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Small Containers for Transport of Dangerous Goods, Classes 3, 4, 5, 6.1, 8, and 9, a Transport Canada Standard

Canada

Small Containers for Transport of Dangerous Goods, Classes 3, 4, 5, 6.1, 8, and 9, a Transport Canada Standard

(Petits contenants pour le transport des marchandises dangereuses des classes 3, 4, 5, 6.1, 8 et 9, une norme de Transports Canada.)

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1. SCOPE

1.1 Organization and content - This standard sets out the requirements for the design and manufacture of small containers with a maximum capacity of 450 L and their use for the transportation of dangerous goods in Class 3, 4, 5, 6.1, 8 or 9. This standard consists of two parts and three appendices. Part I contains the requirements for the design and manufacture of UN Standardized small means of containment in Canada. Part II contains the requirements for the selection and use of small means of containment for handling, offering for transport, or transporting dangerous goods in Class 3, 4, 5, 6.1, 8 and 9.

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). The provisions of Part II apply to new, reconditioned and remanufactured means of containment.

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

1.4 TDG Act and Regulations prevalence - The Transportation of Dangerous Goods Act, 1992, and the Transportation of Dangerous Goods Regulations may call for 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 Transportation of Dangerous Goods Act or Transportation of Dangerous Goods Regulations, the Act or Regulations prevail to the extent of the inconsistency.

1.5 Safety - The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This 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.

1.6 Units - Quantities and dimensions used in this standard are given in metric units. Pressures of all kinds relating to containers (such as test pressure, internal pressure, safety-relief valve set pressure) are indicated in gauge pressure unless specifically noted otherwise. The vapour pressure of substances is indicated in absolute pressure unless specifically noted otherwise.

1.7 Interpretation - In this standard the words “must” and “shall” are imperative. The words “may” and “should” are permissive. Notes in this standard are not requirements and are used to provide guidance or to add information.

1.8 Classification - Dangerous goods must be classified in accordance with Part 2 of the Transportation of Dangerous Goods Regulations and the appropriate shipping names and corresponding particulars (description, identification number — UN (United Nations), classification, division, and packing group, as applicable) selected from Schedule 1 of the Transportation of Dangerous Goods Regulations.

2. REFERENCED PUBLICATIONS

2.1 Publications - The following publications are referenced in this standard. (The source for these publications are given in clause 2.2)

2.1.1 American Society for Testing and Materials (ASTM)

D685 - 93(2007)
Standard Practice for Conditioning Paper and Paper Products for Testing

D1415 - 06
Standard Test Method for Rubber Property—International Hardness

D2240 - 05
Standard Test Method for Rubber Property—Durometer Hardness

D3078 - 02(2008)
Standard Test Method for Determination of Leaks in Flexible Packaging by Bubble Emission

D4332 - 01(2006)
Standard Practice for Conditioning Containers, Packages, or Packaging Components for Testing

D4577 - 05
Standard Test Method for Compression Resistance of a Container Under Constant Load

D4991 - 07
Standard Test Method for Leakage Testing of Empty Rigid Containers by Vacuum Method

D5276 - 98(2004)
Standard Test Method for Drop Test of Loaded Containers by Free Fall

E4 - 07 Standard Practices for Force Verification of Testing Machines

2.1.2 Canadian General Standards Board (CGSB)

43.126-2008
Reconditioning, Remanufacturing and Repair of Drums for the Transportation of Dangerous Goods.

2.1.3 Canadian Standards Association (CSA)

B339-08
Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods

B340-08
Selection and Use of Cylinders, Spheres, Tubes, and Other Containers for the Transportation of Dangerous Goods, Class 2

B341-09
UN pressure receptacles and multi-element gas containers for the transportation of dangerous goods

B342-09
Selection and use of UN pressure receptacles and multiple-element gas containers for the transportation of dangerous goods, Class 2

2.1.4 International Organization for Standardization (ISO)

535:1991
Paper and board -- Determination of water absorptiveness -- Cobb method

3574:2008
Cold-reduced carbon steel sheet of commercial and drawing qualities

9001:2000
Quality management systems – Requirements

9001:2008
Quality management systems – Requirements

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

T 402 sp-08.
Standard conditioning and testing atmospheres for paper, board, pulp handsheets, and related products, Test

T 410 om-08
Grammage of paper and paperboard (weight per unit area), Test Method

T 441 om-04.
Water Absorptiveness of Sized (Non-bibulous) Paper, Paperboard, and Corrugated Fiberboard (Cobb Test), Test

T 802 om-07
Drop test for fiberboard shipping containers, Test Method

T 811 om-07
Edgewise Compressive Strength of Corrugated Fiberboard (Short Column Test), Test Method

T 839 om-08.
Edgewise compressive strength of corrugated fiberboard using the clamp method (short column test)

2.1.6 Transport Canada

Transportation of Dangerous Goods Act, 1992
Transportation of Dangerous Goods Regulations

2.1.7 United Nations (UN)

UN Model Regulations
UN Recommendations on the Transport of Dangerous Goods. Model Regulations. 16th revised edition

2.2 Publication source

2.2.1 American Society for Testing and Materials (ASTM)

ASTM International,
100 Barr Harbor Drive, PO Box C700,
West Conshohocken, PA, 19428-2959 USA
1-800-262-1373
610-832-9500
www.astm.org

2.2.2 Canadian General Standards Board (CGSB)

Canadian General Standards Board,
Place du Portage III, 6B1,
11 Laurier Street,
Gatineau, Quebec, K1A 1G6, Canada,
1-800-665-2472,
819-956-0425,
www.tpsgc-pwgsc.gc.ca/cgsb/

2.2.3 Canadian Standards Association (CSA)

Canadian Standards Association
5060 Spectrum Way
Mississauga, Ontario, L4W 5N6, Canada
1-800-463-6727
www.csa.ca

2.2.4 International Organization for Standardization (ISO)

International Organization for Standardization
1, ch. de la Voie-Creuse CP 56, CH-1211
Geneva 20, Switzerland
Phone: +41 22 749 01 11
www.iso.org

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

Technical Association of the Pulp and Paper Industry
15 Technology Parkway South
Norcross, GA 30092, US
1-800-446-9431 (Canada)
(770) 446-1400
www.tappi.org

2.2.6 Transport Canada

Transport Canada
330 Sparks Street,
Ottawa, Ontario, K1A 0N5, Canada
613-990-2309
1-888-675-6863
www.tc.gc.ca/tdg
www.tc.gc.ca/tdg/clear/menu.htm

2.2.7 United Nations (UN)

United Nations
2 United Nations Plaza, Room DC2-853
New York, NY 10017, USA
1-800-253-9646
http://www.unece.org/trans/danger/danger.htm

3. DEFINITIONS

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

Bag (sac)
Flexible container made of paper, plastic film, textiles, woven material or other suitable materials.

Box (caisse)
Outer packaging with complete rectangular or polygonal faces, made of metal, wood, plywood, reconstituted wood, fibreboard, plastic or other suitable material.

Closure (Fermeture)
A device that closes an opening in a container.

Combination packaging (Emballage combiné)
A container consisting of one or more inner packagings contained in an outer packaging for transport.

Composite packaging (Emballage composite)
A 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.

Container (Contenant)
A small means of containment as defined in the TDG Act.

Crate (Caisse à claire-voie or harasse)
Rigid outer container with incomplete surfaces.

Director (Directeur)
The Director, Regulatory Affairs Branch, Transport Dangerous Goods Directorate, Transport Canada, Place de Ville 9th floor, 330 Sparks Street, Ottawa ON K1A 0N5.

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

Durable markings (Marquage durable)
Compliance marks placed on a container that remains legible until the container is reconditioned.

Grammage (Grammage)
The mass of a unit area of paper or fibreboard determined by TAPPI test method T 410, expressed in grams per square meter. (Also known as basis weight)

Fuel cell (Pile à combustible)
An electrochemical device that converts the chemical energy of a fuel to electrical energy, heat and reaction products.

ICAO (OACI)
International Civil Aviation Organization.

Inner packaging (Emballage intérieur)
A container in direct contact with its contents, for which an outer packaging is required for transport.

Inner receptacle (Récipient intérieur)
The portion of a composite packaging that is in direct contact with its contents.

Intermediate packaging (Emballage intermédiaire)
A container that is used to contain one or more inner packaging, for which an outer packaging is required for transport.

Jerrican (Bidon)
A metal or plastic container of rectangular or polygonal cross-section.

Leakage (Fuite)
The release of product from the filled container.

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

Markings (Marquage)
Compliance marks on a container that indicate compliance with this standard.

Maximum capacity (Capacité maximale)
The maximum volume of water, normally expressed in litres, 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.

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

Nonwoven fabric (Tissu non tissé)
A 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.

Outer packaging (Emballage extérieur)
A container that is not in direct contact with the dangerous goods, which contains one or more inner packaging or an inner receptacle.

Overpack (Suremballage)
A container such as a box, crate or bin, packing materials such as shrink wrap or stretch wrap or devices such as pallets, straps or nets, or the combination thereof, used to hold one or more containers or articles together to form one unit for convenience of handling and stowage during transport.

Permanent markings (Marquage permanent)
Markings 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).

Plastic Fabric (Tissu en plastique)
A material made from woven or nonwoven fabric of a plastic material.

Quality management system (Système de management de la qualité)
A systematic programme of controls, inspections and documented activities aimed at providing confidence that conformity to this standard is consistently achieved in practice.

Reconditioned drum (Fût reconditionné)
A steel or plastic drum that has been successfully processed in accordance with the applicable reconditioning requirements specified in standard CGSB 43.126.

Recycled plastic material (Matériel en plastique recyclé)
Plastic material recovered from used industrial containers.

Remanufactured drum (Fût reconstruit)
A steel or plastic drum that has been successfully processed in conformance with the applicable remanufacturing requirements specified in standard CGSB 43.126.

Salvage container (Contenant de secours)
A container into which damaged, defective, leaking or non-conforming dangerous goods containers, or dangerous goods that have spilled or leaked, are placed for purposes of transport for recovery or disposal.

Single packaging (Emballage simple)
A container, other than a combination packaging.

Sift-proof container (Contenant étanches aux pulvérulents)
A container that is impermeable to dry contents, including any fine solid material produced during transport.

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.

TC
Transport Canada.

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

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

UN packaging symbol
(Symbole d'emballage de l'ONU)

UN Standardized container (Contenant normalisé UN)
A UN standardized means of containment, as defined in the TDG regulations, but for the purpose of this standard having a maximum capacity less than or equal to 450 L.

Viscous liquid (Liquide visqueux)
A liquid that has a dynamic viscosity greater than 2.5 Pascal-second (Pa·s) or 2500 centipoises (cP) at 25 degrees Celsius.

Woven plastic (Plastique tissé)
A 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 person must not design, test or manufacture a container unless these activities are done in accordance with Part I of this standard.

4.2 Markings - A person must not apply markings on a container unless:

a. the markings conform to the requirements of chapter 5;

b. the container was designed in accordance with clause 4.3 and chapter 6;

c. a representative prototype of the container has been successfully tested in accordance with the requirements of chapter 7 and Table 3;

d. the container was manufactured under a quality management system in accordance with chapter 9; and

e. the container design and container manufacturing facility are registered with the Director in accordance with the requirements of chapter 10.

4.3 Container Design

4.3.1 Performance - A container must conform to a registered design for which a representative prototype has been tested and found to meet the applicable performance requirements set out in chapter 7 and Table 3, except for design variations permitted in chapter 8 or Part 2.

4.3.2 Inner packaging - For a combination packaging, the inner packaging must be designed, constructed, filled, closed, secured and maintained so that under normal conditions of transport, including handling, there will be no accidental 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., must be secured in outer packagings with cushioning material capable of preventing puncture and breakage of the inner packaging. The closures of inner packagings must be designed to prevent leaking or sifting.

4.3.3 Leaking between parts or layers of the container – A container must 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 must 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 chapter 6, the net mass of a container must be equal to or less than 400 kg. The maximum capacity of the container must be equal to or less than 450 L.

4.4 Container information

4.4.1 The container manufacturer and distributor must provide the following information in relation to each container design:

a. a list of components that includes enough information so that the user can assemble and close the container in the same fashion as it was tested;

b. a procedure for assembling and closing the container as tested;

c. the maximum capacity of any inner packaging, as applicable; and

d. the tare weight, maximum gross mass and maximum capacity of the container, as applicable.

Note: For containers designed with a handle for lifting, the container information should include instructions on the proper use of the handle, including whether it is intended for lifting the container empty or full.

4.4.2 The container manufacturer and distributor must provide the container information to a container purchaser at each initial purchase of the corresponding container.

4.4.3 The container manufacturer and distributor must provide the container information to a container user upon request.

5. MARKINGS

5.1 General

5.1.1 Required markings - The markings must be durable, legible, placed in a location and of such a size as to be readily visible.

5.1.2 Location of markings

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

5.1.3 Size of markings - Letters, numerals and symbols comprising the markings must be at least 12 mm high, except that:

a. the markings on containers of 30 L maximum capacity or 30 kg net mass or less must be at least 6 mm high; and

b. the markings on containers of 5 L maximum capacity or 5 kg net mass or less must be at least 3mm high.

5.1.4 Permanent markings – The markings required in clause 5.2 a., b., c., d., and e. must be permanent markings when the container is liable to undergo a reconditioning process, which might obliterate the markings on the container.

Note: Embossed or moulded markings are not required to appear in contrasting colours to the background of the container.

5.2 Content and sequence of markings – The following markings are required and must be displayed in the following sequence with each of the elements clearly separated from one another:

a. The **UN packaging symbol** as defined in chapter 3 or the letters "**UN**" when permitted by clause 5.3.1;

b. The **packaging code** listed in Table 1 and, when applicable, the letter "**V**", "**T**", or "**W**" assigned to the packaging code in accordance with clause 5.3.2;

c. The performance level represented by the letters "**X**", "**Y**" or "**Z**" in accordance with clause 5.3.3, followed by the **gross mass** or **relative density** in accordance with clause 5.3.4;

d. The letter "**S**" or the **internal test pressure** in accordance with clause 5.3.5;

e. The **year of manufacture** in accordance with clause 5.3.6;

f. "**CAN**"; *Note: Denotes Canada as the country authorizing the use of the UN marking.*

g. The **name or symbol of the manufacturer** in accordance with clause 5.3.7; and

h. The **Design Registration Number** issued in accordance with clause 10.5.

Table 1: Packaging Codes (clause 5.2 b)

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. Aluminium	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 aluminium	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. Aluminium	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	
4. Boxes	A. Steel		4A	400 kg	6.10
	B. Aluminium		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

Type	Material	Category	Packaging Code	Maximum capacity or maximum net mass	Reference clause
	G. Fibreboard		4G	400 kg	6.15
	H. Plastic	expanded	4H1	60 kg	6.16
		solid	4H2	400 kg	
5. Bags	H. Woven plastic	without inner liner or coating	5H1	50 kg	6.17
		sift-proof	5H2		
		water resistant	5H3		
	H. Plastics film		5H4	50 kg	6.18
	L. Textile	without inner liner or coating	5L1	50 kg	6.19
		sift proof	5L2		
		water resistant	5L3		
	M. Paper	multiwall	5M1	50 kg	6.20
		multiwall, water resistant	5M2		
6.Composite packagings	H. Plastic inner receptacle	in steel drum	6HA1	250 L / 400 kg	6.21
		in steel crate or box	6HA2	60 L / 120 kg	
		in aluminium drum	6HB1	250 L / 400 kg	
		in aluminium crate or box	6HB2	60 L / 120 kg	
		in wooden box	6HC	60 L / 120 kg	
		in plywood drum	6HD1	250 L / 400 kg	
		in plywood box	6HD2	60 L / 120 kg	
		in fibre drum	6HG1	250 L / 400 kg	
		in fibreboard box	6HG2	60 L / 120 kg	
		in plastic drum	6HH1	250 L / 400 kg	
		in solid plastics box	6HH2	60 L / 120 kg	
	P. Glass, porcelain or stoneware inner receptacle	in steel drum	6PA1	60 L / 75 kg	6.22
		in steel crate or box	6PA2		
		in aluminium drum	6PB1		
		in aluminium 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 plastic 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.*

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

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

5.3 Specific requirements relative to markings

5.3.1 UN packaging symbol – The UN packaging symbol must not be substituted with the letters “UN” unless the letters “UN” are applied on a metal container that requires embossed markings.

Note: Stencils and dot matrix printing are acceptable methods of marking the UN packaging symbol.

5.3.2 Letter assigned to the packaging code ("V", "T", or "W" marking)

5.3.2.1 The letter "V" must not be assigned to the packaging code unless:

a. the container is a combination packaging;

b. a representative prototype of the outer packaging has been successfully drop tested in accordance with clause 7.4 with glass inner packagings to the Packing Group I performance level;

c. an empty representative prototype of the outer packaging has been successfully compression tested in accordance with clause 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. the marked gross mass required at clause 5.2 c. is marked in accordance with clause 5.3.4.1 c.

5.3.2.2 The letter "T" must not be assigned to the packaging code unless:

a. the representative prototype was successfully tested to the packing group I or II performance level. The container must be qualified to receive the letters "X" or "Y" performance level markings in accordance with clause 5.3.3;

b. the representative prototype was prepared as for a combination packaging in accordance with clause 7.2.4 and successfully tested in accordance with chapter 7 with water; and

c. the container has passed the leakproofness test set out in clause 7.7 at a test pressure of 30 kPa with the results of this test reflected in the design report in accordance with chapter 11.

5.3.2.3 The letter "W" must not be assigned to the packaging code unless it was assigned in accordance with clause 10.9.

5.3.3 Performance level ("X", "Y" or "Z" markings)

5.3.3.1 The letter "X" must not be marked on a container unless a representative prototype of the container was successfully tested in accordance with the requirements of chapter 7 to the packing group I performance level.

5.3.3.2 The letter "Y" must not be marked on a container unless a representative prototype of the container was successfully tested in accordance with the requirements of chapter 7 to the packing group I or II performance level.

5.3.3.3 The letter "Z" must not be marked on a container unless a representative prototype of the container was successfully tested in accordance with the requirements of chapter 7 to the packing group I, II or III performance level.

5.3.4 Gross mass or relative density

5.3.4.1 The gross mass must not be marked on a container unless:

a. a representative prototype was successfully tested in accordance with chapter 7 with solids, viscous liquids or inner packagings;

b. the gross mass is equal to or less than the gross mass of the representative prototype that was successfully tested in accordance with chapter 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 clause 7.4.

5.3.4.2 The relative density must not be marked on a container unless:

a. the container is a single packaging intended for liquids;

b. a representative prototype was successfully tested in accordance with chapter 7 for liquids; and

c. the relative density is equal to or less than the relative density for which the representative prototype has been successfully tested in accordance with chapter 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 clause 7.4.3.4).

5.3.4.3 The gross mass must be in kilograms 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.

5.3.4.4 The relative density must be rounded down to the first decimal.

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

5.3.5 The letter "S" or Internal test pressure

5.3.5.1 The letter "S" must not be marked on a container unless a representative prototype of the container was successfully tested in accordance with chapter 7 with solids, viscous liquids or inner packagings.

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

a. the container is a single packaging intended for liquids;

b. a representative prototype of the container was successfully tested in accordance with chapter 7 for liquids; and

c. the 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.

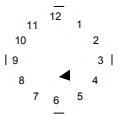
5.3.5.3 The internal test pressure must be in kilopascals (kPa) and rounded down to the nearest 10 kPa.

5.3.6 Year of manufacture

5.3.6.1 The year of manufacture must be represented by the last two digits of the year of manufacture.

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

Note: An acceptable method to display the month of manufacture is a clock diagram.



5.3.7 Name or symbol of the manufacturer – The name or symbol of the manufacturer must be submitted to and registered by the Director.

5.4 Additional markings for drums

5.4.1 Metal drums - In addition to the markings in clause 5.2, a new metal drum having a maximum capacity greater than 100 L must bear the permanent markings specified in clause 5.2 a. to e. 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 markings of the nominal thickness of the top head, body and bottom head must appear on the bottom of the drum, for example: 1.0/0.8/1.0. Nominal thickness of metal must be determined according to the applicable ISO standard, for example ISO 3574 for steel drums. For a metal drum designed to be re-used repeatedly (for example: stainless steel or nickel-copper alloys drums), the markings indicated in clause 5.2 f., g. and h. must be permanent markings.

5.4.2 Plastic drums – In addition to the markings in clause 5.2, a new plastic drum having a maximum capacity greater than 150 L must bear permanent marking indicating the drum body nominal thickness (in mm, rounded to the nearest decimal).

5.5 Additional markings for recycled plastic material - Containers manufactured from recycled plastics (as defined in clause 3) must be marked "REC" near the marks required in clause 5.2.

5.6 Additional markings of country of manufacture - If the container is not manufactured in Canada, the country of manufacture must be marked (for example: "Made in [country of manufacture]") near the markings specified in clause 5.2.

Table 2: Marking sequence and requirements

Content (Clause 5.2)	(a)		(b)			(c)			(d)		(e)		(f)		(g)		(h)
Requirement	5.3.1		Table 1	5.3.2		5.3.3	5.3.4		5.3.5		5.3.6		N/A		5.3.7		10.5
	un		___	___	/	___	___	/	___	/	___	/	CAN	/	___		___

5.7 Examples of markings

5.7.1 NEW containers:

un 4G/Y24.5/S/08 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a new fibreboard box, for PG II or III, to contain inner packaging or solid, 24.5kg maximum gross mass, manufactured in 2008. The design was registered in Canada, by the manufacturer identified as ABC under the registration number 2-9999.
un 1H1/Y1.4/150/07 06 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a new plastic drum, non removable-head, for PG II or III, to contain liquids with SG of 1.4 max., tested at 150 kPa, manufactured in June of 2007
un 1A2/Y150/S/10 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a new steel drum, removable head, for PG II or III, to contain solids, or inner packagings, 150 kg maximum gross mass, manufactured in 2010
un 5H2/Y10.0/S/07 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a new siftproof woven plastic bag for PG II or III to contain solids, 10.0kg maximum gross mass, manufactured in 2007
un 1H2/Y/60/07 CAN/ABC 2-9999 (with additional mark "06" somewhere else on the drum)	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a new plastic drum with removable head for PG II or III to contain liquids with SG of 1.2 max., tested at 60 kPa, manufactured in June of 2007

5.7.2 Special containers ("V" markings):

un 4GV/X10.0/S/01 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a special fiberboard box, to contain inner packagings for solids or liquids dangerous goods PGI, II or III, 10.0 kg maximum gross mass, manufactured in 2001

5.7.3 Equivalent specification ("W" markings):

un 4H1W/Y136/S/98 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a new solid plastic box of equivalent specification, for PG II or III, 136 kg maximum gross mass, for solids or inner packagings, manufactured in 1998

5.7.4 Salvage containers ("T" markings):

	1A2T/Y300/S/10 CAN/ABC 2-9999	as in 6.1.5 a, b, c, d and e as in 6.1.5 f and g	For a steel salvage drum, removable head, PG II or III, 300 kg maximum gross mass, for solids or inner packagings, manufactured in 2010

Note: The markings, for which examples are given in clauses 6.9.1 to 6.9.4 may be applied in a single line or in multiple lines if the correct sequence is respected.

6. CONSTRUCTION

6.1 Steel Drums (1A1 non-removable head, 1A2 removable head

6.1.1 Material - The body and heads must be constructed of steel or steel alloy.

6.1.2 Seams

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

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

6.1.3 Rolling Hoops - The body of a drum with a maximum capacity greater than 60 L must have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If separate rolling hoops are used, they must 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 must be equal to or less than 70 mm.

Note: 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must 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) must 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) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with all removable heads (1A2).

6.2 Aluminium drums (1B1 non-removable head, 1B2 removable head)

6.2.1 Material - Body and heads must be of aluminium or of aluminium alloy.

6.2.2 Seams - All seams must be welded. Chime seams, if any, must be reinforced by the application of separate reinforcing rings.

6.2.3 Rolling Hoops - The body of a drum with a maximum capacity greater than 60 L must have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. If separate rolling hoops are used, they must 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 must be equal to or less than 70 mm.

Note: 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with closures, unless the closure is inherently leakproof. Closure flanges and other devices must be welded in place so that the weld provides a leak proof seam.

6.2.5.2 Closures of non-removable head drums (1B1) must 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) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with all removable heads (1B2).

6.3 Plywood drums (1D)

6.3.1 Material

6.3.1.1 The wood used must 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 must have qualities at least equivalent to those of plywood heads.

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

6.3.2 Design - Body and heads must be designed in relation to the drum's maximum capacity and to the service it is required to perform.

6.3.3 Lining - In order to prevent sifting of the contents, lids must be lined with kraft paper or some other equivalent material which must 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 must be equal to or less than 250 L and the maximum net mass must 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 and 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 must 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 and heads of the drum and its seams must 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 must be as great as in its other parts.

6.4.3 Water Resistance - The assembled drum must 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 must be made from plastic resin that has not been used previously, recycled plastic material or plastic regrind from the same production process. The specific properties of the recycled plastic material must be assured in conformance with clause 9.3.

6.5.1.2 Recycled plastic material must be cleaned and prepared before use.

6.5.1.3 Drums must be adequately resistant to aging and to degradation caused by ultraviolet radiation.

6.5.1.4 If ultraviolet light protection is required, it must 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.

6.5.1.5 The wall thickness at every point of the container must 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) must be equal to or less than 70 mm.

Note: 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with closures, unless the closure is inherently leakproof.

6.5.3.2 Closures for non-removable head drums (1H1) must 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) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with all removable heads.

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

6.6.1 Material - The body and heads must be constructed of a metal or of a metal alloy other than steel or aluminium.

6.6.2 Seams - Chime seams, if any, must be reinforced by the application of separate reinforcing rings. Body seams, if any, must be welded, soldered, brazed or joined by an equivalent joining method.

6.6.3 Rolling Hoops - The body of a drum with a maximum capacity greater than 60 L must have at least two expanded rolling hoops or, alternatively, at least two separate rolling hoops. Separate rolling hoops must 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) must be equal to or less than 70 mm in diameter.

Note: 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with closures, unless the closure is inherently leakproof. Closure flanges must 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) must 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) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must 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 must be constructed of steel or steel alloy.

6.7.2 Seams

6.7.2.1 Chimes must be mechanically seamed or welded.

6.7.2.2 Body seams of steel jerricans intended to contain more than 40 litres of liquid must be welded. Body seams of steel jerricans intended to contain 40 litres or less must 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) must be equal to or less than 70 mm.

Note: 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 must be either of the screw-threaded type or fastened by a screw thread or other device at least as effective. All closures must be designed so they can be effectively secured. Closure flanges and flange spouts of 3A1 jerricans must 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with closures, unless the closure is inherently leakproof.

6.7.4.3 Closure devices for removable head jerricans (3A2) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must 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 must be equal to or less than 60 L and the maximum net mass must be equal to or less than 120 kg.

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

6.8.1 Material - Body and heads must be constructed of aluminium at least 99% pure or of an aluminium alloy.

6.8.2 Seams - All seams must be welded. Chime seams, if any, must 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) must be equal to or less than 70 mm.

Note: 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with closures, unless the closure is inherently leakproof.

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

6.8.4.3 Closure devices for removable head jerricans (3B2) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must 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 aluminium jerricans must be equal to or less than 60 L and the maximum net mass must 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 must be made from plastic resin that has not been used previously, recycled plastic material or plastic regrind from the same production process. The specific properties of the recycled plastic material must be assured in accordance with clause 9.3.

6.9.1.2 Recycled plastic material must be cleaned and prepared before use.

6.9.1.3 Jerricans must be adequately resistant to aging and to degradation caused by ultraviolet radiation.

6.9.1.4 If ultraviolet light protection is required, it must 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.

6.9.1.5 The wall thickness at every point of the container must 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) must be equal to or less than 70 mm.

Note: 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 must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must be used with closures, unless the closure is inherently leakproof.

6.9.3.2 Closures for non-removable head jerricans (3H1) must 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.

6.9.3.3 Closure devices for removable head jerricans (3H2) must be designed to remain secure and leakproof under normal conditions of transport. Gaskets or other equally effective sealing elements must 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 must be equal to or less than 60 L and the maximum net mass must be equal to or less than 120 kg.

6.10 Steel boxes (4A)

6.10.1 Material - Boxes must be constructed of steel or of a steel alloy.

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

6.10.3 Lining - Boxes must be lined with fibreboard, felt or other suitable material, or must have an inner liner or coating of suitable material.

6.10.4 Closures - Closures must be designed to remain secure under normal conditions of transportation.

6.11 Aluminium boxes (4B)

6.11.1 Material - Boxes must be constructed of aluminium or aluminium alloy.

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

6.11.3 Lining - Boxes must be lined with fibreboard, felt or other suitable material, or must have an inner liner or coating of suitable material.

6.11.4 Closures - Closures must be designed to remain secured under normal conditions of transportation.

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

6.12.1 Material

6.12.1.1 Boxes must 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, particleboard or other suitable type.

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

6.12.2 Design - Each part of a 4C2 box must 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 or butt joint with at least two corrugated metal fasteners at each joint.

6.13 Plywood boxes (4D)

6.13.1 Material – Boxes must be constructed of plywood made of 3 plies or more and made from well-seasoned rotary cut, sliced or sawn veneer. The veneer must be commercially dry and free from defects that would lessen the strength of the box. All adjacent plies must be glued with water-resistant adhesive. Other suitable material may be used together with plywood in the construction of boxes.

6.13.2 Design - The plywood boxes must be nailed or fastened to corner posts or ends with other equally suitable devices.

6.14 Reconstituted wood boxes (4F)

6.14.1 Material and design

6.14.1.1 Boxes must be made of be securely fastened water-resistant particleboard or hardboard or other suitable type panels.

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

6.15 Fibreboard boxes (4G)

6.15.1 Material - Boxes must 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 must be firmly glued to the facing.

6.15.2 Design

6.15.2.1 Fibreboard boxes must 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. Hand holes and vent holes are permitted.

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 must provide a good fit for the contents.

6.15.3 Manufacturer's Joint - Manufacturer's joints in the body of boxes must 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 must be used when the box is closed by gluing or taping.

Note: An adhesive used in a fiberboard box manufacturers joint or closure is 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 plastics boxes, 4H2 solid plastics boxes)

6.16.1 Material - Boxes must 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) must 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 must be designed to provide a good fit for the inner packagings.

6.16.2.2 The closure cap for the inner packaging(s) must 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) must be closed with a self-adhesive tape having sufficient tensile strength to prevent the box from opening. The adhesive tape must 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.

6.16.3 Solid Plastic Boxes (4H2)

6.16.3.1 Solid plastic boxes (4H2) must be made from plastic resin that has not been used previously, recycled plastic material or plastic regrind from the same production process. The specific properties of the recycled plastic material must be assured in accordance with clause 9.3.

6.16.3.2 Recycled plastic material must be cleaned and prepared before use.

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

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

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

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

6.17.1 Material

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

6.17.1.2 Bags must be made from stretched tapes or monofilaments of a suitable plastic material.

6.17.2 Plastic fabric bags (5H2) – Code 5H2 plastic fabric bags must 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, one or more separate inner liners of paper or plastic or coated fabric.

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

6.17.4 Net mass limit - The maximum net mass of the bag must be equal to or less than 50 kg.

6.18 Plastic film bags (5H4)

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

6.18.2 Closures - Bags closed by a self-sealing valve must remain siftproof under normal conditions of transport by the application of a positive means of closure or by using multiple flaps.

6.18.3 Net mass limit - The maximum net mass of the bag must be equal to or less than 50 kg.

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

6.19.1 Textile bags (5L2) – Code 5L2 textile bags must 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.

6.19.2 Textile bags (5L3) – Code 5L3 textile bags must be made water-resistant to prevent the entry of moisture by means of separate inner liners of water-resistant paper such as waxed kraft or plastic coated kraft, plastic bonded to the inner surface, or one or more separate inner plastic liners.

6.19.3 Net mass limit - The maximum net mass of the bag must be equal to or less than 50 kg.

6.20 Paper bags (5M1 multiwall, 5M2 multiwall, water resistant)

6.20.1 Material - Paper bags must 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.

6.20.2 Seams - Seams and closures must be sift-proof.

6.20.3 Multiwall, water-resistant bags (5M2)

6.20.3.1 A bag made of four or more plies must 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.

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

6.20.3.3 Where the content may react with moisture or is packed in a damp condition, the innermost ply of water-resistant multiwall paper bags must also be moisture-resistant.

6.20.3.4 The waterproof ply or barrier may be a 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.

6.20.3.5 Seams and closures must be secured so as to be waterproof.

6.20.4 Net mass limit - The maximum net mass of the bag must be equal to or less than 50 kg.

6.21 Composite packagings with plastic inner receptacle (6H)

6.21.1 Inner receptacle

6.21.1.1 Plastic inner receptacles must meet the closure and material requirements in clause 6.5 or 6.9, except for ultraviolet protection in clause 6.5.1.4 or 6.9.1.4.

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

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

6.21.1.4 The maximum capacity of plastic inner receptacles in outer steel crates or boxes (6HA2), aluminium crates or boxes (6HB2), wooden boxes (6HC), plywood boxes (6HD2), fibreboard boxes (6HG2) or solid plastic boxes (6HH2) must be equal to or less than 60 L and their maximum net mass must be equal to or less than 120 kg.

6.21.2 Outer packaging

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

6.21.2.2 Steel crate or box (6HA2) – Clause 6.10 applies to steel boxes or crates used as outer packagings.

6.21.2.3 Aluminium drum (6HB1) – Clause 6.2 applies to aluminium drums used as outer packagings.

6.21.2.4 Aluminium crate or box (6HB2) – Clause 6.11 applies to aluminium crates or boxes used as outer packaging.

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

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

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

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

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

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

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

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

6.22.1 Inner receptacle

6.22.1.1 Glass, porcelain and stoneware inner receptacles must be cylindrical or pear- shaped and be free from any defect that could impair their strength. The walls must be sufficiently thick at every point. The receptacles must be firmly secured in the outer packagings as required by clause 4.3.3 and must not protrude from the outer packaging.

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

6.22.1.3 Closures must be fitted so as to be leakproof and must be secured to prevent any loosening under normal conditions of transport. Vented closures, where used, must conform to the requirements set out in clause 12.8.7.

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

6.22.2 Outer packaging

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

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

6.22.2.3 Aluminium drum (6PB1) – Clause 6.2 applies to aluminium drums used as outer packagings.

6.22.2.4 Aluminium crate or box (6PB2) – Clause 6.11 applies to aluminium crates or boxes used as outer packagings.

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

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

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

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

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

6.22.2.10 Expanded plastic box (6PH1) – Clause 6.16.1 and 6.16.2 applies to expanded plastic boxes used as outer packagings.

6.22.2.11 Solid plastic box (6PH2) – Clause 6.16.1 and 6.16.3 applies to solid plastic boxes used as outer packaging. Solid plastic boxes must be made of high-density polyethylene or comparable plastic resin. Boxes may be closed by a cap.

7. TESTING

7.1 General requirements

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

Table 3: Test requirements for different types of containers

Container Type	Drop	Compression Resistance (Stacking)	Internal Pressure (if intended for liquids)	Leakproofness (if intended for liquids)	Water Resistance (Fibreboard only)
Drums:					
- steel, aluminium or plastic	x[1]	x	x	x	—
- plywood and fibre	x	x	—	—	—
Jerricans, steel or plastic	x[1]	x	x	x	—
Boxes:					
- steel, aluminium, plywood, natural or reconstituted wood, plastic	x[1, 2]	x	—	—	—
- fibreboard	x[1]	x	—	—	x
Bags, all kinds	x	—	—	—	—
Composite Packagings:					
- inner receptacles	—	—	—	—	—
- outer packaging with inner receptacles	x[1]	x	x	x	x
Combination Packagings:	x[1,3]	x[3]	—	—	—
- outer packaging	—	—	—	—	x
- inner packaging	—	—	x[4]	—	—

[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 must be performed at low and ambient temperatures.
[2]For plastic boxes the drop test must be performed at ambient temperature for expanded plastic and at low temperature for solid plastic.
[3]Tested with all components assembled and closed as prepared 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 clauses 7.6 and 12.6.

7.1.2 Variations - Tests must be repeated after each variation of the design, material or manner of construction of a container unless the variations are permitted in chapter 8. Design variations must be documented in the design report required by chapter 11 and made available to the Director upon request.

7.1.3 Recycled plastic - For containers made of recycled plastic, the test schedule set out in clause 7.1.1 must 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 clause 7.3.1 and tested by one of the prescribed methods for a duration of 24 hours or by an appropriate dynamic compression method that is equally effective in the verification of the compression resistance of the container.

Note: 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 Fill and close the containers for testing, including the inner packagings of combination packagings, in the same manner as for transport. All closures must be installed as specified by the closure manufacturer or container manufacturer.

7.2.1.2 Removable head containers for liquids must not be drop, leak or pressure 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 clauses 7.4.3.3 and 7.4.3.4. When containers are conditioned at low temperature, the container must 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.

7.2.3 Containers for solids — Unless otherwise specified, fill containers 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.). It is permissible to use additives such as bags of lead shot to achieve the desired gross mass if they are placed in a manner that is representative of the intended use.

7.2.4 Combination packaging – Fill the inner packagings as required by clause 7.2.2 for liquids and clause 7.2.3 for solids. When testing with another test medium, the mass of the filled test container must not be less than the marked gross mass. It is permissible to use additives such as bags of lead shot to achieve the desired gross mass if they are placed in a manner that is representative of the intended use.

7.3 Conditioning

7.3.1 Ambient Temperature Conditioning — Containers requiring ambient temperature conditioning must be conditioned in accordance with ASTM D 4332 at standard conditioning atmosphere. Paper, fibre or fibreboard containers must be conditioned in accordance with ASTM D 685 or TAPPI T402.

7.3.2 Low Temperature Conditioning – Containers requiring low temperature conditioning must be conditioned at a maximum temperature of –18°C in accordance with ASTM D 4332.

7.3.3 High Temperature Conditioning — Containers requiring high temperature conditioning must be conditioned at a temperature of not less than 40°C in accordance with ASTM D 4332. (ASTM D 4332 Table 2, condition k).

7.4 Drop test - All container types must be subjected to the applicable drop test in accordance to this clause.

7.4.1 Test method

7.4.1.1 Perform the drop test in accordance with ASTM D 5276 using the appropriate drop orientation as specified in clauses 7.4.4 to 7.4.10. Where more than one orientation is possible for a given drop test, the orientation most likely to result in failure of the container must be used.

7.4.1.2 For composite packagings, use the appropriate drop orientation as specified for the outer packaging in clauses 7.4.4 to 7.4.10.

7.4.1.3 For fiberboard boxes (4G), the drop test may be conducted in accordance with TAPPI T802.

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

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

7.4.1.6 The drop test must be performed with the containers in the conditioning atmosphere, specified in clauses 7.4.4 to 7.4.10, or immediately following removal from the conditioning atmosphere.

7.4.2 Procedure

7.4.2.1 Following the drop, except for inner packagings, vent down the containers tested with liquids until they are at equilibrium with the surrounding atmosphere. Venting must 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 must 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 as given in the second row of Table 4 when it is tested with water but where the liquid to be transported has a relative density, d, greater than 1.2. The calculated drop height must be rounded to the first decimal.

Table 4: Drop Heights

Type of Material to be Transported	Drop Height, m		
	PG I performance level "X" marking	PG II performance level "Y" marking	PG III performance level "Z" marking
Solids and certain liquids (clause. 7.4.3.2 & 7.4.3.3)	1.8	1.2	0.8
Liquids with higher densities (clause 7.4.3.4)	d × 1.5	d × 1.0	d × 0.67

Note: d = actual relative density.

7.4.4 Steel Drums, Aluminium Drums, Plywood Drums, Metal Drums (other than aluminium and steel), Steel Jerricans and Aluminium Jerricans.

7.4.4.1 Non-removable head containers — Condition six containers at ambient temperature in accordance with clause 7.3.1. Drop each container once as follows:

container 1, 2 & 3 — diagonally on the top chime with the largest opening of the top head at point of impact.
container 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 clause 7.3.1. Drop each container once as follows:

container 1, 2 & 3 — diagonally on the bottom chime with the intersection of the longitudinal side seam (T-zone) at the point of impact.
container 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 — Condition six fibre drums at ambient temperature in accordance with clause 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 (for example: a closure).

7.4.6 Plastic Drums, Plastic Jerricans, Solid plastic boxes, Plastic Composite Packagings

7.4.6.1 Condition six containers at ambient temperatures in accordance with clause 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 (for example: a closure).

7.4.6.2 Condition six containers at low temperatures in accordance with clause 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 (for example: a closure).

7.4.7 Boxes (except fibreboard boxes and solid plastic boxes) — Condition five boxes at ambient temperature in accordance with clause 7.3.1. 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 bottom corner.

7.4.8 Fibreboard Boxes — Condition five boxes at ambient temperature in accordance with clause 7.3.1. Drop each box 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 manufacturer's joint bottom corner.

7.4.9 Bags (Plastic, Paper or Textile) — Condition three bags at ambient temperature in accordance with Clause 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.

7.4.10 Composite and Combination Packagings — Test containers as specified for the outer packaging. However, combination packagings containing plastic inner packagings, other than bags used as inner packagings intended for solids or articles, and composite packagings with plastic inner receptacle (6H) must be conditioned at

ambient temperature in accordance with clause 7.3.1 and at low temperature in accordance with clause 7.3.2 using the specified number of specimens at each temperature.

7.4.11 Criteria for a successful test

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

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

7.4.11.3 All inner packagings must be retained within the outer packaging. A minor exposure of the inner packaging is acceptable if it is not possible to withdraw the inner packaging.

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

7.4.11.5 For solids, the closure on an inner packaging or inner receptacle must retain its containment function. 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 must 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 must be conducted with the container under constant load in accordance with ASTM D 4577, except for the number of containers, or must be performed with the actual stacked load.

7.5.1.2 If a compression-testing machine is used, it must be capable of applying a constant force to an accuracy of ±1% when determined in accordance with ASTM E 4.

7.5.2 Procedure

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

7.5.2.2 Subject the top of each container to a force or load specified in clause 7.5.3 or 7.5.4 for a time given in clause 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.

Note: Consideration should be given to using a stacking force based on actual shipping experience.

7.5.2.3 The container must not exhibit evidence of leakage, spillage, damage or deformation upon removal of the force or constant load.

7.5.2.4 Plastic containers must be cooled to ambient temperature before the assessment.

7.5.3 Constant Force — Where a constant force is used, the force applied must 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 shipped) in kilograms;
h	=	height of the container in millimetres; and
F	=	force in newtons.

7.5.4 Constant Load — Where a constant load is used, the mass of the constant load must 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 shipped) in kilograms;
h = height of the container in millimetres; and
M = mass of constant load in kilograms.

7.5.5 Duration of Test — Apply the force or constant load for a period of 24 h 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 ± 2°C.

7.5.6 Criteria for a successful test — The containers must not show deformation likely to reduce their strength or integrity significantly or to cause instability. The filling substance must not leak from the container, the inner receptacles or the inner packagings.

Note: The capacity for stability may be verified by stacking two similar filled packaging on top of the tested container for one hour.

7.6 Internal Pressure Test - Containers intended for liquids must be subjected to the internal pressure test, except for inner packagings of a combination packaging not intended for air transport.

7.6.1 Pressure gauge - The pressure gauge used in the internal pressure test must have an accuracy equivalent to ±0.25% for a scale range of 100 kPa and the graduations must be equal to or less than 5 kPa. For a scale range higher than 100 kPa, the graduation must be equal to or less than 5% of the scale range.

7.6.2 Support - The container must 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 must be applied continuously and it must be kept constant throughout the test period as specified in clause 7.6.6.

7.6.3.2 The test pressure will determine the acceptability of a container for a given liquid based on its vapour pressure in accordance with clause 12.8.5.

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

7.6.4 Test Preparation — Three container samples must be conditioned at ambient temperature and be prepared for the internal pressure test as follows:

a. Install an appropriate 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, except that containers fabricated in part of fibreboard must be conditioned in accordance with ASTM D 685 or TAPPI T402;

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 package.

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 clause 7.6.3 and maintain for 5 or 30 minutes as specified in clause 7.6.6.

Note: 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.

Note: If the vacuum method is used, the tests should be performed in accordance with ASTM D 3078 or D 4991.

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

7.7 Leakproofness test - Prototype containers and all containers in production that are intended for liquids, other than inner packagings of combination packagings, must be subjected to a leakproofness test in accordance to this clause.

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 must have an accuracy equivalent to ±0.25% for a scale range of 100 kPa and the graduations must 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 must not affect the results of the test.

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 for conducting the leakproofness test

Air Pressure		
PG I performance level "X" marking	PG II performance level "Y" marking	PG III performance level "Z" marking
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 must not leak.

7.8 Water Absorptiveness Test (Cobb Test)- Fibreboard containers must be subjected to the water absorptiveness test in accordance to this clause.

7.8.1 Test method — The water absorptiveness must be determined in accordance with ISO 535 or TAPPI T441 by exposing the outer facings of the fibreboard to distilled or de-ionized water for 30 min. To achieve a good ring seal, the flutes of the test specimens may be crushed with a heavy roller or other suitable means.

7.8.2 Criteria for a successful test — The fibreboard must not absorb more than 155 g/m^2 of water.

8. PERMITTED DESIGN VARIATIONS

8.1 Design variation requiring no testing - The variations to a tested container design listed in clauses 8.1.1 and 8.1.2 are permitted without further 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 clause 12.1.2 e.

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 gross mass must 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 - The number of rolling hoops may be increased on a drum if the rolling hoops equal or exceed the diameter of the chime.

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.

Note: 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 D 1415 or ASTM D 2240.

Note: 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.

8.1.2 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. the inner packagings are assembled in the outer packaging in such a way that it does not affect the stacking balance; and

c. the 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. the inner packagings are of similar design (for example: shape — round, rectangular, etc.) to the tested inner packagings;

b. the 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. the 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. the total number of inner packagings does not exceed that originally tested; and

f. the 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 8.1.2.3, 8.1.2.4 and 8.1.2.5 may be combined.

8.1.2.7 Material substitution of code 4G fibreboard box – For code 4G fiberboard boxes, the outer packaging material may be substituted by an equivalent material having a different grammage if:

a. for each corresponding layer, the difference between the grammage of the new material and the grammage of the successfully tested material is within +/- 5%; and

b. the construction of the fibreboard remains the same (layer combination, ECT value, flute and orientation of corrugations).

Note: ECT value (Edge Crush test) in accordance with TAPPI T-811 or TAPPI T-839.

8.1.2.8 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 D 1415 or ASTM D 2240.

Note: 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.

8.1.2.9 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 clauses 8.2.1 and 8.2.2 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 must successfully pass the stacking test in accordance with clause 7.5. For containers intended for liquids, the modified container must successfully pass the internal pressure test.

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 stacking test in conformance with clause 7.5.

9. QUALITY MANAGEMENT SYSTEM

9.1 General - Containers must 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.

9.2 Quality standard - The quality management system for code 1A, 1B, 1H, 1N, 3A, 3H, 6HA, 6HB and 6HH containers must 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 Recycled plastic material

9.3.1 The specific properties of recycled plastic material used for production of new containers must be verified and documented regularly as part of a quality management system recognized by the competent authority.

9.3.2 The quality management system must include:

a. a record of pre-sorting and verification that each batch of recycled material has the melt flow rate, density, and tensile yield strength, consistent with that of the design manufactured from such recycled material;

b. a requirement for the nature of the recycled plastic material to be known as well as the prior contents of the containers from which the recycled plastic material was derived; and

c. measures ensuring the quality of containers produced from the recycled plastic material.

10. REGISTRATION

10.1 Registration by Director – A person must not manufacture a container under this standard unless the manufacturing facility and the container design have been registered with the Director.

10.2 Certificate of Registration – A manufacturing facility is registered upon issuance, by the Director, of a Certificate of Registration. The Certificate of Registration remains valid until its indicated expiry date or its revocation for cause.

10.3 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.

10.4 Application for registration

10.4.1 Manufacturing Facility - An application for registration of a manufacturing facility must be submitted to the Director and, at a minimum, must include the following information:

a. the container manufacturer's name and address;

b. the manufacturing facility locations where the container will be produced;

c. a description of the quality management system required in chapter 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

d. if the quality management system must be registered with a quality management system registrar as required by clause 9.2, a copy of the quality management system Certificate of Registration.

10.4.2 Container design – An application to manufacture a new container design must be submitted to the Director and, at a minimum, must include the following information:

a. the container manufacturer's name and address;

b. the manufacturing facility locations where the container will be produced;

c. when different from the container manufacturer, the name and address of the company that has performed the performance testing;

d. the container information as required in clause 4.4;

e. proposed markings as required in chapter 5;

f. the design report in accordance with chapter 11; and

g. a statement declaring that all requirements of this standard have been met, including the date and signature of the officer responsible for compliance to this standard on behalf of the container manufacturer. If the manufacturer did not perform the testing, the statement must also be signed and dated by the responsible officer of the company that has performed the testing.

10.4.3 Record retention

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

10.4.3.2 The manufacturer must keep a copy of every application to manufacture a new container design for as long as UN standardized container is manufactured and at least two years thereafter.

10.5 Registration and compliance – A Certificate of Registration and Design Registration Number shall be issued by the Director, for a manufacturing facility if the Director is satisfied that:

a. the containers manufactured and marked are representative of the registered design;

b. the container manufacturer conforms to the applicable requirements of this standard; and

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

10.6 Revocation for cause

10.6.1 Certificate of Registration - The Director may revoke a Certificate of Registration if the Director is satisfied that:

a. the container as manufactured are not representative of the registered designs or do not comply to the applicable requirements of this standard;

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

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

10.6.2 Design Registration Number - The Director may revoke a Design Registration Number if the Director is satisfied that:

a. the container as manufactured is not representative of the registered design as described in the Design Report; or

b. the container does not comply with the requirements of this standard.

10.7 Renewal of Certificate of Registration - Manufacture of containers must not continue past the expiry date of the Certificate of Registration.

10.8 Application for Renewal – An application for 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 must also include a list of all currently registered container designs identified either as actively being manufactured or to be discontinued.

10.9 Equivalent specification ("W" marking) - The Director may issue a 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.

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

11. DESIGN REPORT

11.1 Date and design report number - The design report must be dated and numbered.

11.2 Application for registration - The design report must include a copy of the submitted application for registration.

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

a. dimensions of the container, including inner packagings;

Note: Material thickness may be represented as shot weight for plastics and grammage for paper or fiberboard.

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. fabrication methods 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 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. a list of variations in the container design permitted under chapter 8 that were not included in the representative prototype design that was successfully tested. Supplemental information must 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.

11.4 Tests and results - The following performance test information must be included in the design report:

11.4.1 Tests Required - Refer, in the report, to the applicable clauses of this standard.

11.4.2 Test Methods and Equipment - 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, 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.

Note: 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 must be made available to the Director upon request.

11.4.3 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 "Tests Required." Photographs of each sample container after testing are desirable.

PART 2 SELECTION AND USE OF CONTAINERS

12. GENERAL REQUIREMENTS

12.1 Selection and use

12.1.1 Except as permitted in chapters 13, 14 and 15, a person must not handle, offer for transport or transport dangerous goods in a container unless:

a. the requirements for selection and use set out in this part and Appendix A specify that the container is permitted to contain the dangerous goods;

b. the container is prescribed in the Packing Instructions listed in Column 6 of the Table in Part A of Appendix A for the appropriate dangerous goods described in Column 1 to 5 of the Table in Part A of Appendix A;

c. the 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 means of containment of that packaging code and it is marked accordingly;

e. for cylinders and spheres, they are selected and used in conformance with chapter 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 clause 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 clause 5.2 c; and

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 clause 5.2 c.

12.1.2 A person must not handle, offer for transport or transport dangerous goods in a container unless:

a. the applicable substance specific provisions set out in the Table of part C in Appendix A are met;

b. the applicable general containment requirements set out in clause 12.8 are met;

c. the container is designed, manufactured, loaded, unloaded, secured, closed and maintained so that during transport, including handling, no condition or release of dangerous goods occurs from the container that could endanger public safety or may reasonably be expected to occur;

d. 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 clause 12.8.5; and

e. 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 must retain their protective properties under normal conditions of transport.

Note: suitable internal protective coatings or treatments may be applied on parts of the container, including closures and liners that are not themselves compatible with the dangerous goods.

12.2 Before filling a container - Before a container is filled with dangerous goods, the person responsible for filling the container must:

a. show through testing in accordance with the requirements of clause 12.9, or by having sufficient user experience with the container and dangerous goods that the single packaging, the inner packaging or the inner receptacle is compatible with the dangerous goods;

b. inspect the container to ensure that it is free from corrosion, contamination or other damage. Any container that shows signs of reduced strength compared with the registered design shall not be used; and

c. verify that the 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.

12.3 Filling and closing

12.3.1 A person filling a container with liquid dangerous goods must leave sufficient ullage (outage) 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. Liquids must not completely fill a container at a temperature of 55°C.

12.3.2 A person assembling or closing a container must:

a. assemble and close the container as instructed in the information provided by the container manufacturer or distributor in accordance with clause 4.4; and

b. verify that no quantity of dangerous goods has adhered to the outside of the outer packaging, the inner packaging or the inner receptacle.

12.4 Before offering for transport – A person who offers for transport a container containing dangerous goods must:

a. make a determination that the container is in proper condition by inspecting the outside of the container to ensure that no dangerous goods has adhered to it and the outside of the container is free from corrosion, dents, gouges or other damage that may render the container unsafe for transport; and

b. ensure that action is taken to remedy any release or condition that could endanger public safety, including action relating to a condition or release that requires repair or replacement of the container or removal of the dangerous goods.

12.5 Before transporting – Before transporting a container containing dangerous goods, the person who will be transporting the container must:

a. make a determination that the container or the overpack by inspecting the outside of the container or overpack to ensure that no dangerous goods has adhered to it and it is free from corrosion, dents, gouges or other damage that may render the container or the containers within the overpack unsafe for transport; and

b. ensure that action is taken to remedy any release or condition that could endanger public safety, including action relating to a condition or release that requires repair or replacement of the container or removal of the dangerous goods.

12.6 Air transport - A person must not handle, offer for transport or transport by aircraft dangerous goods in a container unless it is done in accordance with the applicable requirements set out in Part 12 of the TDG Regulations.

12.7 Special containers ("V" marking) – A person may assemble a combination packaging, marked in accordance with clauses 5.2 b and 5.3.2.1 with the letter "V", from articles or inner packagings of any type, for solids or liquids, if:

a. the cushioning thickness between the inner packagings 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 must 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 contents of the inner packagings; and

c. for an outer packaging that is not siftproof or leakproof, a leakproof liner, plastic bag, or other equally effective means is inserted in the outer packaging to contain any release of solids or liquids, as applicable, from the inner packaging.

12.8 General containment requirements

12.8.1 Dangerous goods that are wetted or diluted substances - Containers used for wetted or diluted substances must 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 must be siftproof or must be provided with a siftproof liner.

12.8.3 Dangerous goods that are solids, which may become liquid – A container intended for liquids must be used for solids that may become liquid at temperatures likely to be encountered during transport.

12.8.4 Dangerous goods that are solids - 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 to clause 5.2 c or by 1.2 if there is no marked relative density.

12.8.5 Dangerous goods that are liquids

12.8.5.1 A container, other than inner packagings, must 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 (for example 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 (for example see Column 3 of Table 6).

12.8.5.2 A container intended for liquids marked with the letters "X" in accordance with clause 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 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 density of 2.25 times the marked relative density on the container or 2.7 if there is no marked relative density; and

c. the container has successfully passed the compression resistance test in accordance with clause 7.5 at the higher density.

12.8.5.3 A container intended for liquids marked with the letters "Y" in accordance with clause 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. the 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. the container has successfully passed the compression resistance test in accordance with clause 7.5 at the higher density.

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

Marked 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 Dangerous goods that are viscous liquids – A drum, jerrican or composite packaging intended for solids may be used for viscous liquids.

12.8.7 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 must 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. If a closure is replaced by a vented closure that is not part of the registered design then, unless 8.1.1.8 is applicable, it must be tested in accordance with clause 8.2.1.1 prior to use and filed as a variation to the design type.

12.8.8 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 must be handled and transported at or below the control temperature specified in Column 4 in Table B of Appendix B for self reactive substances and Column 8 in Table C of Appendix B for organic peroxides. Additional requirements for containers containing self-reactive substances and organic peroxides are given in chapters 16 and 17 respectively.

12.8.9 Combining dangerous goods - Dangerous goods must not be offered for transport together with other dangerous goods or non-dangerous goods in the same container or overpack 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 package or overpack; or

b. cause a discharge, emission or escape of the dangerous goods from the container or overpack that could constitute a danger to public safety.

12.8.10 Container made of recycled plastic material – Dangerous goods assigned to packing group I must not be handled, offered for transport or transported in a container made of recycled plastic material.

12.9 Compatibility Test - Compatibility of the container with the dangerous goods must 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 chapter 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 must 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 packages must 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 must be taken to address potential dangerous goods release during the testing.

12.9.2.2 After the storage period, the containers must meet the compression resistance requirements set out in clause 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 package 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 clause 7.2 and perform the drop tests, stacking test, and where applicable, the internal pressure and leakproofness tests in accordance with clauses 7.4, 7.5, 7.6 and 7.7.

12.9.3 Criteria for a successful test — The tested containers must 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 chapter 7.

13. SALVAGE CONTAINERS

13.1 Application – Damaged, defective, leaking or non-conforming containers, including inner receptacles and inner packagings, or dangerous goods that have spilled or leaked may be transported in a salvage container marked with the letter "T" in accordance with the requirements of clause 5.2 b.

13.2 Before filling a salvage container - Before a salvage container is filled with dangerous goods, the user must inspect the salvage container to ensure that it is free from corrosion, contamination or other damage. Any salvage container that shows signs of reduced strength as compared with the registered design must no longer be used or must be repaired or reconditioned. If the salvage container is a steel or plastic drum, it must be repaired or reconditioned in accordance with CGSB 43.126.

13.3 Container capacity – The maximum capacity of a salvage container may exceed by 20% the prescribed maximum capacity given in clause 4.3.4 and chapter 6 if the appropriate measures are taken to prevent excessive movement of the damaged or leaking containers within a salvage container.

13.4 Liquids - When the salvage container contains liquids, sufficient inert absorbent material must be added to eliminate the presence of free liquid. All cushioning and absorbent material used in the salvage container must be compatible with the dangerous goods contained in the damaged or leaking container.

13.5 Combining dangerous goods - Combinations of different dangerous goods within the Salvage container must be in accordance with clause 12.8.9.

14. SPECIAL CASES

14.1 Transport for disposal of dangerous goods from a collection facility – Dangerous goods intended for disposal that are collected by a collection facility serving the general public may be handled, offered for transport and transported from the collection facility if:

a. the dangerous goods are in the original container, as purchased by the retail consumer;

b. the container has a maximum capacity equal to or less than 30L;

c. the original container does not leak, or, if the original container leaks it is placed into a leakproof intermediate packaging or made leakproof by another equally effective means;

d. the container and, if applicable, the intermediate packaging, are placed into a rigid leakproof outer packaging;

e. the dangerous goods in each outer packaging all have the same primary class classification;

f. the outer packaging is legibly marked “Dangerous Goods Collection Container”, “DG Collection Container”, “Contenant de Collecte pour Marchandises Dangereuses” or “Contenant de Collecte pour MD”; and

g. the dangerous goods are transported directly from the collection facility to the closest appropriate facility for disposal or recycling.

14.2 Transport of dangerous goods in alternative combination packaging – Dangerous goods may be handled, offered for transport and transported if:

Note: The alternative combination packaging is intended for transport for disposal of residential, commercial or industrial dangerous goods that are in small containers that may not be in standard or dangerous goods that may not be in their original container. This packaging is also intended for moving laboratory chemicals that are dangerous goods contained in various types of small containers from one location to another, or for disposal.

a. the dangerous goods are in inner packagings having a maximum capacity of 30L or less;

b. if the inner packaging are damaged or leaking, the inner packaging is placed into a leakproof intermediate packaging or made leakproof by another equally effective means;

c. the inner packagings are tightly packed in the outer packaging with enough cushioning material to prevent damage or breakage of the inner packagings in normal conditions of transport;

d. the outer packaging contains enough absorbing material to absorb all the liquid contained in the inner packagings;

e. the outer packaging is a UN Standardized steel or plastic removable head drum;

f. the dangerous goods in each outer packaging all have the same primary class classification;

g. the gross mass of the container is equal to or smaller than one half the maximum gross mass permitted in accordance with the marking and maximum capacity of the outer container; and

h the outer packaging is legibly and durably marked “Lab Pack” or “Emballage de Labo"

14.3 UN 1999 TARS, LIQUID, including road oils, and cutback bitumens – Dangerous goods that are UN1999 TARS, LIQUID, including road oils, and cutback bitumens may be transported in a 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 accidental release of the dangerous goods that could endanger public safety; and

c. has a maximum capacity equal or less than 450 L.

15. USE OF CYLINDERS AND SPHERES FOR LIQUIDS AND SOLIDS

15.1 Selection

15.1.1 A cylinder or sphere must not be used to handle, offer for transport or transport solids or liquid dangerous goods unless the packing instruction in Part B of Appendix A allows a cylinder or sphere for those dangerous goods.

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

a. is permitted for use in accordance with CSA B340 or CSA B342 for the handling, offering for transport or transporting any dangerous goods included in Class 2;

b. has a service pressure of equal to or greater than 16 Bar unless otherwise specified in the packing instruction; and

c. if due for requalification, is requalified in accordance with CSA B339 or CSA B341. Cylinder and sphere requalification must be performed only by a facility registered by Transport Canada under CSA B339 or CSA B341.

15.1.3 A cylinder or sphere must 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, a 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 – Before filling a cylinder or sphere with solids or liquids, the user must:

a. verify the markings for the date of manufacture and the date of previous requalification to ensure that the cylinder or sphere is not due for requalification or beyond its service life; and

b. perform an inspection of the pressure receptacle as required in CSA B340 or CSA B342.

15.3 After filling - After filling, shut-off valves must be closed. The consignor must verify that the cylinders and spheres as prepared for transport are not leaking. Shut-off valves must remain closed during transport. A cylinder or sphere filled with dangerous goods before its due requalification date may continue in transport and be used beyond this date. An empty cylinder or sphere containing residue of dangerous goods may also be transported past its due requalification date.

15.4 Filling limit - The level of filling must be equal to or less than 95% of the capacity of the cylinder at 50^{O}C and be such that the cylinder does not become liquid full at a temperature of 55^{O}C.

15.5 Refillable pressure receptacles - A person must not fill a cylinder or sphere 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 chapter 12, the self-reactive dangerous goods in class 4.1 listed in Table B of Appendix B must be packed in accordance with the corresponding OP packing method. A packing method corresponding to a smaller package size (i.e. with a lower OP number) may be used. A packing method corresponding to a larger package size (i.e. with a higher OP number) must not be used.

Note: The packing methods are found in packing instruction 520 in Part B of Appendix A.

16.2 Compatibility - Containers must 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 must not be readily combustible and must not cause decomposition of the dangerous goods that are self-reactive if leakage occurs.

16.3 General requirements

16.3.1 Metal containers marked with the packing group I performance level, “X” markings, must not be used.

16.3.2 For self-reactive dangerous goods meeting the requirements for subsidiary class 1 (explosives):

a. nails, staples and other closure devices made of metal having no protective cover must 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 must be such as to prevent movement within the container during transport.

16.3.3 Viscous liquids may be placed in a drum, jerrican or composite packaging intended for solids.

16.3.4 Self-reactive dangerous goods of class 4.1, must 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 not listed in Table B of Appendix B or new formulations of currently assigned self-reactive dangerous goods, the procedure in 2.4.2.3.3 and 2.4.2.3.4 of the UN model regulations must be used to assign the appropriate packing method.

Note: Guidelines for the transportation of temperature-controlled organic peroxides and self-reactive substances are provided in Appendix C.

17. ADDITIONAL REQUIREMENTS FOR CLASS 5.2, ORGANIC PEROXIDES

17.1 Packing method - In addition to the applicable requirements of chapter 12, the organic peroxides in Class 5.2 listed in Table C of Appendix B must be packed in accordance with the corresponding OP packing method. A packing method corresponding to a smaller package size (i.e. with a lower OP number) may be used. A packing method corresponding to a larger package size (i.e. with a higher OP number) must not be used.

Note: The packing methods are found in packing instruction 520 in Part B of Appendix A.

17.2 Compatibility - Containers must 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 must not be readily combustible and must not cause decomposition of the dangerous goods if leakage occurs.

17.3 General requirements

17.3.1 Metal containers marked with the packing group I, “X” markings, must not be used.

17.3.2 For organic peroxides meeting the requirements for class 1 (explosives):

a. nails, staples and other closure devices made of metal having no protective cover must 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 must be such as to prevent movement within the container during transport.

17.3.3 Organic peroxides in Class 5.2, must 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 Table C of Appendix B or new formulations of currently assigned organic peroxides, the procedure in 2.5.3.3 and 2.5.3.4 of the UN Recommendations must be used to assign the appropriate packing method.

Note: Guidelines for the transportation of temperature-controlled organic peroxides and self-reactive substances are provided in Appendix C.

APPENDIX A

APPENDIX A PACKING INSTRUCTIONS AND SUBSTANCE SPECIFIC PROVISIONS

PART A: Packing instructions for dangerous goods

Column 1 – UN number – This column gives the UN number assigned to the dangerous goods.
Column 2 – Shipping Name and Description – This column gives the shipping names and description of dangerous goods.
Column 3 – Class – This column gives the primary classification as determined in accordance with the TDG Regulations.
Column 4 – Sub-Class – This column gives the subsidiary classification as determined in accordance with the TDG Regulations.
Column 5 – Packing Group – This column gives the packing group classification as determined in accordance with the TDG Regulations.
Column 6 – Packing Instructions – This column prescribes the packing instructions that apply to the dangerous goods

Note: Prior to using this table dangerous goods must be classified in accordance with the TDG Regulations.

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	**Dangerous Goods**	**Class**	**Subsidiary Class**	**Packing Group**	**Packing Instructions**
Class 3 - Flammable liquids					
Any	All Dangerous Goods of Class 3 and Packing Group I except those listed below :	3	Any or None	I	1
1250	METHYLTRICHLORO-SILANE	3	8	I	10
1305	VINYLTRICHLORO-SILANE	3	8	I	10
2983	ETHYLENE OXIDE AND PROPYLENE OXIDE MIXTURE, not more than 30% ethylene oxide	3	6.1	I	200
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	99
Any	All Dangerous Goods of Class 3 and Packing Group II and III except those listed below :	3	Any or None	II or III	2
1162	DIMETHYLDICHLORO-SILANE	3	8	II	10
1196	ETHYLTRICHLORO-SILANE	3	8	II	10
1298	TRIMETHYL-CHLOROSILANE	3	8	II	10
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	99
3269	POLYESTER RESIN KIT	3		II	302

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3357	NITROGLYCERIN MIXTURE, DESENSITIZED, LIQUID, N.O.S. with not more than 30% nitroglycerin, by mass	3		II	99
	All Dangerous Goods of Class 3 with no assigned Packing Group:	3	-	None assigned	
3473	FUEL CELL CARTRIDGES containing flammable liquids	3	-	-	6
	Class 4.1 - Flammable solids				
Any	All 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	99
Any	All Dangerous Goods of Class 4.1 and Packing Group II & III, except those listed below :	4.1	Any or None	II & III	4
1326	HAFNIUM POWDER, WETTED with not less than 25% water (a visible excess of water must 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 must 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 must 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
2555	NITROCELLULOSE WITH WATER (not less than 25% water, by mass)	4.1		II	406

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
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	99
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	II	99
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1		II	410
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	99
3344	PENTAERYTHRITE TETRANITRATE MIXTURE, DESENSITIZED, SOLID, N.O.S. with more than 10% but not more than 20% PETN, by mass	4.1		II	406
	All Dangerous Goods of Class 4.1 with no assigned Packing Group:	4.1	-	None assigned	
1327	HAY, STRAW or BHUSA	4.1			5
3221 to 3240	All SELF-REACTIVE SOLID or SELF-REACTIVE LIQUID, all types, Temperature controlled or not.	4.1			520
3360	FIBRES, VEGETABLE, DRY	4.1			5
Class 4.2 - Substances liable to spontaneous combustion					
Any	All 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
2870	ALUMINIUM BOROHYDRIDE IN DEVICES	4.2	4.3	I	3
3255	tert-BUTYL HYPOCHLORITE	4.2	8	I	99
Any	All 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 No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
1361	CARBON, animal or vegetable origin	4.2		II	4
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	II	99
3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2		II	2
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2		II	2
3313	ORGANIC PIGMENTS, SELF-HEATING	4.2		II	4
3341	THIOUREA DIOXIDE	4.2		II	4
3342	XANTHATES	4.2		II	4
Any	All Dangerous Goods of Class 4.2 and Packing Group III, except those listed below :	4.2	Any or None	III	4 for solids 2 for liquids
1363	COPRA	4.2		III	5
1364	COTTON WASTE, OILY	4.2		III	5
1365	COTTON, WET	4.2		III	5
1372	FIBRES, ANIMAL or FIBRES, VEGETABLE burnt, wet or damp	4.2		III	410
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	5
1387	WOOL WASTE, WET	4.2		III	410
1857	TEXTILE WASTE, WET	4.2		III	410
2793	FERROUS METAL BORINGS, SHAVINGS, TURNINGS or CUTTINGS in a form liable to self-heating	4.2		III	5
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	III	99
	Dangerous Goods of Class 4.2 with no assigned Packing Group:	4.2	-	None assigned	
1856	RAGS, OILY	4.2			5
Class 4.3 - Water-reactive Substances					
Any	All Dangerous Goods of Class 4.3 and Packing Group I, except those listed below :	4.3	Any or None	I	403 for solids 402 for liquids
Any	All 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	All 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	99

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3292	BATTERIES, CONTAINING SODIUM, or CELLS, CONTAINING SODIUM	4.3		II	500
3398	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE	4.3		II	2
3399	ORGANOMETALLIC SUBSTANCE, LIQUID, WATER-REACTIVE, FLAMMABLE	4.3	3	II	2
Any	All Dangerous Goods of Class 4.3 and Packing Group III, except those listed below :	4.3	Any or None	III	410 for solids 2 for liquids
1408	FERROSILICON with 30% or more but less than 90% silicon	4.3	6.1	III	5
1435	ZINC ASHES	4.3		III	4
2968	MANEB, STABILIZED or MANEB PREPARATION, STABILIZED against self-heating	4.3		III	4
3133	WATER-REACTIVE SOLID, OXIDIZING, N.O.S.	4.3	5.1	III	99
3170	ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS	4.3		III	4
	All Dangerous Goods of Class 4.3 with no assigned Packing Group:	4.3	-	None assigned	
3476	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing water-reactive substances	4.3			6
Class 5.1 - Oxidizing Substances					
Any	All Dangerous Goods of Class 5.1 and packing group I, except those listed below :	5.1	Any or None	I	503 for solids 502 for liquids
Any	All Dangerous Goods of Class 5.1, Subsidiary Class 6.1, Subsidiary Class 8 and packing group I	5.1	6.1 and 8	I	200
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	99
3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	4.3	I	99
3137	OXIDIZING SOLID, FLAMMABLE, N.O.S.	5.1	4.1	I	99
Any	All Dangerous Goods of Class 5.1 and packing group II and III, except those listed below :	5.1	Any or None	II and III	4 for solids 504 for liquids
3100	OXIDIZING SOLID, SELF-HEATING, N.O.S.	5.1	4.2	II	99
3121	OXIDIZING SOLID, WATER-REACTIVE, N.O.S.	5.1	4.3	II	99
3356	OXYGEN GENERATOR, CHEMICAL†	5.1		II	500

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
3375	AMMONIUM NITRATE EMULSION or SUSPENSION or GEL, intermediate for blasting explosives	5.1		II	99
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
	Class 5.2 - Organic Peroxides				
Any	All Dangerous Goods of Class 5.2	5.2	Any or none	Any	520
	Class 6.1 - Toxic substances				
Any	All Dangerous Goods of Class 6.1 and packing group I except those listed below:	6.1	Any or none	I	3 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, 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
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	99
1647	METHYL BROMIDE AND ETHYLENE DIBROMIDE MIXTURE, LIQUID	6.1		I	602
1649	MOTOR FUEL ANTI-KNOCK MIXTURE	6.1		I	602

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
1670	PERCHLOROMETHYL MERCAPTAN	6.1		I	602
1672	PHENYLCARBYLAMINE CHLORIDE	6.1		I	602
1695	CHLOROACETONE, STABILIZED	6.1	3	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
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	99
2334	ALLYLAMINE	6.1	3	I	602
2337	PHENYL MERCAPTAN	6.1	3	I	602
2382	DIMETHYLHYDRAZINE, SYMMETRICAL	6.1	3	I	602
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	99
3125	TOXIC SOLID, WATER-REACTIVE, N.O.S.	6.1	4.3	I	99
3246	METHANESULPHONYL CHLORIDE	6.1	8	I	602

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	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	99
3381	TOXIC BY INHALATION LIQUID, N.O.S. with an inhalation toxicity lower than or equal to 200 ml/m3 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/m3 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/m3 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/m3 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/m3 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/m3 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/m3 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/m3 and saturated vapour concentration greater than or equal to 10 LC50	6.1	5.1	I	602
3389	TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. with an inhalation toxicity lower than or equal to 200 ml/m3 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/m3 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/m³ 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/m³ 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/m³ and saturated vapour concentration	6.1	4.3, 3	I	601

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	Dangerous Goods	Class	Subsidiary Class	Packing Group	Packing Instructions
	greater than or equal to 500 LC50				
3491	TOXIC BY INHALATION LIQUID, WATER-REACTIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	4.3, 3	I	602
3492	TOXIC BY INHALATION LIQUID, CORROSIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 200 ml/m³ and saturated vapour concentration greater than or equal to 500 LC50	6.1	8, 3	I	601
3493	TOXIC BY INHALATION LIQUID, CORROSIVE, FLAMMABLE, N.O.S. with an inhalation toxicity lower than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC50	6.1	8, 3	I	602
Any	All Dangerous Goods of Class 6.1 and packing group II & III except those listed below:	6.1	Any or none	II and III	4 for solids 2 for liquids
1569	BROMOACETONE	6.1	3	II	602
1700	TEAR GAS CANDLES	6.1	4.1	II	600
2016	AMMUNITION, TOXIC, NON-EXPLOSIVE without burster or expelling charge, non-fuzed	6.1		II	600
2017	AMMUNITION, TEAR-PRODUCING, NON-EXPLOSIVE without burster or expelling charge, non-fuzed	6.1	8	II	600
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
	Class 8 - Corrosive substances				
Any	All Dangerous Goods of Class 8 and packing group I, except those listed below:	8	Any or none	I	3 for solids 1 for liquids
1052	HYDROGEN FLUORIDE, ANHYDROUS	8	6.1	I	200
1744	BROMINE or BROMINE SOLUTION	8	6.1	I	601
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
1834	SULPHURYL CHLORIDE	8		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	All Dangerous Goods of Class 8 and packing group II & III, except those listed below:	8	Any or none	II and III	4 for solids 2 for liquids

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	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	CHLOROPHENILTRICHLOROSILANE	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
1784	HEXYLTRICHLOROSILANE	8		II	10
1799	NONYLTRICHLOROSILANE	8		II	10
1800	OCTADECYLTRICHLOROSILANE	8		II	10
1801	OCTYLTRICHLOROSILANE	8		II	10
1804	PHENYTRICHLOROSILANE	8		II	10
1816	PROPYLTRICHLOROSILANE	8	3	II	10
1818	SILICONE TETRACHLORIDE	8		II	10
2028	BOMBS, SMOKE, NON-EXPLOSIVE with corrosive liquid, without initiating device	8		II	803
2434	DIBENZYLDICHLOROSILANE	8		II	10
2435	ETHYLPHENYLDICHLOROSILANE	8		II	10
2437	METHYLPHENYLDICHLOROSILANE	8		II	10
2803	GALLIUM	8		III	800
2809	MERCURY	8		III	800
2986	CHLOROSILANE, CORROSIVE, FLAMMABLE, N.O.S.	8	3	II	10
2987	CHLOROSILANE, CORROSIVE, N.O.S.	8		II	10
3028	BATTERIES, DRY, CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage	8		III	801
	All Dangerous Goods of Class 8 with no assigned Packing Group:	8	-	None assigned	
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			5
3477	FUEL CELL CARTRIDGES or FUEL CELL CARTRIDGES CONTAINED IN EQUIPMENT or FUEL CELL CARTRIDGES PACKED WITH EQUIPMENT, containing corrosive substances	8			6

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
UN No.	**Dangerous Goods**	**Class**	**Subsidiary Class**	**Packing Group**	**Packing Instructions**
Class 9 - Miscellaneous Products, Substances or Organisms					
Any	All Dangerous Goods of Class 9 and packing group II, except those listed below :	9	Any or none	II	906
2212	BLUE ASBESTOS (crocidolite) or BROWN ASBESTOS (amosite, mysorite)	9		II	4
2969	CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE	9		II	4
3090	LITHIUM BATTERIES	9		II	903
3091	LITHIUM BATTERIES CONTAINED IN EQUIPMENT or LITHIUM BATTERIES PACKED WITH EQUIPMENT	9		II	903
3480	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	9		II	903
3481	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)	9		II	903
Any	All Dangerous Goods of Class 9 and packing group III, except those listed below:	9	Any or none	III	4 for solids 2 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	99
3258	ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240 °C	9		III	99
3268	AIR BAG INFLATORS, or AIR BAG MODULES, or SEAT-BELT PRETENSIONERS†	9		III	902
	All Dangerous Goods of Class 9 with no assigned Packing Group:	9	-	None assigned	
1845	CARBON DIOXIDE, SOLID (DRY ICE)	9			5
2990	LIFE-SAVING APPLIANCES, SELF-INFLATING	9			905
3072	LIFE-SAVING APPLIANCES NOT SELF-INFLATING containing dangerous goods as equipment	9			905
3245	GENETICALLY MODIFIED MICROORGANISMS or GENETICALLY MODIFIED ORGANISMS	9			904
3316	CHEMICAL KIT or FIRST AID KIT	9			901
3363	DANGEROUS GOODS IN MACHINERY or DANGEROUS GOODS IN APPARATUS	9			907

PART B: Packing Instructions

Table A : Consolidated permitted maximum capacity and maximum net mass for the standardized containers (taken from chapters 4 and 6)

	Maximum Capacity	Maximum Net Mass
Combination packaging: Outer Packaging		
1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	450 L	400 kg
4H1	450 L	60 kg
3A2, 3B2 or 3H2	60 L	120 kg
Single packaging		
1A, 1B, 1H, 1N	450 L	400 kg
1G, 1D, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	450 L	400 kg
3A, 3B and 3H	60 L	120 kg
5H, 5L, 5M	---	50 kg
6HA1, 6HB1, 6HD1, 6HG1 and 6HH1	250 L	400 kg
6HA2, 6HB2, 6HC, 6HG2, 6HH2 or all composite packagings of type 6P	60 L	75 kg

Packing Instruction 1

1. The dangerous goods must be handled, offered for transport or transported in:

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 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.

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging

Inner	Maximum capacity	Outer	Maximum net mass
glass	10 L	1A2, 1B2, 1N2, 1H2, 4A, 4B	250 kg
plastic	30 L	1D, 4C1, 4C2, 4D, 4H2	150 kg
metal	40 L	1G, 4F, 4G	75 kg
		4H1	60 kg
		3A2, 3B2 or 3H2	120 kg

Single packaging	Maximum capacity
1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 6HA1, 6HB1	250 L
6HD1, 6HG1 or 6HH1	120 L
3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6P	60 L

3. Only substances having a kinematic viscosity of more than 2.00 $x10^{-4}$ m^2/s (or 200 centistokes (cSt)) at 20 °C are permitted in removable head drums (1A2, 1B2, 1N2, 1H2) and removable head jerricans (3A2, 3B2, 3H2).

Packing Instruction 2

1. The dangerous goods must be handled, offered for transport or transported in:

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 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.

2. The maximum capacity or net mass of the:

   a. inner packaging must be equal to or less than 10 L for glass, 30 L for plastic and 40 L for metal; and

   b. outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum capacity and maximum net mass given in the chapters 4 and 6 (consolidated in Table A)

Packing Instruction 3

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging;

   b. a code 1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 6H or 6P single packaging; or

   c. a cylinder or sphere.

2. The maximum net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum net mass given in the following Table:

Combination packaging

Inner	Maximum net mass	Outer	Maximum net mass
glass	10 kg	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B	400 kg
plastic	50 kg	4C1, 4C2, 4D, 4H2	250 kg
metal	50 kg	4F, 4G	125 kg
		4H1	60 kg
		3A2, 3B2 or 3H2	120 kg

Single packaging	Maximum net mass
1A1, 1A2, 1B1, 1B2, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 6HA1, 6HB1, 6HD1, 6HG1 or 6HH1	400 kg
3A1, 3A2, 3B1, 3B2, 3H1, 3H2	120 kg
6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6P	75 kg

3. Plastic inner packaging must be sift-proof.

4. When a substance being transported may become liquid during transport, the following single packaging are not permitted:

   a. removable head drums (1A2, 1B2, 1N2, 1H2) and removable head jerricans (3A2, 3B2, 3H2);

   b. fibre drums (1G) and plywood drums (1D); and

   c. composite packagings 6HD1, 6HG1, 6HD2, 6HG2, 6PD1, 6PG1, 6PG2, 6PD2 and 6PH2.

Packing Instruction 4

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic, metal, paper or fibre inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 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, 5H3, 5H4, 5L3, 5M2, 6H or 6P single packaging; or

   c. a cylinder or sphere.

2. The net mass of the:

   a. inner packaging must be equal to or less than 10 kg for glass, and 50 kg for plastic, metal, paper and fibre; and

   b. outer packaging or single packaging mentioned in 1a and 1b must maximum net mass equal to or less than the maximum net mass given in the chapters 4 and 6 (consolidated in Table A).

3. Plastic, paper and fibre inner packaging must be sift-proof.

4. When a substance being transported may become liquid during transport, paper inner packaging, fibre inner packaging and the following single packaging are not permitted:

   a. fibre drums (1G) and plywood drums (1D);

   b. boxes (4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2);

   c. bags (5H3, 5H4, 5L3, 5M2); and

   d. composite packagings (6HD1, 6HG1, 6HD2, 6HG2, 6PD1, 6PG1, 6PG2, 6PD2 and 6PH2).

Packing Instruction 5

1.The dangerous goods may be handled, offered for transport or transported in a non-UN standardized container if the container meets the construction requirements of chapter 6.

Packing Instruction 6

1.The dangerous goods may be handled, offered for transport or transported in a non-UN standardized container if it is capable of meeting the packing group II performance level.

2. For fuel cell cartridges contained in equipment or packed with equipment, the dangerous goods must be handled, offered for transport or transported in strong outer packagings. Large robust equipment containing fuel cell cartridges may be transported unpackaged. When fuel cell cartridges are packed with equipment, they must 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. Fuel cell cartridges, which are installed in equipment, must be protected against short circuit and the entire system must be protected against inadvertent operation.

Packing Instruction 10

1. The dangerous goods must be handled, offered for transport or transported in:

   a. a combination packaging comprising of a glass or steel inner packaging and a code 1A2, 1D, 1G, 1H2, 4A, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging; or

   b. a code 1A1, 3A1 or 6HA1 single packaging.

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging

Inner	Maximum capacity	Outer	Maximum net mass
glass	1 L	1A2, 1D, 1G, 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 99

1. These dangerous goods must not be offered for transport or transported unless a competent authority approval has been issued by the Director.

2. The shipping document must be:

   a. accompanied with a copy of the competent authority approval; or

   b. marked "Packaging approved by the competent authority of Canada" and/or "Emballage approuvé par l'autorité compétente du Canada".

Packing Instruction 200

1. The dangerous goods must be offered for transport and transported in cylinder or sphere.
2. Each cylinder or sphere must be initially pressure tested at 1000 kPa (10 bar) and periodically tested at the same pressure within 5 years of the previous test.
3. For toxic dangerous goods with an LC50 equal or less than 200 ml/m^3 (ppm):
   a. valve outlets must 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 must be fitted with an individual valve that is closed during transport. After filling, the manifold must be evacuated, purged and plugged;
   c. cylinders and individual cylinders in a bundle must have a test pressure greater than or equal to 2000 kPa (20 bar);
   d. for cylinders or spheres with a minimum wall thickness of less than 3.5 mm for aluminium alloy or 2 mm for steel, the cylinder or sphere must 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 must not be fitted with a pressure relief device;
   f. the capacity of cylinders and individual cylinders in a bundle must be equal to or less than 85 litres;
   g. each valve must have a taper threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the cylinder or sphere;
   h. each valve must 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 pressure receptacle must be tested for leakage after filling; and
   j. the level of filling must be equal to or less than 92% of the capacity of a cylinder or sphere

Packing Instruction 300

1. The dangerous goods must be handled, offered for transport or transported in a combination packaging comprising of a metal inner packaging and a 4C1, 4C2, 4D or 4F outer packaging.

2. The maximum capacity of the inner packaging must be equal to or less than 1 Litre.

3. The total amount of dangerous goods in the outer packaging must be equal to or less than 5 litres.

4. The inner packagings must be completely surrounded with absorbent and cushioning material.

5. Wooden boxes must be completely lined with a suitable material impervious to water and nitro-glycerine.

Packing Instruction 301

1. The dangerous goods must be offered for transport and transported in an aluminium cylinder comprising of an internal vessel and an outer vessel.

2. For cylinders made from tubing and having welded heads:

   a. the internal vessel must consist of a welded aluminium bladder having an internal volume that is equal to or less than 46 litres;

   b. the outer vessel must have a minimum design pressure of 1 275 kPa (12.75 bar) and a minimum burst pressure of 2 755 kPa (27.55 bar);

   c. each vessel must be leakproof and tested as such during manufacture and before shipment;

   d. the cylinder must be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal container, which will adequately protect all fittings; and

   e. the quantity of fuel per cylinder must be equal to or less than 42 litres.

3. For other types of cylinders:

   a. the internal vessel must consist of a welded vapour tight fuel compartment with an electrometric bladder having an internal volume that is equal to or less than 46 litres;

   b. the outer vessel must have a minimum design pressure of 2 680 kPa (26.8 bar) and a minimum burst pressure of 5 170 kPa (51.7 bar);

   c. each vessel must be leakproof and tested as such during manufacture and before shipment;

   d. the cylinder must be securely packed in non-combustible cushioning material such as vermiculite, in a strong outer tightly closed metal container, which will adequately protect all fittings; and

   e. the quantity of fuel per cylinder must be equal to or less than 42 litres.

Packing Instruction 302

The dangerous good must be offered for transport and transported in a UN Standardized combination packaging permitted for class 3 substances that complies with the following provisions:

   a. the packaging shall meet the requirements for packing group II or III, as applicable;

   b. the base material and the activator (organic peroxide) shall be each separately packed in inner packaging;

   c. the components may be placed in the same outer packaging provided they will not interact dangerously in the event of a leakage;

   d. The activator 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 must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass or metal inner packaging in an hermetically sealed intermediate packaging metal can and a code 1A2, 1B2, 1D, 1G, 1N2, 3A2, 3B2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G outer packaging;

   b. a combination packaging comprising of an hermetically metal can inner packaging and a code 1A2, 1B2, 1N2, 3A2, 3B2, 4A, 4B outer packaging; or

   c. a cylinder or sphere.

2. Maximum capacity or net mass.

   a. For the combination packaging mentioned in 1a., the maximum capacity of the inner packaging must be equal to or less than 1 litre and the maximum net mass of the outer packaging must be equal to or less than 125kg net mass.

   b. For the combination packaging mentioned in 1b., the maximum capacity of the inner packaging must be equal to or less than 4 litres and the maximum net mass of the outer packaging must be equal to or less than 150kg.

3. Inner packagings must not be filled to more than 90% of their maximum capacity and must be cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents.

4. Cylinders or spheres must be made of steel and must 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 must be under a layer of inert gas with a gauge pressure of not less than 20 kPa (0.2 bar).

Packing Instruction 401

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, metal or plastic inner packaging in a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging; or

   b. a cylinder or sphere.

2. For the packaging mentioned in 1a, the maximum capacity of the inner packaging must be equal to or less than 1 litres and the net mass of the outer packaging must be equal to or less than 30 kg.

3. Inner packagings must 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 must be made of steel and must 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 must 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 must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, metal or plastic inner packaging in a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging;

   b. a code 1A1, 6HA1 or 6HB1 single packaging; or

   c. a cylinder or sphere.

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging			
Inner	Maximum net mass	Outer	Maximum net mass
glass	10 kg	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	125 kg
plastic	15 kg	4H1	60 kg
metal	15 kg	3A2, 3B2, 3H2	120 kg
Single packaging			Maximum capacity
1A1, 6HA1, 6HB1			250 L

3. Inner packagings must 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 must be made of steel and must 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 must 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 must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic, metal, paper or fibre inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 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.

2. The maximum net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum net mass given in the following Table:

Combination packaging

Inner	Maximum net mass	Outer	Maximum net mass
Glass	2 kg	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B	400 kg
Plastic	15 kg	3A2, 3B2, 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 must be hermetically sealed.

Packing Instruction 404

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a metal inner packaging and a code 1A2, 1B2, 1D, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F or 4H2 outer packaging;

   b. a code 1A1, 1A2, 1B1, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 6HA1 or 6HB1 single packaging; or

   c. a cylinder or sphere.

2. The maximum capacity or net mass of the:

   a. inner packagings must be equal to or less than 15 kg net mass;

   b. outer packagings mentioned in 1a must be equal to or less than the capacity given in the chapters 4 and 6 (consolidated in Table A); and

   c. single packagings mentioned in 1b must be equal to or less than 150 kg net mass.

3. Inner packagings must have threaded closures and be hermetically sealed.

Packing Instruction 405

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a metal or glass inner packaging and a code 4A, 4B, 4C1, 4C2, 4D or 4F outer packaging; or

   b. a code 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 3A1 or 3B1 single packaging;

2. The maximum capacity or net mass of the:

   a. inner packagings must be equal to or less than 2 kg for glass and 15 kg for metal;

   b. outer packagings mentioned in 1a must be equal to or less than 75 kg net mass; and

   c. single packagings mentioned in 1b must be equal to or less than the maximum capacity given in the chapters 4 and 6 (consolidated in Table A).

3. Inner packagings must be hermetically sealed.

4. Glass inner packagings must be cushioned on all sides with dry, absorbent, non-combustible material in a quantity sufficient to absorb the entire contents.

5. Single packagings must be capable of passing the leakproofness test specified in 7.7 at the packing group II performance level.

Packing Instruction 406

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a water-resistant inner packaging and a code 1D, 1G, 1H2, 3H2, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging; or

   b. a code 1A1, 1A2, 1B1, 1D, 1G, 1H1, 1H2, 1N1, 1N2, 3A1, 3A2, 3B1, 3B2, 3H1, 3H2, 4A, 4B, 4C1, 4C2,4D, 4F, 4G, 4H2 or 6H single packaging;

2. The maximum capacity or net mass of the outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum capacity and maximum net mass given in chapters 4 and 6 (consolidated in Table A).

3. Inner packagings and single packagings must 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.

4. Code 1D, 1H1, 1H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G and 4H2 single packagings must be constructed with a water resistant inner bag, plastic film lining or water resistant coating.

5. Packagings must be so constructed and closed so as to avoid an explosive over pressure or pressure build-up of more than 300 kPa (3 bar).

Packing Instruction 407

1. The dangerous goods must be handled, offered for transport or transported in a combination packaging that may be a non-UN Standardized container.

2. The gross mass of the combination packaging must be equal to or less than 45kg, except that a combination packaging with a fiberboard box outer packaging, the gross mass must be equal to or less than 30kg.

3. Inner packagings must be securely closed to prevent accidental ignition under normal conditions of transport.

4. Matches must be tightly packed.

Packing Instruction 409

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a plastic bag inner packaging and a code 4G outer packaging;

   b. a combination packaging comprising of a plastic inner packaging and a code 4G or 1G outer packaging; or

   c. a code 1G single packaging.

2. The net mass of the:

   a. combination packaging or single packaging mentioned in 1a and 1c must be equal to or less than 50 kg;

   b. combination packagings mentioned in 1b must be equal to or less than 25 kg and the net mass of each inner packagings must be equal to or less than 5 kg.

Packing Instruction 410

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic, metal, paper or fibre inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 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, 5H3, 5H4, 5L3, 5M2, 6H or 6P single packaging; or

   c. a cylinder or sphere.

2. The net mass of the:

   a. inner packaging must be equal to or less than 30 kg for plastic, 40 kg for metal, and 10 kg for paper, fibre and glass; or

   b. outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum net mass given in the chapters 4 and 6 (consolidated in Table A);

3. Inner packagings and single packagings must 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; and

   b. 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2, 5H3, 5H4, 5L3 and 5M2 single packaging.

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

Packing Instruction 411

1. The dangerous goods may be handled, offered for transport or transported in a non-UN standardized container if the container is:

   a. a fiberboard box; or

   b. a container constructed such that an explosion is not possible by reason of increased pressure

2. The net mass of the container must be equal to or less than 30 kg.

Packing Instruction 500

1. The dangerous goods may be handled, offered for transport or transported in a UN standardized container that meets the packing group II performance level.

Packing Instruction 501

1. The dangerous goods must be handled, offered for transport or transported in:

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D or 4H2 outer packaging;

   b. a combination packaging comprising of a plastic or metal inner packaging 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 must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging (1a)

Inner	Maximum capacity	Outer	Maximum net mass
Glass, plastic or metal	5 L	1A2, 1B2, 1D, 1H2, 1N2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4H2	125 kg

Combination packaging (1b)

Inner	Maximum capacity	Outer	Maximum net mass
Plastic or metal	2 L	1G, 4G	50 kg

Single packaging	Maximum capacity
1A1, 1B1, 1H1, 1N1, 6HA1, 6HB1, 6HD1, 6HG1, 6HH1	250 L
3A1, 3B1, 3H1, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6P	60 L

3. The level of filling must 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 must each be packed in a plastic bag.

5. Containers must be vented.

Packing Instruction 502

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 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 must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging			
Inner	Maximum capacity	Outer	Maximum net mass
Glass, plastic or metal	5 L	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	125 kg
		4H1	60 kg

Single packaging	Maximum capacity
1A1, 1B1, 1H1, 6HA1, 6HB1, 6HD1, 6HG1, 6HH1	250 L
3A1, 3B1, 3H1, 6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2, 6P	60 L

Packing Instruction 503

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging; or

   b. a code 1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1D or 1G single packaging;

2. The net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum net mass given in the following Table:

Combination packaging			
Inner	Maximum net mass	Outer	Maximum net mass
Glass, plastic or metal	5 kg	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4H2	125 kg
		4G	40 kg
		4H1	60 kg

Single packaging	Maximum net mass
1A1, 1A2, 1B1, 1B2, 1N1, 1N2	250 kg
1D, 1G	200 kg

Packing Instruction 504

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 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 must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging			
Inner	Maximum capacity	Outer	Maximum net mass
Glass	5 L	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	75 kg
Plastic	30 L		

Combination packaging			
Inner	Maximum capacity	Outer	Maximum net mass
Metal	40 L	1A2, 1B2, 1D, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4H2	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, 6P	60 L

Packing Instruction 520

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass, plastic or metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 3A2, 3B2, 3H2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging; or

   b. a code 1A1, 1A2, 1B1, 1B2, 1D, 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 must 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 listed in Table A and Table C. For organic peroxides or self-reactive substances or new formulations, the packing method must be assigned following the procedures set out in 4.1.7.1.4 of the UN Model regulations, 16th Edition.

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Packing Instruction 520 (continued)

	Packing Method						
Combination packaging	**OP1**	**OP2**	**OP3**	**OP4**	**OP5**	**OP6**	**OP7**
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	**OP1**	**OP2**	**OP3**	**OP4**	**OP5**	**OP6**	**OP7**
(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
1A2, 1B2, 1D, 1G, 1H2			400 kg
3A2, 3B2 and 3H2			60 kg
4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2			200 kg
Combination packaging			
Inner	Maximum net mass	Outer	Maximum net mass
Plastic, fibre	25 kg	4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2	400 kg
Single packaging			Maximum net mass
3A2, 3B2 and 3H2 (for solids)			60 kg
			Maximum capacity
3A2, 3B2 and 3H2 (for liquids)			60 L
1A1, 1A2, 1B1, 1B2, 1D, 1H1, 1H2, 6H (for Liquids)			225 L

3. Inner packagings made of glass must 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 inner packaging and code 1A, 1B, 1N, 3A, 3B, 4A, 4B, 6HA and 6HB are not permitted for packing methods OP1, OP2, OP3, OP4, OP5 and OP6.

5. Viscous liquids must be treated as solids.

Packing Instruction 600

1. The dangerous goods must be handled, offered for transport or transported in a combination packaging consisting of a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 container that meets the packing group II performance level.

2. The net mass of the outer packaging must be equal to or less than 75 kg.

Packing Instruction 601

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of a glass inner packaging in a metal intermediate packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

   b. a combination packaging comprising of a metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

   c. a code 1A1, 1B1, 1H1, 1N1 or 6HA1 container (inner packaging) that is packed in a code 1A2 or 1H2 container (outer packaging); or

   d. a cylinder or sphere;

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging (1a)

Inner	Maximum capacity	Intermediate	Outer	Maximum net mass
Glass	1 L	Metal	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	15 kg

Combination packaging (1b)

Inner	Maximum capacity	Outer	Maximum net mass
Metal	5 L	1A2, 1B2, 1D, 1G 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	75 kg

Drum in a drum (1c)

Inner	Maximum capacity	Outer	Maximum net mass
1A1, 1B1, 1H1, 1N1, 6HA1	125 L	1A2, 1H2	400 kg

3. Inner packagings must 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 must:

   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.

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Packing Instruction 601 (continued)

5. Inner packagings mentioned in 1c must:

a. be designed and tested in accordance with Part I as a single packaging that meets the packing group I performance level except that the internal pressure test set out in clause 7.6 must be conducted at a pressure equal or greater than 300 kPa (3 bar);

b. have a threaded type closure with a cap seal; and

c. be isolated from the outer drum by the use of inert shock-mitigating cushioning material that surrounds the inner packaging on all sides.

6. The inner packaging mentioned in 1c must be periodically reconditioned in accordance with standard CGSB 43.126, at intervals of not more than two and a half years.

7. Cylinders and spheres mentioned in 1d must:

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 2mm 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/m^3 (ppm) must be closed with a plug or valve conforming to the following:

a. each plug or valve must have a taper-threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the pressure receptacle without damage or leakage;

b. each valve must 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 pressure receptacle to prevent loss of substance through or past the packing;

c. each valve outlet must be sealed by a threaded cap or threaded solid plug and inert gasket material; and

d. the materials of construction for the pressure receptacle, valves, plugs, outlet caps, luting and gaskets must be compatible with each other and with the contents.

Packing Instruction 602

1. The dangerous goods must be handled, offered for transport or transported in :

   a. a combination packaging comprising of one or more glass inner packaging in a metal intermediate packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

   b. a combination packaging comprising of a metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

   c. a code 1A1, 1B1, 1H1, 1N1, 6HA1 or 6HH1 single packaging; or

   d. a cylinder or sphere;

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging (1a)

Inner	Maximum capacity	Intermediate	Outer	Maximum net mass
Glass	1 L	Metal	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	15 kg

Combination packaging (1b)

Inner	Maximum capacity	Outer	Maximum net mass
Metal	5 L	1A2, 1B2, 1D, 1G 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	75 kg

Single Packaging (1c)	Maximum capacity
1A1, 1B1, 1H1, 1N1, 6HA1, 6HH1	450 L

3. Inner packagings and single packagings must 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 must:

   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.

5. Single packagings mentioned in 1c must:

   a. meet the packing group I performance level except that the internal pressure test set out in clause 7.6 must be conducted at a pressure equal or greater than 300 kPa (3 bar); and

   b. have a threaded type closure with a cap seal.

6. The containers mentioned in 1c must be periodically reconditioned in accordance with standard CGSB 43.126, at intervals of not more than two and a half years.

(Continued on the next page)

Packing Instruction 602 (continued)

7. Cylinders and spheres mentioned in 1d must:

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/m^3 (ppm) must be closed with a plug or valve conforming to the following:

a. each plug or valve must have a taper-threaded connection directly to the pressure receptacle and be capable of withstanding the test pressure of the pressure receptacle without damage or leakage;

b. each valve must 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 pressure receptacle to prevent loss of substance through or past the packing;

c. each valve outlet must be sealed by a threaded cap or threaded solid plug and inert gasket material; and

d. the materials of construction for the pressure receptacle, valves, plugs, outlet caps, luting and gaskets must be compatible with each other and with the contents.

Packing Instruction 800

1. The dangerous goods must be handled, offered for transport or transported in:

a. a combination packaging comprising of a glass, metal or rigid plastic inner packaging intended to contain liquids and a code 1A2, 1D, 1G, 1H2, 1N2, 4A, 4C1, 4C2, 4D, 4F, 4G, 4H1 or 4H2 outer packaging;

b. a non-UN Standardized steel flask or bottle with threaded closures; or

c. a cylinder or sphere.

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a and 1b must be equal to or less than the maximum capacity and maximum net mass given in the following Table:

Combination packaging (1a)			
Inner	Maximum net mass	Outer	Maximum net mass
glass	15 kg	1A2, 1D, 1G, 1H2, 1N2, 4A	400 kg
metal	15 kg	4C1, 4C2, 4D	250 kg
rigid plastic	15 kg	4F, 4G, 4H2	125 kg
		4H1	60 kg

	Maximum capacity
Non-UN Standardized steel flask or bottle	3 L

(Continued on the next page)

Packing Instruction 800 (continued)

3. Inner packagings must be completely surrounded with cushioning material.

4. Inner packagings or outer packagings must 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.

Packing Instruction 801

1. The dangerous goods may be handled, offered for transport or transported in a non-UN Standardized container if the dangerous goods are placed in a rigid container, wooden slatted crate or on a pallet.

2. Used storage batteries may also be transported loose in stainless steel or plastic battery boxes capable of containing any free liquid.

3. Batteries must be protected against short circuits.

4. Batteries stacked must be adequately secured in tiers separated by a layer of non-conductive material.

5. Battery terminals must not support the weight of other superimposed elements.

6. Batteries must be packaged or secured to prevent inadvertent movement.

Packing Instruction 802

1. The dangerous goods must be handled, offered for transport or transported in:

   a. a combination packaging comprising of a glass or plastic inner packaging and a code 1A2, 1B2, 1D, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F or 4H2 outer packaging;

   b. a combination packaging comprising of a metal inner packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

   c. a code 1A1, 6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2 or 6PH2 single packaging; or

   d. a cylinder or sphere.

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c must be equal to or less than the maximum capacity or net mass given in the following Table:

Combination packaging (1a)			
Inner	Maximum capacity	Outer	Maximum net mass
Glass, plastic	10 L	1A2, 1B2, 1D, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4H2	75 kg

Combination packaging (1b)			
Inner	Maximum capacity	Outer	Maximum net mass
metal	40 L	1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G, 4H2	125 kg

Single packaging	Maximum capacity
1A1	250 L
6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PD2, 6PH2	60 L

Packing Instruction 803

1. The dangerous goods must be handled, offered for transport or transported in a code 1A1, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 single packaging;

2. The net mass of a single packaging must be equal to or less than 75 kg.

3. Articles must 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

1. The dangerous goods must be handled, offered for transport or transported in:

a. a combination packaging comprising of a glass inner packaging in a metal intermediate packaging and a code 1A2, 1B2, 1D, 1G, 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

b. a combination packaging comprising of a metal or polyvinylidene fluorides (PVDF) inner packaging and a code 1A2, 1B2, 1D, 1G 1H2, 1N2, 4A, 4B, 4C1, 4C2, 4D, 4F, 4G or 4H2 outer packaging;

c. a code 1A1, 1B1, 1H1, 1N1 or 6HA1 container (inner packaging) that is packed in a code 1A2 or 1H2 container (outer packaging); or

d. a cylinder or sphere.

2. The maximum capacity or net mass of the inner packaging, outer packaging or single packaging mentioned in 1a, 1b and 1c must be equal to or less than the capacity given in the following Table:

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

3. Inner packagings must 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 must:

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.

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Packing Instruction 804 (continued)

5. Inner packagings mentioned in 1c must:

a. be designed and tested in accordance with Part I as a single packaging that meets the packing group I performance level except that the internal pressure test set out in clause 7.6 must be conducted at a pressure equal or greater than 300 kPa (3 bar);

b. have a threaded type closure with a cap seal; and

c. be isolated from the outer drum by the use of inert shock-mitigating cushioning material that surrounds the inner packaging on all sides.

6. The inner packaging mentioned in 1c must be periodically reconditioned in accordance with standard CGSB 43.126, at intervals of not more than two and a half years.

7. Cylinders and spheres mentioned in 1d must:

a. be subjected to an initial and periodic test every 10 years at a pressure of not less than 1000 kPa (10 bar);

b. be subjected periodically to an internal inspection and leakproofness test at intervals of not more than two and a half years;

c. not be equipped with a pressure relief device;

d. be closed with a plug or valve fitted with a secondary closure device; and

e. 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

1.The dangerous goods must be handled, offered for transport or transported in a UN standardized container that meets the performance level consistent with the packing group assigned to the dangerous goods.

2. The net mass of the container must 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 must be packed in inner packagings that is equal to or less than 250 ml in maximum capacity or 250 g net mass. The inner packagings must be protected from other material in the kit.

4. When carbon dioxide, solid, (dry ice) is used as a refrigerant, the packaging must 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

1.The dangerous goods may be handled, offered for transport or transported in a UN standardized container that meets the packing group III performance level.

2. The dangerous goods may also be handled, offered for transport or transported in a dedicated handling device, vehicle, container or wagon if the dangerous goods are moved from the place of manufacture to an assembly plant.

3. The dangerous goods must be packaged or secured to prevent movement and inadvertent operation during normal conditions of transport.

Packing Instruction 903

1.The dangerous goods may be handled, offered for transport or transported in:

a. a UN standardized container that meets the packing group II performance level;

b. for dangerous goods (batteries or cells) that are packed with equipment, a UN standardized fiberboard container that meets the packing group II performance level. The equipment must be packed in a strong container in such a manner as to prevent accidental operation during transport.

2. For a batteries with a strong, impact resistant outer casing that have a gross mass of 12kg or more, the batteries may be handled, offered for transport or transported in a strong non-UN standardized container, unpackaged in a protective enclosure (for example: in fully enclosed or slatted wooden crates) or on a pallet.

3. Batteries must be secured to prevent inadvertent movement, protected against short circuit and the terminals must not support the weight of other superimposed elements.

Packing Instruction 904

1.The dangerous goods must be handled, offered for transport or transported in,

a. a container in accordance with Packing instruction 2 or 4. The selected container may be tested to the packing group III performance level; or

b. a non-UN standardized container if it is a combination packaging comprising of a watertight inner packaging in a watertight intermediate packaging and an outer packaging strong enough for its maximum capacity, mass and intended use.

2. The combination packaging mentioned in 1b must be successfully tested in accordance with chapter 7 of this standard unless:

a. the inner packaging is watertight and packed in a leakproof intermediate packaging;

b. sufficient absorbent material is placed between the inner packaging and the intermediate packaging to absorb the contents of the inner packaging;

c. if multiple fragile inner packagings are placed in a single intermediate packaging, the inner packagings are individually wrapped or separated to prevent contact between them; and

d. the smallest external dimension of the outer packaging is at least 100 mm.

3. When carbon dioxide, solid, (dry ice) is used as a refrigerant, the container must 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.

4. Substances consigned in liquid nitrogen or dry ice must be packed in an inner packaging that is capable of withstanding very low temperatures. The intermediate packaging must also be capable of withstanding very low temperatures and, in most cases, will need to be fitted over the inner packaging individually.

Packing Instruction 905

1.The dangerous goods may be handled, offered for transport or transported in a non-UN standardized container. Life saving appliances that are constructed to incorporate or are contained in a rigid outer weatherproof casing may not require a container for transport.

2. The dangerous goods contained in the life saving appliance must be secured to prevent inadvertent movement and :

a. for signal devices that are dangerous goods of Class 1, be packed in plastic or fibreboard inner packagings;

b. for gases (Class 2.2), be contained in cylinders or spheres, which may be connected to the appliance;

c. for electric storage batteries (Class 8) and lithium batteries (Class 9), be disconnected or electrically isolated and secured to prevent any spillage of liquid; and

d. for small quantities of other dangerous substances (for example in Class 3 or Classs 4.1 and 5.2), be packed in strong inner packagings.

2. Preparation for transport and packaging must include provisions to prevent any accidental activation of the appliance.

Packing Instruction 906

1.The dangerous goods must be handled, offered for transport or transported in:

a. a container in accordance with the appropriate Packing Instruction 2 or 4;

b. for transformers, condensers and other devices, a non-UN standardized container if it is leakproof and is capable of containing, in addition to the devices, at least 1.25 times the volume of the liquid PCBs, polyhalogenated biphenyls or terphenyls present in them. There must be sufficient absorbent material in the container to absorb at least 1.1 times the volume of liquid, which is contained in the devices. In general, transformers and condensers must 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; or

c. in a non-UN standardized means of containment if it is transported in a transport unit fitted with a metal tray with at least 800mm high sides, containing sufficient inert absorbent material to absorb at least 1.1 times the volume of any free liquid.

2. Transformers and condensers must not leak or must 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

1. The dangerous goods may be handled, offered for transport or transported in a non-UN standardized container if the dangerous goods are packed in a container designed, manufactured, loaded, unloaded, secured, closed and maintained so that during transport, including handling, no condition or release of dangerous goods from the container that could endanger public safety occurs or may reasonably be expected to occur.

2. The 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, no condition or release of dangerous goods from the receptacle that could endanger public safety occurs or may reasonably be expected to occur.

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 machinery or apparatus.

d. is installed, secured or cushioned to prevent movement within the machinery or apparatus during normal conditions of transport. Cushioning material must not react dangerously with the content of the receptacle. Any leakage of the contents must not substantially impair the protective properties of the cushioning material.

PART C : Substance specific provisions

UN number	Provisions
UN1051	The level of filling must be equal to or less than 55% of the capacity of the cylinder or sphere.
UN1052	The wall thickness of a cylinder or sphere must be not less than 3 mm. Prior to transport the pressure must be verified to ensure it has not risen due to potential hydrogen generation. The level of filling must be equal to or less than 84% of the capacity of the cylinder or sphere.
UN1057	The container must be rigid and meet the packing group II performance level. The container must be designed and constructed to prevent movement, inadvertent ignition of the devices or inadvertent release of flammable gas or liquid.
UN1131	The container must be hermetically sealed.
UN1133	The dangerous goods included in packing group II and III may be handled, offered for transport or transported in a non-UN Standardized metal or plastic container if its maximum capacity is equal to or less than 5 litres and the container is transported: a. in palletized loads, a pallet box or unit load device (individual containers placed or stacked and secured by strapping, shrink or stretch-wrapping or other suitable means to a pallet). For sea transport, the palletized loads, pallet boxes or unit load devices must be firmly packed and secured in closed cargo transport units; or b. as an inner packaging of a combination packaging with a gross mass that is equal to or less than 40kg.
UN1204	The dangerous goods must not be handled, offered for transport or transported in a cylinders or spheres. The containers must be so constructed that explosion is not possible by reason of increased internal pressure.
UN1210	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1133.
UN1263	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1133.
UN1308	The dangerous goods included in packing group I and II must not be handled, offered for transport or transported in a single packaging. The gross mass of a combination packaging must be equal to or less than 75kg.
UN1309	The dangerous goods included in packing group II, bags must be transported in a closed means of transport. The dangerous goods included in packing group III may be handled, offered for transport or transported in a 5H1, 5L1 or 5M1 single packaging if the single packagings are overpacked in a plastic bag and stacked on a pallet and wrapped in shrink or stretch wrap.
UN1310	The container must be lead free.
UN1320	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1321	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1322	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1326	The dangerous goods included in packing group II must not be handled, offered for transport or transported in a bag (5H, 5L, 5M).

UN number	Provisions
UN1327	The dangerous goods may be handled, offered for transport or transported as bales.
UN1331	With the exception of safety matches or wax vesta matches, the dangerous goods must not be handled, offered for transport or transported in the same combination packaging or single packaging with any other dangerous goods. The quantity in an inner packaging must be equal to or less than 700 strike-anywhere matches.
UN1344	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1347	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310. The net mass of an outer packaging or a single packaging must be equal to or less than 15kg.
UN1348	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1349	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1352	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1326.
UN1358	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1326.
UN1361	The dangerous goods may be handled, offered for transport or transported in a 5H1, 5L1 or 5M1 single packaging if they are transported in a closed transport unit.
UN1362	The dangerous goods may be handled, offered for transport or transported in a 5H1, 5L1 or 5M1 single packaging if the single packagings are overpacked in a plastic bag and stacked on a pallet and wrapped in shrink or stretch wrap.
UN1363	The dangerous goods may be handled, offered for transport or transported in a non-UN standardized means of containment if it is siftproof and tearproof.
UN1364	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1327.
UN1365	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1327.
UN1378	Metal containers must be vented.
UN1386	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods 1363.
UN1408	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods 1363.
UN1437	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1326.
UN1517	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN1748	When bags are used as a single packaging, they must be adequately separated to allow for the dissipation of heat.
UN1790	For dangerous goods included in packing group I with less than 85% hydrofluoric acid, the prescribed period of use of plastic drums and jerricans as single packagings shall be two years from their date of manufacture. For dangerous goods with more than 60% but not more than 85% hydrogen fluoride, the dangerous goods must be handled, offered for transport or transported in accordance with Packing Instruction 1.

UN number	Provisions
UN1791	For dangerous goods included in packing group II, the container must be vented.
UN1845	The container must be designed and constructed to permit the release of carbon dioxide gas to prevent a build up of pressure that could rupture the container.
UN1856	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1327.
UN1866	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1133.
UN1871	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1326.
UN1873	The dangerous goods must not be handled, offered for transport or transported in a code 6H single packaging or in a metal or plastic inner packaging.
UN2000	The dangerous goods may be handled, offered for transport or transported unpacked on pallets, wrapped in plastic film and secured by appropriate means, such as steel bands as a full load in a closed transport unit. Each pallet must be equal to or less than 1000 kg.
UN2002	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1204.
UN2014	The packaging must be vented.
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.
UN2208	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1748.
UN2211	The dangerous goods may be handled, offered for transport or transported in a non-UN standardized means of containment.
UN2212	The dangerous may be handled, offered for transport or transported in 5M1 single packaging. When bags are used, they must be transported in a closed means of transport or placed in a closed rigid overpack.
UN2213	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1361.
UN2216	The dangerous goods may also be handled, offered for transport or transported: a. in a code 5H1, 5H2, 5H3, 5H4, 5L1, 5L2, 5L3, 5M1 or 5M2 single packaging with a maximum net mass of 50 kg; or b. unpackaged when it is packed in a closed transport unit and the free air space has been restricted to a minimum.
UN2217	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1363.
UN2590	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2212.
UN2698	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2211.
UN2793	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods 1363.
UN2800	Batteries must be protected from short circuit.
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 overpack, which contains dry ice or other means of refrigeration. If a refrigerant is used, the container must be

UN number	Provisions
	chemically and physically resistant to the refrigerant and must have impact resistance at the low temperatures of the refrigerant employed. If dry ice is used, the container and overpack must permit the release of carbon dioxide gas.
UN2813	For the purposes of heat formation, waterproof bags containing not more than 20 g of the substance may be packaged for transport. Each waterproof bag must be sealed in a plastic bag and placed within an intermediate packaging. No outer packaging must contain more than 400 g of substance. Water or liquid, which may react with the water reactive substance, must not be included in the packaging.
UN2852	The net mass of an outer packaging or a single packaging must be equal to or less than 0.5kg.
UN2870	The dangerous goods included in packing group I that are articles must not be handled, offered for transport or transported in a single packaging.
UN2880	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1748.
UN2907	The dangerous goods must not be handled, offered for transport or transported in a container that meets the packing group I performance level. The container must meet: a. the packing group II performance level; and b. the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN2969	The dangerous may be handled, offered for transport or transported in 5H1, 5L1 or 5M1 single packaging.
UN3065	The dangerous may be handled, offered for transport or transported in a wooden barrel. The maximum capacity of the wooden barrel must be equal to or less than 250 litres.
UN3077	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1361.
UN3082	Adhesives, printing inks, printing ink related materials, paints, paint related materials and resin solutions classified as UN3082, must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1133.
UN3149	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2014.
UN3175	The container must successfully pass the leakproofness test at the packing group II performance level (See clause 7.7) unless the liquids are fully absorbed in solid material contained in sealed bags.
UN3182	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1326.
UN3241	The maximum capacity or net mass of the combination packaging or single packaging must be equal to or less than the capacity or net mass given in packing method OP6 of Packing Instruction 520.
UN3243	The container must successfully pass the leakproofness test at the packing group II performance level in accordance with clause 7.7.
UN3244	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN3243.
UN3292	Cells must be packed with sufficient cushioning to prevent contact between cells and between cells and the internal surfaces of the container and to ensure that no dangerous movement of the cells within the container occurs in transport. Batteries may be carried unpacked or in protective enclosures (for example: in fully enclosed or wooden slatted crates). The terminals must not support the weight of other batteries or materials packed with the batteries. Batteries must be protected against short circuit and must be isolated in

UN number	Provisions
	such a manner as to prevent short circuits.
UN3314	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2211.
UN3317	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN3356	When one generator in the container is actuated: a. other generators in the same container must not be actuated; b. the container material must not ignite; and c. the outside surface temperature of the container must be equal to or less than 100 deg. C.
UN3360	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1327.
UN3364	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2852.
UN3365	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2852.
UN3366	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2852.
UN3367	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2852.
UN3368	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2852.
UN3369	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN2852.
UN3370	The net mass of an outer packaging or a single packaging must be equal to or less than 11.5kg.
UN3376	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1310.
UN3391	Air must be eliminated from the vapour space by nitrogen or other means.
UN3392	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN3391.
UN3393	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN3391.
UN3394	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN3391.
UN3474	The dangerous goods must not be handled, offered for transport or transported in a metal inner packaging or metal single packaging (code 1A, 1B, 1N, 3A, 3B, 6HA, 6HB).
UN3485	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1748.
UN3486	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1748.
UN3487	The dangerous goods must be handled, offered for transport or transported in accordance with the additional requirements found in the substance specific provision for dangerous goods UN1748.

This appendix is mandatory.

APPENDIX B CURRENTLY ASSIGNED SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Table B: Currently Assigned Self-Reactive Substances

SELF-REACTIVE SUBSTANCE	Concen-tration (%)	Packing method	Control tempera-ture (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
AZODICARBONAMIDE FORMULATION TYPE C, TEMPERATURE CONTROLLED	< 100	OP6			3234	1)
AZODICARBONAMIDE FORMULATION TYPE D, TEMPERATURE CONTROLLED	< 100	OP7			3236	2)
2,2' -AZODI(2,4-DIMETHYL-4-METHOXYVALERONITRILE)	100	OP7	-5	+5	3236	
2,2' -AZODI(2,4-DIMETHYL-VALERONITRILE)	100	OP7	+10	+15	3236	
2,2' -AZODI(ETHYL-2-METHYLPROPIONATE)	100	OP7	+20	+25	3235	
2,2'-AZODI(ISOBUTYRONITRILE)	100	OP6	+40	+45	3234	
2,2'-AZODI(2-METHYLBUTYRONITRILE)	100	OP7	+35	+40	3236	
4-(BENZYL(METHYL)AMINO)-3-ETHOXYBENZENEDIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
2,5-DIETHOXY-4-MORPHOLINO-BENZENEDIAZONIUM ZINC CHLORIDE	67-100	OP7	+35	+40	3236	
2,5-DIETHOXY-4-MORPHOLINO-BENZENEDIAZONIUM ZINC CHLORIDE	66	OP7	+40	+45	3236	
2,5-DIETHOXY-4-MORPHOLINO-BENZENEDIAZONIUM TETRAFLUOROBORATE	100	OP7	+30	+35	3236	
2,5- DIETHOXY-4-(PHENYLSULPHONYL)-BENZENEDIAZONIUM ZINC CHLORIDE	67	OP7	+40	+45	3236	
DIETHYLENEGLYCOL BIS (ALLYL CARBONATE) + DI ISOPROPYLPEROXYDICARBONATE	≥ 88 + ≤ 12	OP8	-10	0	3237	
2,5-DIMETHOXY-4-(4-METHYL-PHENYLSULPHONYL)BENZENE-DIAZONIUM ZINC CHLORIDE	79	OP7	+40	+45	3236	
4-DIMETHYLAMINO-6-(2-DIMETHYL-AMINOETHOXY) TOLUENE- 2-DIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4-(N-METHYL-N-CYCLOHEXYLAMINO BENZENEDIAZONIUM ZINC CHLORIDE	63-92	OP7	+40	+45	3236	
2-(N,N-ETHOXYCARBONYL-PHENYLAMINO)-3-METHOXY-4-(N-METHYL-N- CYCLOHEXYLAMINO) BENZENEDIAZONIUM ZINC CHLORIDE	62	OP7	+35	+40	3236	

APPENDIX B CURRENTLY ASSIGNED SELF-REACTIVE SUBSTANCES AND ORGANIC PEROXIDES

Table B: Currently Assigned Self-Reactive Substances

SELF-REACTIVE SUBSTANCE	Concen-tration (%)	Packing method	Control tempera-ture (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
N-FORMYL-2-(NITROMETHYLENE) -1,3-PERHYDROTHIAZINE	100	OP7	+45	+50	3236	
2-(2-HYDROXYETHOXY)-1-(PYRROLIDIN-1-YL)BENZENE-4-DIAZONIUM ZINC CHLORIDE	100	OP7	+ 45	+ 50	3236	
3-(2-HYDROXYETHOXY)-4-(PYRROLIDIN-1-YL)BENZENE DIAZONIUM ZINC CHLORIDE	100	OP7	+40	+45	3236	
2-(N,N-METHYLAMINOETHYL-CARBONYL)-4-(3,4-DIMETHYL-PHENYLSULPHONYL)BENZENE-DIAZONIUM HYDROGEN SULPHATE	96	OP7	+45	+50	3236	
3-METHYL-4-(PYRROLIDIN-1-YL) BENZENEDIAZONIUM TETRAFLUOROBORATE	95	OP6	+45	+50	3234	
4-NITROSOPHENOL	100	OP7	+35	+40	3236	
TETRAMINE PALLADIUM (II) NITRATE	100	OP6	+30	+35	3234	

Note: The classifications given in this Table are based on the technically pure substance (except where a concentration of less than 100% is specified). For other concentrations, the substances may be classified differently following the procedures in clause 14.2.2.4 and 14.2.2.5 of the UN Recommendations

1) Azodicarbonamide formulations which meet the criteria of 2.4.2.3.3.2 (c) of the UN Recommendations.
2) Azodicarbonamide formulations which meet the criteria of 2.4.2.3.3.2 (d) of the UN Recommendations.

TABLE C: Currently Assigned Organic Peroxides

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
ACETYL CYCLOHEXANESULPHONYL PEROXIDE	≤ 82				≥ 12	OP4	-10	0	3112	
"	≤ 32		≥ 68			OP7	-10	0	3115	
tert-AMYL PEROXYBENZOATE	≤ 100					OP5			3103	
tert-AMYL PEROXY-2-ETHYLHEXANOATE	≤ 100					OP7	+20	+25	3115	
tert-AMYL PEROXY ISOPROPYL CARBONATE	≤77	≥ 23				OP5			3103	
tert-AMYL PEROXYNEODECANOATE	≤ 77		≥ 23			OP7	0	+10	3115	
tert-AMYL PEROXYPIVALATE	≤ 77		≥ 23			OP5	+10	+15	3113	
n-BUTYL-4,4-DI-(tert-BUTYLPEROXY)VALERATE	> 52 - 100					OP5			3103	
tert-BUTYL HYDROPEROXIDE	>79 - 90				≥ 10	OP5			3103	
tert-BUTYL HYDROPEROXIDE + DI-tert-BUTYLPEROXIDE	< 82 + >9				≥ 7	OP5			3103	
tert-BUTYL MONOPEROXYMALEATE	> 52 - 100					OP5			3102	
"	≤ 52	≥ 48				OP6			3103	
"	> 32 - 52	≥ 48				OP6			3103	
tert-BUTYL PEROXYBENZOATE	> 77 - 100					OP5			3103	
tert-BUTYL PEROXYDIETHYLACETATE	≤ 100					OP5	+20	+25	3113	
tert-BUTYL PEROXY-2-ETHYLHEXANOATE	> 52 – 100					OP6	+20	+25	3113	
"	> 32 - 52		≥ 48			OP8	+30	+35	3117	
"	≤ 52			≥ 48		OP8	+20	+25	3118	
"	≤ 32		≥ 68			OP8	+40	+45	3119	
"	≤ 31 + ≤ 36		≥ 33			OP7	+35	+40	3115	
tert-BUTYL PEROXYISOBUTYRATE	> 52 - 77		≥ 23			OP5	+15	+20	3111	
"	≤ 52		≥ 48			OP7	+15	+20	3115	
tert-BUTYLPEROXY ISOPROPYLCARBONATE	≤ 77	≥ 23				OP5			3103	
tert-BUTYL PEROXY-2-METHYLBENZOATE	≤ 100					OP5			3103	
tert-BUTYL PEROXYNEODECANOATE	> 77 - 100					OP7	-5	+5	3115	
"	≤ 77		≥ 23			OP7	0	+10	3115	
tert-BUTYL PEROXYNEODECANOATE (cont'd)	≤ 52 as a stable dispersion in water					OP8	0	+10	3119	
"	≤ 42 as a					OP8	0	+10	3118	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
	stable dispersion in water (frozen)									
"	≤ 32	≥ 68				OP8	0	+10	3119	
tert-BUTYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23				OP7	0	+10	3115	
"	≤ 42 as a stable dispersion in water					OP8	0	+10	3117	
tert-BUTYL PEROXYPIVALATE	> 67 - 77	≥ 23				OP5	0	+10	3113	
"	> 27 - 67		≥ 33			OP7	0	+10	3115	
"	≤ 27		≥ 73			OP8	+30	+35	3119	
3-CHLOROPEROXYBENZOIC ACID	> 57 - 86			≥ 14		OP1			3102	
CUMYL PEROXYNEODECANOATE	≤ 77		≥ 23			OP7	-10	0	3115	
"	≤ 52 as a stable dispersion in water					OP8	-10	0	3119	
CUMYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23				OP7	-10	0	3115	
CUMYL PEROXYPIVALATE	≤ 77		≥ 23			OP7	-5	+5	3115	
CYCLOHEXANONE PEROXIDE(S)	≤ 91				≥ 9	OP6			3104	
DIACETONE ALCOHOL PEROXIDES	≤ 57		≥ 26		≥ 8	OP7	+40	+45	3115	1)
DIACETYL PEROXIDE	≤ 27		≥ 73			OP7	+20	+25	3115	2)
1,1-DI-(tert-AMYLPEROXY)CYCLOHEXANE	≤ 82	≥ 18				OP6			3103	
DIBENZOYL PEROXIDE	> 51 - 100			≤ 48		OP2			3102	
"	> 77 - 94				≥ 6	OP4			3102	
"	≤ 77				≥ 23	OP6			3104	
DI-(4-tert-BUTYLCYCLOHEXYL) PEROXYDICARBONATE	≤ 100					OP6	+30	+35	3114	
"	≤ 42 as a stable dispersion in water					OP8	+30	+35	3119	
2,2-DI-(tert-BUTYLPEROXY)BUTANE	≤ 52	≥ 48				OP6			3103	
1,6-DI-(tert-BUTYLPEROXYCARBONYLOXY) HEXANE	≤ 72	≥ 28				OP5			3103	
1,1-DI-(tert-BUTYLPEROXY) CYCLOHEXANE	> 80 - 100					OP5			3101	
"	> 52 - 80	≥ 20				OP5			3103	
DI-n-BUTYL PEROXYDICARBONATE	> 27 - 52		≥ 48			OP7	-15	-5	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
"	≤ 42 as a stable dispersion in water (frozen)					OP8	-15	-5	3118	
"	≤ 27		≥ 73			OP8	-10	0	3117	
DI-sec-BUTYL PEROXYDICARBONATE	> 52 - 100					OP4	-20	-10	3113	
"	≤ 52		≥ 48			OP7	-15	-5	3115	
"	> 57 - 90	≥ 10				OP5			3103	
"	≤ 77		≥ 23			OP5			3103	
DICETYL PEROXYDICARBONATE	≤ 100					OP7	+30	+35	3116	
"	≤ 42 as a stable dispersion in water					OP8	+30	+35	3119	
DI-4-CHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5			3102	
"	≤ 52			≥ 48					Exempt	
DICYCLOHEXYL PEROXYDICARBONATE	> 91 - 100					OP3	+10	+15	3112	
"	≤ 91				≥ 9	OP5	+10	+15	3114	
"	≤ 42 as a stable dispersion in water					OP8	+15	+20	3119	
DIDECANOYL PEROXIDE	≤ 100					OP6	+30	+35	3114	
DI-2,4-DICHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5			3102	
DI-(2-ETHOXYETHYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-10	0	3115	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	> 77 - 100					OP5	-20	-10	3113	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	≤ 52 as a stable dispersion in water (frozen)					OP8	-15	-5	3120	
"	≤ 77		≥ 23			OP7	-15	-5	3115	
"	≤ 62 as a stable dispersion in water					OP8	-15	-5	3117	
"	≤ 52 as a stable dispersion in water					OP8	-15	-5	3119	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
2,2-DIHYDROPEROXYPROPANE	≤ 27			≥ 73		OP5			3102	
DIISOBUTYRYL PEROXIDE	> 32 - 52		≥ 48			OP5	-20	-10	3111	
"	≤ 32		≥ 68			OP7	-20	-10	3115	
DIISOPROPYL PEROXYDICARBONATE	> 52-100					OP2	-15	-5	3112	
"	≤ 52		≥ 48			OP7	-20	-10	3115	
"	≤ 28	≥ 72				OP7	-15	-5	3115	
DI-(3-METHOXYBUTYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-5	+5	3115	
DI-(2-METHYLBENZOYL) PEROXIDE	≤ 87				≥ 13	OP5	+30	+35	3112	
DI-(3-METHYLBENZOYL) PEROXIDE + BENZOYL (3-METHYLBENZOYL) PEROXIDE + DIBENZOYL PEROXIDE	≤ 20 + ≤ 18 + ≤ 4		≥ 58			OP7	+35	+40	3115	
2,5-DIMETHYL-2,5-DI-(BENZOYLPEROXY)HEXANE	> 82-100					OP5			3102	
"	≤ 82				≥ 18	OP5			3104	
"	>52-86	≥ 14				OP5			3103	5)
2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY) HEXANE	≤ 100					OP5	+20	+25	3113	
2,5-DIMETHYL-2,5-DIHYDROPEROXYHEXANE	≤ 82				≥ 18	OP6			3104	
1,1-DIMETHYL-3-HYDROXYBUTYL PEROXYNEO-HEPTANOATE	≤ 52	≥ 48				OP8	0	+10	3117	
DIMYRISTYL PEROXYDICARBONATE	≤ 100					OP7	+20	+25	3116	
"	≤ 42 as a stable dispersion in water					OP8	+20	+25	3119	
DI-(2-NEODECANOYLPEROXYISOPROPYL) BENZENE	≤ 52	≥ 48				OP7	-10	0	3115	
DI-n-NONANOYL PEROXIDE	≤ 100					OP7	0	+10	3116	
DI-n-OCTANOYL PEROXIDE	≤ 100					OP5	+10	+15	3114	
DI-(2-PHENOXYETHYL) PEROXYDICARBONATE	>85-100					OP5			3102	
DIPROPIONYL PEROXIDE	≤ 27		≥ 73			OP8	+15	+20	3117	
DI-n-PROPYL PEROXYDICARBONATE	≤ 100					OP3	-25	-15	3113	
"	≤ 77		≥ 23			OP5	-20	-10	3113	
DISUCCINIC ACID PEROXIDE	> 72-100					OP4			3102	4)
"	≤ 72				≥ 28	OP7	+10	+15	3116	
DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE	> 38-82	≥ 18				OP7	0	+10	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
"	≤ 52 as a stable dispersion in water					OP8	+10	+15	3119	
"	≤ 38	≥ 62				OP8	+20	+25	3119	
ETHYL 3,3-DI-(tert-BUTYLPEROXY)BUTYRATE	> 77 - 100					OP5			3103	
1-(2-ETHYLHEXANOYLPEROXY)-1,3-DIMETHYLBUTYL PEROXYPIVALATE	≤ 52	≥ 45	≥ 10			OP7	-20	-10	3115	
tert-HEXYL PEROXYNEODECANOATE	≤ 71	≥ 29				OP7	0	+10	3115	
tert-HEXYL PEROXYPIVALATE	≤ 72		≥ 28			OP7	+10	+15	3115	
ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTYL PEROXYDICARBONATE+DI-ISOPROPYL PEROXYDICARBONATE	≤ 32 + ≤ 15 - 18 ≤ 12 - 15	≥ 38				OP7	-20	-10	3115	
"	≤ 52 + ≤ 28 + ≤ 22					OP5	-20	-10	3111	
METHYLCYCLOHEXANONE PEROXIDE(S)	≤ 67		≥ 33			OP7	+35	+40	3115	
ORGANIC PEROXIDE, LIQUID, SAMPLE						OP2			3103	3)
ORGANIC PEROXIDE, LIQUID, SAMPLE, TEMPERATURE CONTROLLED						OP2			3113	3)
ORGANIC PEROXIDE, SOLID, SAMPLE						OP2			3104	3)
ORGANIC PEROXIDE, SOLID, SAMPLE, TEMPERATURE CONTROLLED						OP2			3114	3)
PEROXYLAURIC ACID	≤ 100					OP8	+35	+40	3118	
1,1,3,3-TETRAMETHYLBUTYL PEROXY-2 ETHYL-HEXANOATE	≤ 100					OP7	+15	+20	3115	
1,1,3,3- TETRAMETHYLBUTYL PEROXYNEODECANOATE	≤ 72		≥ 28			OP7	-5	+5	3115	
"	≤ 52 as a stable dispersion in water					OP8	-5	+5	3119	
1,1,3,3-TETRAMETHYLBUTYL PEROXYPIVALATE	≤ 77	≥ 23				OP7	0	+10	3115	
ACETYL CYCLOHEXANESULPHONYL PEROXIDE	≤ 82				≥ 12	OP4	-10	0	3112	
"	≤ 32		≥ 68			OP7	-10	0	3115	
tert-AMYL PEROXYBENZOATE	≤ 100					OP5			3103	
tert-AMYL PEROXY-2-ETHYLHEXANOATE	≤ 100					OP7	+20	+25	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
tert-AMYL PEROXY ISOPROPYL CARBONATE	≤77	≥ 23				OP5			3103	
tert-AMYL PEROXYNEODECANOATE	≤ 77		≥ 23			OP7	0	+10	3115	
tert-AMYL PEROXYPIVALATE	≤ 77		≥ 23			OP5	+10	+15	3113	
n-BUTYL-4,4-DI-(tert-BUTYLPEROXY)VALERATE	> 52 - 100					OP5			3103	
tert-BUTYL HYDROPEROXIDE	>79 - 90				≥ 10	OP5			3103	
tert-BUTYL HYDROPEROXIDE + DI-tert-BUTYLPEROXIDE	< 82 + >9				≥ 7	OP5			3103	
tert-BUTYL MONOPEROXYMALEATE	> 52 - 100					OP5			3102	
"	≤ 52	≥ 48				OP6			3103	
"	> 32 - 52	≥ 48				OP6			3103	
tert-BUTYL PEROXYBENZOATE	> 77 - 100					OP5			3103	
tert-BUTYL PEROXYDIETHYLACETATE	≤ 100					OP5	+20	+25	3113	
tert-BUTYL PEROXY-2-ETHYLHEXANOATE	> 52 – 100					OP6	+20	+25	3113	
"	> 32 - 52		≥ 48			OP8	+30	+35	3117	
"	≤ 52			≥ 48		OP8	+20	+25	3118	
"	≤ 32		≥ 68			OP8	+40	+45	3119	
"	≤ 31 + ≤ 36		≥ 33			OP7	+35	+40	3115	
tert-BUTYL PEROXYISOBUTYRATE	> 52 - 77		≥ 23			OP5	+15	+20	3111	
"	≤ 52		≥ 48			OP7	+15	+20	3115	
tert-BUTYLPEROXY ISOPROPYLCARBONATE	≤ 77	≥ 23				OP5			3103	
tert-BUTYL PEROXY-2-METHYLBENZOATE	≤ 100					OP5			3103	
tert-BUTYL PEROXYNEODECANOATE	> 77 - 100					OP7	-5	+5	3115	
"	≤ 77		≥ 23			OP7	0	+10	3115	
tert-BUTYL PEROXYNEODECANOATE (cont'd)	≤ 52 as a stable dispersion in water					OP8	0	+10	3119	
"	≤ 42 as a stable dispersion in water (frozen)					OP8	0	+10	3118	
"	≤ 32	≥ 68				OP8	0	+10	3119	
tert-BUTYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23				OP7	0	+10	3115	
"	≤ 42 as a stable dispersion in					OP8	0	+10	3117	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
	water									
tert-BUTYL PEROXYPIVALATE	> 67 - 77	≥ 23				OP5	0	+10	3113	
"	> 27 - 67		≥ 33			OP7	0	+10	3115	
"	≤ 27		≥ 73			OP8	+30	+35	3119	
3-CHLOROPEROXYBENZOIC ACID	> 57 - 86			≥ 14		OP1			3102	
CUMYL PEROXYNEODECANOATE	≤ 77		≥ 23			OP7	-10	0	3115	
"	≤ 52 as a stable dispersion in water					OP8	-10	0	3119	
CUMYL PEROXYNEOHEPTANOATE	≤ 77	≥ 23				OP7	-10	0	3115	
CUMYL PEROXYPIVALATE	≤ 77		≥ 23			OP7	-5	+5	3115	
CYCLOHEXANONE PEROXIDE(S)	≤ 91				≥ 9	OP6			3104	
DIACETONE ALCOHOL PEROXIDES	≤ 57		≥ 26		≥ 8	OP7	+40	+45	3115	1)
DIACETYL PEROXIDE	≤ 27		≥ 73			OP7	+20	+25	3115	2)
1,1-DI-(tert-AMYLPEROXY)CYCLOHEXANE	≤ 82	≥ 18				OP6			3103	
DIBENZOYL PEROXIDE	> 51 - 100			≤ 48		OP2			3102	
"	> 77 - 94				≥ 6	OP4			3102	
"	≤ 77				≥ 23	OP6			3104	
DI-(4-tert-BUTYLCYCLOHEXYL) PEROXYDICARBONATE	≤ 100					OP6	+30	+35	3114	
"	≤ 42 as a stable dispersion in water					OP8	+30	+35	3119	
2,2-DI-(tert-BUTYLPEROXY)BUTANE	≤ 52	≥ 48				OP6			3103	
1,6-DI-(tert-BUTYLPEROXYCARBONYLOXY) HEXANE	≤ 72	≥ 28				OP5			3103	
1,1-DI-(tert-BUTYLPEROXY) CYCLOHEXANE	> 52 - 80	≥ 20				OP5			3103	
DI-n-BUTYL PEROXYDICARBONATE	> 27 - 52		≥ 48			OP7	-15	-5	3115	
"	≤ 42 as a stable dispersion in water (frozen)					OP8	-15	-5	3118	
"	≤ 27		≥ 73			OP8	-10	0	3117	
DI-sec-BUTYL PEROXYDICARBONATE	> 52 - 100					OP4	-20	-10	3113	
"	≤ 52		≥ 48			OP7	-15	-5	3115	
"	> 57 - 90	≥ 10				OP5			3103	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
"	≤ 77		≥ 23			OP5			3103	
DICETYL PEROXYDICARBONATE	≤ 100					OP7	+30	+35	3116	
"	≤ 42 as a stable dispersion in water					OP8	+30	+35	3119	
DI-4-CHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5			3102	
DICYCLOHEXYL PEROXYDICARBONATE	> 91 - 100					OP3	+10	+15	3112	
"	≤ 91				≥ 9	OP5	+10	+15	3114	
"	≤ 42 as a stable dispersion in water					OP8	+15	+20	3119	
DIDECANOYL PEROXIDE	≤ 100					OP6	+30	+35	3114	
DI-2,4-DICHLOROBENZOYL PEROXIDE	≤ 77				≥ 23	OP5			3102	
DI-(2-ETHOXYETHYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-10	0	3115	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	> 77 - 100					OP5	-20	-10	3113	
DI-(2-ETHYLHEXYL) PEROXYDICARBONATE	≤ 52 as a stable dispersion in water (frozen)					OP8	-15	-5	3120	
"	≤ 77		≥ 23			OP7	-15	-5	3115	
"	≤ 62 as a stable dispersion in water					OP8	-15	-5	3117	
"	≤ 52 as a stable dispersion in water					OP8	-15	-5	3119	
2,2-DIHYDROPEROXYPROPANE	≤ 27			≥ 73		OP5			3102	
DIISOBUTYRYL PEROXIDE	> 32 - 52		≥ 48			OP5	-20	-10	3111	
"	≤ 32		≥ 68			OP7	-20	-10	3115	
DIISOPROPYL PEROXYDICARBONATE	> 52-100					OP2	-15	-5	3112	
"	≤ 52		≥ 48			OP7	-20	-10	3115	
"	≤ 28	≥ 72				OP7	-15	-5	3115	
DI-(3-METHOXYBUTYL) PEROXYDICARBONATE	≤ 52		≥ 48			OP7	-5	+5	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
DI-(2-METHYLBENZOYL) PEROXIDE	≤ 87				≥ 13	OP5	+30	+35	3112	
DI-(3-METHYLBENZOYL) PEROXIDE + BENZOYL (3-METHYLBENZOYL) PEROXIDE + DIBENZOYL PEROXIDE	≤ 20 + ≤ 18 + ≤ 4		≥ 58			OP7	+35	+40	3115	
2,5-DIMETHYL-2,5-DI-(BENZOYLPEROXY)HEXANE	> 82-100					OP5			3102	
"	≤ 82				≥ 18	OP5			3104	
"	>52-86	≥ 14				OP5			3103	5)
2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY) HEXANE	≤ 100					OP5	+20	+25	3113	
2,5-DIMETHYL-2,5-DIHYDROPEROXYHEXANE	≤ 82				≥ 18	OP6			3104	
1,1-DIMETHYL-3-HYDROXYBUTYL PEROXYNEO-HEPTANOATE	≤ 52	≥ 48				OP8	0	+10	3117	
DIMYRISTYL PEROXYDICARBONATE	≤ 100					OP7	+20	+25	3116	
"	≤ 42 as a stable dispersion in water					OP8	+20	+25	3119	
DI-(2-NEODECANOYLPEROXYISOPROPYL) BENZENE	≤ 52	≥ 48				OP7	-10	0	3115	
DI-n-NONANOYL PEROXIDE	≤ 100					OP7	0	+10	3116	
DI-n-OCTANOYL PEROXIDE	≤ 100					OP5	+10	+15	3114	
DI-(2-PHENOXYETHYL) PEROXYDICARBONATE	>85-100					OP5			3102	
"	≤ 85				≥ 15	OP7			3106	
DIPROPIONYL PEROXIDE	≤ 27		≥ 73			OP8	+15	+20	3117	
DI-n-PROPYL PEROXYDICARBONATE	≤ 100					OP3	-25	-15	3113	
"	≤ 77		≥ 23			OP5	-20	-10	3113	
DISUCCINIC ACID PEROXIDE	> 72-100					OP4			3102	4)
"	≤ 72				≥ 28	OP7	+10	+15	3116	
DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE	> 38-82	≥ 18				OP7	0	+10	3115	
"	≤ 52 as a stable dispersion in water					OP8	+10	+15	3119	
"	≤ 38	≥ 62				OP8	+20	+25	3119	
ETHYL 3,3-DI-(tert-BUTYLPEROXY)BUTYRATE	> 77 - 100					OP5			3103	
1-(2-ETHYLHEXANOYLPEROXY)-1,3-DIMETHYLBUTYL PEROXYPIVALATE	≤ 52	≥ 45	≥ 10			OP7	-20	-10	3115	
tert-HEXYL PEROXYNEODECANOATE	≤ 71	≥ 29				OP7	0	+10	3115	

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent type B 1) (%)	Inert solid (%)	Water (%)	Packing Method	Control tempe-rature (°C)	Emergency temperature (°C)	UN Number (Generic entry)	Remarks
tert-HEXYL PEROXYPIVALATE	≤ 72		≥ 28			OP7	+10	+15	3115	
ISOPROPYL sec-BUTYL PEROXYDICARBONATE + DI-sec-BUTYL PEROXYDICARBONATE+DI-ISOPROPYL PEROXYDICARBONATE	≤ 32 + ≤ 15 - 18 ≤ 12 - 15	≥ 38				OP7	-20	-10	3115	
"	≤ 52 + ≤ 28 + ≤ 22					OP5	-20	-10	3111	
METHYLCYCLOHEXANONE PEROXIDE(S)	≤ 67		≥ 33			OP7	+35	+40	3115	
ORGANIC PEROXIDE, LIQUID, SAMPLE						OP2			3103	3)
ORGANIC PEROXIDE, LIQUID, SAMPLE, TEMPERATURE CONTROLLED						OP2			3113	3)
ORGANIC PEROXIDE, SOLID, SAMPLE						OP2			3104	3)
ORGANIC PEROXIDE, SOLID, SAMPLE, TEMPERATURE CONTROLLED						OP2			3114	3)
PEROXYLAURIC ACID	≤ 100					OP8	+35	+40	3118	
1,1,3,3-TETRAMETHYLBUTYL PEROXY-2 ETHYL-HEXANOATE	≤ 100					OP7	+15	+20	3115	
1,1,3,3- TETRAMETHYLBUTYL PEROXYNEODECANOATE	≤ 72		≥ 28			OP7	-5	+5	3115	
"	≤ 52 as a stable dispersion in water					OP8	-5	+5	3119	
1,1,3,3-TETRAMETHYLBUTYL PEROXYPIVALATE	≤ 77	≥ 23				OP7	0	+10	3115	

Remarks:

1) With ≤ 9% hydrogen peroxide; available oxygen ≤ 10%.

2) Only non-metallic packagings allowed.

3) See 2.5.3.2.5.1. of the UN Recommendations.

4) Addition of water to this organic peroxide will decrease its thermal stability.

5) With < 0.5% hydroperoxides content.

APPENDIX C 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.

C1. Maintenance of the prescribed temperature is an essential feature for the safe transport of many organic peroxides. In general, there should be:

— thorough inspection of the transport unit prior to loading

— instructions to the carrier about the operation of the refrigeration system

— procedures to be followed in the event of loss of temperature control

— regular monitoring of operating temperatures

— provision of a back-up refrigeration system or spare parts.

C2. Any control and temperature sensing devices in the refrigeration system should be readily accessible and all electrical connections should be weather-proof. 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.

C3. 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 (for example: 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.

C4. The suitability of a particular means of temperature control for transport depends on a number of factors. Among those to be considered are:

— the control temperature(s) of the substance(s) to be transported

— the difference between the control temperature and the anticipated ambient temperature conditions

— the effectiveness of the thermal insulation

— the duration of transport

— an allowance of a safety margin for delays.

C5. 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:

— an adequate quantity of coolant (for example: liquid nitrogen or solid carbon dioxide), allowing a reasonable margin for delay, is carried;

— liquid oxygen or air is not used as coolant;

— there is a uniform cooling effect even when most of the coolant has been consumed;

— the 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:

— the two systems are independent of one another;

— the requirements in D5. b. and c. are complied with.

e. Dual mechanical refrigeration system; if:

— apart from the integral power supply unit, the two systems are independent of one another;

— each system alone is capable of maintaining adequate temperature control;

— 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.

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