



**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****Fifty-seventh session**

Geneva, 30 November-8 December 2020

Item 4 (e) of the provisional agenda

Electric storage systems: sodium-ion batteries**Sodium-ion batteries – Creation of a dedicated UN number
and related special provisions – complementary proposal to
ST/SG/AC.10/C.3/2020/45****Transmitted by the experts from France and the United Kingdom*****Revision****Introduction**

1. ST/SG/AC.10/C.3/2020/45 has been considered during the online informal discussions of the Sub-Committee in July 2020. The concept of introducing requirements on the transport of sodium-ion batteries has been supported in general as the current provisions on UN 3292 do not consider this new technology. However, in introducing these requirements for sodium-ion batteries some consequential amendments needed to be drafted.
2. This revised document aims at providing a complete set of proposals allowing to introduce new entries in the Model Regulations with all consequential amendments required for both the Model Regulations and the Manual of Tests and Criteria.
3. Most of the introductory elements, explanations and contextual information from document ST/SG/AC.10/C.3/2020/45 are still valid and are reproduced below in paragraphs 4 to 15.
4. At the fifty-fifth session, France, with the support of the United Kingdom, presented an informal document (informal document INF.38 (fifty-fifth session)) to suggest a new approach concerning sodium-ion batteries. The Sub-Committee agreed to follow the approach presented in the document (see ST/SG/AC.10/C.3/110, paras. 60 to 62).
5. It was clarified that the aim of the proposal was to create a separate entry for sodium-ion batteries and to establish the corresponding transport conditions. The Sub-Committee recommended to take a careful approach on this subject and to consider also intrinsic hazards to achieve a proper classification.

* 2020 (A/74/6 (Sect.20) and Supplementary, Subprogramme 2).

6. This would be based on the principles laid out in informal document INF.38 (fifty-fifth session). Intrinsic hazards would be assessed by using the well-known testing scheme of section 38.3 of the Manual of Test and Criteria, as proposed in paragraph 15 of that document, with some changes to make it more suitable to the level of risk posed by sodium-ion batteries.

7. It has also been noted that it is a well-known fact that sodium-ion, when discharged, poses very little to no electrical risk. It is therefore proposed to introduce an exemption with a minimal set of requirements for shorted batteries, shorting being a way to ascertain discharge. Indeed, there is no easy way to verify the states of charge of a battery during transport. Short circuit is proposed as a way to ascertain that the transported battery is fully discharged. Other practical methods to ascertain that the battery is fully discharged can be discussed.

8. It was agreed that France and the United Kingdom would work together and with other concerned parties make a detailed proposal for the transport of Na-ion batteries. In this respect, a battery company from the United States of America has contributed to the effort.

9. This process allowed to gather new information on sodium-ion batteries especially concerning their energy density which could have an influence on their related level of risk.

10. Sodium-ion batteries exhibit a wide range of energy densities corresponding to different applications. Batteries designed with low energy densities are for stationary use purposes whereas sodium-ion batteries with higher densities can be used in mobile products such as electric vehicles and portable electronics. Different energy densities may result in different risks in transport.

11. For reference purposes, certain lithium-ion battery chemistries may have an energy density in the range 190 Wh/kg to 250 Wh/kg. At present sodium-ion batteries currently available are reported to have energy densities from 22 Wh/kg to 150 Wh/kg. Understandably the batteries on either end of the range may have widely different intrinsic hazards and due to the different degree of hazard posed, some presenting a lower degree of risk may be subject to a simplified requirement.

12. To take this factor into account, proposal 5 contains a special provision to exempt sodium-ion batteries that have a low energy density even from testing. However, at the time this document is drafted it is felt that more supporting data would be needed to decide on this principle, as well as on the threshold, in terms of energy density, that would be relevant. Therefore, this proposal is still considered as optional in the context of this document.

13. A decision could be made if enough data showed that, in all cases, low energy density sodium-ion batteries would not cause any dangerous electrical reaction.

Summary of the proposals

14. The proposal aims at modifying the UN 3292 entry to exclude Na-ion batteries. For this reason, the proper shipping name of UN 3292 should be changed from: “BATTERIES CONTAINING SODIUM or CELLS, CONTAINING SODIUM” to “BATTERIES CONTAINING METALLIC SODIUM OR SODIUM ALLOY or CELLS CONTAINING METALLIC SODIUM OR SODIUM ALLOY”.

15. It is then necessary to create a new entry for Na-ion batteries. The description of this entry would be “SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE”. Many points such as packing group, special provisions, limited and excepted quantities would be similar to the ones applicable for lithium-ion batteries. An additional special provision is to be developed to include the possibility to transport Na-ion batteries shorted with a minimal set of requirements as mentioned in paragraph 7 above.

16. During the online informal discussions in July, the possibility for sodium-ion batteries using an aqueous alkali electrolyte to be transported under UN 2795 and P801 was considered as relevant based on the advice of different experts participating. This has been addressed by adding a note to the new proposed special provision similar to the note at the end of special provision 372 (see proposal 4).

17. To facilitate the reading of these new more comprehensive proposals, and comparison with the previous ones, the proposals below follow the structure and the division in the 5 proposals presented in document ST/SG/AC.10/C.3/2020/45.

18. Consequential amendments are presented after each proposal they relate to. To draft these amendments all parts of the regulations concerning lithium batteries that could also be relevant to sodium-ion batteries have been checked and a reference to sodium ion batteries using organic electrolyte has been added. In addition, the relevant test requirements have been introduced into the Manual of Tests and Criteria in line with the current structure for lithium batteries.

19. Proposals 1 to 4 and their consequential amendments are a coherent set of requirements that need to be adopted as a whole to clarify the way sodium ion batteries are transported. Proposal 5 is an additional possibility that may be adopted provided enough data is provided in support of such an exemption.

Proposals

20. New text is marked underlined - deleted text ~~strike through~~.

Proposal 1

21. In 3.2.2 change the proper shipping name of UN 3292 to read:

“BATTERIES CONTAINING METALLIC SODIUM OR SODIUM ALLOY or CELLS CONTAINING METALLIC SODIUM OR SODIUM ALLOY”

Consequential amendments for proposal 1

22. In the Alphabetical Index of Substances and Articles:

Amend the following entries to read as follows:

“BATTERIES; CONTAINING <u>METALLIC SODIUM OR SODIUM ALLOY</u> ”	4.3	3292
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“CELLS; CONTAINING <u>METALLIC SODIUM OR SODIUM ALLOY</u> ”	4.3	3292
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And, insert the following new entry:

<u>“Batteries, sodium nickel chloride, see</u>	<u>4.3</u>	<u>3292</u>
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COMMENT – this last addition is proposed in relation to a comment from the expert from Switzerland during the July online discussions concerning the appropriate UN entry for sodium nickel chloride batteries.

Proposal 2

23. In 3.2.2, add two entries in the dangerous goods list as follow:

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited quantities	Packaging and IBCs	
							Packing instruction	Special packing provisions
XXXX	SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE	9			188 230 310 348 376 377 384 XXX XYY	0	P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906	
XXXY	SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE CONTAINED IN EQUIPMENT or SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE PACKED WITH EQUIPMENT	9			188 230 310 348 360 376 377 384 XXX XYY	0	P903 P908 P909 P910 P911 LP903 LP904 LP905 LP906	

Proposal 3

24. In Chapter 2.9, add a new 2.9.5 as follows:

“2.9.5 Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, which are a rechargeable electrochemical system 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 using an organic non aqueous compound as electrolyte, shall be assigned to UN Nos. XXXX or XXXY as appropriate.

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 that includes the same items as for Li-ion cells (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.”

Consequential amendments for proposals 2 and 3

25. Following the adoption of the two new entries related to sodium ion batteries, consequential amendments would be necessary to Chapter 2.9, some special provisions in Chapter 3.3, packing instructions in section 4.1.4 and the Manual of Tests and Criteria section 38.3 concerning testing.

Amendments to part 2

26. In 2.9.2, Assignment to Class 9, after the sentence for AMMONIUM NITRATE BASED FERTILIZERS add the following:

“XXXX SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE
 XXXY SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE
 CONTAINED IN EQUIPMENT or SODIUM ION BATTERIES USING ORGANIC
 ELECTROLYTE PACKED WITH EQUIPMENT”

Amendments to special provisions

27. In Chapter 3.3, amend the special provisions in 3.3.1 as follows:

188 “(a) For a lithium metal or lithium alloy cell, the lithium content is not more than 1 g, and for a lithium ion or sodium ion using organic electrolyte cell, the Watt-hour rating is not more than 20 Wh”

“(b) For a lithium metal or lithium alloy battery the aggregate lithium content is not more than 2 g, and for a lithium ion or sodium ion battery, the Watt-hour rating is not more than 100 Wh. Lithium ion and sodium ion using organic electrolyte batteries subject to this provision shall be marked with the Watt-hour rating on the outside case, except ~~those~~ lithium ion batteries manufactured before 1 January 2009;”

COMMENT – *Sodium ion batteries were not commercially manufactured prior to 2009 so it is not necessary to specify a date after which the requirement for the Watt-hour rating applies.*

“(c) Each lithium cell or battery meets the provisions of 2.9.4 (a), (e), (f) if applicable and (g) or for sodium ion using organic electrolyte cells or batteries, the requirements of 2.9.5 (a), (e) and (f).”

“(f) Each package shall be marked with the appropriate lithium or sodium ion using organic electrolyte battery mark, as illustrated at 5.2.1.9;”

In the penultimate sentence of the final paragraph of (f) amend as:

“When packages are placed in an overpack, the lithium or sodium ion using organic electrolyte battery mark shall either be clearly visible or be reproduced on the outside of the overpack and the overpack shall be marked with the word “OVERPACK”.

In the third to last paragraph of special provision 188, amend to read as follows:

“As used above and elsewhere in these Regulations, “lithium content” means the mass of lithium in the anode of a lithium metal or lithium alloy cell. As used in this special provision “equipment” means apparatus for which the ~~lithium~~ cells or batteries will provide electrical power for its operation.”

COMMENT– *‘Lithium’ is deleted as the definition of “equipment” in this special provision applies to both lithium and sodium ion batteries.*

230 “Lithium cells and batteries may be transported under this entry if they meet the provisions of 2.9.4. Sodium ion using organic electrolyte cells and batteries may be transported under this entry if they meet the provisions of 2.9.5.”

296 “d) Electric storage batteries (Class 8) and lithium or sodium ion using organic electrolyte batteries (Class 9);”

- 328 In the last paragraph: “When lithium metal, ~~or lithium~~, ion or sodium ion using organic electrolyte batteries are contained in the fuel cell system, the consignment shall be consigned under this entry and under the appropriate entries for UN 3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT, ~~or~~ UN 3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT or UN XXXX SODIUM ION BATTERIES USING ORGANIC ELECTROLYTE CONTAINED IN EQUIPMENT”
- 360 In the first sentence: “Vehicles only powered by lithium metal batteries, ~~or~~ lithium ion batteries or sodium ion using organic electrolyte batteries shall be classified under the entry UN 3171 battery-powered vehicle.”
- 348 “Lithium ~~B~~batteries manufactured after 31 December 2011 and sodium ion using organic electrolyte batteries manufactured after 31 December [2023/5] shall be marked with the Watt-hour rating on the outside case.”
- 376 “Lithium ion or sodium ion using organic electrolyte cells or batteries and lithium metal cells or batteries identified as being damaged or defective such that they do not conform to the type tested according to the applicable provisions of the Manual of Tests and Criteria shall comply with the requirements of this special provision.”

In the third paragraph after the NOTE, amend to read as follows:

“Cells and batteries shall be transported according to the provisions applicable to UN 3090, UN 3091, UN 3480, ~~and~~ UN 3481, or UN XXXX and UN XXXY as appropriate, except Special Provision 230 and as otherwise stated in this special provision.”

- 377 “Sodium ion using organic electrolyte, ~~L~~lithium ion and lithium metal cells and batteries and equipment containing such cells and batteries transported for disposal or recycling, either packed together with or packed without non-lithium or non-sodium batteries, may be packaged in accordance with packing instruction P909 of 4.1.4.1.

These cells and batteries are not subject to the requirements of section 2.9.4, or 2.9.5. Additional exemptions may be provided under the conditions defined by modal transport regulations.

Packages shall be marked “LITHIUM BATTERIES FOR DISPOSAL”, “SODIUM ION BATTERIES FOR DISPOSAL”, ~~or~~ “LITHIUM BATTERIES FOR RECYCLING” or “SODIUM ION BATTERIES FOR RECYCLING”.

Amendments to Packing Instructions

28. Amend the following packing instructions in 4.1.4 as follows:

P903

“This instruction applies to UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY.”

For the purpose of this packing instruction, “equipment” means apparatus for which the ~~lithium~~ cells or batteries will provide electrical power for its operation.”

P905

“(c) Electric storage batteries (Class 8), ~~and~~ lithium batteries and sodium-ion using organic electrolyte batteries (Class 9) shall be disconnected or electrically isolated and secured to prevent any spillage of liquid; and”

P908

“This instruction applies to damaged or defective ~~lithium-ion~~ cells and batteries ~~and damaged or defective lithium metal cells and batteries~~, including those contained in equipment, of UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY.”

P909

“This packing instruction applies to UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY transported for disposal or recycling, either packed together with or packed without non-lithium or non-sodium batteries:”

“(2) However, lithium or sodium ion using organic electrolyte cells with a Watt-hour rating of not more than 20 Wh, lithium ion or sodium ion using organic electrolyte batteries with a Watt-hour rating of not more than 100 Wh, lithium metal cells with a lithium content of not more than 1 g and lithium metal batteries with an aggregate lithium content of not more than 2 g may be packed in accordance with the following:”

P910

“This instruction applies to UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.”

P911

“This instruction applies to damaged or defective cells and batteries of UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport.”

(2) Amend footnote ^a(b) as follows:

“The list of hazards expected in case of thermal runaway for the cell or battery type, in the condition it is transported (e.g. usage of an inner packaging, state of charge (SOC), use of sufficient non-combustible, electrically non-conductive and absorbent cushioning material etc.), shall be clearly identified and quantified; the reference list of possible hazards for ~~lithium~~ cells or batteries (e.g. rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours) can be used for this purpose. The quantification of these hazards shall rely on available scientific literature;”

LP903

“This instruction applies to UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY.”

LP904

“This instruction applies to single damaged or defective batteries and to single items of equipment containing damaged or defective cells and batteries of UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY.”

LP905

“This instruction applies to UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.”

LP906

“This instruction applies to damaged or defective batteries of UN Nos. 3090, 3091, 3480, ~~and~~ 3481, XXXX and XXXY liable to rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours under normal conditions of transport.”

(2) Amend footnote ^a(b) as follows:

“The list of hazards expected in case of thermal runaway for the battery type, in the condition it is transported (e.g. usage of an inner packaging, state of charge (SOC), use of sufficient non-combustible, electrically non-conductive and absorbent cushioning material etc.), shall be clearly identified and quantified; the reference list of possible hazards for ~~lithium~~ batteries (e.g. rapidly disassemble, dangerously react, produce a flame or a dangerous evolution of heat or a dangerous emission of toxic, corrosive or flammable gases or vapours) can be used

for this purpose. The quantification of these hazards shall rely on available scientific literature;”

Consequential amendments to the Manual of Tests and Criteria

29. Amend Section 38.3 as follows:

“38.3 Lithium metal, ~~and~~ lithium ion and sodium ion batteries

38.3.1 Purpose

This section presents the procedures to be followed for the classification of lithium metal, ~~and~~ lithium ion and sodium ion cells and batteries (see UN Nos. 3090, 3091, 3480, ~~and~~3481, XXXX and XXXY, and the applicable special provisions of Chapter 3.3 of the Model Regulations).

NOTE: In this section the words ‘sodium ion cells or batteries’ refer to sodium ion using organic electrolyte cells or batteries.’

“38.3.2 Scope

38.3.2.1 All lithium cell types shall be subjected to tests T.1 to T.6 and T.8. All non-rechargeable lithium battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5. All rechargeable lithium 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 lithium batteries with overcharge protection shall be subjected to test T.7. A component lithium cell that is not transported separately from the battery it is part of needs only to be tested according to tests T.6 and T.8. A component lithium cell that is transported separately from the battery shall be subjected to tests T.1 to T.6 and T.8. A lithium 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 Sodium ion, ~~L~~ithium metal and lithium ion cells and batteries shall be subjected to the tests, as required by special provisions 188 and 230 of Chapter 3.3 of the Model Regulations prior to the transport of a particular cell or battery type. Cells or batteries which differ from a tested type by:”

“38.3.2.3 For the purposes of classification, the following definitions apply:

Large battery means a ~~lithium metal battery or lithium ion~~ battery with a gross mass of more than 12 kg.”

Introduce a new definition for Sodium ion cell or battery 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 using an organic non-aqueous compound as electrolyte.”

Small battery means a ~~lithium metal battery or lithium ion~~ battery with a gross mass of not more than 12 kg.”

“38.3.3 (a) When testing primary lithium cells and batteries under tests T.1 to T.5 the following shall be tested in the quantity indicated:”

“38.3.3 (b) When testing rechargeable lithium cells and batteries under tests T.1 to T.5 the following shall be tested in the quantity indicated:”

“38.3.3 (c) When testing primary and rechargeable lithium cells under test T.6, the following shall be tested in the quantity indicated:”

“38.3.3 (d) When testing rechargeable lithium batteries or rechargeable single cell lithium batteries under test T.7, the following shall be tested in the quantity indicated:”

“38.3.3 (e) When testing primary and rechargeable lithium cells and component cells under test T.8, the following shall be tested in the quantity indicated:”

Insert the following new paragraph and sub-paragraphs:

“38.3.3.1 When a sodium ion cell or battery type is to be tested under this sub-section, the number and condition of cells and batteries of each type to be tested are as follows:

1. 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) three cells at first cycle, in fully charged states;
- (ii) three cells after 25 cycles ending in fully charged states;
- (iii) three small batteries at first cycle, in fully charged states;
- (iv) three 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.

2. When testing for component cells of rechargeable sodium ion batteries under test T.5, 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.

3. 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:

- three cells or single cell batteries at first cycle, in fully charged states;
- three cells or single cell batteries after 25 cycles ending in fully charged states; and
- for component cells of rechargeable batteries, 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.

4. 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:

- three single cell batteries at first cycle, in fully charged states;
- three small batteries at first cycle, in fully charged states;
- three small batteries after 25 cycles ending in fully charged states;
- two large batteries at first cycle, in fully charged states; and
- two large batteries after 25 cycles ending in fully charged states.

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.

5. When testing a fully charged 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.

6. When sodium ion batteries that have passed all applicable tests are electrically connected to form a fully charged 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.”

Renumber existing 38.3.3.1 as 38.3.3.2.

“38.3.3.42 Provisions 38.3.2.1, ~~and~~ 38.3.3 and 38.3.3.1 are summarized in the following tables.

Table 38.3.2: Summary table of required tests for lithium primary cells and batteries”

“Table 38.3.3: Summary table of required tests for lithium rechargeable cells and batteries”

Insert a new table in 38.3.3.2 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 ^a	T.8	Sum ^d
Cells not transported separately from a battery	first cycle, 50 % charged state					3				6
	25th cycle, 50 % charged state					3				
Cells	first cycle, fully charged state	3					3			12
	25th cycle, fully charged state	3					3			
Single cell batteries ^b	first cycle, fully charged state	3					3	3		15
	25th cycle, fully charged state	3					3			
Small batteries	first cycle, fully charged state	3						3		12
	25th cycle, fully charged state	3						3		
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 ^c										0

^a 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;

^b 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;

^c 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.

^d The sum represents the number of tests required, not the number of cells or batteries tested.”

Amend section 38.3.5 as follows:

“38.3.5 ~~Lithium-Cell~~ and battery test summary

The following test summary shall be made available:

<p>Lithium-eCell or battery test summary in accordance with sub-section 38.3 of Manual of Tests and Criteria</p>
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- (f) Description of cell or battery to include at a minimum:
- (i) **Sodium ion, Lithium ion or lithium metal cell or battery;**”

Proposal 4

30. It is proposed to add in 3.3.1 a special provision XXX for the transport of shorted sodium-ion cells and batteries.

“XXX Organic sodium-ion cells and batteries and organic sodium-ion cells and batteries contained or packed in equipment, prepared and offered for transport short-circuited, in a way that the system (cell or battery) does not contain electrical energy, are not subject to other provisions of these Regulations if they meet the following:

- (a) The short-circuiting of the cell/battery is easily verifiable (e.g., busbar between terminals)
- (b) Each cell or battery meets the provisions of 2.9.5 (a), (e), (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;”.

NOTE: Notwithstanding the provisions of this special provision, sodium-ion batteries using an aqueous alkali electrolyte shall be transported as UN 2795 BATTERIES, WET, FILLED WITH ALKALI, electric storage.”

Consequential amendments for proposal 4

31. To allow appropriate hazard identification, the current “lithium battery mark” should be applicable to sodium ion batteries.

Amend 5.2.1.9 as follows:

“5.2.1.9 Lithium or sodium ion battery mark

5.2.1.9.1 Packages containing lithium or sodium ion using organic electrolyte cells or batteries prepared in accordance with special provision 188 shall be marked as shown in Figure 5.2.5.

5.2.1.9.2 The mark shall indicate the UN number, preceded by the letters “UN”, i.e. “UN 3090” for lithium metal cells or batteries, ~~or~~ “UN 3480” for lithium ion cells or batteries, ~~or~~ “UN XXXX” for sodium ion using organic electrolyte cells or batteries. Where the ~~lithium~~ cells or batteries are contained in, or packed with, equipment, the UN number, preceded by the letters “UN”, i.e. “UN 3091”, ~~or~~ “UN 3481” ~~or~~ “UN XXXY” as appropriate shall be indicated. Where a package contains ~~lithium~~ cells or batteries assigned to different UN numbers, all applicable UN numbers shall be indicated on one or more marks.

Figure 5.2.5



Minimum dimension 100 mm

Lithium or sodium ion battery mark

* *Place for UN number(s)*

** *Place for telephone number for additional information*

The mark shall be in the form of a rectangle or a square with hatched edging. The dimensions shall be a minimum of 100 mm wide × 100 mm high and the minimum width of the hatching shall be 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number(s) for ~~lithium ion or lithium metal batteries or cells~~) shall be black on white or suitable contrasting background. The hatching shall be red. If the size of the package so requires, the dimensions may be reduced to not less than 100 mm wide × 70 mm high. Where dimensions are not specified, all features shall be in approximate proportion to those shown.”

“5.2.2.1.13.1 Packages containing articles or articles transported unpackaged shall bear labels according to 5.2.2.1.2 reflecting the hazards established according to 2.0.5. If the article contains one or more lithium or sodium ion using organic electrolyte batteries with, for lithium metal batteries, an aggregate lithium content of 2 g or less, and for lithium ion or sodium ion using organic electrolyte batteries, a Watt-hour rating of 100 Wh or less, the lithium or sodium ion battery mark (Figure 5.2.5) shall be affixed to the package or unpackaged article. If the article contains one or more lithium or sodium ion using organic electrolyte batteries with, for lithium metal batteries, an aggregate lithium content of more than 2 g and for lithium ion or sodium ion using organic electrolyte batteries, a Watt-hour rating of more than 100 Wh, the ~~lithium~~ battery label (5.2.2.4.2.2 No. 9A) shall be affixed to the package or unpackaged articles.”

COMMENT – reference to 5.2.2.1.N° 9A in 5.2.2.1.13.1 is probably a mistake and should be corrected although it is not directly related to the subject of sodium ion batteries.

Proposal 5

32. If the data allows to make a positive decision in relation to paragraphs 12 and 13 above, it is proposed to adopt a new special provision YYY under new entries XXXX and XXXY prescribing requirements for low energy batteries as follows:

“YYY Sodium ion using organic electrolyte cells and batteries that have an energy density of [XX Wh/kg]* or less and when protected against short circuit shall, if containing a dangerous good, be transported as articles under an appropriate entry for that dangerous good or if not containing any dangerous goods may be transported as not subject to these regulations. Equipment containing either of these types may be transported as not subject to these regulations provided installed batteries are protected against short circuit.”

* *COMMENT - The value of the energy density must be precisely defined according to test data.*