the applicable requirements in the *Packaging and Transport of Nuclear Substances Regulations*.

Substance Specific Provisions:

In the case of fissile-excepted material, the limits specified in the *Packaging and Transport of Nuclear Substances Regulations* shall be met.

PACKING INSTRUCTION 800

This instruction applies to UN2803, UN2809.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass, metal or rigid plastic inner packaging(s) intended to contain liquids and a code 1A1, 1A2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2 or 4N outer packaging;
 - b. a non-UN Standardized steel flask or bottle with threaded closures; or
 - c. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b shall be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination Packaging (1a)			
Inner Packaging		Outer Packaging	
Maximum net mass		Maximum net mass	
Glass, metal or rigid plastic	15 kg	1A1, 1A2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4N	400 kg
		4C1, 4C2, 4D	250 kg
		4F, 4G, 4H2	125 kg
		4H1	60 kg
Non-UN Standardized (1b)			
			Maximum Capacity
Non-UN Standardized steel flask or bottle			3 L

3. Inner packagings shall be completely surrounded with cushioning material.
4. Inner packagings or outer packagings shall have inner liners or bags of strong leakproof and puncture-resistant material impervious to the contents and completely surrounding the contents to prevent it from escaping from the container irrespective of its position or orientation.

Substance Specific Provisions:

UN2803: When it is necessary to transport the dangerous goods at low temperatures in order to maintain them in a completely solid state, the container may be placed in a strong, water-resistant outer packaging, which contains dry ice or other means of refrigeration. If a refrigerant is used, the container shall be chemically and physically resistant to the refrigerant and shall have impact resistance at the low temperatures of the refrigerant employed. If dry ice is used, the outer packaging shall permit the release of carbon dioxide gas.

PACKING INSTRUCTION 801

This instruction applies to new and used batteries assigned to UN2794, UN2795, UN3028.

1. The dangerous goods shall be handled, offered for transport or transported in a rigid outer packaging, wooden slatted crate, or on a pallet provided the following provisions are met:
 - a. batteries stacked shall be adequately secured in tiers separated by a layer of electrically non-conductive material;
 - b. battery terminals shall not support the weight of other superimposed elements;
 - c. batteries shall be packaged or secured to prevent inadvertent movement;
 - d. batteries shall not leak in any position and inclination expected in normal conditions of transport or shall be made leakproof by individually packaging or by any other equally effective method to prevent the potential release of electrolyte; and
 - e. batteries shall be protected against short circuits.
2. In addition, used batteries may also be transported in metal or solid plastic bins, provided the following provisions are met:
 - a. the bins shall be resistant to the electrolyte that was contained in the batteries;
 - b. the bins shall not be filled to a height greater than the height of their sides;
 - c. the outside of the bins shall be free of residues of electrolyte contained in the batteries;
 - d. under normal conditions of transport, no electrolyte shall leak from the bins;
 - e. measures shall be taken to ensure that filled bins cannot lose their content; and
 - f. measures shall be taken to prevent short circuits, for example by discharging the batteries or by individually protecting the battery terminals.

PACKING INSTRUCTION 802

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass or plastic inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, or 4N outer packaging;
 - b. a combination packaging comprising of one or more metal inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N outer packaging;
 - c. a code 1A1, 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2 or 6PH2 single packaging; or
 - d. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c shall be equal to or less than the maximum capacity or net mass given in the following Table:

Combination Packaging (1a)			
Inner Packaging		Outer Packaging	
Maximum capacity		Maximum Net Mass	
Glass, plastic	10 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	75 kg
Combination Packaging (1b)			
Inner Packaging		Outer Packaging	
Maximum capacity		Maximum Net Mass	
Metal	40 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	125 kg
Single Packaging (1c)			
			Maximum Capacity
1A1			250 L
6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2, 6PH2			60 L

Substance Specific Provisions:

UN1790: For dangerous goods with more than 60% but not more than 85% hydrogen fluoride, the dangerous goods shall be handled, offered for transport or transported in accordance with Packing Instruction 1.

PACKING INSTRUCTION 803

This instruction applies to UN2028.

1. The dangerous goods shall be handled, offered for transport or transported in a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging.
2. The net mass of the packaging shall be equal to or less than 75 kg.
3. Articles shall be individually packaged and separated from each other using partitions, dividers, inner packagings or cushioning material to prevent inadvertent discharge during normal conditions of transport.

PACKING INSTRUCTION 804

This instruction applies to UN1744.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a combination packaging comprising of one or more glass inner packaging(s) in one or more metal or rigid plastic intermediate packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - b. a combination packaging comprising of one or more metal or polyvinylidene fluorides (PVDF) inner packaging(s) and a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2 or 4N outer packaging;
 - c. a drum in a drum combination packaging comprising of a code 1A1, 1B1, 1H1, 1N1 or 6HA1 inner packaging that is packed in a code 1A1, 1A2, 1H1 or 1H2 outer packaging; or
 - d. a cylinder or sphere meeting the requirements of Section 15.
2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c shall be equal to or less than the capacity given in the following Table:

Combination Packaging (1a)				
Inner Packaging		Intermediate Packaging	Outer Packaging	
Maximum capacity			Maximum Net Mass	
Glass	1.3 L	Metal or rigid plastic	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N	25 kg
Combination Packaging (1b)				
Inner Packaging		Outer Packaging		
Maximum capacity		Maximum Net Mass		
Metal or polyvinylidene fluorides (PVDF)	5 L	1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N		75 kg
Drum in a drum combination packaging (1c)				
Inner Packaging (PG I)		Outer Packaging		
Maximum capacity		Maximum Net Mass		
1A1, 1B1, 1H1, 1N1, 6HA1	125 L	1A1,1A2, 1H1, 1H2		400 kg

3. Inner packagings shall be closed with a closure that is physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transport.
4. Inner packagings mentioned in 1a and 1b shall:
 - a. not be filled to more than 90% of their capacity; and
 - b. be individually packaged with cushioning and absorbent material sufficient to absorb the entire contents of the inner packagings.
5. Inner packagings mentioned in 1c shall:
 - a. meet the packing group I performance level and rated for an internal pressure test equal to or greater than 300 kPa (3 bar);
 - b. have a threaded type closure with a cap seal; and
 - c. be isolated from the outer packaging by the use of inert shock-mitigating cushioning material that surrounds the inner packaging on all sides.
6. The inner and outer packagings mentioned in 1c shall be periodically reconditioned in accordance with standard CAN/CGSB-43.126, at intervals of not more than three years.
7. Cylinders and spheres mentioned in 1d shall:
 - a. be subjected to an initial and periodic test every 10 years at a pressure of not less than 1000 kPa (10 bar);
 - b. not be equipped with a pressure relief device;
 - c. be closed with a plug or valve fitted with a secondary closure device; and
 - d. be constructed of materials, including materials of valves, plugs, outlet caps, luting and gaskets, that are compatible with each other and with the contents.

PACKING INSTRUCTION 901

This packing instruction applies to UN3316.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a code 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N, outer packaging that meets the performance level consistent with the packing group assigned to the dangerous goods, or the packing group II performance level, if no packing group has been assigned.
2. The net mass of the container shall be equal to or less than 10 kg, excluding the mass of any carbon dioxide, solid (dry ice) used as a refrigerant.
3. Dangerous goods contained in a chemical kit or first aid kit shall be packed in inner packagings. The inner packagings shall be protected from other material in the kit.
4. When carbon dioxide, solid (dry ice) is used as a refrigerant, the packaging shall be designed and constructed to permit the release of the carbon dioxide gas to prevent the build-up of pressure that could rupture the container.

PACKING INSTRUCTION 902

This packing instruction applies to UN3268.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. a code 1A2, 1B2, 1N2, 1H2, 1D, 1G, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N, outer packaging that meets the packing group III performance level.
2. The dangerous goods shall be packaged or secured to prevent movement and inadvertent operation during normal conditions of transport.
3. Unpackaged articles may also be handled, offered for transport or transported in a dedicated handling device, vehicle or closed cargo transport unit.

PACKING INSTRUCTION 903

This instruction applies to UN3090, UN3091, UN3480, UN3481.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. for cells and batteries:
 - i. a code 1A2, 1B2, 1H2, 1D, 1G, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N outer packaging that meets the packing group II performance level;
 - b. for cells or batteries with a strong, impact resistant outer casing that have a gross mass of 12 kg or more:
 - i. a strong outer packaging;
 - ii. a protective enclosure (e.g., fully enclosed or slatted wooden crates); or
 - iii. a pallet or other handling device;
 - c. for cells or batteries packed with equipment that may contain cells or batteries (i.e. apparatus requiring the lithium metal or, lithium ion cells or batteries with which it is packed for its operation):
 - i. a UN standardized packaging conforming to the requirements in 1a which is then placed with the equipment in an outer packaging; or
 - ii. a packaging completely enclosing the cells or batteries which is then placed in a UN standardized packaging conforming to the requirements in 1a;
 - iii. equipment containing cells or batteries shall be constructed or packaged to prevent accidental operation during transport;
 - d. for cells and batteries contained in equipment:
 - i. a strong outer packaging;
 - ii. cells and batteries contained in large equipment may be transported unpackaged or on pallets if afforded equivalent protection by the equipment in which they are contained;
 - iii. equipment shall be constructed or packaged to prevent accidental operation during transport.
2. Cells or batteries shall be secured to prevent inadvertent movement and protected against damage and protected against short circuit.
3. The terminals shall not support the weight of other superimposed elements.
4. Devices that are intentionally active during transport such as radio frequency identification transmitters, watches and temperature loggers, and that are not capable of generating a dangerous evolution of heat may be transported in strong outer packaging.

PACKING INSTRUCTION 905

This instruction applies to UN2990, UN3072.

1. The dangerous goods shall be handled, offered for transport or transported in an outer packaging.
2. Lifesaving appliances that are constructed to incorporate or are contained in a rigid outer weatherproof casing may be transported unpackaged.
3. Preparation for transport and packaging shall include provisions to prevent any accidental inflation of the appliance.

PACKING INSTRUCTION 906

This instruction applies to UN2315, UN3151, UN3152, UN3432.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. for liquids and solids containing or contaminated with PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes: a container in accordance with the appropriate Packing Instruction 1 or 2;
 - b. for transformers, condensers and other articles:
 - i. a container in accordance with the appropriate Packing Instruction 1 or 2. The articles shall be secured with suitable cushioning material to prevent inadvertent movement during normal conditions of transport; or
 - ii. a non-UN standardized container if it is leakproof and is capable of containing, in addition to the articles, at least 1.25 times the volume of the liquid PCBs, polyhalogenated biphenyls, polyhalogenated terphenyls or halogenated monomethyldiphenylmethanes present in them. There shall be sufficient absorbent material in the container to absorb at least 1.1 times the volume of liquid, which is contained in the articles. In general, transformers and condensers shall be carried in leakproof metal containers which are capable of holding, in addition to the transformers and condensers, at least 1.25 times the volume of the liquid present in them;
 - c. for liquids and solids not packaged in accordance with Packing Instruction 1 or 2, but packaged in a non-standardized container, unpackaged transformers, condensers and other devices may be transported in a closed cargo transport unit fitted with a metal tray with at least 800 mm high sides, containing sufficient inert absorbent material to absorb at least 1.1 times the volume of any free liquid.
2. Transformers and condensers shall not leak or shall be made leakproof by over-packing inside a secondary container, wrapping in plastic film bag or by any other equally effective method.

PACKING INSTRUCTION 907

This instruction applies to UN3363.

1. The dangerous goods shall be handled, offered for transport or transported in an outer packaging designed, manufactured, loaded, unloaded, secured, closed and maintained so that during transport, including handling, there is no condition or release of dangerous goods from the container that could endanger public safety.
2. The article, machinery or apparatus may be transported unpackaged if it is constructed and designed with a receptacle for dangerous goods that:
 - a. is designed, manufactured, loaded, unloaded, secured, closed and maintained so that during transport, including handling, there is no condition or release of dangerous goods from the receptacle that could endanger public safety;
 - b. is sufficiently protected from damage that may occur during normal conditions of transport;
 - c. in the event of damage to the receptacle, no leakage of the dangerous goods may occur from the article, machinery or apparatus;
 - d. is installed, secured or cushioned to prevent movement within the article, machinery or apparatus during normal conditions of transport. Cushioning material shall not react dangerously with the content of the receptacle. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material.

PACKING INSTRUCTION 908

This instruction applies to damaged or defective lithium ion cells and batteries and damaged or defective lithium metal cells and batteries, including those contained in equipment, of UN3090, UN3091, UN3480, UN3481.

1. The dangerous goods shall be handled, offered for transport or transported in combination packaging comprising of one or more inner packaging(s) in a code 1A2, 1B2, 1H2, 1D, 1G, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N outer packaging that meets the packing group II performance level.
2. Each damaged or defective cell or battery or equipment containing cells or batteries shall be individually packed in an inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leakproof to prevent the potential release of electrolyte.
3. Each inner packaging shall be surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat.
4. Sealed packagings shall be fitted with a venting device when appropriate.
5. Appropriate measures shall be taken to minimize the effects of vibrations and shocks and prevent movement of the cells and/or batteries within the container that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may also be used to meet this requirement.
6. Sufficient inert absorbent material shall be added to the inner or outer packaging when they contain leaking cells or batteries to absorb any release of electrolyte.
7. A cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging.
8. Cells or batteries shall be protected against short circuit.

PACKING INSTRUCTION 909

This instruction applies to UN3090, UN3091, UN3480, UN3481 transported for disposal or recycling, either packed together with or packed without non-lithium batteries.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. for cells or batteries:
 - i. a code 1A2, 1B2, 1H2, 1D, 1G, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 4N outer packaging that meets the packing group II performance level;
 - b. for lithium-ion cells with a watt-hour (Wh) rating not more than 20 Wh, lithium-ion batteries with a watt-hour rating not more than 100 Wh, lithium metal cells with a lithium content not more than 1 g and lithium metal batteries with an aggregate lithium content not more than 2 g:
 - i. a strong outer packaging up to 30 kg;
 - c. for cells or batteries contained in equipment:
 - i. a strong outer packaging; or
 - ii. unpackaged or on pallets if the cells or batteries are protected by the equipment in which they are contained;
 - d. for cells or batteries with a strong, impact resistant outer casing that have a gross mass of 12 kg or more:
 - i. a strong outer packaging.
2. If metal outer packagings are used, they shall be fitted with an electrically non-conductive lining material (e.g., plastic).
3. Cells or batteries shall be protected against short circuit and the dangerous evolution of heat by various means, including, but not limited to:
 - a. individual protection of the battery terminals;
 - b. the use of inner packaging to prevent contact between cells and batteries;
 - c. batteries with recessed terminals designed to protect against short circuit;
 - d. the use of electrically non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.
4. Cells or batteries shall be secured in the outer packaging to prevent inadvertent movement during transport (e.g., by using a non-combustible and electrically non-conductive cushioning material or through the use of a tightly closed plastic bag).

PACKING INSTRUCTION 910

This instruction applies to UN3090, UN3091, UN3480, UN3481 production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

1. The dangerous goods shall be handled, offered for transport or transported in:
 - a. for cells or batteries, including when packed with equipment:
 - i. combination packaging comprising of one or more inner packaging(s) in a code 1A2, 1B2, 1H2, 1D, 1G, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N outer packaging that meets the packing group II performance level;
 - ii. each cell or battery shall be individually packed in an inner packaging and placed inside an outer packaging;
 - iii. each inner packaging shall be completely surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat;
 - iv. appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the container that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may be used to meet this requirement;
 - v. a cell or battery with a net mass of more than 30 kg shall be limited to one cell or battery per outer packaging;
 - b. for cells or batteries contained in equipment:
 - i. a code 1A2, 1B2, 1H2, 1D, 1G, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2, 4N outer packaging that meets the packing group II performance level;
 - ii. the equipment shall be constructed or packaged to prevent accidental operation during transport;
 - iii. appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may be used to meet this requirement;
 - c. for batteries that have a total mass of 12 kg or more and that have a strong, impact-resistant outer casing:
 - i. a strong outer packaging or protective enclosure.
2. Cells or batteries shall be protected against short circuit and the dangerous evolution of heat by various means, including, but not limited to:
 - a. individual protection of the battery terminals;
 - b. the use of inner packaging to prevent contact between cells and batteries;
 - c. batteries with recessed terminals designed to protect against short circuit;
 - d. the use of electrically non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

Annex B

(informative)

Temperature control of organic peroxides and self-reactive substances during transportation

General guidance is given in the following paragraphs as the circumstances to be taken into account differ for the various modes of transport.

B.1 Maintenance of the prescribed temperature is an essential feature for the safe transport of many organic peroxides and self-reactive substances. In general, there should be:

- a) thorough inspection of the transport unit prior to loading;
- b) instructions to the carrier about the operation of the refrigeration system;
- c) procedures to be followed in the event of loss of temperature control;
- d) regular monitoring of operating temperatures; and
- e) provision of a back-up refrigeration system or spare parts.

B.2 Any control and temperature sensing devices in the refrigeration system should be readily accessible and all electrical connections should be weatherproof. Two independent sensors should measure the temperature of air space within the transport unit and the output should be recorded so that temperature changes are readily detectable. The temperature should be checked every four to six hours and logged. When substances having a control temperature of less than 25 °C are transported, the transport unit should be equipped with visible and audible alarms, powered independently of the refrigeration system, set to operate at or below the control temperature.

B.3 If, during transport, the control temperature is exceeded, an alert procedure should be initiated involving any necessary repairs to the refrigeration equipment or an increase in the cooling capacity (e.g., by adding liquid or solid refrigerants). There should also be frequent checks of the temperature and preparations for implementation of emergency procedures. If the emergency temperature is reached, the emergency procedures should be set in operation.

B.4 The suitability of a particular means of temperature control for transport depends on a number of factors. Among those to be considered are:

- a) control temperature(s) of the substance(s) to be transported;
- b) difference between the control temperature and the anticipated ambient temperature conditions;
- c) effectiveness of the thermal insulation;
- d) duration of transport; and
- e) allowance of a safety margin for delays.

B.5 Suitable methods for preventing the control temperature from being exceeded are the following, in order of increasing control capability:

- a) thermal insulation; if the initial temperature of the organic peroxide(s) is sufficiently below the control temperature;
- b) thermal insulation with coolant system; if:
 - i) adequate quantity of coolant (e.g., liquid nitrogen or solid carbon dioxide), allowing a reasonable margin for delay, is carried;
 - ii) liquid oxygen or air is not used as coolant;
 - iii) there is a uniform cooling effect even when most of the coolant has been consumed;
 - iv) need to ventilate the unit before entering is clearly indicated by a warning on the door(s) of the unit;
- c) single mechanical refrigeration; if, for organic peroxides with a flash point lower than the sum of the emergency temperature plus 5 °C, explosion-proof electrical fittings are used within the cooling compartment to prevent ignition of flammable vapours from the organic peroxides;
- d) combined mechanical refrigeration system with coolant system; if:
 - i) two systems are independent of one another; and
 - ii) requirements in B5 b) and c) are complied with;
- e) dual mechanical refrigeration system; if:
 - i) apart from the integral power supply unit, the two systems are independent of one another;
 - ii) each system alone is capable of maintaining adequate temperature control; and
 - ii) for organic peroxides with a flash point lower than the sum of the emergency temperature plus 5 °C, explosion-proof electrical fittings are used within the cooling compartment to prevent ignition of flammable vapours from the organic peroxides.