

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

Rationalized Approach for Portable Tanks

Transmitted by the expert from the United States of America

1. The expert from the United States of America reviewed the paper entitled “Guiding Principles for the Model Regulations” submitted by the expert from the United Kingdom, (ST/SG/AC.10/C.3/2005/23). This is a very useful document and will serve to ensure consistency in future amendments to the Model Regulations while benefiting those that are involved in the development of the Model Regulations on the Transport of Dangerous Goods. The expert from the United Kingdom expresses the desire that work on the guiding principles will progress, be maintained and that members of the Sub-Committee will provide contributions.
2. During a review of the Guiding Principles the expert from the United States of America observed that the Guidelines for Assigning Portable Tank Requirements to Substances in Classes 3 to 9 do not provide sufficient details with respect to the tank requirements applicable to certain groups of substances. Furthermore, since the initial development of the guidelines, a number of new tank assignments have been added to the Dangerous Goods List. Additionally, it appears that some of the information that was in the original guidance document (see ST/SG/AC.10/25/Add.2) has been omitted. In particular, the T codes for each grouping are no longer indicated and the notes below each grouping are less explicit. Annex 1 includes ST/SG/AC.10/25/Add.2 as proposed to be amended in this paper. Annex 2 includes an alternate format for the guidance concerning assignment of portable tank instructions. As ST/SG/AC.10/25/Add.2 originally did not comprehensively address assignment of tank instructions for solids, and subsequently a comprehensive approach was agreed to by the Subcommittee (see UN/SCETDG/25/INF.86 Annex 7), the annexes both include guidance for assigning tank instructions to liquids *and* solids. The Sub-Committee is invited to consider which annex’s format is more user-friendly.
3. Based on a comprehensive review of the current Dangerous Goods List and the Guidelines a number of clarifications and amendments have been developed and are proposed in this paper. Many of these amendments are editorial, but some are substantive, and the Sub-Committee is invited to review the proposed changes and comment appropriately.

Proposals:

The Sub-Committee is invited to comment on the following proposed revisions in order that a revised proposal can be developed for the December meeting, taking into account the comments made. On the basis of the agreed rationalized approach, the expert from the United States could identify any discrepancies relative to existing tank assignments in the Dangerous Goods List.

4. Revise the Guidelines for Assigning Portable Tank Requirements to Substances in Classes 3 to 9 as follows:

- a. As the guidelines already address two substances in Class 1 and several substances in Class 2, it is proposed that the title be amended to read “Guidelines for Assigning Portable Tank Requirements to Substances Listed in the Dangerous Goods List”
- b. Revise 5.1 to amend the list of substances prohibited for transport in tanks by adding the following parenthetical remark after the first listed prohibition (new text in bold type):
 - Substances of Class 1 (**other than UN0331 or UN0332 - Explosive, blasting, type B or E (Agent, blasting, type B or E)**);
- c. Revise 5.8 to read as follows:

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 *molten* substance *taking into account the hazards posed by the high temperature of the substance during loading, unloading and while in transport (see 4.2.1.18). Specific filling limits apply for molten and elevated temperature substances in 4.2.1.9.5.*

- d. Add new paragraphs to 6.19 to address toxic by inhalation liquids consistent with the assignments for current toxic inhalation liquids listed in the Dangerous Goods List (see UN Nos. 3381-3390) as follows:

6.19 For substances in **DIVISION 6.1 packing group I** which are toxic by inhalation, the following requirements shall apply:

6.19.1 For substances with an inhalation toxicity less than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC₅₀ with or without subsidiary risks the following requirements should apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T20	10 bar */	<u>8 mm</u>	<u>6.7.2.8.3</u>	<u>NA</u>

6.19.2 For substances with an inhalation toxicity less than or equal to 200 ml/m³ and a saturated vapour concentration greater than or equal to 500 LC₅₀ with or without subsidiary risks the following requirements should apply:

Portable tank instruction	Minimum test pressure	Minimum shell Thickness	Pressure Relief device	Bottom openings
T22	10 bar */	<u>10 mm</u>	<u>6.7.2.8.3</u>	<u>NA</u>

- e. The T codes that were shown in the first column in with the heading “Portable tank instruction” and the detailed notes below each grouping should be reinstated as shown in Annex 1 (these amendments and all other changes to the original version of ST/SG/AC.10/25/Add.2 are shown in redline/strikeout text).

Annex 1

Proposed Revisions to ST/SG/AC.10/25/Add.2

GUIDELINES FOR ASSIGNING PORTABLE TANK REQUIREMENTS TO SUBSTANCES ~~IN CLASSES 3 TO 9~~ LISTED IN THE DANGEROUS GOODS LIST

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 listed in the dangerous goods list. 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 (other than UN0331 or UN0332 - Explosive, blasting, type B or E (Agent, blasting, type B or E));
- Desensitised explosives in Division 4.1;
- Self-reactive substances (other than type F);
- 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 on the Transport of Dangerous Goods. 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/mm² 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 packing groups 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 [6.6.2.4.2/6.7.2.4.2](#) of the Model Regulations on the Transport of Dangerous Goods 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 [6.6.7.2.4](#) 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 [6.6.7.2.1](#) 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 [6.6.7.2.8.1](#) apply); or
- (2) [6.6.7.2.8.3](#).

When paragraph [6.6.7.2.8.3](#) is referenced, a frangible disk must be provided in series preceding the pressure relief device. Paragraph [6.6.7.2.8.3](#) 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, [6.6.7.2.8.3](#) is also specified for certain groups of substances as indicated in Part II and for individual substances as indicated in the Dangerous Goods List of chapter 3 of the Model Regulations based on the decisions of the Committee of Experts.

5.6 **Bottom openings:** Three possible bottom opening arrangements are proposed, [6.6.7.2.6.3](#) (which indicates three serially mounted means of closure), [6.6.7.2.6.2](#) (two serially mounted means of closure) or N.A. (Not Allowed). Bottom openings are not allowed for [P](#)packing groups I and [certain packing group II](#) substances which are highly corrosive to steel [or aluminum](#).

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 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, 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 [molten substance taking into account the hazards posed by the high temperature of the substance during loading, unloading and while in transport \(see 4.2.1.18\). Specific filling limits apply for molten and elevated temperature substances in 4.2.1.9.5.-](#)

Part II

Specific guidelines for assigning portable tank requirements to groups of substances

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

6.0 Compressed gases are not authorized for transport in portable tanks.

6.0.1 For non-refrigerated liquefied gases in Class 2, the following provisions shall apply:

<u>Portable tank instruction</u>	<u>MAWP</u>	<u>Openings below liquid level</u>	<u>Pressure-relief requirements</u>	<u>Maximum filling ratio</u>
<u>T50 */</u>	<u>Individual consideration</u>			

**Note to the Sub-Committee: The expert from the United States may provide additional guidance on the applicable tank requirements for these gases.*

6.0.2 For refrigerated liquefied gases in Class 2, the following provisions shall apply:

<u>Portable tank instruction</u>	<u>Individual consideration – see 6.7.4</u>
<u>T75 */</u>	

** Note to the Sub-Committee: The expert from the United States may provide additional guidance on the applicable tank requirements for these gases.*

6.1—For substances in CLASS 3, packing group III without a subsidiary risk the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T2 or T4</u>	<u>–1.5 bar */</u>	<u>6.6.2.4.26.7.2.4.2</u>	<u>Normal</u>	<u>6.66.7.2.6.3</u>

~~/—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 6.66.7.2.1 of the Model Regulations (T4). A minimum test pressure of 2.65 bar applies for n.o.s. entries (T4), except as provided by the applicable tank provision.~~*

6.2—For substances in CLASS 3, packing group III with a Division 6.1 or a Class 8 subsidiary risk the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T4 or T7</u>	<u>–2.65 bar */</u>	<u>6.6.2.4.26.7.2.4.2</u>	<u>Normal</u>	<u>6.66.7.2.6.3</u>

~~/—A higher minimum test pressure may be required depending on the absolute vapour pressure of the~~*

~~substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T7). A minimum test pressure of 4 bar applies for n.o.s. entries (T7), except as provided by the applicable tank provision.~~

6.3—For substances in **CLASS 3, packing group II without subsidiary risks**, the following requirements shall apply:

Portable Tank Instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T4 or T7	2.65 bar */	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3

~~*/—A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T7). A minimum test pressure of 4 bar applies for n.o.s. entries (T7), except as provided by the applicable tank provision.~~

6.4—For substances in **CLASS 3, packing group II with Division 6.1 or Class 8 subsidiary risks** the following requirements shall apply:

Portable Tank Instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T7 or T11	4.0 bar */	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3 **/

~~*/—A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T11). A minimum test pressure of 6 bar applies for n.o.s. entries (T11), except as provided by the applicable tank provision.~~

~~**/—Bottom openings not allowed for substances which are highly corrosive to steel (T8).~~

6.5—For substances in **CLASS 3, packing group I**, substances in **CLASS 3, packing group I with a Division 6.1 packing groups II or III subsidiary risk** and substances in **CLASS 3, packing group I with a Class 8 packing groups II or III subsidiary risk**, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T11, T12, T15 or T16</u>	<u>6 bar */</u>	<u>6.6.2.4.26.7.2.4.2</u>	<u>Normal **/</u>	<u>6.66.7.2.6.3</u>

6.5 For substances in **Class 3, packing group III**, without a Division 6.1 or Class 8 subsidiary risk, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T2 or T4 */</u>	<u>1.5 bar */</u>	<u>6.7.2.4.2</u>	<u>Normal **/</u>	<u>6.7.2.6.3</u>

*/—A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in

paragraph 6.7.2.1 of the Model Regulations (T4).

For substances in Class 3, packing group II, without a Division 6.1 or Class 8 subsidiary risk, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T4 or T7 */</u>	<u>6 bar */</u>	<u>6.7.2.4.2</u>	<u>Normal **/</u>	<u>6.7.2.6.3</u>

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.7.2.1 of the Model Regulations (T7).

For substances in Class 3, packing group I, without a Division 6.1 or Class 8 subsidiary risk, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T11</u>	<u>6 bar</u>	<u>6.7.2.4.2</u>	<u>Normal **/</u>	<u>6.7.2.6.3</u>

For substances in Class 3, packing group III, with a Division 6.1 or Class 8 subsidiary risk, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T2, T4 or T7 */</u>	<u>1.5 bar **/</u>	<u>6.7.2.4.2</u>	<u>Normal **/</u>	<u>6.7.2.6.3</u>

*/ T7 applies when the substance has a Division 6.1 subsidiary risk.

**/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.7.2.1 of the Model Regulations (T4).

For substances in Class 3, packing group II, with a Division 6.1 or Class 8 subsidiary risk, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T7 or T11</u>	<u>4 bar */</u>	<u>6.7.2.4.2</u>	<u>Normal **/</u>	<u>6.7.2.6.3</u>

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.7.2.1 of the Model Regulations (T11).

~~*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T15 or T16).~~

~~**/ Some substances in this category require 6.66.7.2.8.3 (T12 or T16).~~

~~Note: For Class 3 Packing group I substances with subsidiary risks which are assigned to n.o.s. entries the following guidelines in 6.6 shall be applied. Expert judgement may need to be applied owing to the unique characteristics of certain substances in order to determine bottom opening and pressure relief device requirements.~~

~~6.6—For substances in CLASS 3, packing group I with a Division 6.1, packing group I subsidiary risk, and substances in CLASS 3, packing group I with Class 8, packing group I subsidiary risk, the following requirements shall apply:~~

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T14 or T19	6 bar */	6 mm	-6.6.7.2.8.3	-N.A.

~~*/—A higher minimum test pressure may be used/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 6.6.7.2.1 of the Model Regulations (T19).~~

6.7 The following requirements shall apply for: Flammable solids in DIVISION 4.1, packing groups II and III, Solid substances in DIVISION 4.2, packing groups II and III (none currently assigned to portable tanks), Solid substances in DIVISION 5.1, packing groups II and III, Solid substances in DIVISION 6.1, packing groups II and III, Solid substances in CLASS 8, packing groups II and III, Solid substances in CLASS 9, packing groups II and III

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T1, T2, T3, T4	1.5 bar*/	6.6.2.4.2 **/	Normal	6.6.2.6.3 ***/

For solid substances in DIVISIONS 4.1, 4.2, 4.3, 5.1, 6.1, 8, or 9, packing group III the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T1	1.5 bar	6.7.2.4.2 **/	Normal	6.6.2.6.3 ***/

For solid substances in DIVISIONS 4.1, 4.2, 4.3, 5.1, 6.1, 8, or 9, packing group II the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T3	2.65 bar	6.7.2.4.2 **/	Normal	6.6.2.6.3 ***/

For solid substances in DIVISION 4.3, packing group I, the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T9	4 bar	6mm **/	Normal	Not allowed ***/

For solid substances in DIVISIONS 6.1 or 8, packing group I, the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T6</u>	<u>4 bar</u>	<u>6.7.2.4.2 **/</u>	<u>Normal</u>	<u>6.7.2.6.3 ***/</u>

*/ A higher minimum test pressure may be ~~used~~required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph ~~6.66.7.2.1~~ of the Model Regulations (T3 or T4). A minimum test pressure of 2.65 bar may apply for some n.o.s. entries (excluding Division 4.1 substances) (T3 or T4), except as provided by the applicable tank provision.

**/ 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~~crystallized substances are permitted to be transported in portable tanks with two serially fitted and mutually independent shut-off devices in accordance with ~~6.66.7.2.6.2~~ (T1 or T3).

6.8 For **liquid**-substances in **DIVISION 4.2, packing group I** the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T21	10 bar	10 mm	Normal	N.A.

6.9 For substances in **DIVISION 4.3, packing groups II and III** with or without subsidiary risks the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T7	6 bar	6.6.2.4.2 <u>6.7.2.4.2</u>	Normal	6.66.7.2.6.3

6.10 For substances in **DIVISION 4.3, packing group I** ~~with or without~~ a Class 8 subsidiary risks the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell Thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T9</u>	<u>4 bar</u>	<u>6mm</u>	<u>Normal</u>	<u>Not Allowed</u>

For substances in DIVISION 4.3, packing group I with a Class 8 subsidiary risk the following requirements shall apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T10</u>	<u>4 bar</u>	<u>6mm</u>	<u>Normal</u>	<u>Not Allowed</u>
<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T9, T10, T13 or T14</u>	<u>4 bar ^{*/}</u>	<u>6 mm</u>	<u>—Normal ^{**/}</u>	<u>—N.A.</u>

^{*/}—A higher minimum test pressure may be used depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.6.2.1 of the Model Regulations. (T13 or T14).

^{**/}—Some substances (e.g. chlorosilanes) require 6.6.2.8.3 (T10 or T14).

6.11 For solutions of solid oxidizers in DIVISION 5.1, packing groups II and III without a Class 8 subsidiary risk, the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T4 or T7	2.65 ^{*/}	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3

^{*/} A higher minimum test pressure may be ~~used~~required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph ~~6.66.7.2.1~~ of the Model Regulations (T7).

6.12 For substances in DIVISION 5.1, packing group II (~~hydrogen peroxide solutions~~) with a subsidiary risk of Class 8 (e.g. hydrogen peroxide solutions) the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T7	4 bar	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3

^{*/} Certain substances require a venting device.

6.13 For liquid substances in DIVISION 5.1, packing group I with a subsidiary risk of Class 8 the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T10 ^{*/}	4 bar	6 mm	6.66.7.2.8.3	N.A.

^{*/} Several substances in this group are assigned tank requirements based on expert judgement owing to their unique characteristics.

6.14 For liquid substances in **DIVISION 5.1, packing group I with a ~~Class 8 and a~~ Division 6.1 subsidiary risk with an inhalation toxicity less than or equal to 200 ml/m³ and a saturated vapour concentration greater than or equal to 500 LC₅₀** the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T22	10 bar	10 mm	6.66.7.2.8.3	N.A.

6.15 For substances in **DIVISION 5.2, packing group II (type F organic peroxides) and self-reactive substances, type F, in DIVISION 4.1**, the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T23	4 bar	6.6.2.4.26.7.2.4.2	6.66.7.2.8.2 4.2.1.13.6 4.2.1.13.7 4.2.1.13.8	6.66.7.2.6.3

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 T23. All others are prohibited unless approved by the competent authority.

6.16 For liquid substances in **DIVISION 6.1 packing group III** the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T4 or T7 <u>*/</u>	2.65 bar <u>*/</u>	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3

**/ A higher minimum test pressure may be ~~used~~required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph ~~6.66.7.2.1~~ of the Model Regulations (T7). A minimum test pressure of 4 bar applies for n.o.s. entries (T7), except as provided by the applicable tank provision.*

6.17 For liquid substances in **DIVISION 6.1 packing group II with or without subsidiary risks** the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T7 or T11 <u>*/</u>	4 bar <u>*/</u>	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3 <u>**/</u>

**/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph ~~6.66.7.2.1~~ of the Model Regulations (T11). A minimum test pressure of 6 bar applies for n.o.s. entries (T11), except as provided by the applicable tank provision.*

***/ Bottom openings not allowed for substances which are highly corrosive to steel (T8).*

6.18 For substances in **DIVISION 6.1 packing group I** with or without subsidiary risks the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell Thickness	Pressure relief device	Bottom openings
T14	6 bar	6 mm	6.66.7.2.8.3	N.A.

6.19 For substances in **DIVISION 6.1 packing group I** that are toxic by inhalation, the following requirements shall apply:

6.19.1 ~~reserved~~ For substances with an inhalation toxicity less or than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC₅₀ with or without subsidiary risks the following requirements should apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell thickness</u>	<u>Pressure relief device</u>	<u>Bottom openings</u>
<u>T20</u>	<u>10 bar</u>	<u>8 mm</u>	<u>6.7.2.8.3</u>	<u>NA</u>

6.19.2 For substances with an inhalation toxicity less than or equal to 200 ml/m³ and a saturated vapour concentration greater than or equal to 500 LC₅₀ with or without subsidiary risks the following requirements should apply:

<u>Portable tank instruction</u>	<u>Minimum test pressure</u>	<u>Minimum shell Thickness</u>	<u>Pressure Relief device</u>	<u>Bottom openings</u>
<u>T22</u>	<u>10 bar</u>	<u>10 mm</u>	<u>6.7.2.8.3</u>	<u>NA</u>

6.20 Class 7 assignments are not ~~dealt with~~considered in this document.

6.21 For **liquid** substances in **CLASS 8 packing group III** the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T4 or T7 <u>*/</u>	2.65 bar <u>*/</u>	6.6.2.4.26.7.2.4.2	Normal	6.66.7.2.6.3

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph ~~6.66.7.2.1~~ of the Model Regulations (T7). A minimum test pressure of 4 bar applies for n.o.s. entries (T7), except as provided by the applicable tank provision.

6.22 For **liquid** substances in **CLASS 8 packing group II** with or without a subsidiary risk the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T7 or T11 <u>*/</u>	4 bar <u>*/</u>	<u>6.6.2.4.26.7.2.4.2</u>	Normal	<u>6.66.7.2.6.3</u> <u>**/</u>

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T11). A minimum test pressure of 6 bar applies for n.o.s. entries (T11), except as provided by the applicable tank provision.

**/ Bottom openings not allowed for substances which are highly corrosive to steel (T8).

6.23 For **liquid** substances in **CLASS 8 packing group I** with or without a subsidiary risk the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T10 or T14 <u>*/</u>	4 bar <u>*/</u>	6 mm	<u>6.66.7.2.8.3</u>	N.A.

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T14). A minimum test pressure of 6 bar applies for n.o.s. entries (T14), except as provided by the applicable tank provision.

**/ Several substances in this group are assigned tank requirements based on expert judgement owing to their unique characteristics.

6.24 For **liquid** substances in **CLASS 9**, the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T2 or T4 <u>*/</u>	1.5 bar <u>*/</u>	<u>6.6.2.4.26.7.2.4.2</u>	Normal	<u>6.66.7.2.6.3</u>

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T4). A minimum test pressure of 2.65 bar applies for n.o.s. entries (T4), except as provided by the applicable tank provision.

6.25 For **elevated temperature** substances in **CLASS 9** the following requirements shall apply:

Portable tank instruction	Minimum test pressure	Minimum shell thickness	Pressure relief device	Bottom openings
T1 or T3 <u>*/</u>	1.5 bar <u>*/</u>	<u>6.6.2.4.26.7.2.4.2</u>	Normal	<u>6.66.7.2.6.2</u>

*/ A higher minimum test pressure may be required depending on the absolute vapour pressure of the substance at 65 EC and the pressure prescribed using the definitions for design and test pressure in paragraph 6.66.7.2.1 of the Model Regulations (T3).

Annex 2
Revised Layout for the Assignment of Portable Tank Instructions

Part II

Specific guidelines for assigning portable tank requirements to groups of substances

Class or Division	PG	SR	TI	Notes
1			T1	Only UN0331 or UN0332 - Explosive, blasting, type B or E (Agent, blasting, type B or E) are authorized for transport in portable tanks.
2.1			T50/T75	T50 applies to non-refrigerated liquefied flammable gases. T75 applies to refrigerated liquefied flammable gases.
2.2			T50/T75	T50 applies to non-refrigerated liquefied gases. T75 applies to refrigerated liquefied gases.
2.3			T50	
3	I	Any other than 6.1/8	T11	
	II	Any other than 6.1/8	T4 or T7 ¹	
	III	Any other than 6.1/8	T2 or T4 ¹	
3	I	6.1 or 8	T14	
	II	6.1 or 8	T7 or T11 ¹	
	III	6.1 or 8	T2 or T4 ¹ or T7 ²	
4.1	I	Any		Desensitized explosives in Division 4.1 are not authorized for transport in portable tanks.
	II	Any	T3	Only Type F Self-reactive substances are authorized for transport in tanks, and shall be assigned T23.
	III	Any	T1	
4.2 Liquids	I	Any	T21	
	II	Any		<i>Note: Portable tank instructions are not currently assigned to any liquid self-heating substances. This may be an issue for future consideration.</i>
	III	Any		

Class or Division	PG	SR	TI	Notes
4.2 Solids	I	Any	T21	
	II	Any	T3	
	III	Any	T1	
4.3 Liquids	I	Any	T9 or T10 ³	
	II	Any	T7	
	III	Any	T7	
4.3 Solids	I	Any	T9	
	II	Any	T3	
	III	Any	T1	
5.1 Liquids	I	Any	T10	
	II	Any	T4	
	III	Any	T4	
5.1 Solids	I	Any	N/A	
	II	Any	T3	
	III	Any	T1	
6.1 Liquids (TIH)	I	Any	T20	This instruction shall be assigned to substances with an inhalation toxicity less or than or equal to 1000 ml/m ³ and saturated vapour concentration greater than or equal to 10 LC50.
			T22	This instruction shall be assigned to substances with an inhalation toxicity less than or equal to 200 ml/m ³ and a saturated vapour concentration greater than or equal to 500 LC50.
6.1 Liquids	I	Any	T14	
	II	Any	T7 or T8 ³ or T11 ¹	
	III	Any	T4 or T7 ¹	
6.1 Solids	I	Any	T6	
	II	Any	T3	
	III	Any	T1	
8 Liquids	I	Any	T10 or T14 ¹ or T20 ⁴	
	II	Any	T7 or T8 ³ or T11 ¹	

Class or Division	PG	SR	TI	Notes
	III	Any	T4 or T7 ¹	
8 Solids	I	Any	T6	
	II	Any	T3	
	III	Any	T1	
9 Liquids	II	Any	T4	Special consideration may need to be given to Class 9 substances based on the substances' properties.
	III	Any	T4	
9 Solids	II	Any	T1	
	III	Any	T3	

¹ This instruction shall be assigned to n.o.s. substances and may also be assigned based on the absolute vapour pressure of the substance.

² This instruction shall be assigned to n.o.s. substances with a Division 6.1 subsidiary risk.

³ This instruction shall be assigned when the substance is highly corrosive to steel or aluminum.

⁴ This instruction shall be assigned to substances with an inhalation toxicity less or than or equal to 1000 ml/m³ and saturated vapour concentration greater than or equal to 10 LC50.