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EPBA EUROPEAN PORTABLE BATTERY ASSOCIATION
The Authoritative Voice of the Portable Battery Industry

Economic and Social Council
Economic Commission for Europe
Inland Transport Committee

Joint Meeting of the RID Committee of Experts
and the Working Party on the Transport of Dangerous Goods
Geneva, 11-21 September 2007

Brussels, 11th September 2007

INFORMAL DOCUMENT No.

Carriage of used lithium batteries: ECE/TRANS/WP.15/AC.1/2007/21 and **INF. 48/Rev.1**

Agenda Item 6 (a)

Introduction

The Joint Meeting adopted on their last meeting in Bern a proposal regarding the transport of spent lithium batteries. The forthcoming Joint Meeting will discuss the additional requirements for the packaging instructions P903b.

Proposal

The European Portable Battery Association (EPBA) supports the proposal to delete the additional requirement in brackets:
"*[The empty space in the packaging shall be filled with cushioning material. The cushioning material may be dispensed with when the packaging is entirely fitted with a polyethylene bag and the bag is closed.]*"

Reason

The original reason for the cushioning material was that the empty space in the packaging shall be filled so as to restrict the relative movements of the batteries during carriage.

It is unnecessary, as the density of the cells limits their movements in relation to one another. On the other hand the using of cushioning material is not a gain for safety reasons. In addition, it will make the carriage of used lithium batteries more burdensome because the cushioning material has proved to be difficult to use.
EPBA therefore supports the amendment to delete this requirement from the packaging instructions P903b.

In Explanation

A single battery is not able to move significantly during normal transportation in a mixture of bulk material. The maximum horizontal forces acting on a single battery during normal transportation conditions can be derived from EN 12642. In there the maximum force of the load on the front end wall of the truck is given as 40% of the weight of the load. When a truck slows down rapidly all batteries in the packaging are trying to continue their movement. They are stopped by the packaging material and the front end wall of the truck. Due to Newton’s second law they all exert a force proportional to their weight (mass) and the speed of slowing down. And the single forces of all batteries sum up to 40% of the total weight of the load.
The only batteries in the mixture that are probably able to move are those on the surface of the bulk material; it is obviously that batteries within the bulk material are not able to move significantly because of the weights of the other batteries on top of them.
When a battery on the surface wants to move it has to “climb” over its neighboring battery. This is represented in Fig. B. The easiest case for this movement is when a bigger battery has to “climb” over a small neighbor.
This “climbing” can be simulated with an inclined plane model, given in Fig. A. The weight G of the battery acts strictly downwards. The maximum horizontal acceleration force can be assumed to be 40% of that weight G (EN 12642). These two forces (closed arrowheads in Fig. A) have to be split in one force perpendicular to the inclined plane (dashed line in Fig. A) and another force parallel to the inclined plane (open arrowheads in Fig. A, named downwards and upwards). The critical slope of the inclined plane is given, when the upwards and downwards forces are equally strong. With the acceleration force assumed to be 40% of the weight, the critical angle of the inclined plane is 22°, as indicated in Fig. A.
This critical angle of 22° is significantly smaller than the typical angle of 58° given in Fig. B, valid for the biggest and smallest common battery.
So in reality the “angle of the hill” the batteries have to climb up are to steep for the forces acting on the batteries during normal transportation.

Fig. A

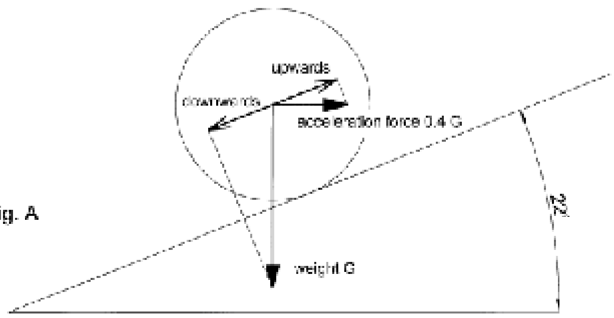

Fig. B