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 **25 November 2014**

Forty-sixth session
Geneva, 1 – 9 December 2014
Item 2 (c) of the provisional agenda
Recommendations made by the Sub-Committee on its forty-third, forty-fourth and forty-fifth sessions and pending issues: electric storage systems

Report on the third meeting of the informal working group on testing large lithium batteries. Addendum to INF 11, Figure 1 and Figure 2.

Transmitted by the expert from France (in his capacity as Chairman of the informal working group), PRBA, RECHARGE and COSTHA

1. In the informal paper INF 11 communicated by the secretariat to the participants of the 46th session of the Sub-Committee of Experts on the Transport of Dangerous Goods, proposals for changes in T4 shock test are made in ANNEX 1.

2. In this ANNEX 1, Proposal 4, Option 1 and Proposal 4, Option 2 are both containing a description of modified tests conditions for the Test T4: shock.

3. More specifically in the paragraphs 38.3.3.4.2. "Test procedure" of both Options, it is indicated that [figures will be transmitted in a separate document]. These Figures are communicated in this addendum to INF 11. In the Annexes 1 and 2 supplied below.

Annex 1

Proposal 4. Option 1.

§ 38.3. 4.4.2. Test procedure

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery.

Each cell ~~or battery~~ shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds. ~~Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.~~

~~However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.~~

Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations.

Battery	Minimum peak acceleration	Pulse duration
Small batteries	150 g_n or result of formula $Acceleration\ (g_n) = \sqrt{\left(\frac{100\ 850}{mass}\right)}$ whichever is smaller	6 milliseconds
Large batteries	50 g_n or result of formula $Acceleration\ (g_n) = \sqrt{\left(\frac{30\ 000}{mass}\right)}$ whichever is smaller	11 milliseconds

- *Mass is expressed in kilograms.*

NOTE: IEC Standard 60068-2-27 (Fourth Edition 2008-02): Environmental testing-Part 2-27: Tests – Test Ea and guidance: Shock *provides guidance on tolerance for acceleration and pulse duration.*

The relationship between minimum peak acceleration and mass is illustrated in Figure 1 for small batteries and Figure 2 for large batteries.

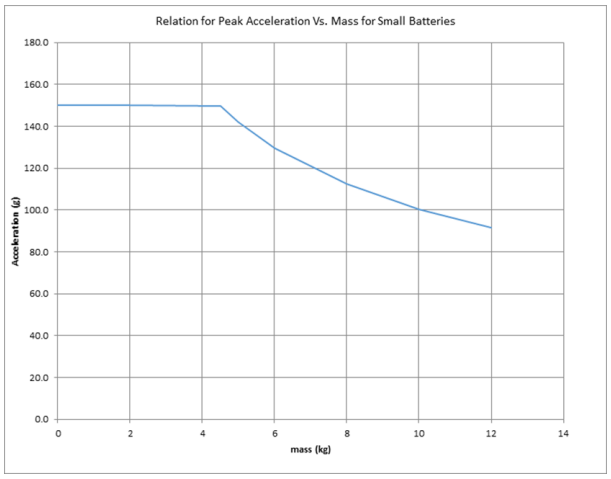

FIGURE 1. Relation between the Peak Acceleration and the Mass for small batteries (below 12.0 kg).

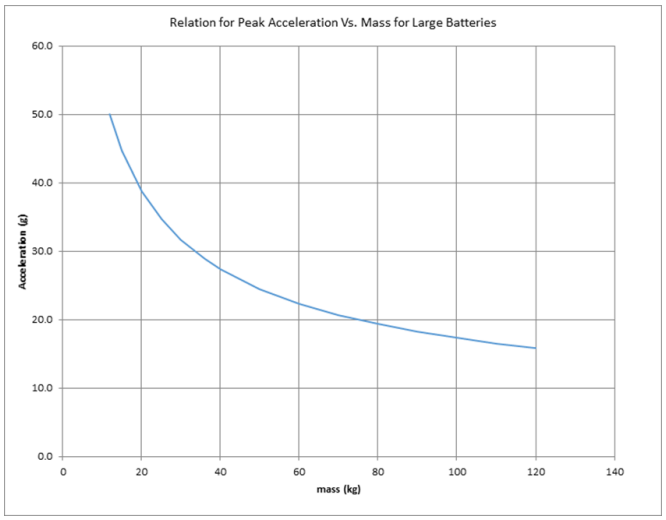

FIGURE 2. Relation between the Peak Acceleration and the Mass for large batteries (above 12.0 kg).

Annex 2

Proposal 4. Option 2.

§ 38.3. 4.4.2. Test procedure

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds.

Alternatively, large cells ~~and large batteries~~ ~~shall~~ may be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds. ~~Each cell or battery shall be subjected to three shocks in the positive direction and three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.~~

~~However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.~~

However, large batteries shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 11 milliseconds. The formula below is provided to calculate the appropriate minimum peak acceleration.

$$Acceleration\ (g_n) = \sqrt{\left(\frac{30\ 000}{mass}\right)}$$

- Mass is expressed in kilograms.

Note: IEC 60068-2-27 (Fourth Edition 2008-02): Environmental testing-Part 2-27: Tests – Test Ea and guidance: Shock provides guidance on tolerance for acceleration and pulse duration.

The relationship between minimum peak acceleration and mass is illustrated in the Figure 2.

Each cell or battery shall be subjected to three shocks in the positive direction and by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.

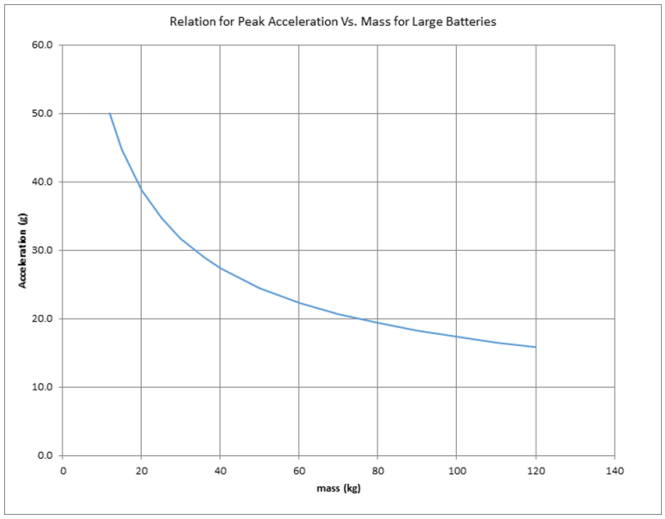

FIGURE 2. Relation between the Peak Acceleration and the Mass for large batteries (above 12.0 kg).

NB. The final numbering of the Figures will be decided according to the Committee's decision on Option 1 and Option 2.