



DANGEROUS GOODS PANEL (DGP)

TWENTY-FIRST MEETING

Montréal, 5 to 16 November 2007

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2009-2010 Edition

Agenda Item 5: Resolution, where possible, of the non-recurrent work items identified by the Air Navigation Commission or the panel

5.4: Review of provisions for dangerous goods relating to lithium batteries

PROPOSED AMENDMENT TO SPECIAL PROVISION A45 AND SPECIFIC PROVISIONS GOVERNING THE TRANSPORT OF LITHIUM METAL BATTERIES ON PASSENGER AIRCRAFT

(Presented by the National Electrical Manufacturers Association (NEMA), Battery Association of Japan (BAJ), European Portable Battery Association (EPBA), Portable Rechargeable Battery Association (PRBA), RECHARGE, and German Electrical and Electronic Manufacturers' Association — Product Division Batteries (ZVEI))

SUMMARY

This working paper invites the DGP to consider changes to Special Provision A45 and specific provisions governing the transport of lithium metal batteries on passenger aircraft.

Action by the DGP is in paragraph 5.

1. INTRODUCTION

1.1 The National Electrical Manufacturers Association (NEMA), Battery Association of Japan (BAJ), European Portable Battery Association (EPBA), Portable Rechargeable Battery Association (PRBA), RECHARGE, and German Electrical and Electronic Manufacturers' Association - Product Division Batteries (ZVEI) are pleased to submit this joint industry paper on lithium metal batteries and lithium ion batteries to members of the ICAO Dangerous Goods Panel (DGP). Members of NEMA, BAJ, EPBA, PRBA, RECHARGE, and ZVEI manufacture approximately 70% of the world's lithium metal batteries and lithium ion batteries, and over the past 30 years have safely shipped tens of billions of cells and batteries by all modes of transport. We are in a unique position to offer an informed perspective and recommendations on the regulations that govern the transport of lithium batteries and the proposals to change these regulations being considered by the DGP.

1.2 This paper contains several proposals for amending the lithium battery provisions in the ICAO Technical Instructions. They were developed by the submitting associations after carefully considering the proposals submitted in DGP/21-WP/21 and DGP/21-WP/19 and discussions at the October 4-5 Ad Hoc Working Group meeting on Lithium Batteries. These proposals represent a practical regulatory scheme for shipping lithium metal batteries and lithium ion batteries and reasonably address the concerns raised in DGP/21-WPs/21 and 19.

2. LITHIUM METAL BATTERIES AND FAA FLAMMABILITY STUDY

2.1 The proposals in DGP/21-WPs/21 and 19 on lithium metal batteries rely heavily on the United States Federal Aviation Administration (FAA) report entitled “*Flammability Assessment of Bulk-Packed, Nonrechargeable Lithium Primary Batteries in Transport Category Aircraft*.” Therefore, we believe it is appropriate to offer brief comments on the shortcomings of this study especially as it pertains to small shipments of lithium metal batteries.

2.2 As a result of the FAA study, DGP/21-WPs/21 and 19 are proposing that shipments as small as one cell with less than 1 g of lithium metal or one battery with less than 2 g of lithium metal should not be transported on passenger aircraft or offered for transport on passenger and cargo aircraft under the current Special Provision A45. We do not support this approach to regulating lithium metal batteries and believe it is inappropriate to apply results gained from the FAA tests for assessing the hazard of shipping batteries in bulk to the transport of all quantities of batteries, independent of lithium content, number of batteries or other conditions.

2.3 The effects of packaging material were largely ignored in the FAA tests. Lithium metal batteries were largely tested unpacked whereas batteries are transported packaged. In the event of a cargo compartment fire, packaging material, even combustible fibreboard, offers a degree of protection against dangerous heating of the batteries. Fire suppression systems on passenger aircraft would likely suppress a fire before it could reach lithium batteries packed in fibreboard packaging. In this connection, it is notable that the fire suppression system simulated in the FAA test suppressed the fire immediately upon activation. Therefore, the test had to be repeated in such a way that the suppression system was only activated after one battery had caught fire. In addition, the new UN Special Provision 188 was changed in December 2006 and contains more robust packaging requirements for lithium cells and batteries shipped under Special Provision A45.

2.4 The FAA states in its report that deep-seated fires in a suppressed cargo hold fire can continue to smolder, producing isolated pockets of temperatures in the 538°C (1000°F) to 649°C (1200°F) range. These temperatures are then used as a basis to conclude that lithium metal batteries may self-ignite even in a suppressed fire. However, in a recent *Federal Register* notice on oxygen cylinders, the U.S. Department of Transportation cites FAA tests indicating that the *mean* temperature in a suppressed cargo hold fire is 205°C (400°F), and on this basis justifies certain requirements regarding packaging of oxygen cylinders. It is more appropriate to consider the mean temperature (as in the oxygen cylinder rulemaking) rather than the peak temperatures referenced in FAA lithium battery study. It should be noted that the FAA found the average temperatures when ignition occurred on two types of lithium metal batteries was 253°C (487°F) and 273°C (524°F).

2.5 The probability of an accident scenario analogous to that contemplated in the FAA fire testing is extremely low. We nonetheless recognize the concerns expressed in DGP/21-WPs/21 and 19 and already have taken numerous steps to better educate shippers of batteries and battery-powered products on the requirements of the ICAO Technical Instructions. The ICAO Technical Instructions

provide a risk-based system of regulation recognizing that risk can not be reduced to zero. In the context of these activities and years of experience, the FAA tests do not justify the severe limits being proposed in DGP/21-WP/21 and DGP/21-WP/19.

3. RESPONSE TO PROPOSAL ON LITHIUM METAL BATTERIES DEVELOPED DURING AD HOC ICAO WORKING GROUP MEETING

3.1 Lithium Metal Batteries on Passenger Aircraft: DGP/21-WP/21 proposes to prohibit shipment on passenger aircraft of lithium metal batteries of any size and quantity. Our associations recognize that additional limitations on lithium metal batteries shipped on passenger aircraft may be appropriate. However, because many parts of the world are not served by cargo aircraft, such a prohibition would preclude emergency shipments of lithium metal batteries required for medical and military applications in many parts of the world.

3.2 Rather than a prohibition on shipping lithium metal batteries on passenger aircraft, we propose to allow packages of up to 2.5 kg gross weight when shipped as Class 9 dangerous goods and to require the use of metal intermediate packages (e.g. paint cans). We also propose to include a special provision that would allow competent authorities to authorize larger packages on passenger aircraft. This proposal would eliminate the exceptions in Special Provision A45 for “small” lithium metal cells and batteries (cells with less than 1 g of lithium metal and batteries with less than 2 g of lithium metal) when shipped on passenger aircraft. These regulatory changes satisfy two of the primary concerns raised in DGP/21-WP/19: 1) Pilots will be notified when packages of lithium metal batteries are on passenger aircraft because they will be shipped as Class 9 dangerous goods; and 2) Limiting packages of lithium metal batteries to 2.5 kg gross weight creates a self-limiting measure on shippers and makes it impractical to consolidate these small packages into large consignments (e.g. pallets) for transport on passenger aircraft.

3.3 Small Lithium Metal Batteries on Cargo Aircraft – Special Provision A45: During discussions at the ad hoc working group meeting on October 4 and 5, it was suggested that small lithium metal batteries no longer should be allowed to be transported on cargo aircraft under Special Provision A45. We strongly oppose removing the A45 exception for small lithium metal batteries when shipped on cargo aircraft. Members of our associations have for 30 years safely shipped billions of small, consumer-type batteries under Special Provision A45. Small lithium metal batteries are ubiquitous and used in many consumer applications. These cells and batteries frequently are shipped in small quantities by consumers and Internet retailers. Requiring all shipments of these types of consumer batteries to be shipped as Class 9 dangerous goods would create an impractical and unenforceable regulatory scheme.

3.4 It is important for the DGP to recognize that substantial changes to the packaging and marking requirements in Special Provision A45 will be made as a result of the changes adopted in Special Provision 188 of the UN Model Regulations. These changes, along with a change to the current 30 kg weight limitation under A45 that was discussed at the ad hoc working group meeting, substantially tightens the existing regulations that govern the transport of small lithium metal cells and batteries. Members of NEMA, BAJ, EPBA, PRBA, RECHARGE, and ZVEI manufacture and safely ship billions of small lithium metal cells and batteries every year. Any change in the weight limitation under Special Provision A45 will have a substantial impact on their business and logistic practices. After careful deliberations, they concluded that a package weight limitation of 15 kg for these small cells and batteries shipped under A45 provides a reasonable quantity limitation for these materials. This is a substantial reduction from the current 30 kg weight limitation contained in Special Provision A45.

3.5 Small Lithium Metal Batteries Packed with or Contained in Equipment – Special Provision A45: As noted previously, substantial changes to the packaging and marking requirements in Special Provision A45 will be made as a result of the changes adopted in Special Provision 188 of the UN Model Regulations. These changes affect small lithium batteries that are packed with or contained in equipment and will provide an additional level of safety for these products in transportation. We support the changes adopted in Special Provision 188 for incorporation into Special Provision A45 that apply to lithium metal batteries packed with or contained in equipment.

4. **RESPONSE TO PROPOSAL ON LITHIUM ION BATTERIES DEVELOPED DURING AD HOC ICAO WORKING GROUP MEETING**

4.1 Lithium ion Batteries – Special Provision A45: At the ad hoc working group meeting, changes to the provisions in Special Provision A45 applicable to lithium ion cells and batteries focused primarily on the current 30 kg package weight limitation. Members of NEMA, BAJ, EPBA, PRBA, RECHARGE, and ZVEI also manufacture and safely ship billions of small lithium ion cells and batteries every year. Any change in the weight limitation under Special Provision A45 will have a substantial impact on their business and logistic practices. We and our members have carefully considered this issue and conclude that a weight limitation of 15 kg per package coupled with the changes to the packaging and marking requirements in Special Provision A45 will improve the regulations that govern the transport of these products and be consistent with our customers' and commercial needs.

5. **ACTION BY THE DGP**

5.1 The DGP is invited to agree to the:

- a) elimination of exception for lithium metal and cells and batteries shipped on passenger aircraft under Special Provision A45;
- b) adoption of the following new requirements for lithium metal cells and batteries shipped on passenger aircraft:
 - 1) packages must be offered as Class 9 dangerous goods and include metal intermediate packaging; and
 - 2) packages may not exceed 2.5 kg G unless authorized by competent authority in country of origin;
- c) a reduction in the packaging weight limitation for lithium metal cells and batteries and lithium ion cells and batteries shipped under Special Provision A45 from 30 kg to 15 kg.

5.2 A summary of these changes is provided on the following page for consideration by the DGP.

	UN Number	Passenger Aircraft		Cargo Aircraft	
		Exceptions	Class 9	Exceptions	Class 9
A	UN 3090 Lithium metal batteries	None	No more than 2.5 kg G per package ¹ SP AXX authorizes larger packages with CA Approval	Excepted according to A45 No more than 15 kg G per package	No more than 35 kg G per package
B	UN 3091 Lithium metal batteries contained in equipment	Excepted according to A45	No more than 5 kg (of batteries) per device	Excepted according to A45	No more than 5 kg (of batteries) per device
C	UN 3091 Lithium metal batteries packed with equipment	Excepted according to A45	No more than 5 kg (applies to weight of battery and battery packaging)	Excepted according to A45	No more than 35 kg (applies to weight of battery and battery packaging)
D	UN 3480 Lithium ion batteries	Excepted according to A45 15 kg G per package	No more than 5 kg G per package	Excepted according to A45 15 kg G per package	No more than 35 kg G per package
E	UN 3481 Lithium ion batteries contained in equipment	Excepted according to A45	No more than 5 kg (of batteries) per device	Excepted according to A45	No more than 5 kg (of batteries) per device
F	UN 3481 Lithium ion Batteries packed with equipment	Excepted according to A45	No more than 5 kg (applies to weight of battery and battery packaging)	Excepted according to A45	No more than 35 kg (applies to weight of battery and battery packaging)
	1	2	3	4	5

— END —

¹ Use of metal intermediate packaging (e.g., paint cans inside fibreboard box) is required.