



U.S. Department
of Transportation

1200 New Jersey Avenue, SE
Washington, DC 20590

**Pipeline and Hazardous
Materials Safety
Administration**

DEC 20 2019

Bill Laudolff
Sr. Mechanical Engineer
Aclara
30400 Solon Road
Solon, OH 44136

Reference No. 19-0110

Dear Mr. Laudolff:

This letter is in response to your August 29, 2019, email requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to lithium battery testing. Specifically, you seek clarification of the requirements to test certain battery configurations in accordance with the United Nations (UN) Manual of Tests and Criteria and confirmation that the battery configurations meet the requirements of § 173.185 of the HMR and may be offered for transport.

In your email, you provide the following conditions of the battery arrangements:

- Single cell batteries are permanently installed on a circuit board and then mounted into the final equipment, i.e. the battery is connected to the equipment with adequate protections and will not provide power to any other equipment.
- Each single cell lithium metal battery meets all the requirements and has been tested in accordance with the UN Manual of Tests and Criteria.

You further describe five battery configurations:

1. Multiple single cell batteries, each with less than 1 gram of lithium content, connected in parallel with a total of not more than 2 grams of lithium content per assembly.
2. Multiple single cell batteries, each with less than 1 gram of lithium content, connected in series with a total of not more than 2 grams of lithium content per assembly.
3. Multiple single cell batteries, each with more than 1 gram of lithium content, connected in parallel.
4. Multiple single cell batteries, each with more than 1 gram of lithium content, connected in series.
5. Any combination of series and parallel connections of single cell batteries.

You ask if each of the battery configurations described require additional testing in accordance with the UN Manual of Tests and Criteria.

The answer is yes. Section 173.185(a) of the HMR states that lithium batteries are subject to the tests in sub-section 38.3 of the UN Manual of Tests and Criteria, regardless of whether the cells used to construct the battery are of a tested type. In Part III, Sub-section 38.3 of the UN Manual of Tests and Criteria, a battery is defined as "two or more cells which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking and protective devices." Based on the information provided in your email, it is the opinion of this Office that because the cells are electrically connected, whether in series or parallel, and fitted with devices necessary for use, such as a circuit board, this arrangement would meet the definition of a battery. Therefore, in accordance with § 173.185(a), each battery would need to meet the criteria in Part III, Sub-section 38.3 of the UN Manual of Tests and Criteria.

I hope this information is helpful. Please contact us if we can be of further assistance.

Sincerely,

A handwritten signature in cursive script, appearing to read "T. Glenn Foster".

T. Glenn Foster
Chief, Regulatory Review and Reinvention Branch
Standards and Rulemaking Division

Larson

19-0110

Dodd, Alice (PHMSA)

From: INFOCNTR (PHMSA)
Sent: Friday, August 30, 2019 11:40 AM
To: Hazmat Interps
Subject: FW: Test Requirements for Single Cell Lithium Metal Battery Arrangements in Equipment.

Hello Alice and Ikeya,

Please see below for letter of interpretation request.

The requester spoke with Josh in the HMIC, Josh provided him with letter 18-0065 and conferred with Ryan Larson to answer his question. Bill still sent in for a LOI request, I found letter 17-0101 after looking through his LOI request and called him to show him the 17-0101 letter. He still insisted on requesting the LOI stating that the 17 letter addresses making a battery pack that powers something but in his case the batteries are directly installed in equipment and he wants to know if they are still treated as individual batteries or do they become a battery assembly even though they are part of the final equipment and aren't being used to power something else. He states the batteries are inseparable from the equipment and the connections are made inside the equipment.

Please let us know if you have any further questions.

Thank you,

Kathryn, HMIC

From: Laudolff, Bill [mailto:blaudolff@aclara.com]
Sent: Thursday, August 29, 2019 3:33 PM
To: INFOCNTR (PHMSA) <INFOCNTR.INFOCNTR@dot.gov>
Subject: Test Requirements for Single Cell Lithium Metal Battery Arrangements in Equipment.

To Whom It May Concern,

I am seeking written clarification of the requirements to test certain configurations per the Manual of Tests and Criteria to confirm that a battery arrangement meets the requirements of 49 CFR 173.185 and may be offered for transport.

Do each of the following arrangements require additional tests of the arrangement per the tests specified in the Manual of Tests and Criteria?

The conditions of the arrangements are as follows:

- Single cell batteries are permanently installed on a circuit board and mounted in the final equipment, i.e. battery is connected to the equipment with adequate protections and will not provide power to any other equipment.
- Each single cell lithium metal battery meets all requirements and has been tested per the Manual of Tests and Criteria.

The arrangements are:

1. Multiple single cell batteries, each of less than 1g lithium content, connected in parallel and not more than 2 g per assembly.
2. Multiple single cell batteries, each of less than 1g lithium content, connected in series and not more than 2 g per assembly.

3. Multiple single cell batteries, each of more than 1g lithium content, connected in parallel.
4. Multiple single cell batteries, each of more than 1g lithium content, connected in series.
5. Any combination of series and parallel connections of single cell batteries.

Best Regards,

Bill Laudolff
Sr. Mechanical Engineer



Save the date for AclaraConnect '20
Conference and Exposition | April 27 - 30 | Nashville, TN

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