

## COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

### Sub-Committee of Experts on the Transport of Dangerous Goods

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#### GUIDING PRINCIPLES FOR THE MODEL REGULATIONS

#### Transmitted by the Experts from Canada and the United Kingdom

1. The expert from the United Kingdom presented paper 2005/23 at the 27<sup>th</sup> session of the Sub-Committee. A number of helpful comments were made and two INF papers from the Expert from the United States were submitted.
2. The text of the Guiding Principles have now been amended as follows:
  - An editorial review to simplify the text to the principles of ‘clear language’ has been undertaken;
  - Minor editorial corrections have been made;
  - New text has been developed for the inclusion of Class 7 provisions, definitions, training and security in Part 1, for the introduction to Part 2, for Chapter 3.2 and for Part 7;
  - No account has been taken of the INF papers from the Expert from the United States since these contained substantive amendments and are the subject of formal proposals for the current session.
3. Subject to final review by the Sub-Committee during the current session, it is proposed that this document now be placed on the UNECE website.
4. It is the view of the Experts from Canada and the United Kingdom that the Guiding Principles could perform two functions. The first, now addressed by this paper, is to describe the basis on which the Model Regulations have been developed and how they work. The second is to explain why the Sub-Committee reached certain decisions on certain subjects. For example, why were risk groups replaced with categories; why was a proper shipping name for methanol fuel cells etc. added. These are subjects that need to be explained not only for anyone who may access the UN website but also for new Sub-Committee members, and other modal and regional bodies who develop and maintain regulations and who, more or less, adopt the Model Regulations. The views of other Experts are invited on the desirability and means of undertaking further work.

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## GENERAL PRINCIPLES

### NATURE, PURPOSE AND SIGNIFICANCE OF THE RECOMMENDATIONS

These Recommendations, the first version of which was published in 1956, have been developed by the United Nations Economic and Social Council's Sub-Committee of Experts on the Transport of Dangerous Goods<sup>1</sup>. They are intended to promote public safety in the transport of dangerous goods which includes the safety of human life and health and of property and the environment. They take into account technical progress, the development of new substances and materials and the requirements of modern multi-modal transport systems

The Recommendations are addressed to governments and international organizations concerned with the safety and the regulation of the transport of dangerous goods.

The Recommendations do not apply to the bulk transport of dangerous goods in sea-going or inland navigation bulk carriers or tank-vessels, which is subject to special international or national regulations.

The Recommendations on the Transport of Dangerous Goods are presented in the form of "Model Regulations on the Transport of Dangerous Goods", which are an annex to the Recommendations. The Model Regulations are a scheme of basic provisions that will allow uniform development of national regulations and international regulations governing the various modes of transport. However, the Model Regulations are intended to be flexible enough to accommodate any special requirements.

The United Nations Economic and Social Council expects that governments, intergovernmental organizations and international organizations, when revising or developing regulations regarding the transport of dangerous goods will conform to the principles set out in these Model Regulations, thus contributing to worldwide harmonization in the transport of dangerous goods. Furthermore, the structure, format and content should be followed to create a more user-friendly approach, to enhance harmonization of regulatory requirements, to facilitate the work of enforcement bodies and to reduce administrative burdens. The Model Regulations have been drafted in the mandatory sense (i.e., the word "shall" is used throughout the text rather than "should") to facilitate direct use of the Model Regulations as a basis for national and international transport regulations.

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<sup>1</sup> By resolution 1999/65 of 26 October 1999, the Economic and Social Council extended the mandate of the Committee to the global harmonization of the various systems of classification and labelling of chemicals. The Committee was reconfigured and renamed the Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals with one sub-committee specialized in the transport of dangerous goods and one sub-committee addressing the global harmonization of classification and labelling of chemicals.

The scope of the Model Regulations should ensure their value for all who are directly or indirectly concerned with the transport of dangerous goods. The Model Regulations include provisions for training, security, principles of classification, definition of classes, listing of proper shipping names and UN numbers for dangerous goods, general packing requirements, testing procedures, marking, labelling or placarding, and transport documents. There are, in addition, special requirements related to particular classes of dangerous goods goods.

With this system of classification, listing, packing, marking, labelling, placarding and documentation in general use, carriers, consignors and enforcement authorities will benefit from harmonized requirements. In general, their task will be facilitated and obstacles to the international transport of dangerous goods reduced accordingly. At the same time, the advantages will become increasingly evident as trade in dangerous goods steadily grows.

## **PRINCIPLES UNDERLYING THE REGULATION OF THE TRANSPORT OF DANGEROUS GOODS**

The transport of dangerous goods is regulated to prevent or mitigate, as far as possible, incidents that could endanger public safety or harm the environment. At the same time, regulations should be framed so that they do not hamper the movement of dangerous goods, other than those too dangerous to be accepted for transport. The aim of regulations, therefore, is to make transport feasible and safe by reducing risks to a minimum.

The Model Regulations are addressed to all modes of transport (road, rail, marine, inland waterway, air). Where less stringent or more stringent requirements can be applied to only one mode, that fact is not generally indicated but may be reflected in national, regional or modal regulations.

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**Reference was made above to the re-formatting of the UN Recommendations as Model Regulations. The following is a reproduction of a paper outlining the reasons for the re-formatting and the principles to be followed in the re-formatting (ST/SG/AC.10/21, Annex 6). The re-formatted version was adopted by the Sub-Committee in 1996 and was approved by the Economic and Social Council.**

### **“PRINCIPLES FOR THE WORK ON REFORMATTING THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS INTO A MODEL REGULATION**

1. The 9<sup>th</sup> edition of the Recommendations on the Transport of Dangerous Goods should be revised in the form of a model regulation.
2. The purposes of revising the Recommendations on the Transport of Dangerous Goods into the form of a model regulation are as follows:
  - (a) to provide a basis for internationally harmonized regulations governing the multimodal transport of dangerous goods, and in doing so, enhance the international harmonization already attained through the current Recommendations;
  - (b) to “recommend” the Recommendations on the Transport of Dangerous Goods to modal organizations, regional bodies and national governments (in particular those governments considering the development of national regulations affecting the transport of dangerous goods) in a form that can be adopted with little or no modification directly into modal,

regional or national regulations.

3. The goals of this effort are to improve the understanding of dangerous goods transport regulations affecting international transport and in doing so, improve compliance and dangerous goods transport safety and facilitate the international transport of dangerous goods.
4. Noting the purpose in 2(b) the model regulation should be in a simplified form that is understood by users of the modal dangerous goods regulations, for example in a form similar to the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air.
5. Whenever possible, a clear distinction should be made between general requirements (i.e. marking, labelling, documentation and packing requirements) and technical requirements (i.e. specifications and test requirements for packagings, Intermediate Bulk Packagings (IBCs) and tanks). The regulations should also identify responsibilities.
6. In order to provide the greatest international consistency, the model rule should be as comprehensive as possible. For example, the provisions of the current Recommendations should be expanded to include provisions prescribing specific types of packagings and Intermediate Bulk Packagings (IBCs) (defined in Chapter 9 and Chapter 16).
7. If areas or requirements needing substantial changes are identified in the course of the work, they should be brought to the attention of the Sub-Committee (including if appropriate, proposed solutions).
8. Specifications for single mode transport units (i.e. rail tank cars, tank vehicles) and modal specific operational requirements should in general not be provided in the model regulation. However, provision for their insertion by modal, regional or national authorities should be made (i.e. additional columns in the Table of dangerous goods).
9. The model regulation should provide a level of safety equivalent to that provided by the current Recommendations.
10. Representatives from all modes of transport should participate.
11. Existing efforts to restructure regulations such as those of the Working Group on restructuring RID/ADR (see ST/SG/AC.10/R.449), existing documents (INF.40 and Add.1) and existing modal regulations should be taken into account.”



**The following is intended to provide general information on the structure and use of the Model Regulations.**

## **PART 1**

### **GENERAL PROVISIONS, DEFINITIONS, TRAINING AND SECURITY**

These Model Regulations consist of seven parts, each of which is divided into chapters. Chapters are numbered sequentially within each part, with the first digit identifying the part in which the chapter is located. For example, the second chapter in Part 7 is designated “Chapter 7.2”.

Chapters are further divided into sections which, in turn, are normally divided into a number of paragraphs. Sections and paragraphs are numbered sequentially with the first number always being the number of the chapter in which the section or paragraph is located. For example, 7.2.1 would be the first section in Chapter 7.2, and 7.2.1.1 would be the first paragraph in that section.

As an exception, and in an effort to maintain a correspondence between the class number and the chapter number in Part 2, the first chapter, “Introduction”, of Part 2 has been numbered Chapter 2.0.

When references appear in the text to other provisions of these regulations, the reference will normally consist of the full section or paragraph reference, as described above. In certain cases, however, broader reference may be made to an entire part, e.g., Part 5, or chapter, e.g., Chapter 5.4

Recommendations on tests and criteria, which are incorporated by reference into certain provisions of the Model Regulations are published as a separate manual, “Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria” (ST/SG/AC.10/11/Rev.4).

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#### **Chapter 1.1 - general provisions**

Provisions for the transport of radioactive material have been transposed from the the International Atomic Energy Agency’s ‘Regulations for the Safe Transport of Radioactive Material’. No amendments of substance have been made, but they have been re-formatted to fit the structure of the Model Regulations. A table of correspondence between paragraph numbers in the IAEA Regulations 1996 (as amended 2005) and the 14th revised edition of the Model Regulations can be found at the end of Volume II of the Model regulations.

#### **Chapter 1.2 - definitions**

Definitions of general applicability used throughout the Model Regulations are listed here. However, some additional definitions that are specific to relevant Chapters of the Model Regulations are found at the beginning of those Chapters (such as the definition of ‘security’ found in Note 2 to Chapter 1.4.).

### **Chapter 1.3 - training**

General training requirements applicable to all persons engaged in the transport of dangerous goods by any mode of transport are included in the Model Regulations. Additional training requirements for security purposes are given in Chapter 1.4. More specific training requirements (such as for drivers of vehicles) are included in the relevant modal provisions.

### **Chapter 1.4 - security**

Until after the events of 11 September 2001, the Model Regulations addressed only the safety of dangerous goods in transport. Since then it has been determined appropriate to consider transport security as a sub-set of safety provisions. The Model Regulations now include general security requirements for all dangerous goods transported above the appropriate limited quantity thresholds. More demanding requirements are included for high consequence dangerous goods. These are dangerous goods that have the potential to cause mass casualties or mass destruction. An indicative list of such substances is included in Table 1.4.1 as guidance. It is open to competent authorities to add or remove substances from such a list depending on their own national circumstances or the perceived level of threat at any particular time.

## PART 2

### CLASSIFICATION

#### CLASSIFICATION AND DEFINITIONS OF CLASSES OF DANGEROUS GOODS

Substances, including mixtures and solutions, and articles are assigned to one of nine classes according to the hazard or the most predominant of the hazards they pose in transport. Some of the classes are divided into divisions, e.g., Class 1, while others are not e.g., Class 2.

The Chemical Abstracts Service (CAS), based in the United States, issues unique numbers to unique substances. The number of unique CAS numbers can be taken as an estimate of the number of unique substances that have been produced. Currently, there are over 8,300,000 commercially available chemicals registered by the CAS. The total of all registered substances exceeds 60,000,000. In 1980 this number was less than 5,000,000. However, not all CAS registered chemicals have physical or chemical characteristics that would make them goods classified as dangerous in transport.

To accommodate the large number of dangerous goods and the consistent, rapid development of new substances, the unusual chemical names used to describe them and the different emergency response for them, the UNSCETDG devised tests and criteria to be used to determine which substances could be identified as dangerous goods in transport. The UNSCETDG then devised a system of nine classes for substances with the objective of dividing all current and future dangerous goods into these classes. The system of classes was established keeping in mind the type of containment to be used, the chemical and physical characteristics of the substances and response procedures that would be most appropriate in the event of an accidental release. Consequently, in the UN Model Regulations each substance has a name (called a Proper Shipping Name) and a four-digit UN number and, according to its chemical and physical characteristics, is assigned to a class and a packing group. The nine classes are:

Class 1	Explosives
Class 2	Gases
Class 3	Flammable Liquids
Class 4	Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases
Class 5	Oxidizing substances and organic peroxides
Class 6	Toxic and Infectious substances
Class 7	Radioactive material
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous goods and articles

The classification of substances by type of hazard was developed to meet technical conditions while at the same time minimizing interference with existing regulations. It should be noted that the numerical order of the classes does not indicate the degree of danger.

The objective of the definitions is to establish which substances are dangerous and in which class, according to their specific characteristics, they should be included. These definitions are intended to provide criteria which should be possible to follow in the various national and international regulations.

For purposes of selecting the appropriate packaging for dangerous goods, substances are further divided into packing groups (although some classes do not have packing groups i.e. Class 2, Division 6.2 and Class 7) in accordance with the degree of danger they present:

Packing Group I:	high danger
Packing Group II:	medium danger
Packing Group III:	low danger

When these definitions are used with the list of proper shipping names for dangerous goods, they provide guidance to those who are responsible for classifying substances; and a notable degree of standardization while retaining a flexibility that allows diverse situations to be taken into account. Classifications for substances in the Model Regulations are made on the basis of consideration of data submitted to the Sub-Committee of Experts on the Transport of Dangerous Goods by governments, intergovernmental organizations and other international organizations in the form recommended in Figure 1. However the actual data submitted are not formally endorsed by the Sub-Committee.

Revision Four of the Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.4) include the tests and procedures required to determine if substances are dangerous goods in transport and to determine their class and, if appropriate, their division, and their packing group or, for explosives, their compatibility group. It should be noted that the Manual is not a concise formulation of testing procedures that will unerringly lead to a proper classification of substances and it assumes, therefore, competence on the part of the testing authority and leaves responsibility for classification with them.

The competent authority has discretion to dispense with certain tests, to vary the details of tests and to require additional tests, when this is justified, to obtain a reliable and realistic assessment of the hazard of a substance.

Wastes should be transported under the requirements of the appropriate class considering their hazards and the criteria presented in the Model Regulations. Wastes not otherwise subject to these Regulations but covered under the Basel Convention<sup>2</sup> may be transported under Class 9.

Many of the substances included in Classes 1 to 9 are deemed dangerous to the environment. Additional labelling is not always specified except for transport by sea. Criteria for substances and mixtures dangerous to the aquatic environment are given in Chapter 2.9 of the Model Regulations.

Many consignments of goods are treated with fumigants that pose a risk during transport, in particular to workers who may be exposed unknowingly when they open transport units. The Model Regulations address fumigated transport units as consignments that are subject to special documentation and warning sign requirements in the consignment procedures of Part 5.

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<sup>2</sup> *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989).*

## **PART 3**

### **DANGEROUS GOODS LIST AND LIMITED QUANTITIES**

#### **Chapter 3.2, Dangerous Goods List**

The Dangerous Goods List in Chapter 3.2 lists the proper shipping names and UN numbers of substances most commonly transported. The list is not exhaustive but is intended to include, as much as possible, proper shipping names and UN numbers for substances that are of commercial importance. Additional information about the list is provided in Chapter 3.1.

A substance or article specifically listed by name in column 2 of the list, such as UN1203, GASOLINE, is already classified and the requirements in the other columns of the list as well as the requirements in the body of the Model Regulations apply.

A substance that is listed in column 2 as "generic" or "not otherwise specified" such as UN 3010, COPPER BASED PESTICIDE, LIQUID, TOXIC or UN1481, PERCHLORATES, INORGANIC, N.O.S., must be classified according to the requirements for classification in the Model Regulations and, of course, if the substance is included in any of the nine classes, the requirements in the Model Regulations apply. Note that any substance or article that is suspected of having explosive characteristics must first be considered for inclusion in Class 1. The concept of generic and "n.o.s." entries in the list is important to understand mainly because the Dangerous Goods List is not exhaustive and is really not a "list of dangerous goods" but, rather, a list of proper shipping names and UN numbers that can be assigned to substances included in any of the nine classes. These n.o.s. entries in the list represent thousands, if not millions, of substances so that the "dangerous goods list" cannot be considered a list of all dangerous goods.

In addition, the dangerous goods list in Chapter 3.1 does not include those substances that are so dangerous they are forbidden for transport without authorization, usually from competent authorities.

#### **Chapter 3.4, Limited quantities**

The rationale behind limited quantity provisions is that selected dangerous goods in small quantities and in good, robust packaging pose a lesser risk in transport than do larger volumes of the same dangerous goods, and on this basis some relief from the requirements may be accepted. In summary, the requirements for dangerous goods in limited quantities generally provide relief from:

- the performance packaging requirements provided they are packaged in combination packagings of less than 30 kg gross mass including strong outer packagings or in shrink wrapped trays of less than 20 kg gross mass;
- the labelling and placarding requirements; and
- segregation requirements.

## METHODOLOGY FOR DETERMINING LIMITED QUANTITIES

CLASS	PG	Quantity
1		Not permitted
2		120ml/30kg 1L/30kg - for aerosols not containing toxic substances
3	I	Not allowed
3	II	1 L/30kg (see Note 1)
3	III	5 L/30kg
4.1	II	1 kg/30kg
4.1	III	5 kg/30kg
4.3	II	500 g/30kg
4.3	III	1 kg/30kg
5.1	II	500 g/30kg
5.1	III	5L - 5 kg /30kg
5.2 Liquid	II	(For types D, E or F 125 ml/30kg; for types B or C 25ml/30kg, except no temperature controlled substances
5.2 Solid	II	(For types D, E or F 500g/30kg; for types B or C 100g/30kg
6.1	II	100 ml - 500g/30kg
6.1	III	5 L – 5kg/30kg
8	I	Not allowed
8	II	1L - 1 kg/30kg
8	III	5 L - 5kg/30kg
9	II	1L - 1kg/30kg (see Note 2)
9	III	5 L - 5kg/30kg

**Note 1:** 5 L is allowed for UN numbers: 1133, 1139, 1169, 1197, 1210, 1263, 1266, 1287, 1306, 1866, 1999, 3065, 3269.

**Note 2:** 5 kg is allowed for UN 2969. These quantity limits do not apply to UN numbers. 2990, 3072, 3090 and 3091..

## **PART 4**

### **PACKING AND TANK PROVISIONS**

#### **1. BASIC PRINCIPLES FOR DEVELOPING PACKING INSTRUCTIONS FOR THE MODEL REGULATIONS**

Packing instructions should be clear and provide as wide a choice of packagings as possible.

The packing instructions should consist of a small number of general instructions supplemented by a limited number of more specific instructions for particularly hazardous or specialized dangerous goods.

Packing instructions should be developed with the objective of being suitable for multimodal transport. More severe packaging restrictions, in some instances, may be necessary for some modes of transport.

A rationalized approach (based on similar properties or hazards presented) should be used for allocating packing instructions to specific substances.

Existing regulations establishing packaging requirements should be considered in developing packing instructions. Organizations specifically responsible for those existing regulations should bring forward relevant points.

Separate instructions should be developed for packagings, large packagings and IBCs.

## **2. GUIDELINES FOR ASSIGNING PORTABLE TANK REQUIREMENTS TO SUBSTANCES IN CLASSES 3 TO 9**

These guidelines are intended as a reference for assigning portable tank requirements to specific substances. The guidelines were developed taking into consideration the hazards of dangerous goods and their physical and chemical characteristics.

The guidelines provide relevant information for assigning specific requirements including minimum test pressures, minimum shell thicknesses, pressure-relief device arrangements and bottom opening closure requirements for portable tanks used to transport substances in Classes 3 to 9.

For certain substances the tank requirements recommended by these guidelines may not be appropriate owing to unique characteristics of the substance not addressed in these guidelines. In these instances expert judgement should be applied in assigning appropriate requirements. For example bottom openings may not be appropriate for substances corrosive to ship structures.

### **General Guidelines**

#### **Prohibited Substances**

Some substances should be prohibited from transport in portable tanks. These substances are considered too dangerous for transport because of their instability or because they pose an unacceptably high level of risk when transported in bulk quantities under normal conditions of transport. The following substances are prohibited from transport in portable tanks:

- Class 1, except for UN0331 and UN0332;
- Desensitised explosives in Division 4.1;
- Self-reactive substances, other than type F, and related substances of Division 4.1;
- Organic peroxides of Division 5.2 other than type F;
- Radioactive materials other than Low Specific Activity (LSA) non-fissile or fissile excepted materials.

Additional prohibited substances are specifically identified in the Model Regulations. Furthermore, some substances may only be transported on the basis of an approval by the competent authority.

### **Minimum Shell Thicknesses**

The minimum shell thicknesses prescribed in the Model Regulations are provided in thicknesses relevant to reference steel with a guaranteed minimum tensile strength of 370 N/mm<sup>2</sup> and a guaranteed minimum elongation of 27%.

When other materials are used equivalent thickness calculations should be performed. Minimum thicknesses range from 5 mm to 10 mm. Part II of the guidelines provides guidance for assigning minimum thicknesses.

Granular or powdered solid substances ~~of~~ included in Packing Group II or Packing Group III may be transported in tanks with minimum shell thicknesses of 5 mm in the reference steel regardless of the tank diameter when 6.6.2.4.2 is specified relevant to a given substance. Regardless of the minimum thickness specified in Part II, if the thickness determined in accordance with the provisions of sections 6.6.2.4 is greater, the greater thickness shall be applied.

### **Corrosive Effects of Substances on Materials of Construction**

The minimum thicknesses prescribed in the Model Regulations do not take a substance's corrosive effects into account. The consignor must ensure that the construction materials of tanks are compatible with the substances to be transported.

### **Minimum Test Pressures**

Irrespective of the pressure assigned in these guidelines, the minimum test pressure assigned to an individual substance should be the greater of the pressure determined on the basis of the definitions in 6.6.2.1 of the Model Regulations and the pressure assigned in these guidelines.

### **Pressure-Relief Devices Requirements**

Two pressure relief device requirements are possible:

- (1) Normal (N), where the provisions of paragraph 6.6.2.8.1 apply, or
- (2) 6.6.2.8.3.

When paragraph 6.6.2.8.3 is referenced, a frangible disk must be provided in series preceding the pressure relief device. Paragraph 6.6.2.8.3 should be assigned to substances that have the potential to polymerize or to produce solid or highly viscous substances capable of preventing proper operation of the relief valve.

In addition, 6.6.2.8.3 is also specified for individual substances as set out in the Dangerous Goods List.

### **Bottom Openings**

Three possible bottom opening arrangements are proposed in these guidelines:

- . 6.6.2.6.3, which indicates three serially mounted means of closure,
- . 6.6.2.6.2, two serially mounted means of closure, or
- . NA (Not Allowed).

### **Filling Limits**

Three different filling restrictions are possible. The filling limits are considered operational requirements. The filling limits do not have a direct relationship to the construction of the tank or the arrangement of the service equipment. On this basis, filling limits are not addressed in Part II of this Annex and will not be included in the tank type designations.

The maximum filling limit for a substance should be consistent with the provisions under "Filling" in Chapter 4.2 of the Model Regulations. The consignor of the dangerous goods has the ultimate responsibility for assuring portable tanks are not filled in excess of the specified limits for each substance transported.

### **Molten Substances**

Assignments for molten substances of all classes should be based on the requirements established for liquids of the same class, division, packing group and subsidiary risk of the substance.

**SPECIFIC GUIDELINES FOR ASSIGNING**  
**PORTABLE TANK REQUIREMENTS FOR DANGEROUS GOODS**  
**OTHER THAN CLASS 7**

**CLASS 3, FLAMMABLE LIQUIDS**

**Class 3, Packing Group I, with a subsidiary risk of Division 6.1, Packing Group I or Class 8, Packing Group I**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>6 bar <u>*/</u></b>	<b>6 mm</b>	<b>6.6.2.8.3</b>	<b>NA</b>

\*/ A higher minimum test pressure may be used depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

*Note: These guidelines shall be used for Class 3, Packing Group I, substances that are assigned to n.o.s. entries and that have subsidiary risks.*

**Class 3, Packing Group I, with a subsidiary risk of Division 6.1, Packing Group II or III or Class 8, Packing Group II or III**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>6 bar <u>*/</u></b>	<b>6.6.2.4.2</b>	<b>Normal <u>**/</u></b>	<b>6.6.2.6.3</b>

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

\*\*/ Some substances in this category require 6.6.2.8.3.

**Class 3, Packing Group II, with no subsidiary risk**

<b>Portable Tank Instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>2.65 bar <u>*/</u></b>	<b>6.6.2.4.2</b>	<b>Normal</b>	<b>6.6.2.6.3</b>

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations.

**Class 3, Packing Group II, with a subsidiary risk of Division 6.1 or Class 8**

<b>Portable Tank Instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>4.0 bar <u>*/</u></b>	<b>6.6.2.4.2</b>	<b>Normal</b>	<b>6.6.2.6.3</b>

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations.

**Class 3, Packing Group III, with no subsidiary risk**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>1.5 bar <u>*/</u></b>	<b>6.6.2.4.2</b>	<b>Normal</b>	<b>6.6.2.6.3</b>

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

**Class 3, Packing Group III, with a subsidiary risk of Division 6.1 or Class 8**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	2.65 bar */	6.6.2.4.2	Normal	6.6.2.6.3

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

**CLASS 4, FLAMMABLE SOLIDS, SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES**

**Division 4.1, Packing Group II and III, Flammable Solids, Self-Reactive Substances and Solid Sensitized Explosives**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	1.5 bar	6.6.2.4.2 */	Normal	6.6.2.6.3 **/

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

**Division 4.1, Flammable Solids, Self-Reactive Substances and Solid Sensitized Explosives, Type F, Self-reactive substances**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	4 bar	6.6.2.4.2	6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	6.6.2.6.3

*Note: Organic peroxides, type F and self-reactive substances, type F, are only permitted in portable tanks when they are listed in Portable Tank Instruction T 34. All others are prohibited unless approved by the competent authority.*

**Division 4.2, Packing Group I, Liquids, Substances Liable to Spontaneous Combustion**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	10 bar	10 mm	Normal	NA

**Division 4.2, Packing Group II and III, Substances Liable to Spontaneous Combustion**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	1.5 bar	6.6.2.4.2 <u>*/</u>	Normal	6.6.2.6.3 <u>**/</u>

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

**Division 4.3, Packing Group I, Substances Which In Contact With Water Emit Flammable Gases, with or without subsidiary risk**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	4 bar	6 mm	Normal	NA

*Note:* There are exceptions where more stringent requirements (minimum test pressure and minimum shell thickness) have been applied on the basis of industry practice (e.g. Metal Alkyls).

**Division 4.3, Packing Group II and III, Substances Which In Contact With Water Emit Flammable Gases**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>1.5 bar</b>	<b>6.6.2.4.2 */</b>	<b>Normal</b>	<b>6.6.2.6.3 **/</b>

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

**CLASS 5, OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES****Division 5.1, Oxidizing substances, Packing Group I, with a subsidiary risk of Class 8**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>4 bar</b>	<b>6 mm</b>	<b>6.6.2.8.3</b>	<b>NA</b>

**Division 5.1, Oxidizing substances Packing Group I, with a subsidiary risk of Division 6.1 or Class 8**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>10 bar</b>	<b>10 mm</b>	<b>6.6.2.8.3</b>	<b>NA</b>

**Division 5.1, Oxidizing Substances, Packing Group II and III, solid substances**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>1.5 bar</b>	<b>6.6.2.4.2 <u>*/</u></b>	<b>Normal</b>	<b>6.6.2.6.3 <u>**/</u></b>

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

**Division 5.1, Oxidizing substances, Packing Group II and III, solutions of solid oxidizers**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>2.65</b>	<b>6.6.2.4.2</b>	<b>Normal</b>	<b>6.6.2.6.3</b>

**Division 5.1, Oxidizing substances, Packing II, hydrogen peroxide solutions with a subsidiary risk of Class 8**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>4 bar</b>	<b>6.6.2.4.2</b>	<b>Normal <u>*/</u></b>	<b>6.6.2.6.3</b>

\*/ Certain substances require a breathing device.

**Division 5.2, Organic peroxides, Packing Group II, Type F Organic Peroxides**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	4 bar	6.6.2.4.2	6.6.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	6.6.2.6.3

*Note* Organic peroxides, type F and self-reactive substances, type F, are only permitted in portable tanks when they are listed in Portable Tank Instruction T 34. All others are prohibited unless approved by the competent authority.

**CLASS 6, TOXIC AND INFECTIOUS SUBSTANCES****Division 6.1, Packing Group I, non-inhalation hazard with or without subsidiary risk**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	6 bar */	6 mm	6.6.2.8.3	NA

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

*Note* Higher minimum test pressure and higher minimum thickness requirements should be considered for Division 6.1 substances that are classified as toxic on the basis of an inhalation hazard at the PG I level.

**Division 6.1, Packing Group II, with or without subsidiary risk, liquid substances**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	4 bar */	6.6.2.4.2	Normal	6.6.2.6.3

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

**Division 6.1, Toxic Substances, Packing Group II and III, solid substances**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	1.5 bar	6.6.2.4.2 <u>*/</u>	Normal	6.6.2.6.3 <u>**/</u>

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

**Division 6.1, Toxic Substances, Packing Group III, liquid substances**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	2.65 bar <u>*/</u>	6.6.2.4.2	Normal	6.6.2.6.3

\*/ A higher minimum test pressure may be used depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

**CLASS 8, CORROSIVE SUBSTANCES****Class 8, Packing Group I, liquid substances, with or without subsidiary risk**

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	4 bar	6 mm	6.6.2.8.3	NA

**Class 8, Packing Group II, liquid substances, with or without subsidiary risk**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>4 bar <u>*/</u></b>	<b>6.6.2.4.2</b>	<b>Normal</b>	<b>6.6.2.6.3</b>

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

**Class 8, Corrosive Substances, Packing Group II and III solid substances**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>1.5 bar</b>	<b>6.6.2.4.2 <u>*/</u></b>	<b>Normal</b>	<b>6.6.2.6.3 <u>**/</u></b>

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

**Class 8, Corrosive Substances, Packing Group III, liquid substances**

<b>Portable tank instruction</b>	<b>Minimum test pressure</b>	<b>Minimum shell thickness</b>	<b>Pressure relief device</b>	<b>Bottom openings</b>
	<b>2.65 bar <u>*/</u></b>	<b>6.6.2.4.2</b>	<b>Normal</b>	<b>6.6.2.6.3</b>

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

## CLASS 9, MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

### Class 9, Miscellaneous Dangerous Substances and Articles, solid substances

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	1.5 bar	6.6.2.4.2 <u>*/</u>	Normal	6.6.2.6.3 <u>**/</u>

\*/ Granular or powdered solid substances may be transported in tanks with minimum shell thicknesses of 5 mm in the required steel regardless of the tank diameter.

\*\*/ All granular or powdered solid substances and some highly viscous or crystallizable substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with 6.6.2.6.2.

### Class 9, Miscellaneous Dangerous Substances and Articles, liquid substances

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	1.5 bar <u>*/</u>	6.6.2.4.2	Normal	6.6.2.6.3

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

### Class 9, Miscellaneous Dangerous Substances and Articles, elevated temperature substances

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	1.5 bar <u>*/</u>	6.6.2.4.2	Normal	6.6.2.6.2

\*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 °C and the pressure prescribed in the Model Regulations using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

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**Chapter 4.3 - Use of Bulk Containers**

**Rationalised approach to the assignment of substances to transport in bulk containers to be added on adoption of ICCA proposals.**

## PART 5

### CONSIGNMENT PROCEDURES

Whenever dangerous goods are offered for transport certain measures should be taken to ensure that the potential risks the dangerous goods pose in transport are correctly communicated. This has traditionally been accomplished through marking and labelling of packages and by placarding of transport units to indicate the hazards of the dangerous goods and through the inclusion of relevant information in the dangerous goods transport documents. Requirements are in Chapters 5.2, 5.3, 5.4 and 5.5 of the Model Regulations.

The labels illustrated in 5.2.2.2 of the Model Regulations should be affixed on dangerous goods or packages containing dangerous goods. The labelling system is based on the classification of dangerous goods and was established with the following aims in mind:

- (a) to make dangerous goods easily recognizable by the general appearance (symbol, colour and shape) of the labels they bear;
- (b) to provide, by means of colours on the labels, a useful first guide for handling, stowage and segregation.

In certain cases, where the hazard posed by dangerous goods is considered low, or the dangerous goods are in a limited quantity, exemptions from labelling may be provided. In such cases, marking of packages with the class or division and the packing group number may be required.

One of the primary requirements of the dangerous goods transport document is to convey basic hazard information about the dangerous goods being offered for transport. It is recognized that individual national authorities or international organizations may consider it necessary to require additional information. However, the basic items of information considered necessary for each of the dangerous goods offered for transport by any mode are identified in Chapter 5.4 of the Model Regulations.

## **PART 6**

### **CONSTRUCTION AND TESTING AND TESTING OF PACKAGINGS, INTERMEDIATE BULK CONTAINERS (IBCs), LARGE PACKAGINGS, PORTABLE TANKS, MULTIPLE-ELEMENT GAS CONTAINERS (MEGCs) AND BULK CONTAINERS**

To be developed.

## **PART 7**

### **PROVISIONS CONCERNING TRANSPORT OPERATIONS**

Part 7 is divided into two chapters.

The provisions in Chapter 7.1 are applicable to all modes of transport and include requirements

- for loading and segregation,
- special provisions for explosives, gases, self-reactive substances, organic peroxides, for substances stabilized by temperature control other than self-reactive substances and organic peroxides, for Class 6 and for Class 7, and
- for reporting of accidents or incidents.

The provisions in Chapter 7.2 are generally mode specific and are in addition to the provisions for all modes in Chapter 7.1. The provisions in Chapter 7.2 include

- special provisions for the transport of portable tanks on vehicles,
- special provisions for radioactive material, and
- security provisions for transport by road, rail and inland waterway.

It must be emphasized that the provisions in Part 7 are additional requirements to those in other parts of the Model Regulations so that Part 7 cannot be read in isolation nor can it be deemed to contain all the requirements necessary for transporting dangerous goods.

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