



U.S. Department
of Transportation

Pipeline and Hazardous Materials
Safety Administration

1200 New Jersey Ave., SE
Washington, DC 20590

OCT 13 2009

Mr. Tom Piggin
Electronic Engineer
GE Sensing & Inspection Technologies
Fir Tree Lane
Groby
Leicestershire
LE6 0FH
UK

Ref. No. 09-0182

Dear Mr. Piggin:

This responds to your August 4, 2009 request for clarification of the requirements in the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to lithium battery packs. Specifically, you ask if the configurations described in your letter constitute a single lithium ion battery pack or separate lithium ion batteries.

In your letter you describe two battery packs, each of which consists of five lithium batteries in a single housing. Each of the lithium ion batteries contains two or more cells and will have an aggregate lithium content of 8.1 grams (99Wh).

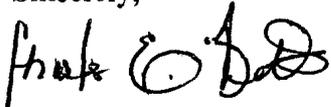
In the first example, the five lithium batteries lead to a single connection, but remain electrically isolated while in transportation. Provided the batteries remain isolated during transportation, this configuration would constitute separate lithium ion batteries for purposes of the HMR, and may be transported in conformance with requirements in §172.102, Special Provision 189 by highway and §173.185 as a Class 9 by air and vessel.

In your second example, the batteries are electrically connected but utilize diodes to ensure that the battery pack will not activate during transportation. In this case, the five battery packs installed in the power supply described in your letter are electrically connected and must be described as a single lithium ion battery pack with an aggregate lithium content of

40.5 grams equivalent lithium content (500Wh) and transported as Class 9 material in conformance with the requirements of §173.185.

I hope this answers your inquiry. If you have further questions, please do not hesitate to contact this office.

Sincerely,

A handwritten signature in black ink, appearing to read "Charles E. Betts". The signature is stylized with a large initial "C" and "B".

Charles E. Betts
Chief, Standards Development
Office of Hazardous Materials Standards

Boothe
§173.185
Lithium Battery
09-0182

Drakeford, Carolyn (PHMSA)

From: INFOCNTR (PHMSA)
Sent: Tuesday, August 04, 2009 3:40 PM
To: Drakeford, Carolyn (PHMSA)
Subject: FW: battery regulations
Attachments: battery configuration.jpg; battery configuration2.jpg

From: Piggin, Thomas (GE EntSol, SensInsp) [mailto:Thomas.Piggin@ge.com]
Sent: Tuesday, August 04, 2009 11:27 AM
To: INFOCNTR (PHMSA)
Subject: battery regulations

Dear Sir/Madam

I have a query regarding lithium battery regulations, attached is how we intend to configure our battery pack, I would greatly appreciate it if you could reply with a comment saying whether the US DOT would allow this to be air transported...

To explain the two drawings:

the second one is identical to the first except that it has diodes in place so that if a single cell fails the others do not try to discharge into it.

the first drawing shows the 5 batteries housed together mechanically, they are not connected electrically as all the wires connect to a single connector, but are isolated from one another. The batteries are also definitely classed as batteries as they contain two or more cells within each of the 5 x 3.7 27Ah batteries.

To explain the 'key' section: We will have some sort of tool, which will plug into the connector and therefore connect the batteries together in our chosen configuration to form a single 500Wh battery. This would only be connected when the product is not in transport.

If having the individual batteries connected in a single case then this is no problem, we could individually package each battery as well if required. It is also worth mentioning that the batteries will be contained in equipment and so I believe subject to packing instruction 967.

Just to also explain that I am aware each individual battery will need to be UN tested if it hasn't already been so done by the manufacturer or if the manufacturer produces these batteries using several smaller cells that have already been tested.

If you could just give a small comment saying whether you would allow this configuration then that would be great.

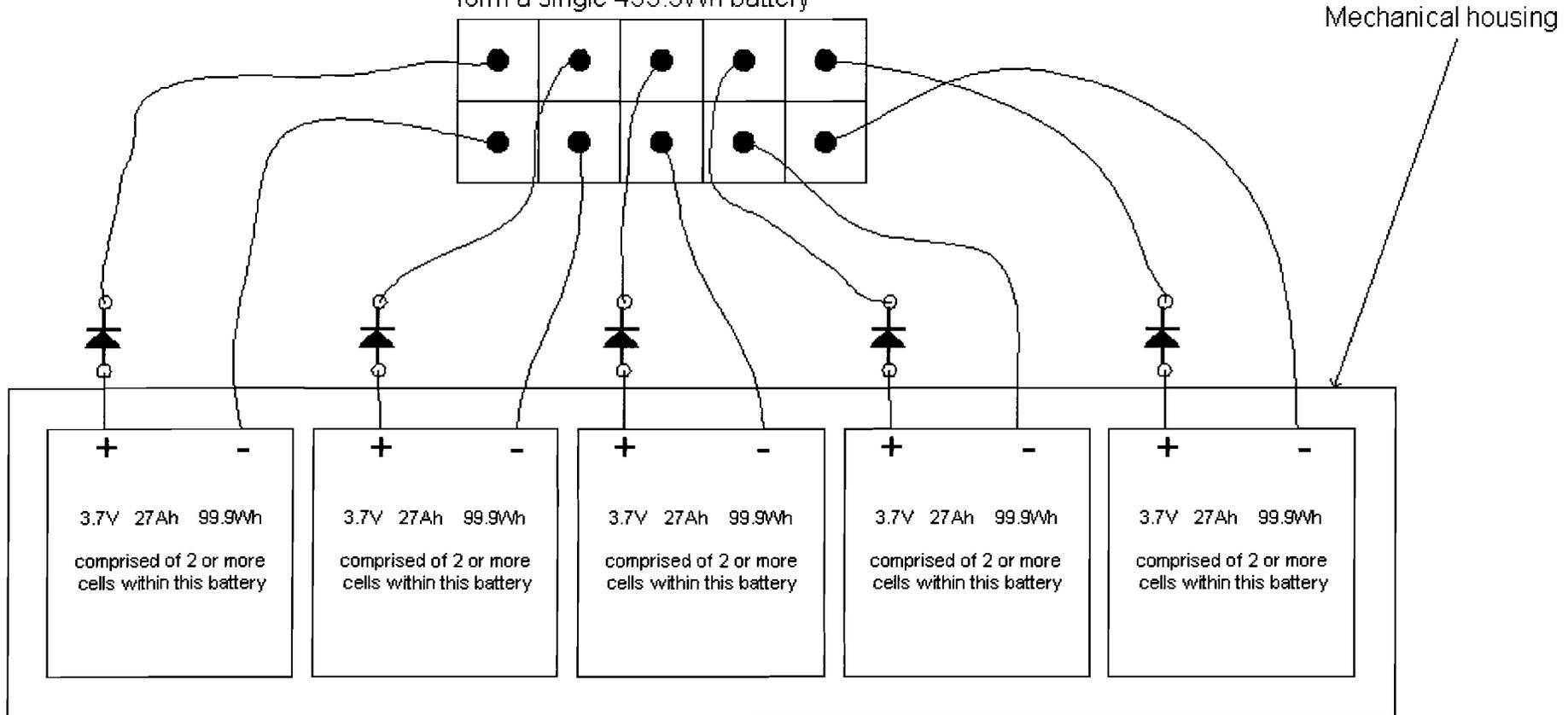
Regards

Tom Piggin
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8/4/2009

LE6 OFH
UK
Druck Limited

10way connector, each connection is isolated from one another but after transportation customer will place a 'key' into the connector which will result in separate batteries becoming connected to form a single 499.5Wh battery



All 5 batteries housed together mechanically, but not electrically connected

Boothe, Deborah (PHMSA)

From: INFOCNTR (PHMSA)
Sent: Friday, August 14, 2009 10:26 AM
To: Boothe, Deborah (PHMSA)
Subject: FW: battery regulations

Debbie,

This gentleman emailed the information center about a letter you are working on. See Below. It appears you might be able to handle this by phone. Could you please give him a call and discuss his follow-up question.

-Rob Benedict

From: Piggin, Thomas (GE EntSol, SensInsp) [mailto:Thomas.Piggin@ge.com]
Sent: Friday, August 14, 2009 10:14 AM
To: INFOCNTR (PHMSA)
Subject: RE: battery regulations

Hi Rob

I have received some information from a colleague within another GE business and he has told me that the US DOT has approved their battery pack, which is the same configuration as how we intend to connect our batteries to the equipment. Is there any way you can confirm this approval in some way?

Their system has two 80Wh batteries that are mechanically connected by a shrink wrapped case. The wiring from each battery goes to a PCB where they are paralleled together to electrically form one single 160Wh battery. The pcb connection then connects the pcb and battery to the instrument, but this connection is not present for transportation. However the connection that parallels the batteries together is still present and so I am enquiring as to how the DOT regards these as separate batteries?

I hope you can provide some sort of answer on this.

Regards

Tom

From: INFOCNTR@dot.gov [mailto:INFOCNTR@dot.gov]
Sent: 06 August 2009 13:25
To: Piggin, Thomas (GE EntSol, SensInsp)
Subject: RE: battery regulations

Dear Thomas Piggin,

We have received your request for a written interpretation regarding the hazardous materials regulations (49 CFR Parts 171-180). Unfortunately, the Hazardous Materials Information Center cannot provide written interpretation/guidance via email. The Office of Hazardous Materials Standards has a mechanism in place to provide written guidance in the form of a letter of interpretation. Typically, written letters of interpretation are responded to at minimum of approximately 6 weeks from when they are received by the Office of Hazardous Materials Standards. However, delivery time of a written interpretation can vary markedly based on topic complexity and the backlog of letters to be completed. Let me know if you are interested in a letter of interpretation and I will forward your request to the

8/14/2009

Office of Hazardous Materials Standards to begin the process.

You may contact the Hazardous Materials Information Center, which is staffed with regulatory specialists who can quickly answer your questions by phone, Monday through Friday, 9 AM - 5 PM EST at +1(202) 366-4488.

Sincerely,

Rob Benedict, Hazardous Materials Specialist

An e-mail response from this office is considered informal guidance. Formal guidance may be requested in accordance with 49 CFR 105.20.

<http://hazmat.dot.gov/infocent.htm>

From: Piggin, Thomas (GE EntSol, SensInsp) [mailto:Thomas.Piggin@ge.com]

Sent: Wednesday, August 05, 2009 9:31 AM

To: INFOCNTR (PHMSA)

Subject: RE: battery regulations

Hi Rob

Is there no way you can provide me a confirmation by email. I have no problem ringing the hotline, but then the only proof I have is what I write about the conversation I've had with the DOT over the phone. All I am asking for is the following...

The DOTs stance on whether they consider a mechanically connected group of batteries i.e in a single case, as one large battery or several smaller batteries even though none of them are electrically connected.

Whether the DOT would class battery wiring connected to a single connector as electrically connected even though there is no possibility of an electrical circuit being created.

My direct number is 0044 1162317269 if you want to call me

Regards

Tom

From: INFOCNTR@dot.gov [mailto:INFOCNTR@dot.gov]

Sent: 05 August 2009 13:06

To: Piggin, Thomas (GE EntSol, SensInsp)

Subject: RE: battery regulations

Dear Thomas Piggin,

We have received your inquiry about the hazardous materials regulations (HMR) (49 CFR Parts 171-180).

The HMR prescribes the requirements of the Department of Transportation governing the offering and transportation of hazardous materials in interstate, intrastate, and foreign commerce by rail car, aircraft, motor vehicle, and vessel. While we cannot provide an exhaustive list of each applicable requirement or a formal interpretation of the regulations via email, we suggest you review the attached written letters of interpretation for additional information the definition of cells and batteries. The previous letters of interpretation are available at the following URLs:

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<http://docketsinfo.dot.gov/reports/rspa/2003-12/030279.pdf>

<http://docketsinfo.dot.gov/reports/rspa/2005-03/040139.pdf>

<http://docketsinfo.dot.gov/reports/rspa/2006-08/060079.pdf>

If you require additional assistance, you may contact the Hazardous Materials Information Center, which is staffed with regulatory specialists who can quickly answer your questions by phone, Monday through Friday, 9 AM - 5 PM EST at +1(202) 366-4488.

Sincerely,

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<http://hazmat.dot.gov/infocent.htm>

From: Piggin, Thomas (GE EntSol, SensInsp) [mailto:Thomas.Piggin@ge.com]

Sent: Wednesday, August 05, 2009 5:21 AM

To: INFOCNTR (PHMSA)

Subject: RE: battery regulations

Hi Rob

Thanks for the quick response. 6 weeks is going to be too long to wait in order to get an answer to this. I think there are two key areas within the configuration that could affect things. What I am seeking clarification on is the factors that would make you consider a battery a battery or a battery as a series of smaller batteries. From all the regulations I have read, IATA, ICAO etc it states that an electrical connection between two smaller batteries would be classed as a large battery. I am happy with this rule. However I have heard that some authorities would consider several smaller batteries connected in a single pack as a single battery. What is your position on this? The second issue is that we would want to connect all the wires from the individual batteries into a single common connector, however the batteries won't be connected to each other electrically, it will just be the wires lumped into a single connector, e.g. 5 batteries, both with a positive and negative wire and then all 10 wires connected into a 10way connector.

Therefore the response I am after is whether the US DOT would regard the two above scenarios as single batteries or several smaller batteries.

Also I am struggling to find the information on the link you gave me, could you point me in the direction of some more specific areas of the document?

I hope you can help.

Regards

Tom

8/14/2009

From: INFOCNTR@dot.gov [mailto:INFOCNTR@dot.gov]
Sent: 04 August 2009 20:41
To: Piggin, Thomas (GE EntSol, SensInsp)
Subject: RE: battery regulations

Dear Thomas Piggin,

We have received your request for a written letter of interpretation regarding the hazardous materials regulations (49 CFR Parts 171-180). The hazardous materials regulations are available at the following URL:

<http://hazmat.dot.gov/regs/rules.htm>

Typically, written letters of interpretation are responded to at minimum of approximately 6 weeks from when they are received by the Office of Hazardous Materials Standards. However, delivery time of a written interpretation can vary markedly based on topic complexity and the backlog of letters to be completed.

Sincerely,

Rob Benedict, Hazardous Materials Specialist

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