



U.S. Department of Transportation  
**Pipeline and Hazardous Materials**  
**Safety Administration**

1200 New Jersey Avenue, SE  
Washington, DC 20590

MAR 13 2015

Mr. Richard Maruya  
President  
A.S. Trust & Holdings, Inc.  
44129 Mikiola Drive  
Kaneohe, HI 96744

Ref. No.: 14-0169

Dear Mr. Maruya:

This is in response to your email dated September 11, 2014 requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) regarding transportation requirements for flammable refrigerants in DOT 39 cylinders. Your questions are paraphrased and answered as follows:

Q1. Is Hydrocarbon gas mixture, liquefied, n.o.s, UN 1965, an appropriate and acceptable classification for R441a and R443a to be used for marking and labeling of packages?

A1. In accordance with § 173.22, it is the shipper's responsibility to properly classify a hazardous material. This Office generally does not perform this function. However, based on the information you have provided the proper shipping name Hydrocarbon gas mixture, liquefied, n.o.s. appears to be an acceptable proper shipping name for R441a and R443a.

Q2. Is a DOT 39 disposable cylinder acceptable to be used for the storage and transport of UN 1965?

A2. The answer is yes. The Column 8B entry for "UN 1965, Hydrocarbon gas mixture, liquefied, n.o.s." under the Hazardous Materials Table (HMT; § 172.101) permits "Hydrocarbon gas mixture, liquefied, n.o.s" Division 2.1 gas to be placed in a non-bulk cylinder prescribed in § 173.304. Section 173.304a(a)(1) permits liquefied gases, except gas in solution, to be placed in a DOT 39 steel cylinder provided the cylinders are not filled and shipped with a mixture that contains a pyrophoric liquid, carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin, or toxic material (Division 2.3 (gas poisonous by inhalation) or Division 6.1 (poisonous materials)), unless specifically authorized in 49 CFR Part 173. Based on the information provided in your letter, the gas you described does not contain these materials.

Q3. Is the maximum quantity of either R441a or R443a contained in a DOT 39 cylinder a function of the volume of the cylinder and the pressure of the fluid, which is a function of the temperature of the fluid?

A3. Section 173.304(b) states the liquid portion of a liquefied gas may not completely fill the packaging at any temperature up to and including 55 °C (131 °F). In addition, the filling density can be determined using the formula provided in "Note 1" to the Table in § 173.304a(a)(2). The filling density for any cylinder containing your material, including a DOT specification 39 cylinder, can be determined by calculating the percent ratio of the weight of the gas in the cylinder to the weight of the water the cylinder will hold at 16 °C (60 °F).

Q4. Is the maximum volume of a DOT 39 cylinder 1,526 cubic inches for service pressures less than 500 psi?

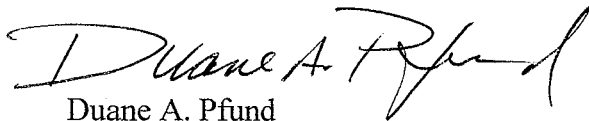
A4. In accordance with § 178.65, cylinders built to meet a DOT 39 specification may not have a maximum water capacity that exceeds 55 pounds (1,526 cubic inches) for cylinders with service pressure of 500 p.s.i.g. or less, and 10 pounds (277 cubic inches) for cylinders with service pressure in excess of 500 p.s.i.g.

Q5. Is the maximum volume of a DOT 39 cylinder containing UN 1965 1.25 liters?

A5. In accordance with § 173.302a, for "a DOT 39 cylinder filled with a Division 2.1 material, the internal volume of the cylinder may not exceed 1.23 L (75 cubic inches)." This internal volume limitation only applies to Division 2.1 non-liquefied materials. As the information you provided indicates your material will be offered in a liquefied state, this 1.23 L limitation does not apply. It is important to note that PHMSA has accepted a petition for rulemaking (P-1622) to consider adopting a limit of 1.23 L (75 cubic inches) for DOT 39 cylinders containing Division 2.1 liquefied compressed gas.

I trust this information is helpful. If you have further questions, please do not hesitate to contact this office.

Sincerely,



Duane A. Pfund  
International Standards Coordinator  
Standards and Rulemaking Division

Webb  
§ 178.65 cylinders  
§ 172.304(a)(b) Marking  
14-0169

**Dodd, Alice (PHMSA)**

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**From:** Ciccarone, Michael CTR (PHMSA)  
**Sent:** Friday, September 12, 2014 10:39 AM  
**To:** Hazmat Interps  
**Subject:** FW: HQ Feedback: Hazardous Materials Information Request

Shante and Alice,

Please submit this for a formal letter of interpretation. Mr. Doyle spoke with Victoria Lehman and Mike Pagel.

Thanks,

Mike

-----Original Message-----

**From:** HMIS (PHMSA)  
**Sent:** Friday, September 12, 2014 6:08 AM  
**To:** INFOCNTR (PHMSA)  
**Subject:** FW: HQ Feedback: Hazardous Materials Information Request

-----Original Message-----

**From:** PHMSA Webmaster  
**Sent:** Thursday, September 11, 2014 3:18 PM  
**To:** HMIS (PHMSA); PHMSA Webmaster  
**Subject:** HQ Feedback: Hazardous Materials Information Request

Request for "Letter of Interpretation" CFR-49. DOT39-400 cylinder with UN1965 labeling can transport Class 2.1 fluids.

After reading CFR-49 Re: Transportation of Class 2.1 fluid I did not find a phrase like " Class 2.1 fluids can be transported in DOT39 cylinders" in a single sentence.

I have concluded concluded DOT39 cylinders with a UN1965 label can be transported in DOT39 cylinders specifically a DOT39-400.

Comments justifying my conclusion are below.

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Greetings:

I am requesting a "Letter of Interpretation" from DOT << could also be the "Subject Line"

A.S.Trust and Holdings, Inc. is seeking a "Letter of Interpretation" from DOT to confirm their understanding of CFR 49 as it pretains to the transportation of Class 2.1 (flammable) liquified hydrocarbon mixtures that are also certified as refrigerants. In particular, the proper cylinder label documentation and the proper non-reusable cylinder designation in

which to transport the Class 2.1 refrigerant mixtures both nationally and internationally. Specifically, can a Class 2.1 flammable hydrocarbon fluid mixture be transported in a DOT39-400 cylinder that has a UN1965 label affixed to it?

A.S. Trust & Holdings - FINDINGS in CFR 49 172.101 Table of Hazardous Mixtures All components in the refrigerants R441a and R443a are in the Class 2.1 "Liquefied hydrocarbon mixtures n.o.s".

R441a is a flammable mixture ( Class 2.1 ) consisting of: propane, ethane, butane, and iso-butane.

R443a is a flammable mixture ( Class 2.1 ) consisting of: propane, propylene, and iso-butane.

These names, R441a and R443a, are recognized and accepted by US Patent Office, National Bureau of Standards and Technology, and ASHRAE ( American Society of Heating, Refrigeration, and Air Conditioning Engineers). Also they have been identified as Hydrocarbon refrigerants by the US EPA and are recognized in US EPA various documents.

CFR 49 Table 172.101 shows the Identification number UN1965 is suitable and acceptable for Class 2.1 flammable hydrocarbon liquefied mixtures.

CFR 49 178.65 and 172.304a describe the design, manufacturing, testing and labeling of DOT39 disposable cylinders for fluids in the UN1965 category.

CFR 49 172.304b describes the criteria is for UN1965 cylinders. In particular UN1965 cylinders have a maximum volume of 1.25 Liters.

CFR 49 172.304a describes the criteria for DOT39 cylinders. In particular DOT39 cylinder fill quantities specify the volume percent of liquid to the total cylinder volume of the cylinder expressed as a percent of water volume of the cylinder.

CFR 49 states the pressure of the contained fluid must be less than the pressure at which the cylinder is tested.

A DOT39-400 cylinder has a maximum pressure limit of 400 psi.

The saturated liquid pressure of R441a at 130°F is 224 psia ( 210 psig ).

The saturated liquid pressure of R443a at 130°F is 298 psia ( 284 psig ).

Since both saturated liquid pressures are less than the test pressure 400 psi, a DOT39-400 cylinder is satisfactory to transport R441a and R443a. Pressures were calculated using the NIST REFPROP v9 program.

CFR 49 178.65 Specifications for DOT39 Cylinder sets the maximum size of the cylinder at 1,526 cu in. for a service pressure of 500 psig or less. 178.65 does not address the topic of fluid flammability.

A.S. Trust & Holdings - CONCLUSIONS:

1. UN1965 is an appropriate and acceptable fluid classification for R441a and R443a to be used for the labeling of transport containers.
2. A DOT39-400 disposable cylinder is acceptable to be used for the storage and transport of Class 2.1 (flammable) fluids. R441a and R443a are Class 2.1 fluids.
3. The maximum quantity of either R441a or R443a contained in a DOT39-400 cylinder is a function of the volume of the cylinder and the pressure of the fluid which is a function of the temperature of the fluid - per 172.304a.
4. The maximum volume of a UN1965 cylinder is 1.25 Liters.
5. The maximum volume of a DOT39 cylinder is 1,526 cubic inches for service pressures less than 500 psi

A.S. Trust & Holdings - REQUEST of DOT:

A letter of Interpretation addressed to:

Mr. Richard Maruya, President  
A.S. Trust & Holdings, Inc.  
44129 Mikiola Drive  
Kaneohe, HI 96744

cc: Frank J. Doyle, P.E.  
via e-mail  
frank.doyle@sbcglobal.net

To answer the following question"

Are the A.S. Trust & Holdings CONCLUSIONS (above) correct. That is to say Class 2.1 (flammable) Refrigerants R441a and R443a can be transported in a DOT39-400 containers that have the UN1965 label attached?

I trust that you will be able to verify in writing that the A.S Trust & Holdings Interpretations of CFR 49 and the conclusions reached are consistent with CFR 49 as it applies to the transportation of the Class 2.1 mixtures R441a and R443a. Thus, the application of a UN1965 label to a DOT39-400 cylinder is an acceptable container in which to transport R441a or R443a.

Respectfully submitted

Frank J. Doyle, P.E.  
for Richard Maruya  
A.S. Trust & Holdings, Inc.

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