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**Committee of Experts on the Transport of Dangerous Goods  
and on the Globally Harmonized System of Classification  
and Labelling of Chemicals**

**Report of the Committee of Experts on the Transport of  
Dangerous Goods and on the Globally Harmonized System of  
Classification and Labelling of Chemicals on its eleventh  
session**

held in Geneva on 9 December 2022

**Addendum**

**Annex II**

**Amendments to the seventh revised edition of the Manual of Tests and  
Criteria (ST/SG/AC.10/11/Rev.7 and Amend.1)**



## Section 1

- 1.2.1.4.3 Amend the beginning of the first sentence to read “Self-reactive substances (type A to type G), organic peroxides (type A to type G) or polymerizing substances should not...”. In the first sentence, after “thermal decomposition”, add “or polymerization”.

## Section 10

Figure 10.6 (a) In 8, replace “PROVISIONALLY ACCEPT INTO THIS CLASS” by “PROVISIONALLY CLASSIFY AS AN EXPLOSIVE”.

Figure 10.7 (a) In 12, replace “PROVISIONALLY ACCEPT INTO THIS CLASS” by “PROVISIONALLY CLASSIFY AS AN EXPLOSIVE”.

## Section 20

- 20.2.5 Amend the beginning of the first sentence to read “Any substance which shows the properties of a self-reactive substance (type A to type G), an organic peroxide (type A to type G) or a polymerizing substance should not...”. At the end, after “thermal decomposition”, add “or polymerization”.

## Section 32

- 32.2.2 In the first sentence, replace “60 °C” by “93 °C” and delete the rest of the sentence after that.

At the end of the paragraph, add the following text:

“For the purposes of transport, the following specifications apply in addition:

- (a) Substances are classified as flammable liquids only when their flash point is not more than 60 °C (flammable liquids Category 4 of the GHS is not implemented);
- (b) Additionally, substances transported or offered for transport at elevated temperatures, are classified as flammable liquids when they give off a flammable vapour at a temperature at or below the maximum transport temperature.”

- 32.2.3 In the third sentence, after “60 °C”, delete “in a closed-cup test, or more than 65.6 °C in an open-cup test,”.

- 32.4 Insert the following new paragraph under the heading:

“ It is recommended to use closed-cup test methods for the determination of the flash point. Open-cup test methods are acceptable for liquids which cannot be tested in closed-cup test methods (e.g., due to their viscosity) or when open-cup test data is already available. In these cases, 5.6 °C should be subtracted from the measured value, because open cup test methods generally result in higher values than closed-cup test methods.”

## Section 33

- 33.2 Add a new note under the heading to read as follows:

**“NOTE:** *The term "metal powders" covers powders of metals or metal alloys.*”

- 33.2.4.3.1 In the second sentence, replace “powders of metals or metal-alloys” by “metal powders”.

- 33.2.4.4.1 In the second sentence, replace “Powders of metals or metal-alloys” by “Metal powders”.

- 33.2.4.4.2 In the second sentence, replace “powders of metals or metal-alloys” by “metal powders”.

## Section 37

- 37.1.2 In the last sentence, replace “classification” by “transport classification”.

## Section 38

- 38.3 In the heading, replace the “and” by a comma and after “**lithium ion**”, insert “**and sodium ion**”.

- 38.3.1 Replace “lithium metal and lithium ion” by “lithium metal, lithium ion and sodium ion” and “3480 and 3481” by “3480, 3481, 3551 and 3552”.

At the end, add a new note to read as follows:

**“NOTE:** *In this section the words “sodium ion cells or batteries” refer to sodium ion with organic electrolyte cells or batteries.”.*

- 38.3.2.1 In the first sentence, before “cell types”, insert “lithium”. In the second sentence, before “battery types”, insert “lithium”. In the third sentence, before “battery types”, insert “lithium”. In the fourth sentence, before “batteries”, insert “lithium”. In the fifth sentence, before “cell”, insert “lithium”. In the sixth sentence, before “cell”, insert “lithium”. In the seventh sentence, before “cell”, insert “lithium”.

At the end, add a new paragraph to read as follows:

“All sodium ion cell types shall be subjected to tests T.1 to T.6. All rechargeable sodium ion battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5 and T.7. In addition, rechargeable single cell sodium ion batteries with overcharge protection shall be subjected to test T.7. A component sodium ion cell that is not transported separately from the battery it is part of needs only to be tested according to tests T.6. A component sodium ion cell that is transported separately from the battery shall be subjected to tests T.1 to T.6. A sodium ion cell or battery that is an integral part of the equipment it is intended to power that is transported only when installed in the equipment, may be tested in accordance with the applicable tests when installed in the equipment.”.

- 38.3.2.2 At the beginning, replace “Lithium metal and lithium ion” by “Lithium metal, lithium ion and sodium ion”.

- 38.3.2.3 In the definition for “*Large battery*”, delete “lithium metal battery or lithium ion”.

In the definition for “*Small battery*”, delete “lithium metal battery or lithium ion”.

Add a new definition to read as follows:

“*Sodium ion cell or battery* means a rechargeable electrochemical cell or battery where the positive and negative electrode are both intercalation or insertion compounds (intercalated sodium exists in an ionic or quasi-atomic form in the lattice of the electrode material) constructed with no metallic sodium (or sodium alloy) in either electrode and with an organic non-aqueous compound as electrolyte.”

- 38.3.3 Insert a new 38.3.3 to read as follows:

### **“38.3.3 *Number and condition of cells and batteries to be tested***

When a cell or battery type has to be tested under this sub section, the number and condition of cells and batteries of each type to be tested are as follows:”

Renumber the current 38.3.3 as 38.3.3.1 and amend as follows:

- Insert a new heading to read: “*Testing of lithium cells and batteries*”.
- Delete the first paragraph under the heading.
- In (a), (b) and (c), introductory phrase, before “cells”, insert “lithium”.
- In (d), introductory phrase, before “batteries”, insert “lithium” (two times).
- In (e), introductory phrase, before “cells and component cells”, insert “lithium”.
- In (f), before “battery assembly”, insert “lithium”.
- In (g), first paragraph, before “batteries”, insert “lithium”. In the paragraph after (iii), replace “assembled battery” by “assembled lithium battery”.

Insert a new 38.3.3.2 to read as follows:

“38.3.3.2 *Testing of sodium ion cells and batteries*

- (a) When testing rechargeable sodium ion cells and batteries under tests T.1 to T.5 the following shall be tested in the quantity indicated:
  - (i) five cells at first cycle, in fully charged states;
  - (ii) five cells after 25 cycles ending in fully charged states;
  - (iii) four small batteries at first cycle, in fully charged states;
  - (iv) four small batteries after 25 cycles ending in fully charged states;
  - (v) two large batteries at first cycle, in fully charged states; and
  - (vi) two large batteries after 25 cycles ending in fully charged states.
- (b) When testing rechargeable sodium ion cells or rechargeable single cell sodium ion batteries under test T.6, the following shall be tested in the quantity indicated:
  - (i) five cells or single cell batteries at first cycle, in fully charged states;
  - (ii) five cells or single cell batteries after 25 cycles ending in fully charged states; and
  - (iii) for component cells of rechargeable batteries, five cells at first cycle at 50 % of the design rated capacity and five cells after 25 cycles ending at 50 % of the design rated capacity.
- (c) When testing rechargeable sodium ion batteries or rechargeable single cell sodium ion batteries under test T.7, the following shall be tested in the quantity indicated:
  - (i) four small batteries at first cycle, in fully charged states;
  - (ii) four small batteries after 25 cycles ending in fully charged states;
  - (iii) two large batteries at first cycle, in fully charged states;
  - (iv) two large batteries after 25 cycles ending in fully charged states; and

Batteries or single cell batteries not equipped with battery overcharge protection that are designed for use only as a component in another battery or in equipment, which affords such protection, are not subject to the requirements of this test.

- (d) When testing a sodium ion battery assembly, with a Watt-hour rating of not more than 6 200 Wh, that is assembled from batteries that have passed all applicable tests, one assembled battery in a fully charged

state shall be tested under tests T.3, T.4 and T.5, and, in addition, test T.7 in the case of a rechargeable battery.

- (e) When sodium ion batteries that have passed all applicable tests are electrically connected to form a battery, with a Watt-hour rating of more than 6 200 Wh, the assembled battery does not need to be tested if the assembled battery is of a type that has been verified as preventing:
- (i) Overcharge;
  - (ii) Short circuits; and
  - (iii) Over discharge between the batteries.

For an assembled sodium ion battery not equipped with overcharge protection that is designed for use only as a component in another battery, in equipment, or in a vehicle, which affords such protection:

- the overcharge protection shall be verified at the battery, equipment or vehicle level, as appropriate, and
- the use of charging systems without overcharge protection shall be prevented through a physical system or process controls.”

Renumber the current 38.3.3.1 as 38.3.3.3 and amend as follows:

- Replace “and 38.3.3” by “, 38.3.3.1 and 38.3.3.2” and, in the English version, replace “table” by “tables”.
- In the heading of table 38.3.2, before “primary”, insert “lithium”.
- In the heading of table 38.3.3, before “rechargeable”, insert “lithium”.
- After table 38.3.3, insert a new table 38.3.4 to read as follows:

**“Table 38.3.4: Summary table of required tests for sodium ion rechargeable cells and batteries**

Rechargeable cells and batteries										
		T.1	T.2	T.3	T.4	T.5	T.6	T.7 <sup>a</sup>	T.8	Sum <sup>d</sup>
Cells not transported separately from a battery	first cycle, 50 % charged state						5			10
	25th cycle, 50 % charged state						5			
Cells	first cycle, fully charged state	5					5			20
	25th cycle, fully charged state	5					5			
Single cell batteries <sup>b</sup>	first cycle, fully charged state	5					5	4		28
	25th cycle, fully charged state	5					5	4		
Small batteries	first cycle, fully charged state	4						4		16
	25th cycle, fully charged state	4						4		
Large batteries	first cycle, fully charged state	2						2		8
	25th cycle, fully charged state	2						2		
Batteries assembled with tested batteries ≤ 6 200 Wh	fully charged state			1				1		2
Batteries assembled with tested batteries > 6 200 Wh <sup>c</sup>										0

<sup>a</sup> *Batteries or single cell batteries not equipped with battery overcharge protection that are designed for use only as a component in another battery or in equipment, which affords such protection, are not subject to the requirements of this test;*

<sup>b</sup> *Except for the T.7 Overcharge test, a single cell battery containing one tested cell does not require testing unless a change in cell design could result in the failure of any test;*

<sup>c</sup> *If the assembled battery is of a type that has been verified as preventing:*

(i) *Overcharge;*

(ii) *Short circuits; and*

(iii) *Over discharge between the batteries.*

<sup>d</sup> *The sum represents the number of tests required, not the number of cells or batteries tested.”*

38.3.5 In the heading, replace “**Lithium cell**” by “**Cell**”.

In the heading of the table, replace “**Lithium cell**” by “**Cell**”.

In (f) (i), replace “Lithium ion or lithium metal” by “Lithium ion, lithium metal or sodium ion”.

## Section 41

41.3.4.4 At the end, replace the semicolon by a full stop and add “The relevant dimensions of the portable tank or MEGC shall be measured after every impact to ensure conformity with the dimensional requirements regarding handling, securing and transfer from one means of transport to another.”.

## Section 51

51.1.1 In the second sentence, before “sub-sections 16.4 and”, insert “sections 12 and 13 and”.

51.2.1 Amend to read as follows (footnote 1 is deleted):

“51.2.1 Desensitized explosives are substances and mixtures in the scope of Chapter 2.1 of the GHS which are phlegmatized to suppress their explosive properties in such a manner that they meet the criteria as specified in 2.17.2 of the GHS and thus may be exempted from the hazard class “Explosives” (Chapter 2.1 of GHS).”

51.2.2 Amend to read as follows and renumber footnote 2 as 1:

“51.2.2 Desensitized explosives should be tested:

(a) For their exothermic decomposition energy<sup>1</sup>, if attempting to exit the class of desensitized explosives;

(b) In accordance with test 1 (a), test series 2 and 3 and tests 6 (a) and (b), respectively of this Manual and in accordance with the classification procedure in section 51.3, to preclude a mass explosion in the corrected burning rate test;

(c) In accordance with the corrected burning rate test; and

(d) Nitrocellulose should be tested in accordance with Appendix 10 of this Manual in order to be used in nitrocellulose mixtures.”

51.3.1 In the first sentence, replace “the test series 6 types 6 (a) and 6 (b) shall be performed in alphabetical order” by “tests as specified below should be performed to rule out the possibility of mass explosion”. In the second sentence, replace “The substances or mixtures” by “In accordance with test 6 (a), substances and mixtures”. Amend the third sentence to read: “If there is

a positive result in test 6 (a), test 6 (b) should be performed with the same initiation system that caused the positive result in test 6 (a).”.

51.3.2 Amend to read as follows:

“51.3.2 It is not always necessary to conduct tests of all types:

- (a) Test series 3 may be waived if the explosive itself (i.e. before being phlegmatized) is not too sensitive or thermally unstable in accordance with test series 3;
- (b) Test series 3 and tests 6 (a) and (b) may be waived if test series 2 has been passed;
- (c) Test series 3 is not applicable to nitrocellulose mixtures containing no explosives other than nitrocellulose, for which the stability of the nitrocellulose has been established in accordance with Appendix 10;
- (d) Tests 6 (a) and 6 (b) may be modified or waived in accordance with section 51.3.3;
- (e) Test 6 (b) may be waived if in each type 6 (a) test:
  - (i) The exterior of the package is undamaged by internal detonation and/or ignition; or
  - (ii) The contents of the package fail to explode, or explode so feebly as would exclude propagation of the explosive effect from one package to another in test 6 (b).”

51.3.3 Amend to read as follows:

“51.3.3 In the first sentence, replace “the Series 1 type 1(a) test, the 6(a) test” by “test 1 (a), test 6 (a)”, and the end, delete the closing parenthesis. In the second sentence, replace “a Series 2 type 2(c) test. the 6 (a) test” by “test 2 (c), test 6 (a)”.

Re-number footnote 3 as 2 and replace “the type 1 (a) test” by “test 1 (a)” and “the Series 6 type 6(a) test” by “test 6 (a).”.

51.3.4 In the first sentence, replace “a test type 6 (b)” as “test 6 (b)”. In the second sentence, replace “Division 1.1” by “the class of explosives (see Chapter 2.1 of the GHS)”.

51.4.4.2 (b) Re-number footnote 4 as 3.

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