



**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****Forty-third session**

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Item 4 (d) of the provisional agenda

Electric storage systems: thermal batteries**New UN number for thermal batteries****Transmitted by the expert from Germany¹****Introduction**

1. In accordance with 2.9.4 of the UN Model Regulations, only lithium batteries tested in accordance with 38.3 of the Manual of Tests and Criteria are accepted for carriage. Only the following lithium batteries are exempted from these tests:

- lithium cells and batteries of which not more than 100 units are produced and which are transported in accordance with Special Provision 310;
- lithium cells or batteries that are transported as prototypes in accordance with the conditions of Special Provision 310; and
- lithium battery assemblies produced from lithium batteries that passed all applicable tests in accordance with 38.3 of the Manual of Tests and Criteria if the lithium content of all anodes is more than 500 g or, in the case of lithium ion batteries, if the energy content is more than 6200 Watt-hours, provided the conditions mentioned in the last sentence of 38.3.3 are met.

2. For certain applications lithium batteries are used whose anode consists of lithium powder and silicon powder or lithium powder and aluminium powder and whose cathode consists of iron disulphide. However, the electrolyte, which consists of organic salts with a binder, is in solid form. When the lithium batteries are used, a mixture of iron powder and

¹ In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

potassium perchlorate is ignited which generates a temperature that causes the electrolyte to liquefy by way of melting so that a current can flow.

3. These batteries can only be used one time. Therefore, such lithium batteries cannot be tested in accordance with Chapter 38.3 of the Manual of Tests and Criteria. Lithium batteries of this type should be exempted from the tests in accordance with Chapter 38.3 of the Manual of Tests and Criteria.

4. For the purpose of adapting the provisions of the UN Model Regulations to the stage of development of lithium batteries, a new UN number for this type of lithium battery should be included in the UN Model Regulations. The provisions should be based on the same principles as for UN numbers 3292 BATTERIES, CONTAINING SODIUM and 3356 OXYGEN GENERATORS.

5. Since such lithium batteries can generate and give off considerable heat when used due to the melting of the electrolyte, they are referred to as thermal batteries. They can contain a pyrotechnic actuating device, and it should also be possible to transport them in packaged form when contained in equipment or packed with equipment; this has to be considered in the packing instruction.

6. Furthermore, an exemption taking the form of a special provision should be included that applies only if certain conditions are met during transport. The temperature of 200 °C at the outside surface of the casing of the activated thermal batteries that is indicated here is based on an exemption of the US Department of Transport..

Proposal:

A new UN number should be created for thermal batteries.

UN No	Name and description	Class									
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
3XXX	THERMAL BATTERIES or THERMAL BATTERIES CONTAINED IN EQUIPMENT	4.3	4.1	II	3XX 3XY	0	E0	P4XX			

The following new special provision should be included:

“3XX (a) Batteries shall not contain dangerous goods other than lithium powder and silicon powder or lithium powder and aluminium powder, a mixture of iron powder and potassium perchlorate and a pyrotechnic actuating device and shall not contain non-dangerous goods other than ferrous disulphide and the electrolyte made of some organic salts and some binder. The mixture of iron powder and potassium perchlorate shall not meet the criteria of an explosive substance of class 1. The batteries when containing a pyrotechnic actuating device shall only be transported under this entry when excluded from Class 1 in accordance with 2.1.1.1 (b) of these Regulations. The contained non-dangerous goods shall neither react dangerously with each other nor with the dangerous goods contained in the battery.

(b) The lithium powder and silicon powder or lithium powder and aluminium powder shall be enclosed in the batteries in such a way that no reaction can occur with the air or moisture.

- (c) Batteries shall consist of hermetically sealed metal casings which fully enclose the dangerous goods and which are so constructed and closed as to prevent the release of the dangerous goods under normal conditions of transport.
- (d) Batteries, without its packaging, shall be capable of withstanding a 1.8 m drop test onto a rigid, non-resilient, flat and horizontal surface, in the position most likely to cause damage, without loss of its contents and without actuation.
- (e) The actuating device shall have at least two positive means of preventing unintentional actuation.
- (f) Batteries need not to meet the requirements of 2.9.4 (a)-(d).
- (g) Batteries shall not be offered for transport at a temperature such that liquid elemental lithium is present in the battery unless approved and under the conditions established by the competent authority.”

The following new special provision concerning the exemption of thermal batteries should be included:

“3XY Batteries offered for transport are not subject to other provisions of these Regulations if they meet the following:

- (a) They meet the requirements of special provision 3xx letter (a) to (g).
- (b) The outside surface temperature of the metal casings does not exceed 200 °C when activated.

Add a new packing instruction in 4.1.4.1

P4xx	PACKING INSTRUCTION	P4xx
	This instruction applies to UN No. 3XXX.	
(1)	<p>The following packagings are authorized, provided that the general provisions of 4.1.1 and 4.1.3 are met:</p> <p>Drums (1A2, 1B2, 1N2, 1H2, 1D, 1G);</p> <p>Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2);</p> <p>Jerricans (3A2, 3B2, 3H2).</p> <p>Packagings shall conform to the packing group II performance level.</p> <p>Batteries or batteries in equipment shall be transported in a package which meets the following requirements when one battery in the package is actuated:</p> <ul style="list-style-type: none"> (a) Other batteries in the package will not be actuated; (b) Packaging material will not ignite; and (c) The outside surface temperature of the completed package shall not exceed 100 °C. 	
(2)	<p>Batteries in equipment may be transported unpacked or in protective enclosures (e.g. fully enclosed or wooden slatted crates) when the outside surface temperature of the equipment does not exceed 100 °C if at least one battery in the equipment is actuated.</p>	