

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

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Item 4 (e) of the provisional agenda

Electric storage systems: sodium-ion batteries

**Transposition of INF.40 into amendments ready for adoption**

Note by the secretariat

**I. Draft amendments to the twenty-second revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations (ST/SG/AC.10/1/Rev.22)**

**Chapter 2.9**

2.9.2 After the section for “*Lithium batteries*”, add a new section to read as follows:

“*Sodium ion batteries*

3551 SODIUM ION BATTERIES with organic electrolyte

3552 SODIUM ION BATTERIES with organic electrolyte CONTAINED IN EQUIPMENT or SODIUM ION BATTERIES with organic electrolyte PACKED WITH EQUIPMENT”

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

2.9.5 Add a new 2.9.5 to read as follows:

“**2.9.5 Sodium ion batteries**

Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment containing sodium ion, which are a rechargeable electrochemical system where the positive and negative electrode are both intercalation or insertion compounds, constructed with no metallic sodium (or sodium alloy) in either electrode and with an organic non aqueous compound as electrolyte, shall be assigned to UN Nos. 3551 or 3552 as appropriate.

**NOTE:** *Intercalated sodium exists in an ionic or quasi-atomic form in the lattice of the electrode material.*

They may be transported under these entries if they meet the following provisions:

- (a) Each cell or battery is of the type proved to meet the requirements of applicable tests of the Manual of Tests and Criteria, part III, sub-section 38.3.
- (b) Each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally encountered during transport;

- (c) Each cell and battery is equipped with an effective means of preventing external short circuits;
- (d) Each battery containing cells or a series of cells connected in parallel is equipped with effective means as necessary to prevent dangerous reverse current flow (e.g., diodes, fuses, etc.);
- (e) Cells and batteries shall be manufactured under a quality management program as prescribed under 2.9.4 (e) (i) to (ix);
- (f) Manufacturers and subsequent distributors of cells or batteries shall make available the test summary as specified in the Manual of Tests and Criteria, Part III, sub-section 38.3, paragraph 38.3.5.”

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

### Chapter 3.2, dangerous goods list

For UN 2795, in column (6), add “401”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

For UN 3292, in column (2), replace “SODIUM” by “METALLIC SODIUM OR SODIUM ALLOY” (two times) and in column (6), add “401”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

Add the following two new entries:

3551	SODIUM ION BATTERIES with organic electrolyte	9			188 230 310 348 376 377 384 400 401	0		P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906			
3552	SODIUM ION BATTERIES with organic electrolyte CONTAINED IN EQUIPMENT or SODIUM ION BATTERIES with organic electrolyte PACKED WITH EQUIPMENT	9			188 230 310 348 360 376 377 384 400 401	0		P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906			

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

### Chapter 3.3

SP 188 In (a), after “lithium ion”, insert “or sodium ion”.

In (b), first sentence, after “lithium ion”, insert “or sodium ion”. In the second sentence, after “Lithium ion”, insert “and sodium ion”. In the second sentence, replace “except those” by “except lithium ion”.

In (c), after “Each”, insert “lithium”, and after “(g)”, insert “or for sodium ion cells or batteries, the provisions of 2.9.5 (a), (e) and (f) shall apply”.

In (f), in the first and last paragraphs, replace “lithium battery mark” by “lithium or sodium ion battery mark”.

In the antepenultimate paragraph, second sentence, delete “lithium”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

SP 230 At the end, add the following new sentence “Sodium ion cells and batteries may be transported under this entry if they meet the provisions of 2.9.5.”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

SP 296 In (d), after “lithium ion”, insert “or sodium ion”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

SP 328 In the last paragraph, replace “lithium metal or lithium ion” by “lithium metal, lithium ion or sodium ion” and replace the “or” before “UN 3481” by a coma. At the end of the sentence, add “or UN 3552 SODIUM ION BATTERIES”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

SP 348 Replace “Batteries” by “Lithium batteries”. After “2011” insert “and sodium ion batteries manufactured after 31 December 2025”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

SP 360 In the first sentence, replace “lithium metal batteries or lithium ion batteries” by “lithium metal, lithium ion or sodium ion batteries”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

SP 376 In the first paragraph, replace “Lithium ion cells or batteries and lithium metal cells or batteries” by “Lithium metal, lithium ion or sodium ion cells or batteries”.

In the paragraph after the note, replace “UN 3480 and UN 3481” by “UN 3480, UN 3481, UN 3551 and UN 3552, as appropriate”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

SP 377 In the first paragraph, replace “Lithium ion and lithium metal” by “Lithium metal, lithium ion and sodium ion” and after “non-lithium”, insert “or non-sodium ion”.

In the second paragraph, after “2.9.4”, insert “or 2.9.5”.

In the third paragraph, replace “or” by “, "SODIUM ION BATTERIES FOR DISPOSAL"”. At the end of the sentence, add “or "SODIUM ION BATTERIES FOR RECYCLING", as appropriate”.

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

Add the following new special provisions:

“400 Sodium-ion cells and batteries and sodium-ion cells and batteries contained in or packed with equipment, prepared and offered for transport, are not subject to other provisions of these Regulations if they meet the following:

- (a) The cell or battery is short-circuited, in a way that the cell or battery does not contain electrical energy. The short-circuiting of the cell or battery shall be easily verifiable (e.g., busbar between terminals).
- (b) Each cell or battery meets the provisions of 2.9.5 (a), (b), (d), (e) and (f);
- (c) Each package shall be marked according to 5.2.1.9;
- (d) Except when cells or batteries are installed in equipment, each package shall be capable of withstanding a 1.2 m drop test in any orientation without damage to cells or batteries contained therein, without shifting of the contents so as to allow battery to battery (or cell to cell) contact and without release of contents;”.
- (e) Cells and batteries when installed in equipment shall be protected from damage. When batteries are installed in equipment, the equipment shall be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging’s capacity

and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.”

- (f) Each cell, including when component of a battery, shall only contain dangerous goods that are authorized to be transported in accordance with the provisions of Chapter 3.4, and the quantity of the dangerous goods in the cell shall not exceed the quantity specified in Chapter 3.2 Table A Column 7a.

401 Sodium ion cells and batteries with organic electrolyte shall be transported as UN 3551 or 3552 as appropriate, sodium-ion batteries with aqueous alkali electrolyte shall be transported as UN 2795 BATTERIES, WET, FILLED WITH ALKALI, electric storage.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

## Alphabetical index

For “BATTERIES, CONTAINING SODIUM”, in the column for “Name and description”, replace “SODIUM” by “METALLIC SODIUM OR SODIUM ALLOY”.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

For “CELLS, CONTAINING SODIUM”, in the column for “Name and description”, replace “SODIUM” by “METALLIC SODIUM OR SODIUM ALLOY”.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

Add the following new entry in alphabetical order:

Batteries, sodium nickel chloride, see	4.3	3292
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(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

## Chapter 4.1

4.1.4.1, P903 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.

In the second sentence, delete “lithium”.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

4.1.4.1, P905 In additional requirement 1 (c), after “lithium batteries”, insert “and sodium-ion batteries”.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

4.1.4.1, P908 In the first sentence, delete “lithium ion”, delete “and damaged or defective lithium metal cells and batteries” and replace “3480 and 3481” by “3480, 3481, 3551 and 3552.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

4.1.4.1, P909 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.

In (2), after “lithium ion”, insert “or sodium ion” (two times).

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

4.1.4.1, P910 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

4.1.4.1, P911 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.

In table note a, sub-paragraph (b), first sentence, delete “lithium”.

(Reference document: *ST/SG/AC.10/C.3/2021/55* and informal document *INF.40*)

4.1.4.3, LP903 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.”

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

4.1.4.3, LP904 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.”

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

4.1.4.3, LP905 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.”

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

4.1.4.3, LP906 In the first sentence, replace “3480 and 3481” by “3480, 3481, 3551 and 3552.”

In table note a, sub-paragraph (b), first sentence, delete “lithium”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

## Chapter 5.2

5.2.1.9 In the heading, after “**Lithium**”, insert “**or sodium ion**”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

5.2.1.9.1 After “lithium”, insert “or sodium ion”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

5.2.1.9.2 In the first paragraph, first sentence, replace the “or” before “UN 3480” by a coma and at the end the sentence, add “or UN 3551” SODIUM for sodium ion cells or batteries”. In the second sentence, delete “lithium” and replace “UN 3091” or “UN 3481” by “UN 3091”, “UN 3481” or “UN 3552”.

In the heading of figure 5.2.5, after “**Lithium**”, insert “**or sodium ion**”.

In the last paragraph, third sentence, replace “UN number” by “UN number(s)” and delete “for lithium ion or lithium metal batteries or cells”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

5.2.2.1.13.1 In the second sentence, replace “lithium batteries” by “lithium or sodium ion batteries”, “lithium ion batteries” by “lithium ion or sodium ion batteries” and “lithium battery” by “lithium or sodium ion battery”. In the third sentence, replace “lithium batteries” by “lithium or sodium ion batteries”, “lithium ion batteries” by “lithium ion or sodium ion batteries”, “the lithium battery label” by “the battery label” and “5.2.2.1.2” by “5.2.2.2”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

## II. Draft amendments to the Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.7 and Amend.1)

### Section 38

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

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

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.”*

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

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.”

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

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

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

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.”

*(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)*

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:”

Re-number the current 38.3.3 as 38.3.3.1 and amend it as follows:

- In (a), (b) and (c), before “cells”, insert “lithium”.
- In (d), before “batteries”, insert “lithium” (two times).
- In (e), 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 for component cells of rechargeable sodium ion batteries under test T.6, three cells at first cycle at 50 % of the design rated capacity and [three] cells after 25 cycles ending at 50 % of the design rated capacity.
- (c) 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.
- (d) 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 single cell batteries at first cycle, in fully charged states;
  - (ii) four small batteries at first cycle, in fully charged states;
  - (iii) four small batteries after 25 cycles ending in fully charged states;
  - (iv) two large batteries at first cycle, in fully charged states;
  - (v) two large batteries after 25 cycles ending in fully charged states; and
  - (vi) 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.
- (e) 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.
- (f) 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 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		24
	25th cycle, fully charged state	5					5			
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.”

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

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”.

(Reference document: ST/SG/AC.10/C.3/2021/55 and informal document INF.40)

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