



U.S. Department
of Transportation

**Pipeline and
Hazardous Materials Safety
Administration**

MAR 18 2005

400 Seventh Street, S.W.
Washington, D.C. 20590

Mr. George A. Kerchner
Wiley Rein & Fielding LLP
1776 K Street NW
Washington, DC 20006

Ref. No: 05-0036

Dear Mr. Kerchner:

This is in response to your letter requesting clarification on the testing of lithium batteries and cells. Specifically you asked for clarification of the requirements of the UN Thermal Test (Test 2) under section 38.3.4.2 of the United Nations Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria for determining the percentage mass loss criteria for lithium and lithium ion batteries and cells.

The method used for determining the "Percentage Mass Loss Criteria" of a lithium battery or cell observed during the UN lithium battery thermal test (Test 2) is limited to the mass loss that is directly attributed to the lithium battery or cell. Mass loss that can be attributed to packaging components (e.g., plastics, foam, potting compound, tape, etc.) should not be considered in calculating the percent of mass loss for the UN Thermal Test (Test 2).

I hope this information is helpful. Please contact us if you require additional assistance

Sincerely,



John A. Gale
Chief, Standards Development
Office of Hazardous Materials Standards



050036

173.185



Wiley Rein & Fielding LLP

Reberford
§ 173.185
Lithium Batteries
05-0036

1776 K STREET NW
WASHINGTON, DC 20006
PHONE 202.719.7000
FAX 202.719.7049

Virginia Office
7925 JONES BRANCH DRIVE
SUITE 6200
MCLEAN, VA 22102
PHONE 703.905.2800
FAX 703.905.2820

www.wrf.com

February 11, 2005

George Kerchner
202.719.4109
gkerchner@wrf.com

Mr. Edward Mazzullo
Director of Hazardous Materials Standards
Research and Special Programs Administration
U.S. Department of Transportation
400 7th Street, SW
Washington, DC 20590

Re: Request for Interpretation on UN Lithium Battery Thermal Test

Dear Mr. Mazzullo:

I am writing to request a clarification from your office on the mass loss limits contained in the UN Thermal Test (Test 2) for lithium and lithium ion cells and batteries found at section 38.3.4.2 in the UN Manual of Test and Criteria, Fourth Revised Edition.

As you are aware, 49 CFR § 173.185 of the HMR and ICAO Technical Instructions require primary lithium and rechargeable lithium ion cells and batteries be tested pursuant to a series of tests found in the UN Manual of Tests and Criteria. The Thermal Test is one of eight UN tests that must be conducted on these cells or batteries. The purpose of the Thermal Test is to “*assess cell and battery seal integrity and internal electrical connections*” using rapid and extreme temperature changes. Cells and batteries meet the requirements of the Thermal Test if there is “*no mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.*” “Mass loss” is defined in the UN Manual of Tests and Criteria as a loss of mass that exceeds the values shown in the table below. To quantify mass loss, the following formula must be used:

$$\text{Mass loss (\%)} = \frac{(M_1 - M_2)}{M_1} \times 100$$

Mass <i>M</i> of cell or battery	Mass loss limit
$M < 1 \text{ g}$	0.5 %
$1 \text{ g} < M < 5 \text{ g}$	0.2 %
$M \geq 5 \text{ g}$	0.1 %

Wiley Rein & Fielding LLP

Mr. Edward Mazzullo

February 11, 2005

Page 2

Unfortunately it is not clear from the requirements of the Thermal Test whether mass loss from such battery pack components as plastic, foam, potting compound, or tape should be considered when calculating total mass loss. It appears the true intent of this test is ensure there is no mass loss *from cells*, no leakage, venting, disassembly, rupture, or fire, and the seal integrity and internal electrical connections are not compromised. A small mass loss, often due to moisture retention, from battery pack components such as plastic, foam, potting compound or tape certainly would not present any safety risks in transport provided the cell and battery seal integrity and internal electrical connections are intact and all other requirements of the Thermal test are met. This type of mass loss can be measured by testing these battery pack components separately from the cells.

I am therefore requesting clarification from RSPA on the following issue:

If a lithium or lithium ion battery pack meet the testing requirements of the UN Thermal Test except the mass loss limits, and it can be measured that the mass loss came from such battery components as plastic, foam, potting compound, or tape, can these batteries be considered as having passed the Thermal Test provided the cell and battery seal integrity and internal electrical connections are intact?

Thank you for taking the time to consider this very important issue. I look forward to your timely response.

Sincerely,

George A. Kerchner

George A. Kerchner