



**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****Fiftieth session**

Geneva, 28 November – 6 December 2016

Item 2 (d) of the provisional agenda

**Recommendations made by the Sub-Committee on its forty-seventh,
forty-eighth and forty-ninth sessions and pending issues: electric storage systems****Large packagings for lithium batteries of small production
runs or for prototype lithium batteries****Submitted by the expert of Germany¹****Introduction**

1. At the forty-fifth session of the Sub-Committee, Germany submitted ST/SG/AC.10/C.3/2014/12 which subsequently led to a lunchtime working group and the development of informal documents INF.62 and INF.62/Rev. 1 on the issue of the transport of lithium batteries of small production runs or prototype lithium batteries contained in equipment. The Sub-Committee adopted the amended special provision 310 and its assignment to UN 3091 and UN 3481.
2. At the forty-sixth session of the Sub-Committee, United Kingdom submitted an alternative proposal where the text with the packaging requirements was presented in a packing instruction instead of being included in special provision 310 (ST/SG/AC.10/C.3/2014/105). The proposal to amend special provision 310 and to add a new packing instruction P910 was adopted and incorporated in the 19th revised edition of the UN Model Regulations.
3. The text as agreed during the forty-fifth session described also large packagings, this option was not retained in the text as agreed during the forty-sixth session.

¹ In accordance with the programme of work of the Sub-Committee for 2015–2016 approved by the Committee at its seventh session (see ST/SG/AC.10/C.3/92, paragraph 95 and ST/SG/AC.10/42, para. 15).

4. Numerous batteries and devices transported in accordance with special provision 310 are of such a size that they do not fit into a type approved packaging as described in P 910 (1) or (2). Consequently, they may be transported unpackaged under conditions specified by the competent authority only, see P 910 (3).

5. At the forty-ninth session of the Sub-Committee, Germany submitted informal document INF.29 proposing a new large packing instruction for lithium batteries of small production runs or for prototype lithium batteries.

6. Several experts expressed their support, but several comments were made with regard to the scope, unpackaged transport, protection from short circuit and editorial issues. The comments have been reviewed and the following conclusions can be drawn:

- Scope: It was questioned if the proposed LP should apply to batteries only or to batteries and cells. As the scope of LP 903 and LP 904 was intentionally limited to single batteries it seems appropriate also to limit the scope for the new LP to single batteries. The LPs were included in the provisions to provide packaging options for batteries too large for packagings approved according to chapter 6.1, but these large packagings should not be used for the transport of high quantities of small batteries or cells. For cells packagings will be usually sufficient. However, it can be questioned if the same limitation should apply to batteries and cells contained in equipment. The expert of Germany is of the opinion that the scope should be amended so as to include single pieces of equipment, irrespective whether they contain a single battery or several batteries and/or cells. LP 903 and LP 904 should be amended accordingly.
- Some experts proposed to include a paragraph on unpackaged transport. As unpackaged transport is already covered by P 910, a repetition in the LP would not add anything. In case that a majority of experts would be in favour of such an amendment in the interest of clarity, also the text on unpackaged transport in P 903 should be repeated in LP 903 to be consistent. This is included as option 2.
- Some experts proposed to specify further the protection for short circuits and to align it with the additional requirements as contained in P910. The examples of protection against short-circuit were mainly drafted with regard to the transport of several batteries together. Inner packagings to prevent contact between cells and batteries and cushioning material to fill empty space between cells and batteries are meaningless for the transport of a single battery or for a single piece of equipment. Therefore no further text has been added under additional requirements and the same requirement as currently used in LP 903 and LP 904 is proposed, editorially improved with regard to the scope.
- Editorial amendments have been included in the light of the decisions of the Sub-Committee on the basis of document ST/SG/AC.10/C.3/2016/2.

Proposal

Option 1

Insert a new LP xxx as follows:

LP9XX	PACKING INSTRUCTION	LP9XX
<p>This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells and batteries and to pre-production prototypes of cells and batteries when these prototypes are transported for testing.</p>		
<p>The following large packagings are authorized for a single battery and for cells and batteries contained in a single equipment, provided that the general provisions of 4.1.1 and 4.1.3 are met.</p>		
<p>(1) For a battery</p> <p>Rigid large packagings conforming to the packaging group II performance level, made of:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) natural wood (50C) plywood (50D) reconstituted wood (50F) rigid fibreboard (50G) <p>Packagings shall also meet the following requirements:</p> <ul style="list-style-type: none"> (a) A battery of different size, shape or mass shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested; (b) The battery shall be packed in an inner packaging and placed inside the outer packaging; (c) The inner packaging shall be completely surrounded by sufficient non-combustible and nonconductive thermal insulation material to protect against a dangerous evolution of heat; (d) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the battery within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and electrically non-conductive; (e) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured; 		
<p>(2) For an equipment containing batteries or cells</p> <p>Rigid large packagings conforming to the packaging group II performance level, made of:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) 		

natural wood (50C)
plywood (50D)
reconstituted wood (50F)
rigid fibreboard (50G)

Packagings shall also meet the following requirements:

- (a) An equipment of different size, shape or mass shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;
- (b) The equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport.
- (c) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the ~~cells or batteries~~ equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and electrically non-conductive; and
- (d) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured;

Additional requirements:

Batteries and cells shall be protected against short circuit.

Consequential amendments

Amend LP 903 as follows:

LP903 PACKING INSTRUCTION	LP 903
This instruction applies to UN Nos. 3090, 3091, 3480 and 3481	
<p>The following large packagings are authorized for a single battery <u>and for cells and batteries contained in a single equipment</u>, provided that the general provisions of 4.1.1 and 4.1.3 are met.</p> <p>Rigid large packagings conforming to the packing group II performance level, made of:</p> <ul style="list-style-type: none"> steel (50A); aluminium (50B); metal other than steel or aluminium (50N); rigid plastics (50H); natural wood (50C); plywood (50D); reconstituted wood (50F); rigid fibreboard (50G). <p>The battery <u>or the equipment</u> shall be packed so that the battery <u>or the equipment</u> is protected against damage that may be caused by its movement or placement within the large packaging.</p>	
<p>Additional requirements:</p> <p>Batteries <u>and cells</u> shall be protected against short circuit.</p>	

Amend LP 904 as follows

LP904	PACKING INSTRUCTION	LP 904
This instruction applies to single damaged or defective batteries <u>and to damaged or defective cells and batteries contained in a single equipment</u> of UN Nos. 3090, 3091, 3480 and 3481, including those contained in equipment		
<p>The following large packagings are authorized for a single damaged or defective battery and for a single damaged or defective <u>cells and batteries contained in a single equipment</u>, provided the general provisions of 4.1.1 and 4.1.3 are met</p> <p>For batteries and equipment containing <u>cells and</u> batteries:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) plywood (50D) <p>Packagings shall conform to the packing group II performance level.</p>		

(1). The damaged or defective battery or equipment containing such cells or batteries shall be individually packed in inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leak-proof to prevent the potential release of electrolyte.

(2). The inner packaging shall be surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat.

(3). Sealed packagings shall be fitted with a venting device when appropriate.

(4). Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movement of the battery or the equipment within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may also be used to meet this requirement.

(5). Non combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured.

For leaking batteries and cells, sufficient inert absorbent material shall be added to the inner or outer packaging to absorb any release of electrolyte.

Additional requirements:

Batteries and cells shall be protected against short circuit.

Option 2

Insert a new LP xxx as follows:

LP9XX	PACKING INSTRUCTION	LP9XX
<p>This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 production runs consisting of not more than 100 cells and batteries and to pre-production prototypes of cells and batteries when these prototypes are transported for testing.</p>		
<p>The following large packagings are authorized for a single battery and for cells and batteries contained in a single equipment, provided that the general provisions of 4.1.1 and 4.1.3 are met.</p>		
<p>(1) For a battery</p> <p>Rigid large packagings conforming to the packaging group II performance level, made of:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) natural wood (50C) plywood (50D) reconstituted wood (50F) rigid fibreboard (50G) <p>Packagings shall also meet the following requirements:</p> <ul style="list-style-type: none"> (f) A battery of different size, shape or mass shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested; (g) The battery shall be packed in an inner packaging and placed inside the outer packaging; (h) The inner packaging shall be completely surrounded by sufficient non-combustible and nonconductive thermal insulation material to protect against a dangerous evolution of heat; (i) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the battery within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and electrically non-conductive; (j) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured; 		
<p>(2) For an equipment containing batteries or cells</p> <p>Rigid large packagings conforming to the packaging group II performance level, made of:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) natural wood (50C) plywood (50D) 		

reconstituted wood (50F)
rigid fibreboard (50G)

Packagings shall also meet the following requirements:

- (e) An equipment of different size, shape or mass shall be packaged in an outer packaging of a tested design type listed above provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested;
 - (f) The equipment shall be constructed or packaged in such a manner as to prevent accidental operation during transport.
 - (g) Appropriate measures shall be taken to minimize the effects of vibration and shocks and prevent movement of the ~~cells or batteries~~ equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it shall be non-combustible and electrically non-conductive; and
 - (h) Non-combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured;
- (3) The equipment or the battery may be transported unpackaged under the conditions specified by the competent authority. Additional conditions that may be considered in the approval process include, but are not limited to:
- (a) The equipment or the battery shall be strong enough to withstand the shocks and loadings normally encountered during transport, including transshipment between cargo transport units and between cargo transport units and warehouses as well as any removal from a pallet for subsequent manual or mechanical handling; and
 - (b) The equipment or the battery shall be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.

Additional requirements:

Batteries and cells shall be protected against short circuit.

Consequential amendments

Amend LP 903 as follows:

LP903 PACKING INSTRUCTION	LP 903
This instruction applies to UN Nos. 3090, 3091, 3480 and 3481	
<p>The following large packagings are authorized for a single battery <u>and for cells and batteries contained in a single equipment</u>, provided that the general provisions of 4.1.1 and 4.1.3 are met.</p> <p>(1) Rigid large packagings conforming to the packing group II performance level, made of:</p> <ul style="list-style-type: none"> steel (50A); aluminium (50B); metal other than steel or aluminium (50N); rigid plastics (50H); natural wood (50C); plywood (50D); reconstituted wood (50F); rigid fibreboard (50G). <p>The battery <u>or the equipment</u> shall be packed so that the battery <u>or the equipment</u> is protected against damage that may be caused by its movement or placement within the large packaging.</p> <p>(2) <u>In addition, the following is authorized for batteries with a gross mass of 12 kg or more employing a strong, impact resistant outer casing, and assemblies of such batteries:</u></p> <ul style="list-style-type: none"> (a) <u>Strong outer packagings;</u> (b) <u>Protective enclosures (e.g., fully enclosed or wooden slatted crates); or</u> (c) <u>Pallets or other handling devices.</u> <p><u>Batteries shall be secured to prevent inadvertent movement, and the terminals shall not support the weight of other superimposed elements.</u></p> <p>(3) <u>In addition, the following is authorized for cells or batteries contained in equipment: Strong outer packagings constructed of suitable material, and of adequate strength and design in relation to the packaging capacity and its intended use. They shall be constructed in such a manner as to prevent accidental operation during transport. Packagings need not meet the requirements of 4.1.1.3.</u></p> <p><u>Equipment can be offered for transport unpackaged or on pallets when the cells or batteries are afforded equivalent protection by the equipment in which they are contained.</u></p>	
Additional requirements:	
Batteries <u>and cells</u> shall be protected against short circuit.	

Amend LP 904 as follows

LP904	PACKING INSTRUCTION	LP 904
<p>This instruction applies to single damaged or defective batteries <u>and to damaged or defective cells and batteries contained in a single equipment</u> of UN Nos. 3090, 3091, 3480 and 3481, including those contained in equipment</p>		
<p>The following large packagings are authorized for a single damaged or defective battery and for a single damaged or defective <u>cells and batteries contained in a single equipment</u>, provided the general provisions of 4.1.1 and 4.1.3 are met</p> <p>For batteries and equipment containing <u>cells and</u> batteries:</p> <ul style="list-style-type: none"> steel (50A) aluminium (50B) metal other than steel or aluminium (50N) rigid plastics (50H) plywood (50D) <p>Packagings shall conform to the packing group II performance level.</p> <ol style="list-style-type: none"> 1. <u>The damaged or defective</u> battery or equipment containing such <u>cells or batteries</u> shall be individually packed in inner packaging and placed inside of an outer packaging. The inner packaging or outer packaging shall be leak-proof to prevent the potential release of electrolyte. 2. <u>The</u> inner packaging shall be surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat. 3. Sealed packagings shall be fitted with a venting device when appropriate. 4. Appropriate measures shall be taken to minimize the effects of vibrations and shocks, prevent movement of the battery <u>or the equipment</u> within the package that may lead to further damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may also be used to meet this requirement. 5. Non combustibility shall be assessed according to a standard recognized in the country where the packaging is designed or manufactured. <p>For leaking <u>batteries and cells</u>, sufficient inert absorbent material shall be added to the inner or outer packaging to absorb any release of electrolyte.</p>		
<p>Additional requirements:</p> <p>Batteries <u>and</u> cells shall be protected against short circuit.</p>		