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 OF THE MODEL REGULATIONS

Note by the secretariat

1. The Committee of experts at its 21st session (December 2000) agreed in principle and supported the idea of preparing a document on guiding principles, rationalized approaches and common approaches used in developing the Model Regulations (Refer to ST/SG/AC.10/27, paras 150-155, reproduced in Annex 1 hereto).

2. The secretariat, with the kind assistance of Mr. Keith Bradley (United Kingdom), has started to give some thought to the preparation of this document, and believes that some more guidance, and support from experts of the Sub-Committee, is needed for completing the work.

3. The secretariat believes that this guiding principles are mainly intended for experts of the Sub-Committee or regulators, and therefore need not be issued as a publication. They could nevertheless be made available on the UNECE website in a first step, and perhaps later translated in all UN languages and published if not too bulky and if of interest to the general public.

4. The secretariat notes that some principles are already contained in the Orange Book; some principles related to rationalized approaches (e.g. for tanks) are contained in official reports; some principles have been used for rationalized approaches (e.g. for assignment of packing instructions) but have never been consolidated or even submitted to the Sub-Committee as official documents; a proposal has been submitted by the expert form the Netherlands for a systematic list of substances.

General principles

5. The general principles underlying the regulations of the transport of dangerous goods are already laid down in paragraphs 1 to 18 of the Recommendations (as reproduced in Annex 2 hereto).

6. The principles for reformatting the Recommendations into Model Regulations were laid down in ST/SG/AC.10/21, Annex 6 (reproduced in Annex 3 hereto).

7. The Sub-Committee may wish to consider the above existing principles an check whether they should be updated or not.

Part 1 of the Model Regulations

8. The secretariat believes that there is no need to develop guiding principles for Part 1, since it contains already provisions of a general nature. The secretariat notes however that Part 1 of the Model Regulations is much less developed that Part 1 of corresponding legal instruments such as ADR, RID, ADN, mainly due to the fact that the Model Regulations have no legal status. Since the Model Regulations are intended to be used for direct application through legal instruments, the Sub-Committee may wish to consider whether additional guidance should be developed for purposes of implementation (e.g. Part. 1 is normally the part which should contain general provisions for exemptions, derogations, transitional measures or other administrative provisions).

Part 2 - Classification

9. General principles are already contained in paras. 6-11 of the Recommendations and the secretariat believes that Part 2 itself is self-explanatory and need not be further explained by guiding principles. Nevertheless, the Sub-Committee may wish to consider whether it could be complemented by a systematic approach as proposed by the expert from the Netherlands, or by classification trees for assignment to collective entries as in ADR and RID.

Part 3

10. Principles are contained in para. 7 of the Recommendations and in the general provisions of Chapter 3.1. The secretariat notes that for individual dangerous goods, only those which are most commonly carried are supposed to be listed in Chapter 3.2, but there is no criterion for "most commonly carried" or "commercial importance". In this respect the Sub-Committee may have not always been consistent: for example, in the past, some UN numbers had been assigned to dangerous goods of commercial importance in a certain physical state. For reasons of systematic, in the past biennium, new UN numbers have been assigned to the same goods in a different physical state or in solution, without checking whether or not the other physical forms were also of commercial importance.

Chapter 3.4 – Limited quantities

11. Rationale for limited quantities is given in Annex 4 hereto. This rationale may have to be revised after completion of present work on limited quantities, excepted quantities, etc.

Part 4

Chapter 4.1 – Packagings, IBCs, large packagings

12. Principles for packing instructions were laid down in ST/SG/AC.10/C.3/26, Annex 3 (see Annex 5 hereto). What is missing is the rationalized approach that has been used for assigning packing instructions. The Sub-Committee may wish to invite experts who participated in the informal working group which elaborated the packing instructions to provide the secretariat with the rationale for assignment of packing instructions and special packing requirements.

Chapter 4.2 – Tanks

13. The rationalized approach is contained in ST/SG/AC.10/C.3/26/Add.1 for liquids (see Annex 6 hereto) and ST/SG/AC.10/C.3/2002/75, Annex 1 for solids (see Annex 7 hereto). The Sub-Committee may wish to check whether the guidelines are still valid.

Chapter 4.3 – Bulk containers

14. Assignment of BK codes has been done according to UN/SCETDG/21/INF.66, Annex 2 (see annex 8 hereto), to which an entry for UN 2900 should be added. No rationalized approach document summarizing the criteria has been developed. Some criteria are contained in sub-section 4.3.2, but they are sometimes in contradiction with the effective assignment (e.g. only BK2 is authorized for divisions/class 4.2, 4.3 and 8, but BK1/BK2 have been assigned to UN Nos 3170 and 3244 which are respectively in divisions 4.3 and 8).

Part 5

15. Original principles were contained in document E/CN.2/CONF.5/R.438 (see Annex 9 hereto). Existing principles are contained in paras. 12-15 of the Recommendations. The principles do not cover marking and placarding. The secretariat believes that Part 5 is self-explanatory and it is questionable whether detailed guidelines have to be developed.

Part 6

16. No guiding principles available (more research in old documents about testing rationale would be necessary).

Part 7

17. The provisions of Part 7 seems to be self-explanatory.

Annex 1

(Extract from ST/SG/AC.10/27)

"Rationalized development of the Model Regulations

150. For the proposal of the expert from Germany in ST/SG/AC.10/2000/21 concerning the rationalized development of the Model Regulations, several experts agreed that an investigation programme should be encouraged in order to provide a more scientific background for decision-making but others did not see how this proposal could be interpreted in the work programme, or felt that it was not the appropriate time.

151. The expert from Germany was invited to provide, in the next biennium, examples of how risk analysis could be used for rationalizing the Model Regulations.

152. Most experts agreed in principle and supported the idea of preparing a document on guiding principles, rationalized approaches and common approaches used in developing the Model Regulations, provided that this would not result in an excessive workload for the secretariat.

153. A member of the secretariat said that, subject to the effective availability of staff resources during the biennium, it should be possible to start identifying such guiding principles in previous reports and compiling them for the Sub-Committee. However he felt that in a first stage at least this should be done in one language only otherwise this could have unforeseen financial implications for translation services. He also said that some of these guiding principles had been agreed by informal working groups, e.g. for the development of packing instructions, and were not necessarily fully reflected in official reports, and therefore the assistance of experts might be needed.

154. The observer from Austria mentioned that the IAEA Regulations on the Safe Transport of Radioactive Material are accompanied with two sister publications (Explanatory material and Advisory Material) and he said that it would be useful to do the same with the UN Model Regulations to facilitate effective implementation at national level. However, the Committee considered that this could not be a task for the secretariat and, if this had to be done, it should be done by the Sub-Committee itself but it would increase tremendously its workload.

155. Several experts offered to provide assistance or guidance to the secretariat, as needed, and the expert from the United Kingdom was invited to take the lead in this respect."

Annex 2

(Paras. 1 to 18 of the Orange Book)

NATURE, PURPOSE AND SIGNIFICANCE OF THE RECOMMENDATIONS

1. These Recommendations have been developed by the United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods in the light of technical progress, the advent of new substances and materials, the exigencies of modern transport systems and, above all, the requirement to ensure the safety of people, property and the environment. They are addressed to governments and international organizations concerned with the regulation of the transport of dangerous goods. They 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.

2. The recommendations concerning the transport of dangerous goods are presented in the form of "Model Regulations on the Transport of Dangerous Goods", which are presented as annex to this document. The Model Regulations aim at presenting a basic scheme of provisions that will allow uniform development of national and international regulations governing the various modes of transport; yet they remain flexible enough to accommodate any special requirements that might have to be met. It is expected that governments, intergovernmental organizations and other international organizations, when revising or developing regulations for which they are responsible, will conform to the principles laid down in these Model Regulations, thus contributing to worldwide harmonization in this field. Furthermore, the new structure, format and content should be followed to the greatest extent possible in order to create a more user-friendly approach, to facilitate the work of enforcement bodies and to reduce the administrative burden. Although only a recommendation, the Model Regulations have been drafted in the mandatory sense (i.e., the word "shall" is employed throughout the text rather than "should") in order to facilitate direct use of the Model Regulations as a basis for national and international transport regulations.

3. The scope of the Model Regulations should ensure their value for all who are directly or indirectly concerned with the transport of dangerous goods. Amongst other aspects, the Model Regulations cover principles of classification and definition of classes, listing of the principal 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 goods. With this system of classification, listing, packing, marking, labelling, placarding and documentation in general use, carriers, consignors and inspecting authorities will benefit from simplified transport, handling and control and from a reduction in time-consuming formalities. In general, their task will be facilitated and obstacles to the international transport of such goods reduced accordingly. At the same time, the advantages will become increasingly evident as trade in goods categorized as "dangerous" steadily grows.

PRINCIPLES UNDERLYING THE REGULATION OF THE TRANSPORT OF DANGEROUS GOODS

4. Transport of dangerous goods is regulated in order to prevent, as far as possible, accidents to persons or property and damage to the environment, the means of transport employed or to other goods. At the same time, regulations should be framed so as not to impede the movement of such goods, other than those too dangerous to be accepted for transport. With this exception, the aim of regulations is to make transport feasible by eliminating risks or reducing them to a minimum. It is a matter therefore of safety no less than one of facilitating transport.

5. The Model Regulations annexed to this document are addressed to all modes of transport. Where less stringent requirements can be applied to only one mode, that fact is *not* indicated unless otherwise specified in these Regulations. For air transport more stringent requirements may occasionally apply.

CLASSIFICATION AND DEFINITIONS OF CLASSES OF DANGEROUS GOODS

6. The classification of goods by type of risk involved has been drawn up 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 is not that of the degree of danger.

7. The objective of the recommended definitions is to indicate which goods are dangerous and in which class, according to their specific characteristics, they should be included. These definitions have been devised so as to provide a common pattern which it should prove possible to follow in the various national and international regulations. Used with the list of dangerous goods, the definitions should provide guidance to those who have to use such regulations; and they present 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 Committee 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 Committee.

8. The Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.4) present the United Nations schemes for the classification of certain types of dangerous goods and gives descriptions of the test methods and procedures, considered to be the most useful, for providing competent authorities with the necessary information to arrive at a proper classification of substances and articles for transport. It should be noted that the Manual is not a concise formulation of testing procedures that will unerringly lead to a proper classification of products 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 product.

9. 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[1] may be transported under Class 9.

10. Many of the substances listed in Classes 1 to 9 are deemed as being 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.

11. 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.

CONSIGNMENT PROCEDURES

12. Whenever dangerous goods are offered for transport certain measures should be taken to ensure that the potential risks of the dangerous goods offered are adequately communicated to all who may come in contact with the goods in the course of transport. This has traditionally been accomplished through special marking and labelling of packages to indicate the hazards of a consignment and through the inclusion of relevant information in the transport documents and by placarding of transport units. Requirements in this regard are provided in the Model Regulations annexed to this document.

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[1] *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989).*

13. The labels recommended in 5.2.2.2 of the Model Regulations should be affixed on goods or packages. 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 from a distance 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.

14. In certain cases, where the danger of an item of dangerous goods is considered low, or the goods are packed 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.

15. One of the primary requirements of the transport document for dangerous goods is to convey the fundamental information relative to the hazard of the goods being offered for transport. To achieve this end, it is considered necessary to include certain basic information in the transport document for the dangerous goods consignment unless otherwise exempted in the Model Regulations. 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 dangerous substance, material or article offered for transport by any mode are identified in the Model Regulations.

EMERGENCY RESPONSE

16. The relevant national and/or international organizations should establish emergency provisions to be taken in the event of accidents or incidents during the transport of dangerous goods in order to protect persons, property and the environment. For radioactive material appropriate guidelines for such provisions are contained in "Emergency Response Planning and Preparedness for Transport Accidents Involving Radioactive Material", Safety Series No. 87, IAEA, Vienna (1988).

COMPLIANCE ASSURANCE

17. The competent authority should ensure compliance with these Regulations. Means to discharge this responsibility include the establishment and execution of a programme for monitoring the design, manufacture, testing, inspection and maintenance of packaging, the classification of dangerous goods and the preparation, documentation, handling and stowage of packages by consignors and carriers, to provide evidence that the provisions of the Model Regulations are being met in practice.

TRANSPORT OF RADIOACTIVE MATERIAL

18. The Competent Authority should ensure that the consignment, acceptance for transport and transport of radioactive material is subject to a Radiation Protection Programme as described in the Model Regulations. The competent authority should arrange for periodic assessments of the radiation doses to persons due to the transport of radioactive material, to ensure that the system of protection and safety complies with the "International Basic Safety Standards for Protection against Ionizing Radiation and for the safety of Radiation Sources", Safety Series No. 115, IAEA, Vienna (1996).

Annex 3

(Reproduction of ST/SG/AC.10/21, Annex 6)

"PRINCIPLES FOR THE WORK ON REFORMATTING THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS INTO A MODEL REGULATION

1. The 9th 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."

Annex 4

Chapter 3.4 Limited quantities

The rationale behind limited quantity provisions is that selected dangerous goods in small packagings pose a lesser risk in transportation than do larger volume packages 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 ASSIGNING LIMITED QUANTITIES

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

Note 1*: Except for UN numbers: 1133, 1139, 1169, 1197, 1210, 1263, 1266, 1287, 1306, 1866, 1999, 3065, 3269 - 5 L allowed.*
Note 2: *Except UN 2969 - 5 kg and UN Nos. 2990, 3072, 3090 and 3091 for which such provisions are not necessary.*

Annex 5

Guiding principles for developing packing instructions to be included in the model regulations

Basic principles

1. Packing instructions should be clear and provide as wide a choice of packagings as possible while providing an adequate level of safety.

2. 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 substances and articles.

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

4. A rationalized approach should be used for allocating packing instructions to specific substances.

5. Existing regulations establishing packaging requirements should be considered in developing instructions with parties specifically responsible for those regulations bringing forward relevant points.

6. Part 6 of the Model Regulations annexed to the Recommendations on the Transport of Dangeorus Goods includes capacity and mass limits for packagings and IBCs. These limits should be used unless there is safety based rationale for different limitations.

7. Separate instructions should be developed for packagings and IBCs.

Administrative guidelines

8. The packing instructions should be completed within the 1997-1998 biennium.

9. The current United Kingdom and United States of America documents together with other documents also based on existing modal regulations should be used as a basis for developing the packing instructions. These documents should be considered as work in progress to be used by the Sub-Committee and its working group to complete its work in developing packing instructions which are acceptable to all concerned parties including modal authorities.

10. Delegations should be encouraged to provide detailed comments to the United Kingdom and United States of America in due time prior to the submission deadline for papers to the fourteenth session of the Sub-Committee.

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Annex 6

GUIDELINES FOR ASSIGNING PORTABLE TANK REQUIREMENTS TO SUBSTANCES IN CLASSES 3 TO 9

1. These guidelines for assigning portable tank requirements to substances in Classes 3 to 9 are provided as a reference to be used 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.

2. The guidelines provide guidance 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.

3. 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.

4. The guidelines are provided in two parts. Part I provides general guidance. Part II provides specific guidance for groups of substances organized on the basis of the Class or Division, Packing Group and subsidiary risk.

Part I

General Guidelines

5. In assigning tank requirements to a substance the following should be taken into account:

5.1 ***Prohibited Substances***: Some substances should be prohibited from transport in portable tanks. These substances are considered too dangerous for transport typically 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:

- Substances of Class 1;
- 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.

5.2 ***Minimum Shell Thicknesses*:** The minimum shell thicknesses prescribed are provided in thicknesses relevant to reference steel with a guaranteed minimum tensile strength of 370 N/mm^2 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 provide guidance for assigning minimum thicknesses. Granular or powdered solid substances of PG II or 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.

5.3 ***Corrosive Effects of Substances on Materials of Construction***: The minimum thicknesses prescribed do not take a substance's corrosive effects into account. The consignor must ensure that the tank materials of construction are compatible with the lading.

5.4 ***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.

5.5 ***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 specified in the dangerous goods list based on the decisions of the Committee of Experts.

5.6 ***Bottom Openings***: Three possible bottom opening arrangements are proposed, 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).

5.7 ***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 shipper of the dangerous goods has the ultimate responsibility for assuring portable tanks are not filled in excess of the specified limits for each substance, solution or mixture transported.

5.8 ***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.

Part II

Specific guidelines for assigning portable tank requirements to groups of substances

6.0 In assigning tank requirements to a substance the following should be taken into account:

6.1 For substances in **CLASS 3, PG III without a subsidiary risk** the following requirements should apply:

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**

*/ A higher minimum test pressure may be required 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.

6.2 For substances in **CLASS 3, PG III with a Division 6.1 or a Class 8 subsidiary risk** the

following requirements should apply:

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 using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.3a For substances in **CLASS 3, PG II without subsidiary risks**, the following requirements should apply:

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 using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations.

6.3b For substances in **CLASS 3, PG II with Division 6.1 or Class 8 subsidiary risks** the following requirements should apply:

Portable Tank Instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
	4.0 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 using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations.

6.4 For substances in **CLASS 3, PG I**, substances in **CLASS 3, PG I with a Division 6.1 PG II or III subsidiary risk** and substances in **CLASS 3, PG I with a Class 8 PG II or III subsidiary risk,** the following requirements should apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottomopenings
	6 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 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.

***Note**: For Class 3 PG I substances with subsidiary risks which are assigned to n.o.s. entries the guidelines in 6.5 shall be applied.*

6.5 For substances in **CLASS 3, PG I with a Division 6.1, PG I subsidiary risk**, and substances in **CLASS 3, PG I with Class 8, PG I subsidiary risk**, the following requirements should apply:

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 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.

6.6 The following requirements should apply for:
Flammable solids in DIVISION 4.1, PG II and III, Solid substances in DIVISION 4.2, PG II and III, Solid substances in DIVISION 4.3, PG II and III, Solid substances in DIVISION 5.1, PG II and III Solid substances in DIVISION 6.1, PG II and III, Solid substances in CLASS 8, PG II and III Solid substances in CLASS 9, PG II and III

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 reference 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.

6.7 For **liquid** substances in **DIVISION 4.2, PG I** the following requirements should apply:

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

6.8 For substances in **DIVISION 4.3, PG I with or without subsidiary risks** the following requirements should apply:

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).*

6.9 For **solutions of solid oxidizers in DIVISION 5.1, PG II and III**, the following requirements should apply:

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

6.10 For substances in **DIVISION 5.1, PG II (hydrogen peroxides solutions) with a subsidiary risk of Class 8** the following requirements should apply:

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**

*/ Certain substances require a breathing device.

6.11 For substances in **DIVISION 5.1, PG I with subsidiary risk of Class 8** the following requirements should apply:

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

6.12 For substances in **DIVISION 5.1, PG I with a Class 8 and a Division 6.1 subsidiary risk** the following requirements should apply:

Portable tank instruction	**Minimum test pressure**	**Minimum shell thickness**	**Pressure relief device**	**Bottom openings**
	10 bar	**10 mm**	**6.6.2.8.3**	**NA**

6.13 For substances in **DIVISION 5.2, PG II (Type F Organic Peroxides)** and **self-reactive substances, type F, in DIVISION 4.1**, the following requirements should apply:

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.*

6.14 For **liquid** substances in **DIVISION 6.1 PG III** the following requirements should apply:

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 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.

6.15 For liquid substances in **DIVISION 6.1 PG II with or without subsidiary risks** the following requirements should apply:

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 using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.16 For substances in **DIVISION 6.1 PG I (non-inhalation hazard) with or without subsidiary risks** the following requirements should apply:

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 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.*

6.17 Class 7 assignments are not dealt with in this document.

6.18 For **liquid** substances in **CLASS 8 PG III** the following requirements should apply:

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 using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.19 For **liquid** substances in **CLASS 8 PG II with or without a subsidiary risk** the following requirements should apply:

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 using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.20 For **liquid** substances in **CLASS 8 PG I with or without a subsidiary risk** the following requirements should apply:

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

6.21 For **liquid** substances in **CLASS 9**, the following requirements should apply:

Portable tank instruction	**Minimum test pressure**	**Minimum shell trickness**	**Pressure relief device**	**Bottom openings**
	1.5 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 using the definitions for design and test pressure in paragraphs 6.6.2.1 of the Model Regulations.

6.22 For **elevated temperature substances** in **CLASS 9** the following requirements should apply:

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

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

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Annex 7

Rationalized approach for the assignment of tank instructions for solids

Rationalized Approach for the Transport of Solids			
Class/SR	**PG**	**TI**	**TP**
4.1	I	*Not Authorized*	
	II	T3**	TP33
	III	T1*	TP33
4.2	I	T21*	TP7, TP33
	II	T3	TP33
	III	T1	TP33
4.3/6.1	I	*Not Authorized*	-
4.3	I	T9*	TP7, TP33
	II	T3	TP33
	III	T1	TP33
5.1	I	*Not Authorized*	
	II	T3	TP33
	III	T1	TP33
5.2	-	T23***	TP33
6.1	I	T6	TP33
	II	T3	TP33
	III	T1	TP33
8	I	T6	TP33
	II	T3	TP33
	III	T1	TP33
9	II	T3	TP33
	III	T1	TP33

* Some substances in this category are not assigned a T-Code on the basis of the risk posed in transport.

** Wetted substances that may possess explosive properties are not authorized. Some substances in this category are not assigned a T-Code on the basis of the risk posed in transport.

*** Only Type F organic peroxides are authorized.

Solids not considered appropriate for transport in tanks include:

- Explosives, desensitized explosives and self-reactive substances with the exception of Type F;
- Hypochlorites, dry or wetted (i.e. UN 1471, UN 1748, UN 2208, UN 2880)
- Division 5.2 substances, except Type F;
- Division 6.2 substances;
- Class 7 substances, except LSA, non-fissile or fissile excepted; and
- UN 3255, tert-Butyl hypochlorite, UN 2907, Isosorbide dinitrate mixture, UN 2956 5 tert-Butyl-2,4,6 Trinitro-m-Xylene (Musk Xylene), UN 3241, 2-Bromo-2-Nitropropane-1,3-Diol and UN 3251, Isosorbide-5-Mononitrate.

***NOTE**: Some of the assignments below proposed by a working group were later amended by the Sub-Committee.*

UN No.	**Name and description**	**Class or division**	**Subsid-iary risk**	**UN packing group**	**RID/ADR**	**IMO**	**CFR**	**D**	**Bulk container ~~types~~ codes**
(1)	**(2)**	**(3)**	**(4)**	**(5)**					
1334	NAPHTHALENE, CRUDE or NAPHTHALENE, REFINED	4.1		III	x	x	x	x	[BK]1 [BK]2
1350	SULPHUR	4.1		III	x	x	x	x	[BK]1 [BK]2
1376	IRON OXIDE, SPENT or IRON SPONGE, SPENT obtained from coal gas purification	4.2		III	x	x	x	x	[BK]2
1408	FERROSILICON with 30% or more but less than 90% silicon	4.3	6.1	III	x	x	x	x	[BK]2
1438	ALUMINIUM NITRATE	5.1		III	x	x	x	x	[BK]1 [BK]2
1454	CALCIUM NITRATE	5.1		III	x	x	x	x	[BK]1 [BK]2
1474	MAGNESIUM NITRATE	5.1		III	x	x	x	x	[BK]1 [BK]2
1486	POTASSIUM NITRATE	5.1		III	x	x	x	x	[BK]1 [BK]2
1495	SODIUM CHLORATE	5.1		II	x	x	x	x	[BK]1 [BK]2
1498	SODIUM NITRATE	5.1		III	x	x	x	x	[BK]1 [BK]2
1499	SODIUM NITRATE AND POTASSIUM NITRATE MIXTURE	5.1		III	x	x	x	x	[BK]1 [BK]2
1942	AMMONIUM NITRATE with not more than 0.2% combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance	5.1		III	x	x	x	x	[BK]1 [BK]2

UN No. (1)	Name and description (2)	Class or division (3)	Subsid-iary risk (4)	UN packing group (5)	RID/ADR	IMO	CFR	D	Bulk container ~~types~~ codes
2067	AMMONIUM NITRATE FERTILIZERS: uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, with not less than 90% ammonium nitrate and not more than 0.2% combustible material (including organic material calculated as carbon), or with more than 70% but less than 90% ammonium nitrate and not more than 0.4% total combustible material	5.1		III	x	x	x	x	[BK]1 [BK]2
2069	AMMONIUM NITRATE FERTILIZERS: uniform non-segregating mixtures of ammonium nitrate/ammonium sulphate, with more than 45% but not more than 70% ammonium nitrate and not more than 0.4% total combustible material	5.1		III	x	x	x	x	[BK]1 [BK]2
2213	PARAFORMALDEHYDE	4.1		III	x	x	x	x	[BK]1 [BK]2
2950	MAGNESIUM GRANULES, COATED, particle size not less than 149 microns	4.3		III	x	x	x	x	[BK]2
2969	CASTOR BEANS or CASTOR MEAL or CASTOR POMACE or CASTOR FLAKE	9		II	x	x	x	x	[BK]1 [BK]2
3175	OLIDS CONTAINING FLAMMABLE LIQUID, N.O.S.	4.1		II	x	x	x	x	[BK]1 [BK]2
3243	SOLIDS CONTAINING TOXIC LIQUID, N.O.S.	6.1		II	x	x	x	x	[BK]1 [BK]2
3244	SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S.	8		II	x	x	x	x	[BK]1 [BK]2
3yyy	SODIUM CARBONATE PEROXYHYDRATE	5.1		II					BK1 and BK2
3XXX	SODIUM PERBORATE MONOHYDRATE	5.1		III					BK1 and BK2

Annex 9

5. Consignment procedures

Labels and Marks

The purpose of labels is to identify the risk and without regard to printed text.

The labels recommended are mainly intended affixing on goods .or packages. The labeling system is based on the classification of dangerous goods); it was established with the following aims in mind :
(a) to make dangerous goods easily recognizable from a distance by the general appearance (symbol, colour and shape) of the labels they bear
(b) to make the nature of the risk easy to identify by means of symbols.
(c) to provide, by means of colours on the labels, a useful first guide for handling and stowing.
These recommendations relate essentially to danger labels. There is no reason, however, why regulations should not provide additional labelling indicating precautions to be taken (e.g. a markl bearing a symbol representing an umbrella to show that a substance should not come in contact with water).

Transport Document

When dangerous goods are shipped, it is essential that they should be given an absolutely correct and accurate designation in the relevant documents in order to prevent any misunderstanding as to their nature on the part of those concerned, in particular the carriers.

The consignor must certify, either on the transport document or separate declaration, that he has put up his goods for shipping in accordance with the operative regulations.

Reference: E/CN.2/CONF.5/R.438
