国 际 民 用 航 空 组 织

# 工 作 文 件

DGP/25-WP/39
4/09/15
修改稿
**(Revised)**
25/9/15

## 危险物品专家组（DGP）

## 第二十五次会议

**2015年10月19日至30日，蒙特利尔**

**议程项目5：** **拟定一项全面战略以减缓与锂电池运输相关的风险，包括拟定基于性能的包装标准并努力促进合规**

## 锂金属纽扣式电池

（由B. Firkins提交）


### 摘要

在第二届国际多学科锂电池运输协调会议（SIMDLBTCM）上，日本电池协会提交了锂金属钮扣式电池热失控的测试结果。

出席会议的其他人描述这一结果与其他方面进行的测试相一致。它接受 0.3 克锂含量锂纽扣式电池所带来的风险是安全的。

第二届国际多学科锂电池运输协调会议第 14 号建议对锂金属纽扣式电池作出规定。

**危险物品专家组的行动：**请专家组：

a) 审议本文件中提出的建议和讨论要点，并提供意见；
b) 按照本工作文件附录A所示，接受纽扣式电池的拟议定义；
c) 按照本工作文件附录B所示，对锂金属电池（纽扣式电池）微量数量的规定提出意见；
d) 按照本工作文件附录C所示，对在危险货物表中创建锂金属纽扣式电池条目提出意见；
e) 按照本工作文件附录D所示，对相对少量的锂金属电池（钮扣式电池）的特别规定提出意见；
f) 按照本工作文件附录E所示，对数量较多的锂金属电池（纽扣式电池）制定包装说明提出意见。

## 1. INTRODUCTION

1.1 During the Second International Multi-Disciplinary Lithium Battery Transport Coordination Meeting (SIMDLBTCM) held in Cologne, Germany in September 2014； the Battery Association of Japan submitted tests that had been conducted on Lithium Metal Button Cells which had been put into thermal runaway.

1.2 The results were described by other persons present at the meeting as being consistent with tests that they had conducted.

1.3 It was accepted that the risk presented by lithium button cells, of up to 0.3g lithium content, was proving to be not unsafe. The button cells may disassemble, melt down or partially combust ； however the effects did not propagate from one button cell to the next.

1.4 In the context of overheating of lithium metal batteries, and the potential threats to aviation safety caused by a bulk shipment of lithium metal button cells to sympathetically react to the point that an aircraft's fire suppression system would be overwhelmed； the threat was found not to exist.

1.5 There was discussion of, and consideration given to, whether small lithium metal batteries, of the same aggregate lithium content as button cells, could be shipped as having an equivalent package of energy； despite having potentially a different chemistry and properties of combustion.

1.6 It was generally considered that the form factor (shape) of button cells was adequately defined and documented in the UN Manual of Tests and Criteria. Should someone wish to consign lithium cells or batteries with a different shape, but the same lithium content as button cells, then objective testing and evidence would need to be produced before any expansion beyond button cells could be considered.

1.7 The SIMDLBTCM report summarised the discussion and the resultant recommendation as:

> *"3.2.4 Lithium metal button cells, with a lithium content not exceeding 0.3 grams, may not present a significant hazard and should have a separate UN classification to facilitate shipments."*
>
> ***"Recommendation 14/14 — Lithium Metal Button Cells:***
>
> *That method be established to distinguish lithium metal button cells from other types of lithium metal cells."*

## 2. METHODS TO DISTINGUISH LITHIUM METAL BUTTON CELLS

2.1 Several options for distinguishing lithium metal button cells were briefly considered. One option was to make application to the UN Committee of Experts on Dangerous Goods, seeking a new UN Number and proper shipping name for lithium button cells. This does introduce a relatively lengthy timeframe.

2.2 Another option is to seek a solution that could be implemented within the ICAO Technical Instructions: such as introducing a light typeface entry as explanatory text for UN3090 Lithium Metal Battery. This would take the form of:

**UN 3090 Lithium metal battery** (button cells)；.or

**UN 3090 Lithium metal battery,** button cells.

2.3 Such an approach would be consistent with other entries in the Technical Instructions, such as UN 1950, **Aerosols.**

2.4 The text for Aerosols in the UN Model Regulations is:

| UN No | Name and Description | Class or Division | Subsidiary Risk | UN Packing Group | Special provisions | Limited and Excepted Quantities | | Packing Instruction | Special Packing Provisions |
|---|---|---|---|---|---|---|---|---|---|
| 1950 | AEROSOLS | 2 | | | 63<br>190<br>277<br>327<br>344 | See SP 277 | E0 | P207<br>LP02 | Pp87<br>L2 |

2.5 The corresponding text in the Technical Instructions is:

| *Name* | *UN No.* | *Class or division* | *Sub-sidiary risk* | *Labels* | *State variations* | *Special provisions* | *UN packing group* | *Excepted quantity* | *Passenger aircraft* | | *Cargo aircraft* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | *Packing instruction* | *Max. net quantity per package* | *Packing instruction* | *Max. net quantity per package* |
| *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* | *12* | *13* |
| **Aerosols**, flammable | 1950 | 2.1 | | Gas Flammable | | A145<br>A167 | | E0 | 203<br>Y203 | 75kg<br>30 Kg<br>G | 203 | 150 Kg |
| **Aerosols**, flammable containing substances in Division 6.1, Packing Group II | 1950 | 2.1 | 6.1 | | | | | | FORBIDDEN | | FORBIDDEN | |
| **Aerosols**, flammable containing substances in Division 6.1, Packing Group III and substances in Class 8, Packing Group III | 1950 | 2.1 | 6.1<br>8 | Gas flammable<br>&<br>Toxic<br>&<br>Corrosive | | A145<br>A167 | | E0 | 203<br>Y203 | 75kg<br>30 Kg<br>G | 203 | 150 Kg |
| . . . | | | | | | | | | | | | |

## 3. IDENTIFICATION OF ISSUES

3.1 **Definitions**:

3.1.1 It will be necessary to define Button Cells within the Technical Instructions, either in the Glossary of Terms in Appendix A2, or in the definitions at Part 1； Chapter 3； section 1.3. The definition in the Technical Instructions will need to correspond with the definition contained in the UN Manual of Tests and Criteria at Section 38.3. The preferred option is to capture the definition within Part 1； Chapter 3, Section 1.3. The proposed amendment is at Appendix A.

3.2 **Limitations based on current knowledge**

3.2.1 Consideration also needs to be given to the future. Currently testing, and button cell manufacture, is in respect of batteries with less than 0.3g lithium content； this covers the existing range of lithium button cells. The UN definition does not limit the lithium content. It would therefore be appropriate for the Technical Instructions to specify an upper limit based on the current situation. The method of providing the upper limit should be flexible enough to be amended, without a significant bureaucratic impost.

3.2.2 One method of setting an upper limit, is via a Special Provision. This could take the form of:

> A2xx This entry applies to Button cells, as defined in 1：1.3, Each cell is to be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, section 38.3. Each cell must not have a lithium content exceeding 0.3 grams. Lithium metal button cells with a lithium content exceeding 0.3g are to be consigned as UN3090 Lithium Metal Batteries in accordance with packing Instruction 968.

3.2.3 An alternative, and preferred option from the point of allowing greater future flexibility, is an expansion of the light typeface entry i.e.

**UN 3090 Lithium Metal Battery** (Button cells not exceeding 0.3g lithium content).

3.2.4 Should larger format lithium button cells be produced and have similar properties on combustion and propagation to existing button cells, then the light type entry can be progressively increased. If the combustion and propagation properties of larger button cells are different, then relevant entries can be created when the need arises.

3.3 **Packing Instruction**

3.3.1 The current detail of Packing Instruction 968 is already complex enough with Section 1A, IB and II. The addition of what could be a Section III, regarding the packing of lithium metal batteries (button cells) would bring additional complexity. It is therefore proposed that any packaging and packing requirements should stand separate to Packing Instruction 968, and would be limited to lithium metal button cells only.

3.4 **Packaging**

3.4.1 There are several options for consideration of the risks being presented by button cells and what would be the least stringent method of packaging, whilst still maintaining an appropriate margin of safety. The three main options would appear to be:

a) an entry into the text for de minimis consideration. An example is set out at Appendix B

b) a special provision which specifies minimum packaging conditions and imposes no further requirements. An example is set out at Appendix D.

c) the creation of a separate packing instruction. A representative packing instruction is provided in Appendix E as “Packing Instruction 97x”.

3.5 The difficulty in alignment with the UN Model recommendations； yet achieving an equivalent scalable framework as “De Minimis – Excepted Quantity – Limited Quantity – Fully Regulated” is that excepted quantity provisions and E1-E5 codes are not applied to articles. De Minimis provisions are also based around the excepted quantity codes； but does offer some scope for consideration within the air mode of transportation of dangerous goods.

## 4. ACTION BY THE DGP-WG

4.1 The panel is invited to:

a) consider the proposals and discussion points raised in this paper and to provide comments；

b) accept the proposed definition for button cells shown in Appendix A to this working paper；

c) provide comments on creating provisions for de minimis quantities of lithium metal batteries (button cells) as shown in Appendix B to this working paper；

d) provide comments on creating an entry in the dangerous goods lists for lithium metal button cells as shown in Appendix C to this working paper

e) provide comments on creating a special provision for comparatively small quantities of lithium metal batteries (button cells), as shown in Appendix D to this working paper； .

f) provide comments on creating a packing instruction for larger quantities of lithium metal batteries (button cells), as shown in Appendix E to this working paper.

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# 附录A

# 对《技术细则》第1部分的拟议修订

# 第1部分

# 概论

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# 第3章

# 一般说明

本章部分内容受国家差异条款BE 1的影响；见表 A-1

**3.1 定义**

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**气瓶捆包** 不允许航空运输。气瓶的组合体，这些气瓶被捆绑在一起，用导管相连并作为一个整体进行运输。

**纽扣式电池** 整体高度小于直径的圆形小电池或电池组。

**货物** 为本细则之目的，指除邮件、随行行李或错运行李以外，航空器上载运的任何财产。

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# 附录**B**

# 对《技术细则》第**3**部分的拟议修订

# 第**3**部分

# 危险物品表，特殊规定和限制数量与例外数量

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## 第**5**章

## 例外数量包装的危险物品

本章部分内容受JP 23国家差异条款的影响；见表A-1

### **5.1** 例外数量

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### **5.6** 微量数量

5.6.1 确定编码为E1、E2、E4或E5的危险物品，作为货物运输时，不受本细则限制，条件是：

a) 每一内包装的材料最大净量，液体和气体限于1 mL，固体限于1 g；

b) 已符合5.2的规定，但如内包装稳妥地装入带衬垫材料的外包装内，使之在正常运输条件下不会破裂、穿孔或内装物泄漏，则不需要中层包装。对于液态危险物品，外包装必须含有足够的吸附材料，能够吸收内包装的全部内装物。

c) 已遵守5.3的规定；和

d) 每一外包装中所盛危险物品的最大净数量，固体不得超过100 g，液体和气体不得超过 100 mL。

5.6.2 确定为UN 3090—锂金属电池的危险物品，纽扣式电池作为货物运输时，不受本细则限制，条件是：

a) 每一内包装的材料最大净量限于0.3克锂；

b) 每一内包装内装有多个纽扣式电池时，纽扣式电池不得彼此接触；

c) 已符合5.2的规定，但如内包装稳妥地装入外包装内，使之在正常运输条件下不会破裂、穿孔或内装物泄漏或与其他纽扣式电池直接接触，则不需要中层包装。

d) 已遵守5.3的规定；

e) 按照防止水分或湿度引起包装件内纽扣式电池之间短路的方式包装；

f) 每一外包装中所盛危险物品的最大净数量不超过100克

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附录C

对《技术细则》第**3**部分的拟议修订

# 第**3**部分

# 危险物品表，特殊规定和限制数量与例外数量

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## 第 **2** 章

## 危险物品表（表**3-1**）的编排

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**表 3-1.** 危险物品表

| 名称 | UN 编号 | 类别或项别 | 次要危险性 | 标签 | 国家差异条款 | 特殊规定 | UN 包装等级 | 例外数量 | *客机* | | *货机* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 包装说明 | 每个包装件最大净量 | 包装说明 | 每个包装件最大净量 |
| *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* | *12* | *13* |
| | | | | | | | | | See 9XX | | See 965 | |
| **Lithium metal batteries** (button cells cells not exceeding 0.3g lithium content) 锂金属电池（锂含量不超过0.3克的纽扣式电池） | 3090 | 9 | | 杂项危险物品—锂电池 | US 2<br>US 3 | A2XX | | E0 | See 9XX | 5 kg | See 9XX | 35 kg |

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# 附录D

## 对《技术细则》第3部分的拟议修订

# 第3部分

# 危险物品表，特殊规定和限制数量与例外数量

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## 第3章

## 特殊规定

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**表3-2 特殊规定**

| | 本细则 | UN | |
|---|---|---|---|
| ≠ | A2XX | | 锂金属电池（钮扣式电池）作为货物托运不受本技术细则限制。每个电池必须：<br>a) 所属类型被证明能够符合联合国试验和标准手册第III部分38.3小节规定的每项试验要求；<br>b) 包装在能将电池芯完全封装的内包装内；<br>c) 保护以防止短路。这包括防止在同一包装内与导电材料接触，导致发生短路，其中包括内包装材料受潮或暴露于湿度增加可能变得导电。<br>必须放入内包装，然后再放入坚固的外包装当中。<br>每个包装件都必须：<br>a) 能够承受从任何方向进行的1.2米跌落试验，而不会发生下列情况：<br>1) 使其中所装的电池芯或电池受损；<br>2) 使内装物移动，以致电池与电池（或电池芯与电池芯）互相接触；<br>3) 内装物释出。<br>b) 每个包装件必须贴有锂电池操作标签（图5-31），其中包括注明“纽扣式电池”。<br>c) 每个包装件的最大净数量（重量）不得超过1千克<br>为电池芯或电池进行运输准备或将其交付运输的人员，必须接受与其责任相符的关于这些要求的适当指示。 |

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# 附录E

# 对《技术细则》第4部分的拟议修订

## 第4部分

## 包装说明

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## 第11章

## 第9类 —— 杂项危险物品

加入以下新包装说明:

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**包装说明97x**

仅限于客机和货机运输UN 3090锂金属电池（锂含量不超过0.3克的纽扣式电池）

1. 引言

本条目适用于锂金属电池（锂含量不超过0.3克的纽扣式电池）。

2. **禁止运输的锂电池**

以下规定适用于本包装说明内所有锂金属电池芯和电池：

禁止运输由制造商查明为具有安全方面缺陷、或已经受损、可能会产生导致危险的热量、造成火情或短路的电池芯和电池（例如那些出于安全原因退还给制造商的电池芯和电池）。

除非得到始发国和运营人所属国的国家有关当局批准，禁止航空运输废弃锂纽扣式电池，以及为回收或处置目的运输的锂电池

| 联合国编号和运输专用名称 | | 包装件数量（第I节） | |
|---|---|---|---|
| | | 客机 | 货机 |
| UN 3090 | **Lithium metal batteries** (button cells not exceeding 0.3g lithium content)<br>**锂金属电池**（锂含量不超过0.3克的纽扣式电池） | 5 kg锂金属纽扣式电池 | 35 kg锂金属纽扣式电池 |

3 要求

每个电池必须：

— 所属类型被证明能够符合联合国试验和标准手册第III部分38.3小节规定的每项试验要求。

注：2014年1月1日之前生产的符合根据联合国试验和标准手册第五次修订版第III部分38.3小节的规定试验的设计型号的电池可以继续运输。

— 按照2;9.3.1 e) 所述质量管理方案制造
— 锂含量不超过或等于0.3克
— 包装在能将电池芯完全封装的内包装内
— 保护以防止短路。这包括防止在同一包装内与导电材料接触，导致发生短路。

每个包装件必须：
— 能够承受从任何方向进行的1.2米跌落试验，而不会发生下列情况：
— 使其中所装的电池芯或电池受损；
— 使内装物移动，以致电池与电池（或电池芯与电池芯）互相接触；
— 内装物释出。
— 每个包装件必须贴有锂电池操作标签（图5-31），其中包括注明“纽扣式电池”。
— 包装件表面须注明标记。

**外包装**

箱　　桶　　方桶

坚固的外包装

**合成包装件**

当包装件放在合成包装件内时，本包装说明所要求的锂电池操作标签必须清楚可见，或将标签贴在合成包装件外面，而且合成包装件必须标有“合成包装件”字样。

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