IMDG CODE

INTERNATIONAL MARITIME DANGEROUS GOODS CODE

VOLUME 1

2024 EDITION

INCORPORATING AMENDMENT 42-24

IMO INTERNATIONAL MARITIME ORGANIZATION

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VOLUME 2

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Foreword

The International Convention for the Safety of Life at Sea, 1974 (SOLAS), as amended, deals with various aspects of maritime safety and contains in chapter VII the mandatory provisions governing the carriage of dangerous goods in packaged form or in solid form in bulk. The carriage of dangerous goods is prohibited except in accordance with the relevant provisions of chapter VII, which are amplified by the *International Maritime Dangerous Goods Code* (IMDG Code).

Regulation II-2/19 of the SOLAS Convention, as amended, specifies the special requirements for a ship intended to carry dangerous goods, the keel of which was laid or which was at a similar stage of construction on or after 1 July 2002.

The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL), deals with various aspects of prevention of marine pollution, and contains in its Annex III the mandatory provisions for the prevention of pollution by harmful substances carried by sea in packaged form. Regulation 1(2) prohibits the carriage of harmful substances in ships except in accordance with the provisions of Annex III, which are also amplified by the IMDG Code.

In accordance with the Provisions concerning Reports on Incidents Involving Harmful Substances (Protocol I to MARPOL), incidents involving losses of such substances from ships must be reported by the master or other person having charge of the ship concerned.

The IMDG Code that was adopted by resolution A.716(17) and amended by amendments 27 to 30 was recommended to Governments for adoption or for use as the basis for national regulations in pursuance of their obligations under regulation VII/1.4 of the 1974 SOLAS Convention, as amended, and regulation 1(3) of Annex III of MARPOL. The IMDG Code, as amended, attained mandatory status from 1 January 2004 under the umbrella of SOLAS; however, some parts of the Code continue to be recommendatory. Observance of the Code harmonizes the practices and procedures followed in the carriage of dangerous goods by sea and ensures compliance with the mandatory provisions of the SOLAS Convention and of Annex III of MARPOL.

The Code, which sets out in detail the requirements applicable to each individual substance, material or article, has undergone many changes, in both layout and content, in order to keep pace with the expansion and progress of industry. IMO's Maritime Safety Committee (MSC) is authorized by the Organization's Assembly to adopt amendments to the Code, thus enabling IMO to respond promptly to developments in transport.

The MSC at its one hundred and eighth session agreed that, in order to facilitate the multimodal transport of dangerous goods, the provisions of the IMDG Code, 2024 edition, may be applied from 1 January 2025 on a voluntary basis, pending their official entry into force on 1 January 2026 without any transitional period. This is described in resolution MSC.556(108) and the Preamble to this Code. It needs to be emphasized that, in the context of the language of the Code, the words "shall", "should" and "may", when used in the Code, mean that the relevant provisions are "mandatory", "recommendatory" and "optional", respectively.

Reference marks

The following symbols placed against an item indicate changes from the previous edition, in accordance with Amendment 42-24 to the IMDG Code:

- ■ Insertion of an item
- ⊗ Deletion of an item
- △ Change to an item

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Note

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Chapter 4.1

Use of packagings, including intermediate bulk containers (IBCs) and large packagings

4.1.0 Definitions

Effectively closed: liquid-tight closure.

Hermetically sealed: vapour-tight closure.

Securely closed: so closed that dry contents cannot escape during normal handling; the minimum provisions for any closure.

4.1.1 General provisions for the packing of dangerous goods in packagings, including IBCs and large packagings

Note: For the packing of goods of classes 2, 6.2 and 7, the general provisions of this section only apply as indicated in 4.1.8.2 (class 6.2, UN 2814 and UN 2900), 4.1.9.1.5 (class 7) and in the applicable packing instructions of 4.1.4 (P201 and LP02 for class 2 and P620, P621, P622, IBC620, LP621 and LP622 for class 6.2).

4.1.1.1 Dangerous goods shall be packed in good quality packagings, including IBCs and large packagings, which shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet or overpack for subsequent manual or mechanical handling. Packagings, including IBCs and large packagings, shall be constructed and closed so as to prevent any loss of contents when prepared for transport which may be caused under normal conditions of transport, by vibration, or by changes in temperature, humidity or pressure (resulting from altitude, for example). Packagings, including IBCs and large packagings, shall be closed in accordance with the information provided by the manufacturer. No dangerous residue shall adhere to the outside of packages, IBCs and large packagings during transport. These provisions apply, as appropriate, to new, reused, reconditioned or remanufactured packagings, and to new, reused, repaired or remanufactured IBCs, and to new, reused or remanufactured large packagings.

4.1.1.2 Parts of packagings, including IBCs and large packagings, which are in direct contact with dangerous goods:

.1 shall not be affected or significantly weakened by those dangerous goods; and

.2 shall not cause a dangerous effect, such as catalysing a reaction or reacting with the dangerous goods;

.3 shall not allow permeation of the dangerous goods that could constitute a danger under normal conditions of transport.

Where necessary, they shall be provided with a suitable inner coating or treatment.

4.1.1.3 Unless otherwise provided elsewhere in this Code, each packaging, including IBCs and large packagings, except inner packagings, shall conform to a design type successfully tested in accordance with the provisions of 6.1.5, 6.3.5, 6.5.6 or 6.6.5, as applicable. However, IBCs manufactured before 1 January 2011 and conforming to a design type which has not passed the vibration test of 6.5.6.13 or which was not required to meet the criteria of 6.5.6.9.5.4 at the time it was subjected to the drop test may still be used.

4.1.1.3.1 Packagings, including IBCs and large packagings, may conform to one or more than one successfully tested design type and may bear more than one mark.

4.1.1.4 When filling packagings, including IBCs and large packagings, with liquids,* sufficient ullage (outage) shall be left to ensure that neither leakage nor permanent distortion of the packaging occurs as a result of an expansion of the liquid caused by temperatures likely to occur during transport. Unless specific provisions

* With respect to ullage limits only, the provisions applicable for packagings for solid substances may be used if the viscous substance has an outflow time via a DIN-cup with a 4 mm diameter outlet exceeding 10 minutes at 20°C (corresponding to an outflow time via a Ford cup 4 of more than 690 seconds at 20°C, or to a viscosity of more than 2,680 centistokes at 20°C).

are prescribed, liquids shall not completely fill a packaging at a temperature of 55°C. However, sufficient ullage shall be left in an IBC to ensure that at the mean bulk temperature of 50°C it is not filled to more than 98% of its water capacity.*

4.1.1.4.1 For air transport, packagings intended to contain liquids shall also be capable of withstanding a pressure differential without leakage as specified in the international regulations for air transport.

4.1.1.5 Inner packagings shall be packed in an outer packaging in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings containing liquids shall be packaged with their closures upward and placed within outer packagings consistent with the orientation marks prescribed in 5.2.1.7.1 of this Code. Inner packagings that are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials, etc., shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

4.1.1.5.1 Where an outer packaging of a combination packaging or a large packaging has been successfully tested with different types of inner packagings, a variety of such different inner packagings may also be assembled in this outer packaging or large packagings. In addition, provided an equivalent level of performance is maintained, the following variations in inner packagings are allowed without further testing of the package:

.1 Inner packagings of equivalent or smaller size may be used provided:

- the inner packagings are of similar design to the tested inner packagings (such as shape – round, rectangular, etc.);
- the material of construction of inner packagings (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested inner packaging;
- the inner packagings have the same or smaller openings and the closure is of similar design (such as screw cap, friction lid, etc.);
- sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of the inner packagings;
- inner packagings are oriented within the outer packaging in the same manner as in the tested package; and

.2 A lesser number of the tested inner packagings or of the alternative types of inner packagings identified in .1 above may be used, provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the inner packagings.

4.1.1.5.2 Use of supplementary packagings within an outer packaging (e.g. an intermediate packaging or a receptacle inside a required inner packaging) additional to what is required by the packing instructions is authorized, provided all relevant requirements are met, including those of 4.1.1.3, and, if appropriate, suitable cushioning is used to prevent movement within the packaging.

4.1.1.5.3 Cushioning and absorbent material shall be inert and suited to the nature of the contents.

4.1.1.5.4 The nature and the thickness of the outer packagings shall be such that friction during transport does not generate any heating likely to alter dangerously the chemical stability of the contents.

4.1.1.6 Dangerous goods shall not be packed together in the same outer packaging, or in large packagings, with dangerous or other goods if they react dangerously with each other and cause:

.1 combustion and/or evolution of considerable heat;

.2 evolution of flammable, toxic or asphyxiant gases;

.3 the formation of corrosive substances; or

.4 the formation of unstable substances.

4.1.1.7 The closures of packagings containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during transport.

4.1.1.7.1 Where two or more closure systems are fitted in series on an IBC, that nearest to the substance being transported shall be closed first.

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* For a differing temperature, the maximum degree of filling may be determined as follows:

$$\text{Degree of filling} = \frac{98}{1 + \alpha\,(50 - t_F)}$$ per cent of the capacity of the IBC.

In this formula α represents the mean coefficient of cubic expansion of the liquid substance between 15°C and 50°C; that is to say, for a maximum rise in the temperature of 35°C, "α" is calculated according to the formula:

$$\alpha = \frac{d_{15} - d_{50}}{35 \times d_{50}}$$

where d_{15} and d_{50} are the relative densities of the liquid at 15°C and 50°C and t_F is the mean temperature of the liquid at the time of filling.

4.1.1.7.2 Unless otherwise specified in the Dangerous Goods List, packages containing substances which:

.1 evolve flammable gases or vapour;

.2 may become explosive if allowed to dry;

.3 evolve toxic gases or vapour;

.4 evolve corrosive gases or vapour; or

.5 may react dangerously with the atmosphere

should be hermetically sealed.

4.1.1.8 Where pressure may develop in a package by the emission of gas from the contents (as a result of temperature increase or other causes), the packaging or IBC may be fitted with a vent provided that the gas emitted will not cause danger on account of its toxicity, its flammability, the quantity released, etc.

A venting device shall be fitted if dangerous overpressure may develop due to normal decomposition of substances. The vent shall be so designed that, when the packaging or IBC is in the attitude in which it is intended to be transported, leakages of liquid and the penetration of foreign substances are prevented under normal conditions of transport.

4.1.1.8.1 Liquids may only be filled into inner packagings which have an appropriate resistance to internal pressure that may be developed under normal conditions of transport.

4.1.1.9 New, remanufactured or re-used packagings, including IBCs and large packagings, or reconditioned packagings and repaired or routinely maintained IBCs shall be capable of passing the tests prescribed in 6.1.5, 6.3.5, 6.5.6 or 6.6.5, as applicable. Before being filled and handed over for transport, every packaging, including IBCs and large packagings, shall be inspected to ensure that it is free from corrosion, contamination or other damage and every IBC shall be inspected with regard to the proper functioning of any service equipment. Any packaging which shows signs of reduced strength as compared with the approved design type shall no longer be used or shall be so reconditioned that it is able to withstand the design type tests. Any IBC which shows signs of reduced strength as compared with the tested design type shall no longer be used or shall be so repaired or routinely maintained that it is able to withstand the design type tests.

4.1.1.10 Liquids shall be filled only into packagings, including IBCs, which have an appropriate resistance to the internal pressure that may develop under normal conditions of transport. As the vapour pressure of low-boiling-point liquids is usually high, the strength of receptacles for these liquids shall be sufficient to withstand, with an ample factor of safety, the internal pressure likely to be generated. Packagings and IBCs marked with the hydraulic test pressure prescribed in 6.1.3.1(d) and 6.5.2.2.1, respectively, shall be filled only with a liquid having a vapour pressure:

.1 such that the total gauge pressure in the packaging or IBC (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55°C, determined on the basis of a maximum degree of filling in accordance with 4.1.1.4 and a filling temperature of 15°C, will not exceed two thirds of the marked test pressure; or

.2 at 50°C, less than four sevenths of the sum of the marked test pressure plus 100 kPa; or

.3 at 55°C, less than two thirds of the sum of the marked test pressure plus 100 kPa.

IBCs intended for the transport of liquids shall not be used to carry liquids having a vapour pressure of more than 110 kPa (1.1 bar) at 50°C or 130 kPa (1.3 bar) at 55°C.

Examples of required marked test pressures for packagings, including IBCs, calculated as in 4.1.1.10.3

UN No.	Name	Class	Packing group	V_{p55} (kPa)	$V_{p55}\times1.5$ (kPa)	($V_{p55}\times1.5$) minus 100 (kPa)	Required minimum test pressure (gauge) under 6.1.5.5.4.3 (kPa)	Minimum test pressure (gauge) to be marked on the packaging (kPa)
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	*n*-Decane	3	III	1.4	2.1	−97.9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	199	299	199	199	250

Note 1: For pure liquids, the vapour pressure at 55°C (Vp_{55}) can often be obtained from scientific tables.

Note 2: The table refers to the use of 4.1.1.10.3 only, which means that the marked test pressure shall exceed 1.5 times the vapour pressure at 55°C less 100 kPa. When, for example, the test pressure for *n*-decane is determined according to 6.1.5.5.4.1, the minimum marked test pressure may be lower.

Note 3: For diethyl ether, the required minimum test pressure under 6.1.5.5.5 is 250 kPa.

4.1.1.11 Empty packagings, including IBCs and large packagings, that have contained a dangerous substance shall be treated in the same manner as is required by this Code for a filled packaging, unless adequate measures have been taken to nullify any hazard.

4.1.1.12 Every packaging as specified in chapter 6.1 intended to contain liquids shall successfully undergo a suitable leakproofness test. This test is part of a quality assurance programme as stipulated in 6.1.1.3 which shows the capability of meeting the appropriate test level indicated in 6.1.5.4.4:

.1 before it is first used for transport;

.2 after remanufacturing or reconditioning of any packaging, before it is re-used for transport.

For this test, the packaging need not have its closures fitted. The inner receptacle of a composite packaging may be tested without the outer packaging, provided the test results are not affected. This test is not necessary for inner packagings of combination packagings or large packagings.

4.1.1.13 Packagings, including IBCs, used for solids which may become liquid at temperatures likely to be encountered during transport shall also be capable of containing the substance in the liquid state.

4.1.1.14 Packagings, including IBCs, used for powdery or granular substances shall be sift-proof or shall be provided with a liner.

4.1.1.15 For plastics drums and jerricans, rigid plastics IBCs and composite IBCs with plastics inner receptacles, unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous substances shall be five years from the date of manufacture of the receptacles, except when a shorter period of use is prescribed because of the nature of the substance to be transported.

Note: For composite IBCs the period of use refers to the date of manufacture of the inner receptacle.

4.1.1.16 Where ice is used as a coolant it shall not affect the integrity of the packaging.

4.1.1.17 **Explosives, self-reactive substances and organic peroxides**

Unless specific provision to the contrary is made in this Code, the packagings, including IBCs and large packagings, used for goods of class 1, self-reactive substances of class 4.1 and organic peroxides of class 5.2 shall comply with the provisions for the medium danger group (packing group II).

4.1.1.18 **Use of salvage packagings and large salvage packagings**

4.1.1.18.1 Damaged, defective, leaking or non-conforming packages, or dangerous goods that have spilled or leaked may be transported in salvage packagings mentioned in 6.1.5.1.11 and 6.6.5.1.9. This does not prevent the use of a larger size packaging or large packaging of appropriate type and performance level and under the conditions of 4.1.1.18.2 and 4.1.1.18.3.

4.1.1.18.2 Appropriate measures shall be taken to prevent excessive movement of the damaged or leaking package within a salvage packaging. When the salvage packaging contains liquids, sufficient inert absorbent material shall be added to eliminate the presence of free liquid.

4.1.1.18.3 Appropriate measures shall be taken to ensure there is no dangerous build-up of pressure.

4.1.1.19 **Use of salvage pressure receptacles**

4.1.1.19.1 In the case of damaged, defective, leaking or non-conforming pressure receptacles, salvage pressure receptacles according to 6.2.3 may be used.

Note: A salvage pressure receptacle may be used as an overpack in accordance with 5.1.2. When used as an overpack, marks shall be in accordance with 5.1.2.1 instead of 5.2.1.3.

4.1.1.19.2 Pressure receptacles shall be placed in salvage pressure receptacles of suitable size. More than one pressure receptacle may be placed in the same salvage pressure receptacle only if the contents are known and do not react dangerously with each other (see 4.1.1.6). In this case the total sum of water capacities of the pressure receptacles shall not exceed 3,000 L. Measures shall be taken to prevent movement of the pressure receptacles within the salvage pressure receptacle, e.g. by partitioning, securing or cushioning.

4.1.1.19.3 A pressure receptacle may only be placed in a salvage pressure receptacle if:

.1 the salvage pressure receptacle is in accordance with 6.2.3.5 and a copy of the approval certificate is available;

.2 parts of the salvage pressure receptacle which are, or are likely to be in direct contact with the dangerous goods will not be affected or weakened by those dangerous goods and will not cause a dangerous effect (e.g. catalysing reaction or reacting with the dangerous goods); and

.3 the contents of the contained pressure receptacle(s) is limited in pressure and volume so that if totally discharged into the salvage pressure receptacle, the pressure in the salvage pressure receptacle at 15 °C will not exceed the test pressure of the salvage pressure receptacle (for gases, see packing instruction

in P200 (3) 4.1.4.1). The reduction of the useable water capacity of the salvage pressure receptacle, e.g. by any contained equipment and cushioning, shall be taken into account.

4.1.1.19.4 The proper shipping name, the UN number preceded by the letters "UN" and label(s) as required for packages in chapter 5.2 applicable to the dangerous goods inside the contained pressure receptacle(s) shall be applied to the salvage pressure receptacle for transport.

4.1.1.19.5 Salvage pressure receptacles shall be cleaned, purged and visually inspected internally and externally after each use. They shall be periodically inspected and tested in accordance with 6.2.1.6 at least once every five years.

4.1.1.20 During transport, packagings, including IBCs and large packagings, shall be securely fastened to or contained within the cargo transport unit, so that lateral or longitudinal movement or impact is prevented and adequate external support is provided.

4.1.1.21 Except as provided in 4.1.1.18 and 4.1.1.19, packagings including large packagings and IBCs shall not be filled or discharged while they remain on board.

4.1.2 Additional general provisions for the use of IBCs

4.1.2.1 When IBCs are used for the transport of liquids with a flashpoint of 60°C (closed cup) or lower, or of powders liable to dust explosion, measures shall be taken to prevent a dangerous electrostatic discharge.

4.1.2.2 Every metal, rigid plastics and composite IBC shall be inspected and tested, as relevant, in accordance with 6.5.4.4 or 6.5.4.5:

– before it is put into service;

– thereafter at intervals not exceeding two and a half and five years, as appropriate; and

– after the repair or remanufacture, before it is re-used for transport.

An IBC shall not be filled and offered for transport after the date of expiry of the last periodic test or inspection. However, an IBC filled prior to the date of expiry of the last periodic test or inspection may be transported for a period not to exceed three months beyond the date of expiry of the last periodic test or inspection. In addition, an IBC may be transported after the date of expiry of the last periodic test or inspection:

.1 after emptying but before cleaning, for purposes of performing the required test or inspection prior to refilling; and

.2 unless otherwise approved by the competent authority, for a period not to exceed six months beyond the date of expiry of the last periodic test or inspection in order to allow the return of dangerous goods or residues for proper disposal or recycling. Reference to this exemption shall be entered in the transport document.

4.1.2.3 IBCs of type 31HZ2 when transporting liquids shall be filled to at least 80% of the volume of the outer casing and shall be transported in closed cargo transport units.

4.1.2.4 Except for routine maintenance of metal, rigid plastics, composite and flexible IBCs performed by the owner of the IBC, whose State and name or authorized symbol is durably marked on the IBC, the party performing routine maintenance shall durably mark the IBC near the manufacturer's UN design type mark to show:

.1 the State in which the routine maintenance was carried out; and

.2 the name or authorized symbol of the party performing the routine maintenance.

4.1.3 General provisions concerning packing instructions

4.1.3.1 Packing instructions applicable to dangerous goods of classes 1 to 9 are specified in 4.1.4. They are subdivided in three subsections depending on the type of packagings to which they apply:

subsection 4.1.4.1	for packagings other than IBCs and large packagings; these packing instructions are designated by an alphanumeric code comprising the letter "P";
subsection 4.1.4.2	for IBCs; these are designated by an alphanumeric code comprising the letters "IBC";
subsection 4.1.4.3	for large packagings; these are designated by an alphanumeric code comprising the letters "LP".

Generally, packing instructions specify that the general provisions of 4.1.1, 4.1.2 and/or 4.1.3, as appropriate, are applicable. They may also require compliance with the special provisions of 4.1.5, 4.1.6, 4.1.7, 4.1.8 or 4.1.9 when appropriate. Special packing provisions may also be specified in the packing instruction for individual substances or articles. They are also designated by an alphanumeric code comprising the letters:

"PP" for packagings other than IBCs and large packagings

"B" for IBCs

"L" for large packagings.

Unless otherwise specified, each packaging shall conform to the applicable provisions of part 6. General packing instructions do not provide guidance on compatibility and the user shall not select a packaging without checking that the substance is compatible with the packaging material selected (such as, metal fluorides are unsuitable for glass receptacles). Where glass receptacles are permitted in the packing instructions, porcelain, earthenware and stoneware packagings are also allowed.

4.1.3.2 Column 8 of the Dangerous Goods List shows for each article or substance the packing instruction(s) that shall be used. Column 9 indicates the special packing provisions applicable to specific substances or articles.

4.1.3.3 Each packing instruction shows, where applicable, the acceptable single and combination packagings. For combination packagings, the acceptable outer packagings, inner packagings and, when applicable, the maximum quantity permitted in each inner or outer packaging are shown. *Maximum net mass* and *maximum capacity* are as defined in 1.2.1. Where packagings which need not meet the requirements of 4.1.1.3 (e.g. crates, pallets, etc.) are authorized in a packing instruction or the special provisions named in the Dangerous Goods List, these packagings are not subject to the mass or volume limits generally applicable to packagings conforming to the requirements of chapter 6.1, unless otherwise indicated in the relevant packing instruction or special provision.

4.1.3.4 The following packagings shall not be used when the substances being transported are liable to become liquid during transport:

Packagings

Drums: 1D and 1G

Boxes: 4C1, 4C2, 4D, 4F, 4G and 4H1

Bags: 5L1, 5L2, 5L3, 5H1, 5H2, 5H3, 5H4, 5M1 and 5M2

Composite: 6HC, 6HD1, 6HD2, 6HG1, 6HG2, 6PC, 6PD1, 6PD2, 6PG1, 6PG2 and 6PH1

Large packagings

Flexible plastics: 51H (outer packaging)

IBCs

For substances of packing group I:
All types of IBCs

For substances of packing groups II and III:

Wooden: 11C, 11D and 11F

Fibreboard: 11G

Flexible: 13H1, 13H2, 13H3, 13H4, 13H5, 13L1, 13L2, 13L3, 13L4, 13M1 and 13M2

Composite: 11HZ2 and 21HZ2

4.1.3.5 Where the packing instructions in this chapter authorize the use of a particular type of packaging (such as 4G; 1A2), packagings bearing the same packaging identification code followed by the letters "V", "U", "W" marked in accordance with the provisions of part 6 (such as "4GV", "4GU" or "4GW"; "1A2V", "1A2U" or "1A2W") may also be used under the same conditions and limitations applicable to the use of that type of packaging according to the relevant packing instructions. For example, a combination packaging marked "4G" with the packaging code "4GV" may be used whenever a combination packaging marked "4G" is authorized, provided the provisions in the relevant packing instruction regarding types of inner packagings and quantity limitations are respected.

4.1.3.6 **Pressure receptacles for liquids and solids**

4.1.3.6.1 Unless otherwise indicated in this Code, pressure receptacles conforming to:

.1 the applicable requirements of chapter 6.2; or

.2 the National or International standards on the design, construction, testing, manufacturing and inspection, as applied by the country in which the pressure receptacles are manufactured, provided that the provisions of 4.1.3.6 and 6.2.3.3 are met,

are authorized for the transport of any liquid or solid substance other than explosives, thermally unstable substances, organic peroxides, self-reactive substances, substances where significant pressure may develop by evolution of chemical reaction and radioactive material (unless permitted in 4.1.9).

This subsection is not applicable to the substances mentioned in 4.1.4.1, packing instruction P200, table 3.

4.1.3.6.2 Every design type of pressure receptacle shall be approved by the competent authority of the country of manufacture or as indicated in chapter 6.2.

4.1.3.6.3 Unless otherwise indicated, pressure receptacles having a minimum test pressure of 0.6 MPa shall be used.

4.1.3.6.4 Unless otherwise indicated, pressure receptacles may be provided with an emergency pressure relief device designed to avoid bursting in case of overfill or fire accidents.

Pressure receptacle valves shall be designed and constructed in such a way that they are inherently able to withstand damage without release of the contents or shall be protected from damage which could cause inadvertent release of the contents of the pressure receptacle, by one of the methods as given in 4.1.6.1.8.1 to 4.1.6.1.8.5.

4.1.3.6.5 The level of filling shall not exceed 95% of the capacity of the pressure receptacle at 50°C. Sufficient ullage (outage) shall be left to ensure that the pressure receptacle will not be liquid-full at a temperature of 55°C.

4.1.3.6.6 Unless otherwise indicated, pressure receptacles shall be subjected to a periodic inspection and test every five years. The periodic inspection shall include an external examination, an internal examination or alternative method as approved by the competent authority, a pressure test or equivalent effective non-destructive testing with the agreement of the competent authority, including an inspection of all accessories (e.g. tightness of valves, emergency relief valves or fusible elements). Pressure receptacles shall not be filled after they become due for periodic inspection and test but may be transported after the expiry of the time limit. Pressure receptacle repairs shall meet the requirements of 4.1.6.1.11.

4.1.3.6.7 Prior to filling, the filler shall perform an inspection of the pressure receptacle and ensure that the pressure receptacle is authorized for the substances to be transported and that the provisions of this Code have been met. Shut-off valves shall be closed after filling and remain closed during transport. The consignor shall verify that the closures and equipment are not leaking.

4.1.3.6.8 Refillable pressure receptacles shall not be filled with a substance different from that previously contained unless the necessary operations for change of service have been performed.

4.1.3.6.9 Marking of pressure receptacles for liquids and solids according to 4.1.3.6 (not conforming to the requirements of chapter 6.2) shall be in accordance with the requirements of the competent authority of the country of manufacturing.

4.1.3.7 Packagings, including IBCs and large packagings, not specifically authorized in the applicable packing instruction shall not be used for the transport of a substance or article unless specifically approved by the competent authority and provided:

.1 the alternative packaging complies with the general provisions of this chapter;

.2 when the packing instruction indicated in the Dangerous Goods List so specifies, the alternative packaging meets the provisions of part 6;

.3 the competent authority determines that the alternative packaging provides at least the same level of safety as if the substance were packed in accordance with a method specified in the particular packing instruction indicated in the Dangerous Goods List; and

.4 a copy of the competent authority approval accompanies each consignment or the transport document includes an indication that alternative packaging was approved by the competent authority.

Note: The competent authorities granting such approvals shall take action to amend the Code to include the provisions covered by the approval as appropriate.

4.1.3.8 **Unpackaged articles other than class 1 articles**

4.1.3.8.1 Where large and robust articles cannot be packaged in accordance with the requirements of chapter 6.1 or 6.6 and they have to be transported empty, uncleaned and unpackaged, the competent authority may approve such transport. In doing so, the competent authority shall take into account that:

.1 Large and robust articles shall be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between cargo transport units and between cargo transport units and warehouses, as well as any removal from a pallet for subsequent manual or mechanical handling.

.2 All closures and openings shall be sealed so that there can be no loss of contents which might be ca... under normal conditions of transport, by vibration, or by changes in temperature, humidity or pre... (resulting from altitude, for example). No dangerous residue shall adhere to the outside of the large ... robust articles.

.3 Parts of large and robust articles, which are in direct contact with dangerous goods:

.1 shall not be affected or significantly weakened by those dangerous goods; and

.2 shall not cause a dangerous effect, e.g. catalysing a reaction or reacting with the dangerous goo...

.4 Large and robust articles containing liquids shall be stowed and secured to ensure that neither lea... nor permanent distortion of the article occurs during transport.

.5 They shall be fixed in cradles or crates or other handling devices in such a way that they will not bec... loose during normal conditions of transport.

4.1.3.8.2 Unpackaged articles approved by the competent authority in accordance with the provisions of 4.1.3.8.1 th... be subject to the consignment procedures of part 5. In addition the consignor of such articles shall en... that a copy of any such approval is transported with the large and robust articles.

Note: A large and robust article may include flexible fuel containment systems, military equipment, machi... or equipment containing dangerous goods above the limited quantity thresholds.

4.1.3.9 Where, in 4.1.3.6 and in the individual packing instructions, cylinders and other pressure receptacles ... gases are authorized for the transport of any liquid or solid substance, use is also authorized of cylinders a... pressure receptacles of a kind normally used for gases which conform to the requirements of the compe... authority of the country in which the cylinder or pressure receptacle is filled. Valves shall be suitably protec... Pressure receptacles with capacities of 1 L or less shall be packed in outer packagings constructe... suitable material of adequate strength and design in relation to the capacity of the packaging and its intend... use and secured or cushioned so as to prevent significant movement within the outer packaging du... normal conditions of transport.

4.1.4 List of packing instructions

4.1.4.1 Packing instructions concerning the use of packagings (except IBCs and large packagings)

P001	PACKING INSTRUCTION (LIQUIDS)			P001
The following packagings are authorized provided the general provisions of 4.1.1 and 4.1.3 are met.				
Combination packagings		Maximum capacity/net mass (see 4.1.3.3)		
Inner packagings	Outer packagings	Packing group I	Packing group II	Packing group III
Glass 10 L Plastics 30 L Metal 40 L	Drums			
	steel (1A1, 1A2)	75 kg	400 kg	400 kg
	aluminium (1B1, 1B2)	75 kg	400 kg	400 kg
	other metal (1N1, 1N2)	75 kg	400 kg	400 kg
	plastics (1H1, 1H2)	75 kg	400 kg	400 kg
	plywood (1D)	75 kg	400 kg	400 kg
	fibre (1G)	75 kg	400 kg	400 kg
	Boxes			
	steel (4A)	75 kg	400 kg	400 kg
	aluminium (4B)	75 kg	400 kg	400 kg
	other metal (4N)	75 kg	400 kg	400 kg
	natural wood (4C1, 4C2)	75 kg	400 kg	400 kg
	plywood (4D)	75 kg	400 kg	400 kg
	reconstituted wood (4F)	75 kg	400 kg	400 kg
	fibreboard (4G)	75 kg	400 kg	400 kg
	expanded plastics (4H1)	40 kg	60 kg	60 kg
	solid plastics (4H2)	75 kg	400 kg	400 kg
	Jerricans			
	steel (3A1, 3A2)	60 kg	120 kg	120 kg
	aluminium (3B1, 3B2)	60 kg	120 kg	120 kg
	plastics (3H1, 3H2)	30 kg	120 kg	120 kg
Single packagings				
Drums				
steel, non-removable head (1A1)		250 L	450 L	450 L
steel, removable head (1A2)		prohibited	250 L	250 L
aluminium, non-removable head (1B1)		250 L	450 L	450 L
aluminium, removable head (1B2)		prohibited	250 L	250 L
other metal, non-removable head (1N1)		250 L	450 L	450 L
other metal, removable head (1N2)		prohibited	250 L	250 L
plastics, non-removable head (1H1)		250 L*	450 L	450 L
plastics, removable head (1H2)		prohibited	250 L	250 L
Jerricans				
steel, non-removable head (3A1)		60 L	60 L	60 L
steel, removable head (3A2)		prohibited	60 L	60 L
aluminium, non-removable head (3B1)		60 L	60 L	60 L
aluminium, removable head (3B2)		prohibited	60 L	60 L
plastics, non-removable head (3H1)		60 L*	60 L	60 L
plastics, removable head (3H2)		prohibited	60 L	60 L
Composite packagings				
Plastics receptacle in steel, aluminium or plastics drum (6HA1, 6HB1, 6HH1)		250 L	250 L	250 L
Plastics receptacle in fibre or plywood drum (6HG1, 6HD1)		120 L*	250 L	250 L
Plastics receptacle in steel or aluminium crate or box or plastics receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		60 L*	60 L	60 L
Glass receptacle in steel, aluminium, fibre, plywood, expanded or solid plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or in a steel, aluminium, wood or fibreboard box or in a wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)		60 L	60 L	60 L
Pressure receptacles, provided that the general provisions of 4.1.3.6 are met				

* Not permitted for class 3, packing group I.

P001 PACKING INSTRUCTION (LIQUIDS) *(continued)* P00

Special packing provisions:

PP1 For UN Nos. 1133, 1210, 1263 and 1866 and for adhesives, printing inks, printing ink related materials, paints, paint related materials and resin solutions which are assigned to UN 3082, metal or plastics packagings for substances of packing groups II and III in quantities of 5 L or less per packaging are not required to meet the performance tests in chapter 6.1 when transported:

(a) in palletized loads, a pallet box or a unit load device, such as individual packagings placed or stacked and secured by strapping, shrink- or stretch-wrapping or other suitable means to a pallet. For sea transport, the palletized loads, pallet boxes or unit load devices shall be firmly packed and secured in closed cargo transport units. On roll-on/roll-off ships the unit loads may be carried in vehicles other than closed vehicles provided they are securely fenced to the full height of the cargo carried; or

(b) as an inner packaging of a combination packaging with a maximum net mass of 40 kg.

PP2 For UN 3065, wooden barrels with a maximum capacity of 250 L and which do not meet the provisions of chapter 6.1 may be used.

PP4 For UN 1774, packagings shall meet the packing group II performance level.

PP5 For UN 1204, packagings shall be so constructed that explosion is not possible by reason of increased internal pressure. Gas cylinders and gas receptacles shall not be used for these substances.

PP10 For UN 1791, for packing group II, the packaging shall be vented.

PP31 For UN Nos. 1131, 1553, 1693, 1694, 1699, 1701, 2478, 2604, 2785, 3148, 3183, 3184, 3185, 3186, 3187, 3188, 3398 (PG II and III), 3399 (PG II and III), 3413 and 3414, packagings shall be hermetically sealed.

PP33 For UN 1308, for packing groups I and II, only combination packagings with a maximum gross mass of 75 kg are allowed.

PP81 For UN 1790 with more than 60% but not more than 85% hydrogen fluoride and UN 2031 with more than 55% nitric acid, the permitted use of plastics drums and jerricans as single packagings shall be two years from the date of manufacture

PP93 For UN Nos. 3532 and 3534, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.

P002 PACKING INSTRUCTION (SOLIDS) P00

The following packagings are authorized provided the general provisions of 4.1.1 and 4.1.3 are met.

Combination packagings			Maximum net mass (see 4.1.3.3)		
Inner packagings		Outer packagings	Packing group I	Packing group II	Packing group III
Glass	10 kg	Drums			
Plastics[1]	30 kg	steel (1A1, 1A2)	125 kg	400 kg	400 kg
Metal	40 kg	aluminium (1B1, 1B2)	125 kg	400 kg	400 kg
Paper[1, 2, 3]	50 kg	other metal (1N1, 1N2)	125 kg	400 kg	400 kg
Fibre[1, 2, 3]	50 kg	plastics (1H1, 1H2)	125 kg	400 kg	400 kg
		plywood (1D)	125 kg	400 kg	400 kg
		fibre (1G)	125 kg	400 kg	400 kg
		Boxes			
		steel (4A)	125 kg	400 kg	400 kg
		aluminium (4B)	125 kg	400 kg	400 kg
		other metal (4N)	125 kg	400 kg	400 kg
		natural wood (4C1)	125 kg	400 kg	400 kg
		natural wood with sift-proof walls (4C2)	250 kg	400 kg	400 kg
		plywood (4D)	125 kg	400 kg	400 kg
		reconstituted wood (4F)	125 kg	400 kg	400 kg
		fibreboard (4G)	75 kg	400 kg	400 kg
		expanded plastics (4H1)	40 kg	60 kg	60 kg
		solid plastics (4H2)	125 kg	400 kg	400 kg
		Jerricans			
		steel (3A1, 3A2)	75 kg	120 kg	120 kg
		aluminium (3B1, 3B2)	75 kg	120 kg	120 kg
		plastics (3H1, 3H2)	75 kg	120 kg	120 kg
Single packagings					
Drums					
steel (1A1 or 1A2[4])			400 kg	400 kg	400 kg
aluminium (1B1 or 1B2[4])			400 kg	400 kg	400 kg
metal, other than steel or aluminium (1N1 or 1N2[4])			400 kg	400 kg	400 kg
plastics (1H1 or 1H2[4])			400 kg	400 kg	400 kg
fibre (1G[5])			400 kg	400 kg	400 kg
plywood (1D[5])			400 kg	400 kg	400 kg

[1] These inner packagings shall be sift-proof.

[2] These inner packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).

[3] Paper and fibre inner packagings shall not be used for substances of packing group I.

[4] These packagings shall not be used for substances of packing group I that may become liquid during transport (see 4.1.3.4).

[5] These packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).

P002 PACKING INSTRUCTION (SOLIDS) *(continued)* P002

The following packagings are authorized provided the general provisions of 4.1.1 and 4.1.3 are met.

Single packagings *(continued)*	Maximum net mass (see 4.1.3.3) Packing group I	Packing group II	Packing group III
Jerricans			
steel (3A1 or 3A2[4])	120 kg	120 kg	120 kg
aluminium (3B1 or 3B2[4])	120 kg	120 kg	120 kg
plastics (3H1 or 3H2[4])	120 kg	120 kg	120 kg
Boxes			
steel (4A)[5]	Not allowed	400 kg	400 kg
aluminium (4B)[5]	Not allowed	400 kg	400 kg
other metal (4N)[5]	Not allowed	400 kg	400 kg
natural wood (4C1)[5]	Not allowed	400 kg	400 kg
natural wood with sift-proof walls (4C2)[5]	Not allowed	400 kg	400 kg
plywood (4D)[5]	Not allowed	400 kg	400 kg
reconstituted wood (4F)[5]	Not allowed	400 kg	400 kg
fibreboard (4G)[5]	Not allowed	400 kg	400 kg
solid plastics (4H2)[5]	Not allowed	400 kg	400 kg
Bags			
bags (5H3, 5H4, 5L3, 5M2)[5]	Not allowed	50 kg	50 kg
Composite packagings			
Plastics receptacle in steel, aluminium, plywood, fibre or plastics drum (6HA1, 6HB1, 6HG1[5], 6HD1[5], or 6HH1)	400 kg	400 kg	400 kg
Plastics receptacle in steel or aluminium crate or box, wooden box, plywood box, fibreboard box or solid plastics box (6HA2, 6HB2, 6HC, 6HD2[5], 6HG2[5] or 6HH2)	75 kg	75 kg	75 kg
Glass receptacle in steel, aluminium, plywood or fibre drum (6PA1, 6PB1, 6PD1[5] or 6PG1[5]) or in steel, aluminium, wood, or fibreboard box or in wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2[5] or 6PD2[5]) or in expanded or solid plastics packaging (6PH2 or 6PH1[5])	75 kg	75 kg	75 kg
Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.			

[4] These packagings shall not be used for substances of packing group I that may become liquid during transport (see 4.1.3.4).

[5] These packagings shall not be used when the substances being transported may become liquid during transport (see 4.1.3.4).

Special packing provisions:

PP7 For UN 2000, celluloid may be transported unpacked on pallets, wrapped in plastic film and secured by appropriate means, such as steel bands, as a single commodity in closed cargo transport units. Each pallet shall not exceed 1,000 kg.

PP8 For UN 2002, packagings shall be so constructed that explosion is not possible by reason of increased internal pressure. Gas cylinders and gas receptacles shall not be used for these substances.

PP9 For UN Nos. 3175, 3243 and 3244, packagings shall conform to a design type that has passed a leakproofness test at the packing group II performance level. For UN 3175 the leakproofness test is not required when the liquids are fully absorbed in solid material contained in sealed bags.

PP11 For UN 1309, packing group III, and UN 1362, 5H1, 5L1 and 5M1 bags are allowed if they are overpacked in plastic bags and are wrapped in shrink or stretch wrap on pallets.

△ **PP12** For UN Nos. 2213 and 3077, 5H1, 5L1 and 5M1 bags are allowed when transported in closed cargo transport units.

PP13 For articles classified under UN 2870, only combination packagings meeting the packing group I performance level are authorized.

PP14 For UN Nos. 2211, 2698 and 3314, packagings are not required to meet the performance tests in chapter 6.1.

PP15 For UN Nos. 1324 and 2623, packagings shall meet the packing group III performance level.

PP20 For UN 2217, any sift-proof, tearproof receptacle may be used.

PP30 For UN 2471, paper or fibre inner packagings are not permitted.

PP31 For UN Nos. 1362, 1463, 1565, 1575, 1626, 1680, 1689, 1698, 1868, 1889, 1932, 2471, 2545, 2546, 2881, 3048, 3088, 3170, 3174, 3181, 3182, 3189, 3190, 3205, 3206, 3341, 3342, 3448, 3449 and 3450, packagings shall be hermetically sealed.

PP34 For UN 2969 (as whole beans), 5H1, 5L1 and 5M1 bags are permitted.

PP37 For UN Nos. 2590 and 2212, 5M1 bags are permitted. All bags of any type shall be transported in closed cargo transport units or be placed in closed rigid overpacks.

PP38 For UN 1309, bags are permitted only in closed cargo transport units or as unit loads.

PP84 For UN 1057, rigid outer packagings meeting the packing group II performance level shall be used. The packagings shall be designed and constructed and arranged to prevent movement, inadvertent ignition of the devices or inadvertent release of flammable gas or liquid.

PP85 For UN Nos. 1748, 2208, 2880, 3485, 3486 and 3487, bags are not allowed.

PP92 For UN Nos. 3531 and 3533, packagings shall be designed and constructed to permit the release of gas or vapour to prevent a build-up of pressure that could rupture the packagings in the event of loss of stabilization.

PP100 For UN numbers 1309, 1323, 1333, 1376, 1435, 1449, 1457, 1472, 1476, 1483, 1509, 1516, 1567, 1869, 2210, 2858, 2878, 2968, 3089, 3096 and 3125, flexible, fibreboard or wooden packagings shall be sift-proof and water-resistant or shall be fitted with a sift-proof and water-resistant liner.

PART 5

CONSIGNMENT PROCEDURES

Chapter 5.1

General provisions

5.1.1 Application and general provisions

5.1.1.1 This part sets forth the provisions for dangerous goods consignments relative to authorization of consignments and advance notifications, marking, labelling, documentation (by manual, electronic data processing (EDP) or electronic data interchange (EDI) techniques) and placarding.

5.1.1.2 Except as otherwise provided in this Code, no person may offer dangerous goods for transport unless those goods are properly marked, labelled, placarded, described and certified on a transport document, and otherwise in a condition for transport as required by this part.

Note: In accordance with the GHS, a GHS pictogram not required by this Code should only appear in transport as part of a complete GHS label and not independently (see GHS 1.4.10.4.4).

5.1.1.3 A carrier shall not accept dangerous goods for transport unless:

.1 A copy of the dangerous goods transport document and other documents or information as required by the provisions of this Code are provided; or

.2 The information applicable to the dangerous goods is provided in electronic form.

5.1.1.4 The information applicable to the dangerous goods shall accompany the dangerous goods to final destination. This information may be on the dangerous goods transport document or may be on another document. This information shall be given to the consignee when the dangerous goods are delivered.

5.1.1.5 When the information applicable to the dangerous goods is given to the carrier in electronic form, the information shall be available to the carrier at all times during transport to final destination. The information shall be able to be produced without delay as a paper document.

5.1.1.6 The purpose of indicating the proper shipping name (see 3.1.2.1 and 3.1.2.2) and the UN number of a substance, material or article offered for transport and, in the case of a marine pollutant, of the addition of "marine pollutant" on documentation accompanying the consignment, and of marking the proper shipping name in accordance with 5.2.1 on the package, including IBCs containing the goods, is to ensure that the substance, material or article can be readily identified during transport. This ready identification is particularly important in the case of an accident involving these goods, in order to determine what emergency procedures are necessary to deal properly with the situation and, in the case of marine pollutants, for the master to comply with the reporting requirements of Protocol I of MARPOL.

5.1.2 Use of overpacks and unit loads

5.1.2.1 An overpack and unit load shall be marked with the proper shipping name and the UN number and marked and labelled, as required for packages by chapter 5.2, for each item of dangerous goods contained in the overpack or unit load unless marks and labels representative of all dangerous goods in the overpack or unit load are visible. An overpack, in addition, shall be marked with the word "OVERPACK" unless marks and labels representative of all dangerous goods, as required by chapter 5.2, in the overpack are visible. Labelling of overpacks containing radioactive materials shall be in accordance with 5.2.2.1.12. The lettering of the "OVERPACK" mark shall be at least 12 mm high.

5.1.2.2 The individual packages comprising a unit load or an overpack shall be marked and labelled in accordance with chapter 5.2. Each package of dangerous goods contained in the unit load or overpack shall comply with all applicable provisions of the Code. The "OVERPACK" mark on an overpack is an indication of compliance with this provision. The intended function of each package shall not be impaired by the unit load or overpack.

5.1.2.3 Each package bearing package orientation marks as prescribed in 5.2.1.7.1 of this Code and which is overpacked, placed in a unit load or used as an inner packaging in a large packaging shall be oriented in accordance with such marks.