



U.S. Department  
of Transportation

**Pipeline and Hazardous  
Materials Safety  
Administration**

1200 New Jersey Avenue, SE  
Washington, D.C. 20590

JUL 9 2008

Mr. Steve Jacob  
Raytheon Missile Systems  
11651 N. Via De La Verbenita  
Oro Valley, AZ 85737

Ref. No. 08-0028

Dear Mr. Jacob:

This responds to your January 24, 2008 request for clarification on a container designed to transport a lithium battery under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180).

According to your request, you have designed a container to ship a lithium ion battery to be used by the military. The container will contain a total of 18 batteries connected in three banks. Each of the 18 batteries consists of 25 cells in a plastic, sealed, waterproof enclosure with a vent. Each bank of six batteries is tightly assembled and enclosed in a strong aluminum box; the three boxes are assembled together to make a single unit. The outside container is waterproof and includes a charging device connected to the large battery assembly. The container includes mechanisms to protect the battery assembly from shock and vibration to prevent short circuits and reverse charging. The total weight of the battery assembly is 26 kg; the total weight of the assembly with aluminum enclosures is 41 kg. The battery assembly contains a total of 0.315 kg of lithium.

Your questions are paraphrased and answered as follows:

Q1. Does this configuration conform to the HMR for transportation by highway?  
What test requirements apply to the container? Is a liner required?

A1. The battery assembly must conform to the requirements in §173.185 of the HMR. Thus, among other requirements, the battery assembly must be tested in accordance with the UN Manual of Tests and Criteria and must be packaged in combination packagings conforming to the requirements of Subparts L and M of Part 178 at the Packing Group II performance level. A liner is not required if the container is waterproof. Packaging test requirements and pass/fail criteria are in Subpart M of part 178.

Q2. May the battery be connected and charging during transportation?

A2. No. The terminals must be protected from damage and short circuits. Batteries connected and charging during transportation may pose a short circuit hazard.

If you cannot comply with the §173.185 requirements, you must apply for an Approval from the Office of Special Permits and Approvals. Procedures for applying for an Approval are in Subpart H of Part 107 in the HMR.

I hope this answers your inquiry.

Sincerely,



Susan Gorsky  
Regulations Officer  
Office of Hazardous Materials Standards

Boothe  
 3173.185  
 Battery  
 08-0028

**Drakeford, Carolyn <PHMSA>**

**From:** INFOCNTR <PHMSA>  
**Sent:** Thursday, January 24, 2008 4:51 PM  
**To:** Drakeford, Carolyn <PHMSA>  
**Subject:** FW: Interpretation on 173.185

**From:** Steven D Jacob [mailto:SteveJacob@raytheon.com]  
**Sent:** Thursday, January 24, 2008 4:30 PM  
**To:** INFOCNTR <PHMSA>  
**Subject:** Interpretation on 173.185

I spoke to Jenny and she told me that if I wanted a written letter of interpretation that I needed to ask for one, please send one.

We are designing a container to ship a lithium ion battery that will be used by the Army. The battery will be placed in a container, the battery has the following characteristics; it has 18 batteries within it which are BB2590 (standard Army battery) that are connected in 3 banks (6 batteries per bank,  $3 \times 6 = 18$ ). Each bank of 6 batteries is tightly assembled and enclosed in a strong aluminum box then the 3 boxes are assembled together to make a single unit of 18 batteries. Each smaller battery (BB2590) has 24 cells in it and has a plastic sealed waterproof enclosure with a vent. Each cell is of the 18650 lithium ion kind. The total weight of all 18 batteries is 26 kg (57 lb); the total weight of the assembly with the aluminum enclosures is 41 kg (90 lb). The total battery has 0.315 kg of lithium (0.7 lb)

The container is made waterproof and is also a charging device; it has a connector that connects to the large battery assembly. The container also has mechanical shock isolation within it to protect the battery from damage due to shock and vibration. The output of the battery is wired to a connector that is mounted on the outside panel of the container, there is a protective plastic cover over the connector that is captive and used to prevent the connector from shorting. There is also a protection diode in series with the connector to the battery to prevent reverse charging.

My questions are as follows:

- 1) Can I meet the requirements of CFR 49 with the current configuration so that the battery and container may be transported on roadways?
- 2) Can the battery while it is in the container be connected and charging while being transported on roadways?
- 3) Do I have to conduct some sort of drop test or POP test to the container? If yes then does the battery need to be in it while it is being tested? What is a pass and what is a failure?
- 4) Do I need liner in the container? (The individual batteries are already sealed in a plastic enclosure and vented)
- 5) Can you identify anything that I am missing? My purpose is to be able to transport on roadways the battery in the container.

Please send a written interpretation, it may be emailed to me at [stevejacob@raytheon.com](mailto:stevejacob@raytheon.com) or sent to my home address: 11651 N. Via De La Verbenita, Oro Valley, AZ 85737. I am giving you my home address because our interoffice mail is very slow.

Thank you  
 Steve Jacob

1/25/2008

Principal Electrical Engineer  
Raytheon  
520.794.2132

Steve Jacob  
Principal Electrical Engineer  
Raytheon Missile Systems  
520.794.2132  
SteveJacob@Raytheon.com