International Civil Aviation Organization

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WORKING PAPER

DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE

Rio de Janeiro, Brazil, 20 to 24 October 2014

Agenda Item 5: Review of provisions for the safe transport of lithium batteries
5.6: Miscellaneous lithium battery issues

LITHIUM BATTERIES — IMPROVING COMPLIANCE

(Presented by the Secretary)

SUMMARY

This working paper discusses issues related to non-compliant shipments of lithium batteries.

Action by the DGP-WG: Action by the DGP-WG/ is in paragraph 4.

1. INTRODUCTION

1.1 The issue of safely transporting lithium batteries by air has been the subject of considerable discussion at recent meetings of the DGP. In particular, much has been said on the risks posed by non-compliant shipments, both deliberate and inadvertent. Two aspects have been specifically commented upon:

a) lack of effective oversight by States which have lithium battery manufacturers; and

b) transport of cells or batteries which have not been subjected to the required testing detailed in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* (UN MTC).

2. LACK OF EFFECTIVE OVERSIGHT

2.1 Regarding the first aspect (the lack of effective oversight of lithium cell or battery manufacturers by States which have such manufacturers), the size/extent of the problem is based on the complexity of the regulatory system, the number of entities involved in shipping (e.g. cell manufacturers, battery manufacturers, all manufacturing entities downstream who use these cells or batteries) plus the quantities being shipped by air. A further complication is the transport of excepted lithium cells/batteries

in general cargo; this results in an expectation that dangerous goods oversight will be conducted for something which is in the general cargo stream.

2.2 A paper on this issue will be presented at the next meeting of the Regional Aviation Safety Group Asia and Pacific Regions. This region has a large number of States with considerable cell or battery manufacturing industries. It is anticipated workshops involving all involved parties on how best to ensure effective oversight will be held and that the experience gained in the region will then be passed on to other regions.

3. UN TESTING

3.1 The second aspect is that linked to UN testing. A basic premise of ensuring safety when transporting lithium batteries is that they have been tested in accordance with the UN *Manual of Tests and Criteria*. Although shippers must comply with all the relevant provisions of the Technical Instructions, including that which states "each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3", nowhere is there a requirement to provide a copy of the test report. Although there are specific requirements and examples of test reports in the UN *Manual of Tests and Criteria* for other substances or articles, none is provided for lithium batteries. This leads to the situation where a shipper, especially if they are not the original manufacturer, faces the challenge of obtaining the appropriate test report for the cell or battery. Representatives from the cell and battery manufacturing industry have informed the panel of their inability to provide statistics regarding their cells or batteries when those cells or batteries are no longer with the original manufacturer; presumably the same difficulty exists in reverse for the shippers. It should also be noted these cells or batteries may be reshipped many times during the production life cycle, each shipper being responsible to know that the cell or battery has successfully been UN tested.

3.2 Emphasis has been placed by the battery industry on the requirement that cells and batteries must be manufactured under a quality management programme (see the appendix to this paper for the provisions contained in the 2015-2016 Edition of the Technical Instructions). It should be noted that the UN tests are for each design type; presently there are no requirements for sample testing to be done during the production process, even under the quality management programme, regardless of how long after the original design type has been tested.

3.3 However, the same difficulty faces shippers; the further downstream from the original manufacturer, the more difficult it is to obtain the test data (noting again there is no requirement for a standard test report).

4. ACTION BY THE DGP-WG

4.1 In order to overcome difficulties associated with the complexity of effective oversight and assigning a responsibility to the shipper which may be impossible to achieve, the working group is invited to consider the following:

a) a review and simplification of the regulatory scheme so that all involved, be they manufacturers, shippers or operators, can comply with the regulations and so that regulatory authorities are able to conduct effective oversight.

b) requesting cell/battery manufacturers to develop a standardized test report, a copy of which is then supplied with the article. Should the issue of inclusion of proprietary information cause difficulty, an abridged version of the test report could also be developed for onward transmission;

c) requesting States to provide a list of “approved” testing laboratories to ICAO for inclusion in the Technical Instructions. This would allow shippers to contact the appropriate testing laboratory to obtain confirmation that the cell or battery had passed the appropriate UN tests. This would also have the benefit of permitting regulatory authorities access to this information, a key component of effective oversight.

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APPENDIX A

EXTRACT FROM PART 2, CHAPTER 9 OF THE TECHNICAL INSTRUCTIONS

9.3 LITHIUM BATTERIES

9.3.1 Cells and batteries, cells and batteries contained in equipment, or cells and batteries packed with equipment, containing lithium in any form must be assigned to UN Nos. 3090, 3091, 3480 or 3481 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 each test of the UN *Manual of Tests and Criteria*, Part III, subsection 38.3;

\+ Cells and batteries manufactured according to a type meeting the requirements of subsection 38.3 of the UN *Manual of Tests and Criteria*, Revision 3, Amendment 1 or any subsequent revision and amendment applicable at the date of the type testing may continue to be transported, unless otherwise provided in these Instructions.

\+ Cell and battery types only meeting the requirements of the UN Manual of Tests and Criteria, Revision 3, are no longer valid. However, cells and batteries manufactured in conformity with such types before 1 July 2003 may continue to be transported if all other applicable requirements are fulfilled.

≠ *Note.— Batteries must be of a type proved to meet the testing requirements of the UN Manual of Tests and Criteria, Part III, subsection 38.3, irrespective of whether the cells of which they are composed are of a tested type.*

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b) each cell and battery incorporates a safety venting device or is designed to preclude a violent rupture under conditions normally incident to 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 must be manufactured under a quality management programme that includes:

1) a description of the organizational structure and responsibilities of personnel with regard to design and product quality;

2) the relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;

3) process controls that should include relevant activities to prevent and detect internal short circuit failure during manufacture of cells;

4) quality records, such as inspection reports, test data, calibration data and certificates. Test data must be kept and made available to the appropriate national authority upon request;

5) management reviews to ensure the effective operation of the quality management programme;

6) a process for control of documents and their revision;

7) a means for control of cells or batteries that are not conforming to the type tested in accordance with Part III, subsection 38.3 of the UN *Manual of Tests and Criteria*;

8) training programmes and qualification procedures for relevant personnel; and

9) procedures to ensure that there is no damage to the final product.

Note.— In-house quality management programmes may be accepted. Third-party certification is not required, but the procedures listed in 1) to 9) above must be properly recorded and traceable. A copy of the quality management programme must be made available to the appropriate national authority upon request.

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