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**CAN/CGSB-43.145-2019**



# Design, manufacture and use of large packagings for the transportation of dangerous goods, classes 3, 4, 5, 6.1, 8, and 9

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the transportation of dangerous goods, classes 3, 4, 5,  
6.1, 8, and 9**

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

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## Introduction

This is the first edition of CAN/CGSB-43.145, *Design, manufacture and use of large packagings for the transportation of dangerous goods, classes 3, 4, 5, 6.1, 8, and 9*.

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

This standard contains requirements for

- Design and manufacture of UN standardized large packagings;
- The selection and use of large packagings for the transportation of classes 3, 4, 5, 6.1, 8 and 9 dangerous goods;
- Large packaging design registration and manufacturer registration; and
- Packing instructions.

This standard also provides requirements for a quality management system.

This standard is based on the *Recommendations on the Transport of Dangerous Goods, Model Regulations*, 20<sup>th</sup> edition, published by the United Nations (UN).

# Design, manufacture and use of large packagings for the transportation of dangerous goods, classes 3, 4, 5, 6.1, 8, and 9

## 1 Scope

### 1.1 Organization and content

This standard sets out the requirements for designing, manufacturing and marking of UN standardized large packagings and for selecting and using large packagings for the transportation of dangerous goods of Class 3, 4, 5, 6.1, 8 and 9. This standard consists of two parts and two annexes.

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

Part II contains the requirements for the selection and use of large packagings for the transportation of dangerous goods of Class 3, 4, 5, 6.1, 8 and 9.

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

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

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

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

NOTE 2 Requirements on the packaging, handling, offering for transport and transport of used Aerosols (Class 2) may be found in the CAN/CGSB-43.123 standard.

### 1.2 Application

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

### 1.3 Minimum requirements

This standard sets out certain minimum requirements regarding the design, construction, qualification, selection, and use or testing of large packagings. It is the responsibility of the large packaging manufacturer to ensure that the large packaging will safely carry out its intended function within these constraints. Consequently, it is essential to exercise competent technical and engineering judgment in conjunction with this standard.

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

It should be noted that this standard, by itself, does not have the force of law unless it is officially adopted by a regulatory authority. The *TDG Act, 1992* and the *TDG Regulations* may set out for additional requirements regarding the design, manufacture, selection, use, or testing of large packagings. Where there is an inconsistency between the requirements of this standard and those of the *TDG Act* or *TDG Regulations*, the *TDG Act* or *TDG Regulations* prevail to the extent of the inconsistency. It is recommended to read the standard in conjunction with the *TDG Regulations*.

## 1.5 Safety

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

## 1.6 Units

Quantities and dimensions used in this standard are given in SI units.

## 1.7 Classification

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

## 2 Normative references

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

NOTE The addresses provided below were valid at the date of publication of this standard.

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

### 2.1 Canadian General Standards Board (CGSB)

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

CAN/CGSB-43.123 — *Aerosol containers and gas cartridges for transport of dangerous goods.*

#### 2.1.1 Source

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

They may also be obtained from the Government of Canada Publications, Publishing and Depository Services, Public Services and Procurement Canada, Ottawa, ON, K1A 0S5. Telephone: 1-800-635-7943 or 613-941-5995. Fax 1-800-565-7757 or 613-954-5779. Email [publications@tpsgc-pwgsc.gc.ca](mailto:publications@tpsgc-pwgsc.gc.ca). Website: <http://publications.gc.ca/site/eng/home.html>.

### 2.2 Transport Canada (TC)

*Transportation of Dangerous Goods Act, 1992*

*Transportation of Dangerous Goods Regulations*

TP14850-2010 — *Small Containers for Transport of Dangerous Goods, Classes 3, 4, 5, 6.1, 8 and 9, a Transport Canada Standard.*



### 2.2.1 Source

The above may be obtained from the Publishing and Depository Services, Public Services and Procurement Canada, Ottawa, Canada K1A 0S5. Telephone: 613-941-5995 or 1-800-635-7943, fax: 613-954-5779 or 1-800-565-7757, email: [publications@tpsgc-pwgsc.gc.ca](mailto:publications@tpsgc-pwgsc.gc.ca). Website: [www.tc.gc.ca/tdg](http://www.tc.gc.ca/tdg) or [www.publications.gc.ca](http://www.publications.gc.ca).

The Transport Canada publication TP14850 may be downloaded from Transport Canada at: <https://www.tc.gc.ca/en/transport-canada/corporate/transparency/corporate-management-reporting.html>.

## 2.3 ASTM International

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

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

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

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

ASTM D7790-12 — *Standard Guide for Preparation of Plastic Packagings Containing Liquids for United Nations (UN) Drop Testing.*

### 2.3.1 Source

The above may be obtained from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, U.S.A., telephone 610-832-9585, fax 610-832-9555, Web site [www.astm.org](http://www.astm.org), or from IHS Markit, 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone 613-237-4250 or 1-800-267-8220, fax 613-237-4251, Website [www.global.ihs.com](http://www.global.ihs.com).

## 2.4 International Organization for Standardization (ISO)

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

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

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

### 2.4.1 Source

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

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

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

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

### 2.5.1 Source

The above may be obtained from the Technical Association of the Pulp and Paper Industry, 15 Technology Parkway South, Norcross, GA 30092, U.S.A. Telephone: 1-800-446-9431, fax: 1-770-209-7206, Email: [tappipress@brighkey](mailto:tappipress@brighkey).

net. Website: [www.tappi.com](http://www.tappi.com), or from IHS Markit, 200-1331 MacLeod Trail SE, Calgary, Alberta T2G 0K3, telephone 613-237-4250 or 1-800-267-8220, fax 613-237-4251, Website [www.global.ihs.com](http://www.global.ihs.com).

## 2.6 United Nations (UN)

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

### 2.6.1 Source

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

## 3 Terms and definitions

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

### 3.1

#### **basis weight**

see grammage.

### 3.2

#### **body**

receptacle of a large packaging.

### 3.3

#### **Certificate of registration**

document issued by the Director to a Manufacturer for the purpose of registering that manufacturing facility pursuant to the applicable requirements of this Standard.

### 3.4

#### **closed cargo transport unit**

cargo transport unit which totally encloses the means of containment by permanent structures with complete and rigid surfaces.

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

### 3.5

#### **closure**

device that closes an opening of a receptacle.

### 3.6

#### **dangerous goods**

dangerous goods as defined in the TDG Act, and includes dangerous goods listed in Annex B.

### 3.7

#### **design registration number**

number issued by the Director to a manufacturing facility certifying that the design of the UN standardized large packaging meets all applicable requirements of this Standard.

**3.8****Director**

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

**3.9****grammage**

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

**3.10****inner packaging**

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

**3.11****large packaging**

packaging consisting of an outer packaging that contains articles or inner packagings and

- a) is designed for mechanical handling; and
- b) exceeds 400 kg net mass, but has a volume of not more than 3 m<sup>3</sup>.

**3.12****liner**

separate tube or bag, including its openings and their closures, inserted into the large packaging, but not forming an integral part of it.

**3.13****manufacturer**

person, corporation, partnership, or facility registered with the Director pursuant to clause 10.

**3.14****maximum capacity**

maximum volume of water, expressed in litres, that a container can hold at 15 °C and at an absolute pressure of 101.3 kPa, when filled through the intended filling orifice with the container resting in its normal position of filling.

**3.15****maximum permissible gross mass**

sum of the tare mass of the large packaging and the mass of the content, as authorized for transport.

**3.16****receptacle**

containment vessel for receiving and holding the dangerous goods, including the openings and their closures but not the liner.

**3.17****recycled plastic material**

plastic material recovered from used industrial containers, production residue and regrind.

**3.18****remanufactured large packaging**

metal or rigid plastic large packaging that is converted from one UN design type to another UN design type.

**3.19**

**salvage large packaging**

special packaging into which damaged, defective, leaking or non-conforming dangerous goods packagings, including inner receptacles and inner packagings, or articles that have spilled or leaked are placed for purposes of transport for recovery or disposal, and which

- a) is designed for mechanical handling; and
- b) exceeds 400 kg net mass but has a volume of not more than 3 m<sup>3</sup>.

**3.20**

**sift-proof**

impermeable to dry content, including any fine solid material produced during transport.

**3.21**

**TC**

Transport Canada

**3.22**

**TDG Act**

Transportation of Dangerous Goods Act, 1992.

**3.23**

**TDG Regulations**

Transportation of Dangerous Goods Regulations.

**3.24**

UN packaging symbol



**3.25**

**UN standardized large packaging**

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

**3.26**

**UN standardized large packaging design type**

design specification for the prototype large packaging successfully tested in accordance with Part I and as described in the UN standardized large packaging Design Report of Annex A.

## Part I

# Design, manufacture and marking of UN standardized large packagings

## 4 General requirements

### 4.1 General

A UN standardized large packaging shall be designed, manufactured and marked in accordance with the requirements in Part I of this standard.

#### 4.1.1 Reports

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

### 4.2 Large packaging code

The large packaging code shall consist of the following sequence of numbers and letters: a number as specified in 4.2 a) followed by a capital letter as specified in 4.2 b).

a) A number as specified in the following list:

- 1) number 50 for rigid large packagings;
- 2) number 51 for flexible large packagings

b) A capital letter as specified in the following list that represents the material of construction of the large packaging:

- A steel
- B aluminum
- C natural wood
- D plywood
- F reconstituted wood
- G fibreboard
- H plastic
- M paper
- N metal other than steel or aluminum.

### 4.3 Large packaging types by code

The large packaging described in Column 1 of Table 1 having the design characteristics described in Column 2 shall be assigned the corresponding large packaging code in Column 3.

#### 4.4 Use of the letter “T”

When assigned in accordance with the requirements of 5.1.5, the capital letter “T” shall follow the large packaging code.

#### 4.5 Use of the letter “W”

When assigned in accordance with the requirements of 10.10, the capital letter “W” shall follow the large packaging code.

#### 4.6 Large packaging design report

A report shall be completed in accordance with Annex A for every large packaging design type, and the report shall be submitted to the Director as specified in clause 10.

#### 4.7 Large packaging information

The large packaging manufacturer or distributor shall document the following information in relation to each large packaging design:

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

**4.7.1** The large packaging manufacturer or distributor shall transmit the large packaging information listed in 4.7 a) to d) to each large packaging purchaser upon the purchaser’s initial purchase of the corresponding large packaging. The information may be provided in written or electronic form.

**4.7.2** The large packaging manufacturer or distributor shall make available the large packaging information listed in 4.7 a) to d) to a large packaging user upon request.

Table 1 — UN standardized large packagings

Column 1	Column 2	Column 3
Large packaging	Design characteristics	Large packaging code
Rigid <sup>a</sup>	Steel	50A
	Aluminum	50B
	Natural wood	50C
	Plywood	50D
	Reconstituted wood	50F
	Fibreboard	50G
	Plastic	50H
	Metal (other than steel or aluminum)	50N
Flexible	Plastic	51H
	Paper	51M
<sup>a</sup> A rigid large packaging shall retain its general shape when empty.		

## 5 Compliance mark

### 5.1 Primary marking

#### 5.1.1 Size, location, and content

Every large packaging shall bear markings that are durable, legible, at least 12 mm in height, and placed in a location so as to be readily visible. The markings shall appear on the side of the large packaging. The markings shall remain legible for the life of the large packaging. The markings shall consist of the following sequence of numbers, letters and symbols clearly separated, e.g. by a slash or space, so as to be easily identifiable:

- a) The United Nations (UN) packaging symbol



For large packagings that have metal identification plates on which the marking is stamped or embossed, the capital letters “UN” may be applied instead of the symbol. When stenciling or similar techniques are used to apply the circle in the UN symbol, small gaps necessary for their application are permitted.

- b) The large packaging code as described in 4.2 and 4.3. The letter “W” or “T” shall follow the large packaging code if it complies with 10.10 or 5.1.5.
- c) The capital letter (“X”, “Y” or “Z”) designating the packing group or groups for which the design prototype has been tested:
  - 1) “X” for packing groups I, II and III; the large packaging has been successfully tested to the packing group I performance level, at minimum
  - 2) “Y” for packing groups II and III; the large packaging has been successfully tested to the packing group II performance level, at minimum, or
  - 3) “Z” for packing group III; the large packaging has been successfully tested to at least the packing group III performance level
- d) The month, designated numerically, and the last two digits of the year of manufacture.
- e) The three letter country code “CAN”.

NOTE Denotes Canada as the country authorizing the allocation of the mark.
- f) The name or symbol of the manufacturer, as submitted to and registered by the Director;
- g) The design registration number issued in accordance with 10.3;
- h) The stacking test load in kilograms, as specified in 7.5. For large packagings not designed to be stacked, the number “0” shall be displayed.
- i) The maximum permissible gross mass in kilograms.

### **5.1.2 Maximum permissible gross mass**

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

- a) 5 kg if the maximum permissible gross mass is between 400 kg and 950 kg,
- b) 10 kg if the maximum permissible gross mass is between 950 kg and 2000 kg, or
- c) 20 kg if the maximum permissible gross mass is above 2000 kg.





### **5.1.3 Change in the maximum permissible gross mass**

The marked maximum permissible gross mass of a UN standardized large packaging design type that has been changed in accordance with the requirements of 8.1.1 b) shall be reduced in proportion to the reduction in dimensions of the large packaging.



#### 5.1.4 Examples of primary marking

Examples of markings for various design types of UN standardized large packagings follow:

<b>Examples of primary marking</b>	
<b>Marking</b>	<b>Description</b>
 50A/Y/01 18 CAN/ABC 10-01/ 5500/1500	A steel large packaging / for packing group II and III / manufactured in January 2018 / authorized by Canada / manufactured by ABC company / Design registration number 10-01 / the stacking test load in kg / the maximum permissible gross mass in kg.
 51H/Z/01 18 CAN/ABC 10-02/ 0/1500	A flexible plastic large packaging / for packing group III only / manufactured in January 2018 / authorized by Canada / manufactured by ABC company / Design registration number 10-02 / not designed to be stacked / the maximum permissible gross mass in kg.
 50BT/Y/01 18 CAN/ABC 10-03/ 10800/1200	An aluminum salvage large packaging / for packing group II and III / manufactured in January 2018 / authorized by Canada / manufactured by ABC company / Design registration number 10-03 / the stacking test load in kg / the maximum permissible gross mass in kg.
 50H/Y/01 18 CAN/ABC 10-04/ 10800/1200	A rigid plastic large packaging / for packing group II and III / manufactured in January 2018 / authorized by Canada / manufactured by ABC company / Design registration number 10-04 / the stacking test load in kg / the maximum permissible gross mass in kg.

#### 5.1.5 Specific requirement relative to the marking of a salvage large packaging

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

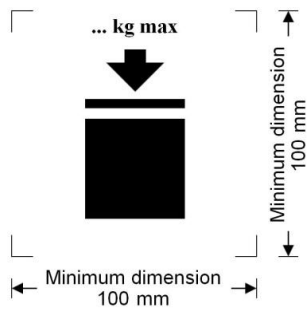
- a) the representative prototype was successfully tested to the packing group I or II performance level and marked with the letter “X” or “Y” in accordance with 5.1.1 c);
- b) the representative prototype was successfully tested in accordance with clause 7 with water and filled to not less than 98% of its maximum capacity and to its maximum permissible gross mass; and
- c) the large packaging has passed the leakproofness test set out in 7.8 at a test pressure of 30 kPa.

### 5.2 Additional marking

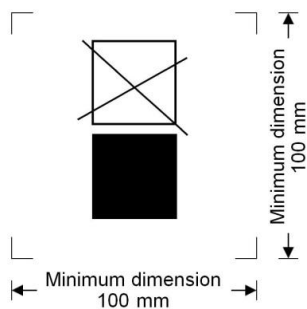
#### 5.2.1 Maximum permissible stacking load or non-stackable symbol

**5.2.1.1** The maximum permissible stacking load applicable shall be displayed on a symbol as shown in 5.2.1.1.1 or 5.2.1.1.2. The symbol and lettering shall be applied against a background of contrasting colour. The length of any side of the symbol as displayed on a large packaging shall be equal to or greater than 100 mm. The letters and numbers shall be at least 12 mm high.

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



**5.2.1.1.2** The non-stackable large packaging symbol shall appear as illustrated below



## 5.2.2 Compliance marks on remanufactured large packagings

When a UN design type is converted to another UN design type, the original primary marking and additional markings specified in 5.1.1 and 5.2.1 shall be removed or made permanently illegible and new primary marking and additional markings shall be applied in accordance with this standard.

## 5.2.3 Additional marking for salvage large packagings

Salvage large packagings shall additionally be marked with the word “SALVAGE” or “SECOURS” near the marks specified in 5.1.1. The lettering of the “SALVAGE” or “SECOURS” mark shall be at least 12 mm high.

## 5.2.4 Additional marking for recycled plastic material

Large packagings manufactured from recycled plastic shall be marked “REC” near the primary marking.

## 5.2.5 Illegible or missing compliance marks

### 5.2.5.1 General

When the compliance mark on a large packaging is illegible or missing, the owner or the manufacturer shall replace the compliance mark in accordance with 5.2.5.2.

### 5.2.5.2 Supporting documentation

Prior to the installation of a replacement mark:

- a) the owner shall have documented all the information on the compliance mark and can positively link the information to a specific large packaging, or

- b) the large packaging manufacturer can unequivocally link the large packaging to a set of data the manufacturer has kept on large packagings manufactured under its control.

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

## **6 Detailed requirements**

### **6.1 Metal large packagings (50A, 50B and 50N)**

**6.1.1** The large packaging shall be constructed of suitable ductile metal. Welds shall maintain their integrity when the large packaging is subjected to the test procedures required by this standard. Low temperature performance shall be taken into account when applicable.

#### **6.1.2 Galvanic action**

Care shall be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.

#### **6.1.3 Closures**

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

### **6.2 Flexible large packagings (51H and 51M)**

#### **6.2.1 Material of construction**

The large packaging shall be made of suitable material. The strength of the material used and the method of construction shall be appropriate to the capacity and intended use of the large packaging.

#### **6.2.2 Seams**

The seams of the large packaging shall be formed by stitching, heat sealing, gluing or an equally effective method. The ends of a stitched seam shall be secured.

#### **6.2.3 Resistance to aging and environmental degradation**

The materials of construction shall provide resistance to aging and degradation caused by the external environment, to substance contained and, if required, by ultraviolet radiation.

- a) For flexible plastic large packagings, if protection against ultraviolet radiation is necessary, then it shall be provided by the addition of a pigment or inhibitor such as carbon black to plastic materials. These additives shall be compatible with the contents and remain effective throughout the life of the large packaging.
- b) Additives may be included in the composition of the material to improve the resistance to aging or to serve other purposes, provided they do not adversely affect the physical or chemical properties of the material.

#### **6.2.4 Recycled plastic material**

Except for recycled plastic, no used material other than production residues or regrind from the same manufacturing process shall be used in the body.

#### **6.2.5 Height to width ratio**

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

### **6.2.6 Code 51M large packaging**

After complete immersion in water for at least 24 h, the materials used in the construction of a Code 51M large packaging shall retain at least 85% of their tensile strength, as measured originally on the material that was conditioned to equilibrium at 67% relative humidity or less.

## **6.3 Rigid plastic large packagings (50H)**

### **6.3.1 Material of construction**

The large packaging shall be made of suitable plastic resin of known specifications. The strength of the materials used and the method of construction of the body shall be appropriate to the capacity and intended use of the large packaging.

### **6.3.2 Closures**

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

### **6.3.3 Resistance to aging and environmental degradation**

The materials of construction shall provide resistance to aging and degradation caused by the external environment, to substance contained and, if required, by ultraviolet radiation.

- a) If protection against ultraviolet radiation is necessary, then it shall be provided by the addition of a pigment or inhibitor such as carbon black to plastic materials. These additives shall be compatible with the contents and remain effective throughout the life of the plastic body.
- b) Additives may be included in the composition of the plastic material to improve the resistance to aging or to serve other purposes, provided they do not adversely affect the physical or chemical properties of the material.

### **6.3.4 Recycled plastic material**

Except for recycled plastic, no used material other than production residues or regrind from the same manufacturing process shall be used in the body.

## **6.4 Fibreboard large packagings (50G)**

### **6.4.1 Material of construction**

The large packaging shall be made of solid or double-faced corrugated fibreboard (single or multiwall), appropriate to the capacity and intended use of the large packaging. The fibreboard shall be cut, creased without scoring, and slotted to permit assembly without cracking, surface breaks or undue bending. Large packagings made of corrugated fibreboard shall have the fluting firmly glued to the facings.

### **6.4.2 Puncture resistance**

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

### **6.4.3 Joints in the fibreboard**

The joints of large packaging shall be lapped and taped, lapped and glued, lapped and stitched with metal staples, or made by another equally effective method. The adhesive of glued or taped joints shall be water-resistant. If a

liner is used, metal staples shall pass completely through all fibreboard pieces and shall be protected to prevent any damage to the liner.

#### **6.4.4 Top lifting device**

The large packaging shall not incorporate top-lifting devices.

#### **6.4.5 Pallet base**

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

#### **6.4.6 Stacking**

A large packaging designed for stacking shall have a bearing surface that evenly distributes the load. Strengthening devices, such as timber supports used to increase the stacking performance of the large packaging, shall be external to the liner, if a liner is used.

### **6.5 Wooden large packagings (50C, 50D and 50F)**

#### **6.5.1 Material of construction**

The walls of the large packaging shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices. The strength of the materials used and the method of construction of the body shall be appropriate to the capacity and intended use of the large packaging.

#### **6.5.2 Natural wood**

If the large packaging is made of natural wood, the wood shall be well-seasoned, commercially dry and free from defects that would reduce the strength of any part of the large packaging. The wood shall also consist of parts that are made of one piece or the equivalent. A part is equivalent to one piece when a suitable method of glued assembly is used such as a Lindermann joint, a tongue and groove joint, a ship-lapped joint, a rabbet joint, and a butt joint with at least two corrugated metal fasteners at each joint or when other methods at least equally effective are used.

#### **6.5.3 Plywood**

If the large packaging is made of plywood:

- a) the plywood shall be well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would reduce the strength of the large packaging;
- b) the plywood shall consist of three or more plies and adjacent plies shall be glued with a water-resistant adhesive; and
- c) other materials may be used with plywood for the construction of the large packaging.

#### **6.5.4 Reconstituted wood**

If the large packaging is made of reconstituted wood, the wood shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

### **6.5.6 Top lifting device**

The large packaging shall not incorporate top-lifting devices.

### **6.5.7 Pallet base**

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

### **6.5.8 Stacking**

A large packaging designed for stacking shall have a bearing surface that evenly distributes the load. Strengthening devices such as timber supports used to increase the stacking performance of the large packaging shall be external to the liner, if a liner is used.

## **6.6 Inner packagings**

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

## **7 Test requirements for large packagings**

### **7.1 General requirements**

#### **7.1.1 Test samples**

Each representative prototype of a large packaging design shall pass the required tests prescribed in clause 7. Provided the validity of the test results is not affected, several tests may be made on one sample.

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

#### **7.1.2 Variations**

Tests shall be repeated after any modification of the design type, other than the permitted design variations specified in clause 8. Design variations shall be documented in the required large packaging design report and made available to the Director upon request. The Director may permit some or all of the tests in clause 7 to be waived for a large packaging design that differs only in minor respects from a UN standardized large packaging design type.

#### **7.1.3 Test schedule**

Large packagings selected for testing shall be representative of the design intended for production. The tests required for each design type are set out in 7.3 to 7.8 and Table 2.

#### 7.1.4 Additional testing

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

#### 7.1.5 Recycled plastic

For containers made of recycled plastic, the test schedule set out in 7.1.3 shall be repeated for each batch of recycled plastic material. The Director may permit some or all of the tests to be waived for different batches of recycled plastic material where the variation in the composition of the recycled plastic is minimal.

### 7.2 Preparation for testing

#### 7.2.1 General

Before testing in accordance with the applicable requirements in 7.3 to 7.8, load the large packaging with the filled inner packagings or articles intended for transport. Alternatively, the substances in the inner packagings or the articles may be replaced by a substitute that represents the dangerous goods intended for transport, except where this would invalidate the results of the tests.

##### 7.2.1.1 Large packagings with inner packagings for liquids

When a substitute is used to fill the inner packagings, it shall be of similar relative density and viscosity to those of the substance being transported. Water may also be used for the liquid drop test under the conditions in 7.6.5.2. When large packagings with inner packagings are conditioned at low temperature, the inner packagings shall be filled with a substitute test medium that has a relative density similar to water (0.95 minimum at room temperature) and remains liquid at  $-18^{\circ}\text{C}$ . The test medium may be kept in the liquid state by the addition of antifreeze, if necessary.

##### 7.2.1.2 Large packaging with inner packagings for solids or articles

When a substitute is used to fill the inner packagings or other articles are used, they shall have the same physical characteristics (mass, etc.) as the filled inner packagings or articles to be transported. It is permissible to use materials, such as bags of lead shot, to achieve the requisite maximum permissible gross mass provided the materials are placed so that the test results are not affected.

**7.2.1.3** For large packagings where the inner packagings are designed to contain liquid or solid dangerous goods, separate testing is required for both liquid and solid content.

#### 7.2.2 Conditioning

##### 7.2.2.1 Ambient temperature conditioning

Large packaging requiring ambient temperature conditioning shall be conditioned in accordance with ASTM D4332 or ASTM D7790.

##### 7.2.2.1.1 Fibreboard conditioning

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

- a)  $23 \pm 2^{\circ}\text{C}$  and  $50\% \pm 5\%$  RH (see ASTM D4332);

- b) 20 ± 2°C and 65% ± 5% RH;
- c) 27 ± 2°C and 65% ± 5% RH.

**7.2.2.2 Low temperature conditioning**

Large packagings made of plastic materials and large packagings containing inner packagings of plastic materials, other than bags intended to contain solids or articles, shall be conditioned at a maximum temperature of -18°C in accordance with ASTM D7790.

**Table 2 — Large packaging test requirements**

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Large packaging code	Bottom lift test <sup>b</sup> (see 7.3)	Top lift test <sup>b</sup> (see 7.4)	Stacking test <sup>c</sup> (see 7.5)	Drop test (see 7.6)	Water absorptiveness test (see 7.7)	Leakproofness test <sup>d</sup> (see 7.8)
Metal <sup>a</sup> : 50A, 50B, 50N	X	X	X	X	—	X
Flexible <sup>a</sup> : 51H, 51M	—	X	X	X	—	—
Rigid plastic <sup>a</sup> : 50H	X	X	X	X	—	X
Fibreboard <sup>a</sup> : 50G	X	—	X	X	X	—
Wooden <sup>a</sup> : 50C, 50D, 50F	X	—	X	X	—	—

<sup>a</sup> An “X” indicates that the tests are required. A large packaging that has passed one test may be used for the other tests, in any order.

<sup>b</sup> Conduct the test if the large packaging is designed for this method of handling.

<sup>c</sup> Conduct the test if the large packaging is designed to be stacked.

<sup>d</sup> This test is required for salvage large packagings only.

**7.3 Bottom lift test**

**7.3.1 Scope**

Conduct the test on a large packaging of any design type that is fitted with a means of lifting from the base.

**7.3.2 Preparation for testing**

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

**7.3.3 Procedure**

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



#### 7.3.4 Results

After testing, there shall be no observable permanent deformation which renders the large packaging unsafe for transport and no release of the contents.

### 7.4 Top lift test

#### 7.4.1 Scope

Conduct the test on a large packaging of any design type that is designed to be lifted from the top.

#### 7.4.2 Preparation for testing

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

- a) Metal and rigid plastics large packagings shall be filled. A load shall be added and evenly distributed. The mass of the filled large packaging and the load shall be twice the maximum permissible gross mass.
- b) Flexible large packagings shall be filled. A load shall be added and evenly distributed. The mass of the filled large packaging and the load shall be six times the maximum permissible gross mass.

#### 7.4.3 Procedure

Lift the large packaging in accordance with its designed lifting procedure until it clears the floor and hold for at least 5 min.

#### 7.4.4 Results

Criteria for passing the test

- a) Flexible large packaging: There shall be no observable permanent damage to the large packaging or its lifting devices which renders the large packaging unsafe for transport or handling and no release of the contents.
- b) Metal and rigid plastic large packaging: There shall be no observable permanent deformation of the large packaging, including the pallet base, if any, which renders the large packaging unsafe for transport or handling and no release of the contents.

**NOTE** Observable permanent damage/deformation includes any change in shape of any component of the large packaging such as bending of lifting eyes, vertical or horizontal structural members, buckling of side walls, top or bottom faces, etc. Some limited observable permanent damage/deformation may be acceptable, as long as it does not render the large packaging unsafe upon further handling. Examples of unsafe observable permanent damage/deformation could be bending such that stacking of containers is no longer stable, or that subsequent lifting events results in further movement of the components. If components are stressed by shipping vibration or drops, they may deform further, ultimately to a failure point that results in product leakage. Good engineering judgement combined with further testing or analysis may be required to determine safe from unsafe observable permanent damage/deformation.

### 7.5 Stacking test

#### 7.5.1 Scope

Conduct the test on a large packaging of any design type that is designed to have other large packagings of a similar design type stacked on it.

#### 7.5.2 Preparation for testing

Before testing in accordance with 7.5.3, fill the large packaging to its maximum permissible gross mass.

### 7.5.3 Procedure

- a) Place the large packaging on its base on level, hard ground. Apply the test load specified in 7.5.3 b) to the top of the large packaging for the time specified in 7.5.3 c) by one of the following methods:
  - 1) One or more large packagings of the same design type shall be filled to the maximum permissible gross mass and stacked on the large packaging under test; or
  - 2) Weights shall be loaded on either a flat plate or a reproduction of the base of the large packaging and stacked on the large packaging under test.
- b) Calculation of superimposed test load:
  - 1) The load to be placed on the large packaging shall be 1.8 times the combined maximum permissible gross mass of the number of large packagings of a similar large packaging design type that are intended to be stacked on top of the large packaging during transport.
- c) Subject the large packaging to the test load for the applicable time and conditions below:
  - 1) All types of large packagings other than metal large packagings — 24 h;
  - 2) Metal large packagings — 5 min.

### 7.5.4 Results

Criteria for passing the test

- a) All types of large packagings other than flexible large packagings: There shall be no observable permanent deformation which renders the large packaging unsafe for transport or handling and no release of the contents.
- b) Flexible large packaging: There shall be no deterioration of the body which renders the large packaging unsafe for transport or handling and no release of the contents.

## 7.6 Drop test

### 7.6.1 Scope

Conduct this test on a large packaging of any design type.

### 7.6.2 Preparation for testing

Before conditioning in accordance with 7.6.3, follow the steps below, as applicable.

- a) Large packagings with inner packagings containing liquids — Fill the inner packagings to at least 98% of their maximum capacity;
- b) Large packagings with inner packagings containing solids — Fill the inner packagings to at least 95% of their maximum capacity; and
- c) Large packagings for articles — Fill the large packaging to the maximum permissible gross mass.

### 7.6.3 Conditioning

Condition the large packaging at ambient temperature or at low temperature in accordance with 7.2.2.

- a) For rigid plastic large packaging — condition the large packaging at low temperature.

- b) For large packaging containing inner packagings of plastic material — condition the large packaging at low temperature.
- c) All other large packaging designs — condition the large packaging at ambient temperature.

#### 7.6.4 Procedure

Drop the unrestrained large packaging using the height specified in 7.6.5 onto a rigid, non-resilient, smooth, flat, horizontal surface. The point of impact shall be that part of the base that would cause the most damage to the large packaging.

NOTE Although drops onto corners may cause the most visible and drastic deformation to the large packaging, flat drops onto the base may result in greater shock loadings. This greater shock level may be transmitted into the inner packagings and may result in more severe damage that results in leakage. Care should be taken to account for this effect when deciding which orientation is used in drop testing to cause the most damage to the large packaging. Additional testing is one means by which the effect can be dealt with.

#### 7.6.5 Drop height

**7.6.5.1** For a large packaging containing articles or inner packaging containing solids or liquids if the test is performed with the substance to be transported or with another substance having essentially the same physical characteristics:

**Table 3 — Large packaging drop test – Articles or inner packaging containing solids or liquids**

Drop test height m		
Packing group I	Packing group II	Packing group III
1.8	1.2	0.8

**7.6.5.2** For a large packaging containing inner packagings containing liquids if the test is performed with water:

- a) Where the dangerous goods to be transported have a relative density not exceeding 1.2:

**Table 4 — Large packaging drop test – Inner packaging containing liquids with a relative density not exceeding 1.2**

Drop test height m		
Packing group I	Packing group II	Packing group III
1.8	1.2	0.8

- b) Where the dangerous goods to be transported have a relative density exceeding 1.2, the drop heights shall be calculated on the basis of the relative density,  $d$ , of the substance to be transported rounded up to the first decimal as follows:

**Table 5 — Large packaging drop test – Inner packaging containing liquids with a relative density exceeding 1.2**

Drop test height m		
Packing group I	Packing group II	Packing group III
d x 1.5	d x 1.0	d x 0.67

**7.6.6 Results**

Criteria for passing the test

There shall be no damage which renders the large packaging unsafe to be transported. There shall be no leakage of the filling substance from the inner packaging(s) or articles(s).

**7.7 Water absorptiveness test (Cobb test)****7.7.1 Scope**

Conduct the test on a fibreboard large packaging design type.

**7.7.2 Test method**

The water absorptiveness of at least one sample shall 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 specimen may be crushed with a heavy roller or other suitable means.

**7.7.3 Results**

The fibreboard shall not absorb more than 155 g/m<sup>2</sup> of water.

**7.8 Leakproofness test****7.8.1 Scope**

Conduct the test on a salvage large packaging design type.

**7.8.2 Pressure gauge**

The pressure shall be measured by use of a gauge of suitable range and accuracy. The gauge shall be regularly calibrated or be frequently verified for accuracy against a regularly calibrated gauge.

**7.8.3 Procedure**

Apply an air pressure of at least 30 kPa (0.3 bar) and hold the pressure for at least 10 min. Replace the vented closures with similar non-vented closures that are fastened in the closed position. During the test, observe the large packaging for air leakage using a method of detection such as air-pressure differential, coating the seams and joints with a soap solution and observing for bubbles, or another equally effective method.

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

#### 7.8.4 Results

There shall be no leakage of air from the large packaging.

NOTE For safety reasons, the leakproofness test may also be performed with water.

### 8 Permitted design variations

#### 8.1 Design variation requiring no testing

The variations to a tested large packaging design listed in 8.1.1 to 8.1.2 are permitted without further testing.

##### 8.1.1 Design variations applicable to any types of large packaging designs:

- a) An interior or exterior surface treatment (such as a protective coating, galvanizing or fluorination) may be added to a large packaging provided the treatment does not affect the mechanical properties of the treated material.
- b) Each overall dimension of a large packaging may be reduced in the same proportion, or the height of a large packaging design may be reduced provided, in each case, that the marked maximum permissible gross mass is reduced to the sum of the tare mass of the large packaging and the proportionately lower net mass.
- c) A non-integral liner that is made of a more flexible material than the body may be added to a large packaging provided the mass of the liner is less than 2% of the tare mass and the liner does not affect the performance of the closure system.
- d) Non-structural accessories, such as placard holders, may be added to a large packaging provided the change in tare mass of the large packaging is equal to or less than 5%.
- e) Additives may be included in the composition of the plastic of a large packaging to improve resistance to aging or ultraviolet radiation provided the chemical and physical properties of the plastic are not adversely affected. For example, the impact strength of the plastic in the cold dart drop test should not vary more than 10% from that for the tested large packaging.
- f) A different gasket may be installed on a large packaging provided the width and thickness of the gasket is the same as the original gasket and the material of construction of the gasket does not differ from the original gasket by more than 12% in hardness when measured in accordance with ASTM D1415 or ASTM D2240. The measured hardness of the new gasket may be 12% higher or 12% lower than the measured hardness of the original gasket from the successfully tested design.

##### 8.1.1.1 Inner packagings and articles

##### 8.1.1.2 Quantity of inner packagings and articles

A lesser number of inner packagings or articles may be assembled in a large packaging if:

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

### 8.1.1.3 Type of inner packaging and article

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

### 8.1.1.4 Inner packaging size and material

A different inner packaging of equivalent or smaller size or different material 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 large packagings in the same manner as in the tested design;
- e) the total number of inner packagings does not exceed that originally tested; and
- f) the cushioning thickness between the inner packagings and the large 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.

### 8.1.1.5 Combined variations

The variations permitted in 8.1.1.2, 8.1.1.3, and 8.1.1.4 may be combined.

## 8.1.2 Design variations applicable to specific types of large packaging designs:

### 8.1.2.1 Metal large packaging

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

### 8.1.2.2 Design variations requiring limited testing

Quantity of inner packagings or articles – A lesser number of inner packagings or articles that significantly contribute to the stacking strength of the large packaging may be used if the modified large packaging undergoes the stacking in accordance with 7.5.

## 9 Quality management system

### 9.1 General

Large packagings shall be manufactured and remanufactured under a quality management system capable of ensuring that the large packagings are in accordance with the tested and registered design specified in the design report, the requirements of this standard and the *TDG Regulations*. A copy of the quality management system shall be made available to the Director upon request.

## 9.2 Quality standard

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

## 9.3 Additives

When additives are included in the composition of the plastic, the specific properties of plastic material shall be verified and documented regularly as part of a quality management system.

# 10 Transport Canada registration

## 10.1 General

A person shall not manufacture a large packaging under this standard unless the manufacturing facility and the large packaging design have been registered with the Director. Remanufactured large packagings are subjected to the same design and manufacturing requirements that apply to new large packagings and the design type shall be registered with the Director.

## 10.2 Certificate of registration

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

## 10.3 Design registration number

A large packaging 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 Manufacturer

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

- a) name, street address, and mailing address of the company or individual applying for registration;
- b) name, title, address, email and telephone number of the corporate officer or other person responsible for compliance with this standard;
- c) name, title, address, email and telephone number of the local contact person responsible for compliance with this standard, if different from item b);
- d) if the applicant is not an individual, letters patent, certificates of incorporation, or other documents evidencing the legal existence of the applicant;
- e) the facility locations where the large packagings will be manufactured;
- f) design reports prepared in accordance with Annex A for all large packaging designs to be registered; and
- g) a copy of the ISO 9001 quality management system certificate for each facility location (as identified in item e), as issued by the quality management system registrar.

## 10.5 Record retention

10.5.1 The manufacturer shall keep a copy of every design report for as long as UN standardized large packagings are manufactured and at least two years thereafter.

## 10.6 Registration and compliance

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

- a) the large packagings manufactured and marked are representative of the registered design;
- b) the large packaging manufacturer conforms to the applicable requirements of this standard; and
- c) the manufacturer is capable of consistently complying with the requirements of this standard

## 10.7 Revocation for cause

### 10.7.1 Certificate of registration

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

- a) the large packagings 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.

### 10.7.2 Design registration number

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

- a) the large packaging as manufactured is not representative of the registered design as described in the Design report;
- b) the large packaging does not comply with the requirements of this standard.

## 10.8 Expiry of Certificate of registration

Manufacture of large packagings shall not continue past the expiry date of the Certificate of registration, unless:

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

## 10.9 Application for amendment or renewal

An application for amendment or renewal of a Certificate of registration is subjected to the same process and conditions as the initial application for Certificate of registration relating to the manufacturer. The application for renewal of a manufacturer need not include all previously submitted design reports, but shall include a list of all currently registered large packaging designs identified either as actively being manufactured or to be discontinued.



### 10.10 Equivalent specification (“W” mark)

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

### 10.11 Design modifications

When the modification is within the permitted design variations of clause 8 where no new testing is required, the applicant is not required to submit an application. However, the documentation shall be made available to the Director, upon request.

## Part II

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

## 11 General requirements

### 11.1 Selection and use

Except as permitted in clauses 12, 13 and 14, a large packaging shall not be used to handle, offer for transport, and transport dangerous goods unless:

- a) the requirements for selection and use set out in Part II and Appendix B specify that the large packaging is permitted to contain the dangerous goods;
- b) the large packaging is prescribed in the Packing instructions listed in Column 6 of the Table in Part 1 of Appendix B for the appropriate dangerous goods described in Column 1 to 5 of the Table in Part 1 of Appendix B;
- c) the large packaging conforms to the requirements of the applicable packing instructions;
- d) where large packaging codes are listed in the packing instructions, the large packaging is a UN standardized large packaging of that packaging code and is marked accordingly;
- e) if the large packaging is a UN standardized large packaging, the letter designating the packing group of the dangerous good shall be displayed:
  - 1) the capital letter “X” if the dangerous goods are in Packing groups I, II or III;
  - 2) the capital letter “Y” if the dangerous goods are in Packing groups II or III; or
  - 3) the capital letter “Z” if the dangerous goods are in Packing group III.

### 11.2 Reuse of a large packaging

A large packaging that is used more than once, shall be in such condition, including closure devices and cushioning materials, that they conform to all applicable requirements of the standard.

### 11.3 Before filling a large packaging

A large packaging shall not be filled with dangerous goods unless the large packaging is free of any visible defect that shows signs of reduced strength compared with the registered design type that may render the large packaging unsafe for transport.

### 11.4 Filling and closing a large packaging

The following requirements shall apply:

- a) The maximum permissible gross mass specified in the marking of a large packaging shall not be exceeded.
- b) The large packaging shall be closed as instructed in the information provided by the large packaging manufacturer or distributor in accordance with 4.7.
- c) Where pressure may develop in a large packaging by the evolution of gas from the contents, the large packaging shall be equipped with a vent provided that any gas emitted will not cause danger to public safety. The vent shall be designed so that when the large packaging 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.
- d) Combinations of different dangerous goods within the large packaging shall be in accordance with 13.1.

### 11.5 Before offering for transport and transporting

A large packaging containing dangerous goods shall be secured to the means of transport to prevent movement and damage of the large packaging, the other goods in the transport unit, or the transport unit itself.

## 12 Salvage large packagings

### 12.1 Application

Damaged, defective, leaking or non-conforming packaging, including inner receptacles and inner packagings, or articles that have spilled or leaked may be transported in a salvage large packaging marked with the letter "T" or the marks "SALVAGE" or "SECOURS" in accordance with the requirements of 5.1.1 b) and 5.2.3.

### 12.2 Securement within salvage large packaging

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

### 12.3 Liquids in salvage large packaging

When the salvage large packaging contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid. All cushioning and absorbent material used in the salvage large packaging shall be compatible with the dangerous goods contained in the damaged or leaking container or with the content of the damaged or leaking article.

## 13 General containment requirements

### 13.1 Combining dangerous goods

Dangerous goods shall not be transported together with other dangerous goods or non-dangerous goods in the same large packaging 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 large packaging; or
- b) cause a discharge, emission or escape of the dangerous goods from the large packaging that could constitute a danger to public safety.

## 14 Special cases

### 14.1 Transport of dangerous goods waste in quantity or concentration available to the general public

Dangerous goods waste in quantity or concentration available to the general public may be handled, offered for transport or transported if:

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

NOTE 1 This special case is not intended for waste batteries. Waste batteries shall be packaged in accordance with the appropriate packing instruction listed in Annex B.

NOTE 2 Intermediate packaging is the packaging between the inner and the outer packaging.

### 14.2 Transport of dangerous goods waste in quantity or concentration not available to the general public

Dangerous goods waste in quantity or concentration not available to the general public may be handled, offered for transport or transported if:

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

## **Annex A** *(normative)*

### **UN standardized large packaging design report**

**A.1** The following information, at a minimum, for the successfully tested large packaging design shall be provided in the UN standardized large packaging design report (see 4.6). Information provided in the report shall only be used for assessing conformance to the requirements of this standard by the Director.

#### **A.2 Contents**

##### **A.2.1 General**

The report shall contain the following general information:

- a) a unique identification number;
- b) the date of the report;
- c) when different from the large packaging manufacturer, the name, address, email and telephone number of the person, corporation, partnership or facility that has performed testing in accordance with clause 7;
- d) the facility locations at which the large packaging will be manufactured;
- e) the proposed compliance mark as required in clause 5;
- f) the standard to which the large packaging is designed and its edition or publication date; and
- g) the large packaging information provided by the large packaging manufacturer or distributor to user as specified in 4.7.

##### **A.2.2 Testing**

The report shall contain the following testing information:

- a) the tests, and references to the applicable paragraphs of this standard, that were conducted on the large packaging;
- b) the date that the tests were conducted;
- c) a description of the equipment used for testing the large packaging;
- d) the test medium;
- e) a description of the method for each test; and
- f) the results of each test.

**NOTE** Provide test results in terms of the pass/fail criteria of each specific test and each tested sample large packaging (results may be displayed in a tabular form). Describe damage in detail. Photographs of each sample after testing are desirable. The date that the tests were conducted will be identified.

### A.3 Description of the large packaging design type

A.3.1 The report shall include:

- a) the tare mass and the maximum permitted gross mass of the large packaging and any inner packagings or articles used in the testing;
- b) a drawing of the assembly of the large packaging including dimensions, materials list, and location of openings and fittings; and
- c) the fabrication method of the large packaging including the type, specification, and number and location of joints, seams and fasteners. For seams, the forming method shall be identified.

#### A.3.2 Drawings

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

#### A.3.3 Other components

The report shall describe the components of the large packaging including gaskets, liners, loading and discharge devices, and pallet base. The description shall include the dimensions and the materials of construction of the components.

#### A.3.4 Materials of construction

The report shall describe the materials of construction and additives of all structural components of the large packaging, including the liner and any inner packagings.

#### A.3.5 Material specification

The description of the materials in A3.4 shall include the following information:

- a) for metal (50A, 50B, 50N): type, specification (ASTM or ISO standard) and nominal thickness;
- b) for plastics, molded (50H): resin type, density and nominal thickness;
- c) for plastics, woven (51H): resin type, fabric (warp/weft) tapes per 100 mm, mass per unit area and material strength;
- d) for plastics, film (51H): resin type, nominal thickness and material strength;
- e) for fibreboard, rigid (50G): puncture resistance, number of plies, minimum combined mass of plies and average values for the burst test or edge crush test;
- f) for fibreboard, corrugated (50G): board style, grammage of facings and medium, average values for the bursting test or edge crush test, the flute type and adhesive type;
- g) for paper, flexible (51M): type of paper, grammage, number of plies;
- h) for natural wood (50C): species and thickness;
- i) for plywood (50D): species, adhesive type, thickness and number of plies; and
- j) for reconstituted wood (50F): type, thickness and adhesive type.

#### **A.4. Certification statement**

**A.4.1** The report shall include a statement declaring that all requirements of this standard have been met, including the date and signature of the officer responsible for compliance to this standard on behalf of the large packaging manufacturer. The statement shall be signed by a representative of the manufacturer, by the person who conducted the tests, and by his or her employer if the employer is different from the manufacturer.

## Annex B (normative)

### Dangerous goods list and packing instructions

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

**B.2** Part 2 of Annex B provides for Detailed packing instructions.

#### Part 1: Dangerous goods list with packing instructions numbers

##### Description of table columns

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN number	Dangerous goods	Class	Subsidiary class	Packing group	Packing instructions
UN number assigned to the dangerous goods	Shipping names and description of dangerous goods	Primary class in accordance with the TDG Regulations	Subsidiary class in accordance with the TDG Regulations	Packing group classification in accordance with the TDG Regulations	Packing instructions that apply to the dangerous goods <sup>a</sup>

<sup>a</sup> A code including the letters "LP" refers to the large packagings.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
<b>Class 3 – Flammable liquids</b>					
Any	All Dangerous Goods of Class 3 and PG I	3	Any or none	I	LP11
Any	All Dangerous Goods of Class 3 and PG II	3	Any or none	II	LP11
Any	All Dangerous Goods of Class 3 and PG III, except those listed below:	3	Any or none	III	LP1
1106	AMYLAMINE	3	8	III	LP11
1198	FORMALDEHYDE SOLUTION, FLAMMABLE	3	8	III	LP11
1289	SODIUM METHYLATE SOLUTION in alcohol	3	8	III	LP11
1297	TRIMETHYLAMINE, AQUEOUS SOLUTION, not more than 50% trimethylamine, by mass	3	8	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
1308	ZIRCONIUM SUSPENDED IN A FLAMMABLE LIQUID	3	—	III	LP11
1986	ALCOHOLS, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	LP11
1988	ALDEHYDES, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	LP11
1992	FLAMMABLE LIQUID, TOXIC N.O.S.	3	6.1	III	LP11
2260	TRIPROPYLAMINE	3	8	III	LP11
2276	2-ETHYLHEXYLAMINE	3	8	III	LP11
2310	PENTANE-2,4-DIONE	3	6.1	III	LP11
2361	DIISOBUTYLAMINE	3	8	III	LP11
2478	ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. or ISOCYANATE SOLUTION, FLAMMABLE, TOXIC, N.O.S.	3	6.1	III	LP11
2526	FURFURYLAMINE	3	8	III	LP11
2529	ISOBUTYRIC ACID	3	8	III	LP11
2610	TRIALLYLAMINE	3	8	III	LP11
2733	AMINES, FLAMMABLE, CORROSIVE, N.O.S. or POLYAMINES, FLAMMABLE, CORROSIVE, N.O.S.	3	8	III	LP11
2841	DI-n-AMYLAMINE	3	6.1	III	LP11
2924	FLAMMABLE LIQUID, CORROSIVE, N.O.S.	3	8	III	LP11
3065	ALCOHOLIC BEVERAGES, with more than 24% but not more than 70% alcohol by volume	3	—	III	LP11
3248	Medicine, Liquid, Flammable, Toxic, N.O.S.	3	6.1	III	LP11
3256	Elevated Temperature Liquid, Flammable, N.O.S. with a flash point above 60 °C, at or above its flash point	3	—	III	LP11
3269	POLYESTER RESIN KIT, liquid base material	3	—	III	LP11



Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
3469	PAINT FLAMMABLE, CORROSIVE(including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid lacquer base) or PAINT RELATED MATERIAL CORROSIVE, FLAMMABLE (including paint thinning or reducing compound)	3	8	III	LP11
3494	PETROLEUM SOUR CRUDE OIL, FLAMMABLE, TOXIC	3	6.1	III	LP11
<b>Any</b>	<b>Dangerous Goods with no assigned Packing Group</b>	<b>3</b>	<b>Any or none</b>	<b>—</b>	<b>LP11</b>
<b>Division 4.1 — Flammable solids, self-reactive substances and solid de-sensitized explosives</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 4.1 and PG I</b>	<b>4.1</b>	<b>Any or none</b>	<b>I</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 4.1 and PG II</b>	<b>4.1</b>	<b>Any or none</b>	<b>II</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 4.1 and PG III, except those listed below:</b>	<b>4.1</b>	<b>Any or none</b>	<b>III</b>	<b>LP2</b>
<b>Any</b>	<b>Any SELF-REACTIVE LIQUID or SELF-REACTIVE SOLID</b>	<b>4.1</b>	<b>Any or none</b>	<b>III</b>	<b>LP11</b>
<b>Any</b>	<b>Any SELF-REACTIVE LIQUID, TEMPERATURE CONTROLLED or SELF-REACTIVE SOLID, TEMPERATURE CONTROLLED</b>	<b>4.1</b>	<b>Any or none</b>	<b>III</b>	<b>LP11</b>
1313	CALCIUM RESINATE	4.1	—	III	LP11
1314	CALCIUM RESINATE, FUSED	4.1	—	III	LP11
1318	COBALT RESINATE, PRECIPITATED	4.1	—	III	LP11
1324	FILMS, NITROCELLULOSE BASE, gelatin coated, except scrap	4.1	—	III	LP11
1328	HEXAMETHYLENE-TETRAMINE	4.1	—	III	LP11
1330	MANGANESE RESINATE	4.1	—	III	LP11
1331	MATCHES, 'STRIKE ANYWHERE'	4.1	—	III	LP11
1338	PHOSPHORUS, AMORPHOUS	4.1	—	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
1353	FIBRES or FABRICS IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S.	4.1	—	III	LP11
1944	MATCHES, SAFETY (book, card or strike on box)	4.1	—	III	LP11
1945	MATCHES, WAX 'VESTA'	4.1	—	III	LP11
2254	MATCHES, FUSEE	4.1	—	III	LP11
2304	NAPHTHALENE, MOLTEN	4.1	—	III	LP11
2448	SULPHUR, MOLTEN	4.1	—	III	LP11
2623	FIRELIGHTERS, SOLID with flammable liquid	4.1	—	III	LP11
2714	ZINC RESINATE	4.1	—	III	LP11
2715	ALUMINUM RESINATE	4.1	—	III	LP11
2858	ZIRCONIUM, DRY, coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns)	4.1	—	III	LP11
2925	FLAMMABLE SOLID, CORROSIVE, ORGANIC, N.O.S.	4.1	8	III	LP11
2926	FLAMMABLE SOLID, TOXIC, ORGANIC, N.O.S.	4.1	6.1	III	LP11
2956	5-tert-BUTYL-2,4,6-TRINITRO-m-XYLENE (MUSK XYLENE)	4.1	—	III	LP11
3089	METAL POWDER, FLAMMABLE, N.O.S.	4.1	—	III	LP11
3097	FLAMMABLE SOLID, OXIDIZING, N.O.S.	4.1	5.1	III	LP11
3176	FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S.	4.1	—	III	LP11
3179	FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S.	4.1	6.1	III	LP11
3180	FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S.	4.1	8	III	LP11
3182	METAL HYDRIDES, FLAMMABLE, N.O.S.	4.1	—	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
3251	ISOSORBIDE-5-MONONITRATE	4.1	—	III	LP11
3527	POLYESTER RESIN KIT, solid base material	4.1	—	III	LP11
3531	POLYMERIZING SUBSTANCE, SOLID, STABILIZED, N.O.S.	4.1	—	III	LP11
3532	POLYMERIZING SUBSTANCE, LIQUID, STABILIZED, N.O.S.	4.1	—	III	LP11
3533	POLYMERIZING SUBSTANCE, SOLID, TEMPERATURE CONTROLLED, N.O.S.	4.1	—	III	LP11
3534	POLYMERIZING SUBSTANCE, LIQUID, TEMPERATURE CONTROLLED, N.O.S.	4.1	—	III	LP11
<b>Any</b>	<b>Dangerous Goods with no assigned Packing Group</b>	<b>4.1</b>	<b>Any or none</b>	<b>—</b>	<b>LP11</b>
<b>Class 4.2 — Substances liable to spontaneous combustion</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 4.2 and PG I</b>	<b>4.2</b>	<b>Any or none</b>	<b>I</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 4.2 and PG II</b>	<b>4.2</b>	<b>Any or none</b>	<b>II</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 4.2 and PG III, except those listed below:</b>	<b>4.2</b>	<b>Any or none</b>	<b>III</b>	<b>LP2</b>
1372	FIBRES, ANIMAL, burnt, wet or damp or FIBRES, VEGETABLE, burnt, wet or damp	4.2	—	III	LP11
1373	FIBRES or FABRICS, ANIMAL or VEGETABLE or SYNTHETIC, N.O.S. with oil	4.2	—	III	LP11
1379	PAPER, UNSATURATED OIL TREATED, incompletely dried (including carbon paper)	4.2	—	III	LP11
1385	SODIUM SULPHIDE, ANHYDROUS or SODIUM SULPHIDE with less than 30% water or crystallization	4.2	—	III	LP11
1387	WOOL WASTE, WET	4.2	—	III	LP11
1857	TEXTILE, WASTE, WET	4.2	—	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
2006	PLASTICS, NITROCELLULOSE-BASED, SELF-HEATING, N.O.S.	4.2	—	III	LP11
2009	ZIRCONIUM, DRY, finished sheets, strip or coiled wire	4.2	—	III	LP11
2210	MANEB or MANEB PREPARATION with not less than 60% maneb	4.2	4.3	III	LP11
3126	SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	III	LP11
3127	SELF-HEATING SOLID, OXIDIZING, N.O.S.	4.2	5.1	III	LP11
3128	SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	III	LP11
3183	SELF-HEATING LIQUID, ORGANIC, N.O.S.	4.2	—	III	LP11
3184	SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S.	4.2	6.1	III	LP11
3185	SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S.	4.2	8	III	LP11
3186	SELF-HEATING LIQUID, INORGANIC, N.O.S.	4.2	—	III	LP11
3187	SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	III	LP11
3188	SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	III	LP11
3191	SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S.	4.2	6.1	III	LP11
3192	SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S.	4.2	8	III	LP11
3206	ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S.	4.2	8	III	LP11
3400	ORGANOMETALLIC SUBSTANCE, SOLID SELF-HEATING	4.2	—	III	LP11
<b>Any</b>	<b>Dangerous Goods with no assigned Packing Group</b>	<b>4.2</b>	<b>Any or none</b>	<b>—</b>	<b>LP11</b>

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
<b>Division 4.3 — Substances which in contact with water, emit flammable gases</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 4.3</b>	<b>4.3</b>	<b>Any or none</b>	<b>Any or none</b>	<b>LP11</b>
<b>Class 5.1 — Oxidizing substances</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 5.1 and PG I</b>	<b>5.1</b>	<b>Any or none</b>	<b>I</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 5.1 and PG II, except those listed below:</b>	<b>5.1</b>	<b>Any or none</b>	<b>II</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 5.1 and PG III, except those listed below:</b>	<b>5.1</b>	<b>Any or none</b>	<b>III</b>	<b>LP2</b>
1500	SODIUM NITRITE	5.1	6.1	III	LP11
1511	UREA HYDROGEN PEROXIDE	5.1	8	III	LP11
1748	CALCIUM HYPOCHLORITE, DRY or CALCIUM HYPOCHLORITE MIXTURE, DRY with more than 39% available chlorine (8.8% available oxygen)	5.1	—	III	LP11
2427	POTASSIUM CHLORATE, AQUEOUS SOLUTION	5.1	—	III	LP11
2428	SODIUM CHLORATE, AQUEOUS SOLUTION	5.1	—	III	LP11
2429	CALCIUM CHLORATE, AQUEOUS SOLUTION	5.1	—	III	LP11
2880	CALCIUM HYPOCHLORITE, HYDRATED or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, with not less than 5.5% but not more than 16% water	5.1	—	III	LP11
2984	HYDROGEN PEROXIDE, AQUEOUS SOLUTION with not less than 8% but less than 20% hydrogen peroxide (stabilized as necessary)	5.1	—	III	LP11
3085	OXYDIZING SOLID, CORROSIVE, N.O.S.	5.1	8	III	LP11
3087	OXIDIZING SOLID, TOXIC, N.O.S.	5.1	6.1	III	LP11
3098	OXIDIZING LIQUID, CORROSIVE, N.O.S.	5.1	8	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
3099	OXIDIZING LIQUID, TOXIC, N.O.S.	5.1	6.1	III	LP11
3139	OXIDIZING LIQUID, N.O.S.	5.1	—	III	LP11
3210	CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	LP11
3211	PERCHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	LP11
3213	BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	LP11
3216	PERSULPHATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	LP11
3218	NITRATES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	LP11
3219	NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S.	5.1	—	III	LP11
3405	BARIUM CHLORATE SOLUTION	5.1	6.1	III	LP11
3406	BARIUM PERCHLORATE SOLUTION	5.1	6.1	III	LP11
3407	CHLORATE AND MAGNESIUM CHLORIDE MIXTURE SOLUTION	5.1	—	III	LP11
3408	LEAD PERCHLORATE SOLUTION	5.1	6.1	III	LP11
3487	CALCIUM HYPOCHLORITE, HYDRATED, CORROSIVE or CALCIUM HYPOCHLORITE, HYDRATED MIXTURE, CORROSIVE with less than 5.5% but not more than 16% water	5.1	8	III	LP11
<b>Any</b>	<b>All Dangerous Goods of Class 5.1 with no assigned Packing Group</b>	<b>5.1</b>	<b>Any or none</b>		<b>LP11</b>
<b>Class 5.2 — Organic Peroxides</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 5.2</b>	<b>5.2</b>	<b>Any or none</b>	<b>Any or none</b>	<b>LP11</b>
<b>Class 6.1 — Toxic substances</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 6.1 and PG I</b>	<b>6.1</b>	<b>Any or none</b>	<b>I</b>	<b>LP11</b>

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
Any	All Dangerous Goods of Class 6.1 and PG II	6.1	Any or none	II	LP11
Any	All <u>Liquid</u> Dangerous Goods of Class 6.1 and <u>PG III</u> , except those listed below:	6.1	Any or none	III	LP1
1851	MEDICINE, LIQUID, TOXIC, N.O.S.	6.1	—	III	LP11
2903	PESTICIDE, LIQUID, TOXIC, FLAMMABLE, N.O.S., flash point not less than 23°C	6.1	3	III	LP11
2991	CARBAMATE, PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
2993	ARSENICAL PESTICIDE, LIQUID TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
2995	ORGANOCHLORINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
2997	TRIAZINE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3005	THIOCARBAMATE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3009	COPPER BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3011	MERCURY BASED PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3013	SUBSTITUTED NITROPHENOL PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3015	BIPYRIDILIUM PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3017	ORGANOPHOSPHORUS PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
3019	ORGANOTIN PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3025	COUMARIN DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3347	PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point not less than 23°C	6.1	3	III	LP11
3351	PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE, flash point no less than 23°C	6.1	3	III	LP11
3410	4-CHLORO- <i>o</i> -TOLUIDINE HYDROCHLORIDE SOLUTION	6.1	—	III	LP11
3411	beta-NEPHTHYLAMINE	6.1	—	III	LP11
3424	AMMONIUM DINITRO- <i>o</i> -CRESOLATE, SOLUTION	6.1	—	III	LP11
3440	SELENIUM COMPOUND, LIQUID, N.O.S.	6.1	—	III	LP11
<b>Any</b>	<b>All <u>Solid</u> Dangerous Goods of Class 6.1 and <u>PG III</u>, except those listed below:</b>	<b>6.1</b>	<b>Any or none</b>	<b>III</b>	<b>LP2</b>
2763	TRIAZINE PESTICIDE, SOLID, TOXIC	6.1	—	III	LP11
3249	MEDICINE, SOLID, TOXIC, N.O.S.	6.1	—	III	LP11
3462	TOXINS, EXTRACTED FROM LIVING SOURCES, SOLID, N.O.S.	6.1	—	III	LP11
<b>Any</b>	<b>Any Dangerous Goods of Class 6.1 with no assigned Packing Group</b>	<b>6.1</b>	<b>Any or none</b>	<b>—</b>	<b>LP11</b>
<b>Class 8 — Corrosive substances</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 8 and PG I</b>	<b>8</b>	<b>Any or none</b>	<b>I</b>	<b>LP11</b>
<b>Any</b>	<b>All Dangerous Goods of Class 8 and PG II, except those listed below:</b>	<b>8</b>	<b>Any or none</b>	<b>II</b>	<b>LP11</b>
2531	METHACRYLIC ACID, STABILIZED	8	—	II	LP1



Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
<b>Any</b>	<b>All <u>Liquid</u> Goods of Class 8 and <u>PG III</u>, except those listed below:</b>	<b>8</b>	<b>Any or none</b>	<b>III</b>	<b>LP1</b>
1719	CAUSTIC ALKALI LIQUID, N.O.S.	8	—	III	LP11
1761	CUPRIETHYLENEDIAMINE SOLUTION	8	6.1	III	LP11
2215	MALEIC ANHYDRIDE, MOLTEN	8	—	III	LP11
2803	GALLIUM	8	—	III	LP11
2809	MERCURY	8	6.1	III	LP11
2922	CORROSIVE LIQUID, TOXIC, N.O.S.	8	6.1	III	LP11
3066	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or reducing compound)	8	—	III	LP11
3421	POTASSIUM HYDROGEN DIFLUORIDE SOLUTION	8	6.1	III	LP11
3471	HYDROGEN DIFLUORIDES SOLUTION, N.O.S.	8	6.1	III	LP11
<b>Any</b>	<b>All <u>Solid</u> Goods of Class 8 and <u>PG III</u> except those listed below:</b>	<b>8</b>	<b>Any or none</b>	<b>III</b>	<b>LP2</b>
1774	FIRE EXTINGUISHER CHARGES, corrosive liquid	8	—	II	LP11
2028	BOMBS, SMOKE, NON-EXPLOSIVE with corrosive liquid, without initiating device	8	—	II	LP11
2215	MALEIC ANHYDRIDE	8	—	III	LP11
2803	GALLIUM	8	—	III	LP11
2809	MERCURY	8	6.1	III	LP11
2817	AMMONIUM HYDROGEN-DIFLUORIDE SOLUTION	8	6.1	III	LP11
2818	AMMONIUM POLYSULPHIDE SOLUTION	8	6.1	III	LP11
2923	CORROSIVE SOLID, TOXIC, N.O.S.	8	6.1	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
3084	CORROSIVE SOLID, OXIDIZING, N.O.S.	8	5.1	II	LP11
3095	CORROSIVE SOLID, SELF-HEATING, N.O.S.	8	4.2	II	LP11
3096	CORROSIVE SOLID, WATER-REACTIVE, N.O.S.	8	4.3	II	LP11
3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.	8	—	II	LP11
3495	IODINE	8	6.1	III	LP11
<b>Any</b>	<b>Any Dangerous Goods of Class 8 with no assigned Packing Group</b>	<b>8</b>	<b>Any or none</b>	<b>—</b>	<b>LP11</b>
2794	BATTERIES, WET, FILLED WITH ACID, electric storage	8	—	—	LP801
2795	BATTERIES, WET, FILLED WITH ALKALI, electric storage	8	—	—	LP801
<b>Class 9 — Miscellaneous substances and articles</b>					
<b>Any</b>	<b>All Dangerous Goods of Class 9 and PG I</b>	<b>9</b>	<b>Any or none</b>	<b>I</b>	<b>LP11</b>
<b>Any</b>	<b>All <u>Liquid</u> Dangerous Goods of Class 9 and <u>PG II</u></b>	<b>9</b>	<b>Any or none</b>	<b>II</b>	<b>LP11</b>
<b>Any</b>	<b>All <u>Liquid</u> Dangerous Goods of Class 9 and <u>PG III</u>, except those listed below:</b>	<b>9</b>	<b>Any or none</b>	<b>III</b>	<b>LP1</b>
3257	ELEVATED TEMPERATURE LIQUID, N.O.S., at or above 100°C and below its flash point (including molted metals, molten salts, etc.)	9	—	III	LP11
<b>Any</b>	<b>All <u>Solid</u> Dangerous Goods of Class 9 and <u>PG II</u></b>	<b>9</b>	<b>Any or none</b>	<b>II</b>	<b>LP11</b>
<b>Any</b>	<b>All <u>Solid</u> Dangerous Goods of Class 9 and <u>PG III</u>, except those listed below:</b>	<b>9</b>	<b>Any or none</b>	<b>III</b>	<b>LP2</b>
2211	POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour	9	—	III	LP11
2216	FISH MEAL (FISH SCRAP), STABILIZED	9	—	III	LP11

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
UN No.	Dangerous goods	Class	Sub-class	Packing group	Packing instructions
2590	ASBESTOS, CHRYSOTILE	9	—	III	LP11
2807	MAGNETIZED MATERIAL	9	—	III	LP11
3258	ELEVATED TEMPERATURE SOLID, N.O.S., at or above 240°C	9	—	III	LP11
3314	PLASTIC MOULDING COMPOUND in dough, sheet or extruded rope from evolving flammable vapour	9	—	III	LP11
3316	CHEMICAL KIT or FIRST AID KIT	9	—	III	LP11
<b>Any</b>	<b>Any Dangerous Goods of Class 9 with no assigned Packing Group, except those listed below:</b>	<b>9</b>	Any or none	—	<b>LP11</b>
3090	LITHIUM METAL BATTERIES (including lithium alloy batteries)	9	—	—	LP903 LP904 LP905
3091	LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT or LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT (including lithium alloy batteries)	9	—	—	LP903 LP904 LP905
3268	SAFETY DEVICES, electrically initiated	9	—	—	LP902
3480	LITHIUM ION BATTERIES (including lithium ion polymer batteries)	9	—	—	LP903 LP904 LP905
3481	LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or LITHIUM ION BATTERIES PACKED WITH EQUIPMENT (including lithium ion polymer batteries)	9	—	—	LP903 LP904 LP905
3509	PACKAGINGS, DISCARDED, EMPTY, UNCLEANED	9	—	—	LP2

## Part 2 – Detailed packing instructions

PACKING INSTRUCTION LP1					
The dangerous goods shall be handled, offered for transport and transported in the following large packagings:					
Inner packagings		Large packaging	PG I	PG II	PG III
Glass Plastics Metal	10L 30L 40L	50A 50B 50C 50D 50F 50G 50H 50N	Not allowed	Not allowed	Allowed

PACKING INSTRUCTION LP2					
The dangerous goods shall be handled, offered for transport and transported in the following large packagings:					
Inner packagings		Large packaging	PG I	PG II	PG III
Glass Plastics <sup>b</sup> Metal Paper <sup>a,b</sup> Fibre <sup>a,b</sup>	10 kg 50 kg 50 kg 50 kg 50 kg	50A 50B 50C 50D 50F 50G 50H 50N 51H <sup>c,d</sup>	Not allowed	Not allowed	Allowed

<sup>a</sup> These inner packagings shall not be used when the substances being transported may become liquid during transport.

<sup>b</sup> These inner packagings shall be siftproof.

<sup>c</sup> To be used with flexible inner packaging only.

<sup>d</sup> This large packaging shall not be used when the substances being transported may become liquid during transport.

### **Substance Specific Provision:**

UN 3509: Large packagings and their parts shall be transported in leakproof and sift-proof containers. Large packagings that are transported closed and do not leak may be transported unpackaged.

**PACKING INSTRUCTION LP11**

The dangerous goods shall not be handled, offered for transport or transported in a large packaging.

**PACKING INSTRUCTION LP801**

This packing instruction applies to UN 2794 and UN 2795

The dangerous goods shall be handled, offered for transport and transported on shelves, which are permanently fixed and secured to the means of transport.

Additional requirements:

1. Batteries are loaded and secured on the shelves as to prevent damage, short circuits, and inadvertent movement so that under normal conditions of transport, including handling, there will be no release of the dangerous goods that could endanger public safety.
2. Battery terminals shall not support the weight of other superimposed elements.

**PACKING INSTRUCTION LP902**

This packing instruction applies to UN 3268

The dangerous goods shall be handled, offered for transport and transported in:

1. a code 50A, 50B, 50C, 50D, 50F, 50G, 50H, 50N large packaging that meets the packing group III performance level

Unpackaged articles may also be offered for transport or transported in a dedicated handling device, vehicle or closed cargo transport unit.

Additional requirement:

1. The articles shall be packaged or secured to prevent movement and inadvertent operation during normal conditions of transport.

**PACKING INSTRUCTION LP903**

This packing instruction applies to batteries of UN 3090, UN 3091, UN 3480, UN 3481, including those contained in equipment

The dangerous goods shall be handled, offered for transport and transported in:

1. a code 50A, 50B, 50C, 50D, 50F, 50G, 50H, 50N large packaging that meets the packing group II performance level

Additional requirements:

1. The battery or the equipment shall be packed so that the battery or the equipment is protected against damage that may be caused by its movement or placement within the large packaging.
2. Batteries shall be protected against short circuit and the dangerous evolution of heat by various means, including, but not limited to:
  - a) individual protection of the battery terminals,
  - b) batteries with recessed terminals designed to protect against short circuits,
  - c) the use of an electrically non-conductive and non-combustible cushioning material to fill empty space between the batteries and the large packaging.

**PACKING INSTRUCTION LP904**

This packing instruction applies to damaged or defective batteries or batteries transported for disposal or recycling of UN 3090, UN 3091, UN 3480, UN 3481, including those contained in equipment.

The dangerous goods shall be handled, offered for transport and transported in:

1. a code 50A, 50B, 50D, 50H, 50N large packaging that meets the packing group II performance level.

Additional requirements:

1. Each damaged or defective battery or equipment containing such a battery shall be individually packed in an inner packaging and placed inside of the large packaging. The inner packagings or the large packaging shall be leakproof to prevent the potential release of electrolyte.
2. The inner packagings shall be surrounded by sufficient non-combustible and non-conductive thermal insulation material to protect against a dangerous evolution of heat.
3. Sealed packagings shall be fitted with a venting device when appropriate.
4. Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movements of the batteries within the large packaging that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may also be used to meet this requirement.
5. For leaking batteries, sufficient inert absorbent material shall be added to the inner packagings or the large packaging to absorb any release of electrolyte.
6. The battery shall be protected against short circuit and the dangerous evolution of heat by various means, including, but not limited to:
  - a) individual protection of the battery terminals,
  - b) batteries with recessed terminals designed to protect against short circuits,
  - c) the use of an electrically non-conductive and non-combustible cushioning material to fill empty space between the batteries and the large packaging.

**PACKING INSTRUCTION LP905**

This packing instruction applies to UN 3090, UN 3091, UN 3480, UN 3481, production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

The dangerous goods shall be handled, offered for transport and transported in:

1. For a single battery:
  - a) a code 50A, 50B, 50C, 50D, 50F, 50G, 50H, 50N large packaging that meets the packing group II performance level
  - b) each battery shall be individually packed in an inner packaging and placed inside an outer packaging.
  - c) each inner packaging shall be completely surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat.
  - d) appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the container that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may be used to meet this requirement.
2. For cells or batteries contained in a single item of equipment:
  - a) a code 50A, 50B, 50C, 50D, 50F, 50G, 50H, 50N large packaging that meets the packing group II performance level
  - b) the equipment shall be constructed or packaged to prevent accidental operation during transport;
  - c) appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may be used to meet this requirement.

Additional requirements:

1. Cells or batteries shall be protected against short circuit and the dangerous evolution of heat by various means, including, but not limited to:
  - a) individual protection of the battery terminals,
  - b) batteries with recessed terminals designed to protect against short circuits,
  - c) the use of an electrically non-conductive and non-combustible cushioning material to fill empty space between the batteries and the large packaging.