



U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

JUN 29 2017

Mr. Daniel Nash
Phase Four, Inc.
133 Center Street
El Segundo, CA 90245

Reference No. 17-0021

Dear Mr. Nash:

This letter is in response to your February 17, 2017, email requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to limited quantities of compressed gases. Specifically, you ask about the definition of a "container" as it applies to the exception from labeling and specification packagings as outlined in § 173.306(a)(1).

You state that you are shipping a compressed gas (UN2036, Xenon, compressed, 2.2) in what you describe as a pressurized system that is comprised of multiple pressurized vessels that are not isolated from each other, but collectively have a capacity less than 4 fluid ounces. You note that while in transportation the pressure vessels that contain the hazardous material and the manifold will be pressurized as a single volume (i.e., with no shut-off valve between the individual pressure vessels). You ask for confirmation of your understanding that the pressurized system can be considered a "container" for the purposes of § 173.306(a)(1) and thus excepted from labeling and specification packaging.

Your understanding is correct. The HMR do not specifically define the word "container." However, a standard dictionary defines it as, "one that contains [,] such as a receptacle (as a box or a jar) holding goods." "Container" as it is used in § 173.306(a)(1) includes all container types (except cigarette lighters), such as the pressurized system you describe, that comply with the requirements in § 173.306. Because the combined capacity of the two vessels in your system (i.e., the "container") is below the 4-fluid ounce capacity limitation outlined § 173.306(a)(1), you may use the limited quantity exception for compressed gases. Note that if the package is shipped by air, the exceptions from packaging and labeling do not apply.

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

Sincerely,

Dirk Der Kinderen
Chief, Standards Development Branch
Standards and Rulemaking Division

Dodd, Alice (PHMSA)

Casey
\$173.306
Limited Quantities
17-0021

From: INFOCNTR (PHMSA)
Sent: Friday, February 17, 2017 4:26 PM
To: Hazmat Interps
Subject: FW: Interpretation Letter for Phase Four, Inc.

Hi Shante/Alice,

Please submit this as a letter of interpretation. Mr. Nash spoke with Jodi.

Please let me know if you have any questions.

Thanks,
Jordan

From: Daniel Nash [mailto:daniel@phasefour.io]
Sent: Friday, February 17, 2017 4:15 PM
To: INFOCNTR (PHMSA) <INFOCNTR.INFOCNTR@dot.gov>
Subject: Re: Interpretation Letter for Phase Four, Inc.

Jordan - Please see below for the full mailing address for Phase Four, Inc.:

Phase Four, Inc.
133 Center Street
El Segundo, CA 90245

If any other information is required to process our request, please let me know. Thank you,

Daniel Nash
Senior Flight Systems Engineer
Phase Four, Inc.
daniel@phasefour.io
[971.227.7147](tel:971.227.7147)
www.phasefour.io

The information transmitted in this email is intended only for the person or entity to which it is addressed, and may contain material confidential to Phase Four. Any review, re-transmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient(s) is prohibited. If you received this email in error, please contact the sender and delete the material from your files.

On Fri, Feb 17, 2017 at 12:39 PM, INFOCNTR (PHMSA) <INFOCNTR.INFOCNTR@dot.gov> wrote:

Dear Daniel,

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://phmsa.dot.gov/regulations>

In order to process your request please respond to this email with your full mailing address.

Please allow a minimum of 8 weeks before contacting the Office of Hazardous Materials Standards (OHMS) for a status on written letters of interpretations. Delivery time of a written interpretation can vary markedly based on topic complexity and the depth of review necessary by OHMS Divisions and modal administrations (e.g., FAA) to ensure an appropriate response.

Sincerely,

Jordan, 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://phmsa.dot.gov/hazmat/regs/interps>

From: Daniel Nash [mailto:daniel@phasefour.io]

Sent: Thursday, February 16, 2017 4:50 PM

To: PHMSA HM InfoCenter <PHMSAHMInfoCenter@dot.gov>; INFOCNTR (PHMSA) <INFOCNTR.INFOCNTR@dot.gov>

Cc: Jim Behmer <jim@phasefour.io>; Jason Wallace <jason@phasefour.io>; Umair Siddiqui <umair@phasefour.io>

Subject: Interpretation Letter for Phase Four, Inc.

Hello - I'm writing to seek clarification on CFR 49 regarding §173.306 *Limited quantities of compressed gases*. I would like a DOT interpretation of this chapter as it relates to our system.

Specifically, we would like to claim an exemption from CFR 49 labeling and specification packaging requirements per §173.306(a):

(1) When in containers of not more than 4 fluid ounces capacity (7.22 cubic inches or less) except cigarette lighters. Additional exceptions for certain compressed gases in limited quantities and the ORM-D hazard class are provided in paragraph (i) of this section.

We can safely say our entire system (and obviously the individual constituent components) falls below the 4 fl. oz. requirement per this particular exemption. However, our uncertainty lies in the definition of "container" as referenced in this sub-chapter.

Earlier this morning, I spent approximately 30 minutes on the phone with the DOT Hotline, which was unable to provide a definition of "container" as it pertains to this exemption. However, I was told that because our system is pressurized as a single volume and individual pressurized sections cannot be isolated from each other, we had reasonable grounds to consider our entire pressurized system a single "container".

Below is a description of our system with all information I consider pertinent to the discussion:

- The pressurized section (during transportation) of our system, which I'll henceforth consider the "container", is composed of the following piece-parts
 - 2x ~50cc pressure vessels, individually falling under the *173.306 small quantities* exemption. These pressure vessels are designed to a MEOP that is compatible with the other high-pressure components of the system, have a burst factor of >2, and will be individually radiographically inspected after weldment fabrication. All NDE, NDT, and burst testing will be compliant with DOT 3E cylinders.
 - An internally designed high-pressure manifold, made of 316L stainless steel. designed to the same margins as the pressure vessels (>2 burst factor), compliant with MIL-STD-1522A
 - 1/8" OD stainless steel tubing per ASTM A 269
 - Various compression fittings rated to system MEOP
 - Other fluid components which prevent flow from leaving the container are discussed below
- Container media is a type 2.2 gas: compressed Xenon gas
- Container service pressure expected during transportation: 1,800 psi
- Container MEOP: 3,000 psi
- Container proof pressure (container will be acceptance tested and confirmed compliant prior to transportation): 4,500 psi
- In the transportation configuration, both propellant tanks, the ASTM A 269 tubing, and the high-pressure manifold will be pressurized as a single volume to the service pressure, and our type 2.2 Xe gas can freely flow within this single volume
- The following closed fluid paths retain pressure strictly to the container:
 - A normally closed solenoid valve in series with a normally closed dry-break fluid quick-disconnect
 - A "zero-leak" blocking check valve in series with a normally closed dry-break fluid quick-disconnect
 - Two normally closed solenoid valves in series
 - In other words, each possible leak path requires the failure of two in-series components to allow pressurized type 2.2 gas to leave the container

To summarize, we are seeking clarification or confirmation from the DOT that the system described above is subject to the exemption §173.306(a)(1) because our pressurized system can be considered a "container", with

a total pressurized volume within the threshold of 4 fl. oz. For transparency, the total system volume is expected to be 3.8 fl. oz. +/- 0.05 fl. oz, below the limit.

Please consider our argument and provide validation of our intent to claim this exemption, or provide another suitable path forward. Also, please do not hesitate to ask any questions of us which will assist in your understanding of our system. Thank you,

Daniel Nash

Senior Flight Systems Engineer

Phase Four, Inc.

daniel@phasefour.io

[971.227.7147](tel:971.227.7147)

www.phasefour.io

The information transmitted in this email is intended only for the person or entity to which it is addressed, and may contain material confidential to Phase Four. Any review, re-transmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient(s) is prohibited. If you received this email in error, please contact the sender and delete the material from your files.