



U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

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

MAY 23 2016

Mr. Richard Maruya
President
A.S. Trust & Holdings
44-129 Mikiola Drive
Kaneohe, HI 96744

Reference No. 15-0231

Dear Mr. Maruya:

This is in response to your November 24, 2015 email requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the packaging requirements for HCR188C/R441A and HCR188C/R443A refrigerant gases. As previously stated in a letter of interpretation, Ref. No. 14-0169 (see Attachment 1), you plan to ship the refrigerants as "UN1965, Hydrocarbon gas mixture, liquefied, n.o.s., Division 2.1." We have summarized and answered your questions below.

Q1. Can a DOT 39-400 cylinder be used for these HCR188C refrigerants?

A1. The answer is yes. In accordance with 49 CFR 173.304, HCR188C/ R441A and HCR188C/R443A may be packaged in specification DOT 39 cylinders with a service pressure of 400 p.s.i. provided all of the applicable requirements of the HMR are met, including, but not limited to, filling limits prescribed in §§ 173.304 and 173.304a. As stated in the letter of interpretation, Ref. No. 14-0169, § 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 for any cylinder containing these materials can be determined by calculating the percent ratio of the weight of the gas in the packaging to the weight of the water the container will hold at 16 °C (60 °F). See "Note 1" of § 173.304a(a)(2).

As stated in a previous interpretation letter, Ref. No. 15-0022 (see Attachment 2), the Pipeline and Hazardous Materials Safety Administration (PHMSA) does not believe it is a safe practice to ship liquefied flammable gases in a DOT 39 cylinder exceeding 75 cubic inches. Prior to 2002, § 173.304(a)(3) "Note 9" appeared in the HMR and limited liquefied flammable gases in DOT 39 cylinders to a size of 75 cubic inches. In an October 20, 1998 (HM-220D) [63 FR 58460] Notice of Proposed Rulemaking (NPRM), PHMSA proposed to limit all liquefied

flammable gases in DOT 39 cylinders to 75 cubic inches. The NPRM proposed to remove "Note 9" from §173.304(a)(3) and apply the 75 cubic inch size limit on DOT 39 cylinders to all liquefied compressed gases (not just flammable) in 173.304(a)(3). PHMSA received several comments in opposition to extending the 75 cubic inch limit on DOT-39 cylinders to all liquefied compressed gases. PHMSA then published a Final Rule on August 8, 2002 (HM-220D) [67 FR 51625] and, based on comments received from the regulated community, decided not to expand the 75 cubic inch limit on DOT 39 cylinders containing liquefied compressed gases. However, in the process of publishing the Final Rule, PHMSA inadvertently deleted Note 9 in § 173.304a that limited liquefied flammable gases in DOT 39 cylinders to 75 cubic inches. It was never the intention of PHMSA to remove the 75 cubic inch limit for liquefied flammable gases in DOT 39 specification cylinders. PHMSA received and accepted a petition (P-1622) from Worthington Cylinders to address this error in a future rulemaking.

Q2. Is a DOT 39-400 equipped with a standard pressure relief cap acceptable for flammable refrigerants at this time?

A2: In accordance with § 173.301(f)(4), a pressure relief device (PRD) is required on a specification DOT 39 cylinder regardless of cylinder size or filled pressure. A specification DOT 39 cylinder used for liquefied Division 2.1 materials must be equipped with a metal PRD. Fusible PRDs are not authorized on specification DOT 39 cylinders containing liquefied gas. Furthermore, in accordance with § 173.301(f)(1), a specification DOT 39 cylinder filled with R443A and R441A would need to comply with the requirements specified in CGA S-1.1/CGA S-7. As you stated in your incoming letter, CGA Publication S-1.1 does not specifically identify your commodity. However, based on the component gases that make up the mixtures R441A or R443A, and following the procedure outlined in CGA S-7, it is determined that a rupture disk CG-1 type PRD or CG-7 type pressure relief valve PRD may be used with your R441A and R443A liquefied compressed gases.

I trust this information is helpful. Please feel free to contact this office if you need further assistance.

Sincerely,



Duane A. Pfund
International Standards Coordinator
Standards and Rulemaking Division

Attachments

Antonilli
173.22
Cylinders
15-0231

Dodd, Alice (PHMSA)

From: Betts, Charles (PHMSA)
Sent: Wednesday, November 25, 2015 7:58 AM
To: Hazmat Interps
Subject: FW: DOT 39 - 400 disposable cylinder call
Attachments: DOT 39 cylinder DOTansportation.pdf; DOT spec sheet March 2009 new collar.pdf.kzglm.u.partial; letter DOT 39- 400.pdf

Please log and assign for response.

From: Pfund, Duane (PHMSA)
Sent: Wednesday, November 25, 2015 6:42 AM
To: Betts, Charles (PHMSA)
Cc: Freeman, Cheryl (PHMSA); Shafkey, Refaat (PHMSA)
Subject: FW: DOT 39 - 400 disposable cylinder call

Charles – can we get this logged in?

From: richardastrust.com [<mailto:richardastrust@yahoo.com>]
Sent: Tuesday, November 24, 2015 11:52 PM
To: Freeman, Cheryl (PHMSA) <cheryl.freeman@dot.gov>; Shafkey, Refaat (PHMSA) <refaat.shafkey@dot.gov>; Pfund, Duane (PHMSA) <Duane.Pfund@dot.gov>
Subject: Re: DOT 39 - 400 disposable cylinder call

Cheryl, Refaat, and duane

Please see attached and request to DOT for a letter on the use of DOT 39-400 disposable cylinder for my refrigerants HCR188C/R441A and HCR188C/R443A.

I apologize but did not know the proper email address to email the request. would you be so kind as to forward to Mr Best for me.

Thank you and Happy thanksgiving to all.

Richard

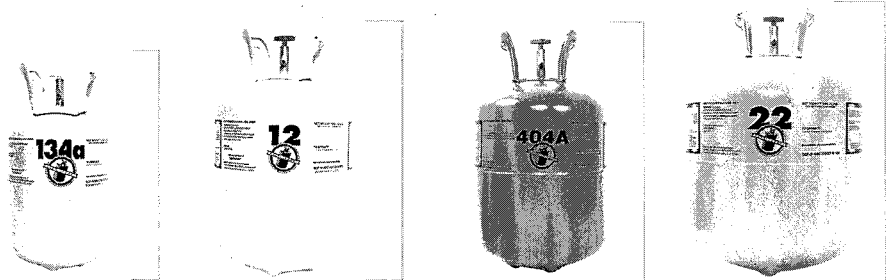
Richard Maruya
phone 808 2351890 fax 808 235 0116 cell 808 5614688
e mail richard@astrust.com or richard@maruya.net
web site HCR188C <http://www.hcr188c.com/>
The "CLIMATE FRIENDLY" Refrigerant

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REFRIGERANT

DOT 39 NON-REFILLABLE

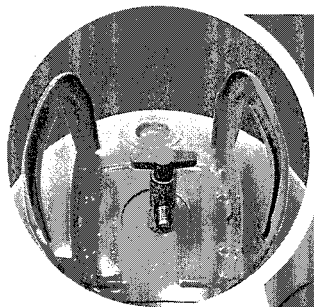


SPECIFICATIONS

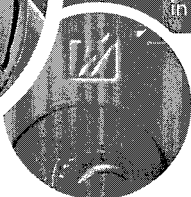
MODEL/DIAMETER (IN.)	7.5 INCH	9 INCH	9.5 INCH		12 INCH
HEIGHT (IN.)	14.6	16.4	16.4		17.6
HEIGHT (MM)	369.8	416.7	416.7		446
WATER CAPACITY (LBS.)	15.8	26.7	29.7		49.6
WATER CAPACITY (KG)	7.2	12.1	13.5		22.5
DIAMETER (MM)	190.5	228.6	241.3		304.8
CYLINDER VOLUME (CU. IN.)	438	739	822		1,378
CYLINDER VOLUME (LITERS)	7.2	12.1	13.5		22.5
STANDARD SPECIFICATION					
SERVICE PRESSURE (PSIG)	260	260	260		260
SERVICE PRESSURE (bar)	17.9	17.9	17.9		17.9
TEST PRESSURE (PSIG)	325	325	325		325
TEST PRESSURE (bar)	22.4	22.4	22.4		22.4
OPTIONAL SPECIFICATION					
SERVICE PRESSURE (PSIG)	400	N/A	400	320	320
SERVICE PRESSURE (bar)	27.6	N/A	27.6	22	22
TEST PRESSURE (PSIG)	500	N/A	500	400	400
TEST PRESSURE (bar)	34.5	N/A	34.5	27.6	27.6

All dimensions are approximate.

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Columbus, Ohio 43085
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Fax: 614.438.3083
Cylinders@WorthingtonIndustries.com
WorthingtonCylinders.com

A.S. TRUST & HOLDINGS
44-129 MIKIOLA DRIVE
KANEOHE, HI 96744

TELEPHONE: (808) 235-1890 FAX: (808) 235-0116 CELL/M: (808) 561-4688
EMAIL: richard@astrust.com

November 24, 2015

Mr. Charles Best
Department of Transportation

RE: DOT on DOT 39-400

Dear Mr. Best:

As per my conference call on November 23, 2015 at 11 a m EST with Cheryl Freeman and Refaat.Shafkey on the DOT 39-400:

We are requesting a letter from DOT to show to cylinder manufacturers that HCR188C/R441A and HCR188C/R443A can be used in the DOT 39-400 disposable cylinder with the pressure relief cap.

There seems to be confusion with the cylinder manufacturers that HCR188C/R441A and R443A cannot be used in DOT 39 disposable cylinders. Their reasons are the DOT 39 disposable cylinder is only rated for maximum pressure of 260 psi and it must have the spring loaded release valve although it is not a DOT rule presently.

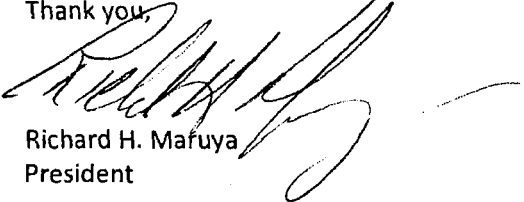
My situation on this matter was addressed by the DOT in the letter attached and needs clarification that the DOT 39-400 is acceptable with my 2 refrigerants since the spring loaded relief valve is not a mandatory DOT rule. The pressure relief cap is acceptable for flammable refrigerants at this time.

Also, we need the letter to specify the DOT 39-400 has a service pressure of 400 psi and both HCR188C refrigerants, as per attachments, will work with the DOT 39-400 and is legal at this time with the standard press cap relief system. Cylinder manufacturers state that the DOT 39 has a maximum pressure of 260 psi but the DOT 39-400 has a max pressure of 400 psi which is below the maximum pressure of both HCR188C refrigerants.

Cylinder manufacturers state that the DOT 39 has to have a spring loaded relief valve for flammable refrigerants. We need it stated that this, so far, is a submission and the original DOT cylinder with the relief cap can be used.

Please feel free to contact me if you have any questions.

Thank you,


Richard H. Maruya
President



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?

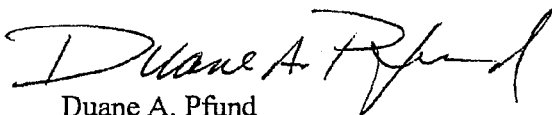
A4. In accordance with § 178.65, cylinders built to meet a DOT 39 specification may not have a maximum water capacity that exceeds 55 pounds (1,526 cubic inches) for cylinders with service pressure of 500 p.s.i.g. or less, and 10 pounds (277 cubic inches) for cylinders with service pressure in excess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

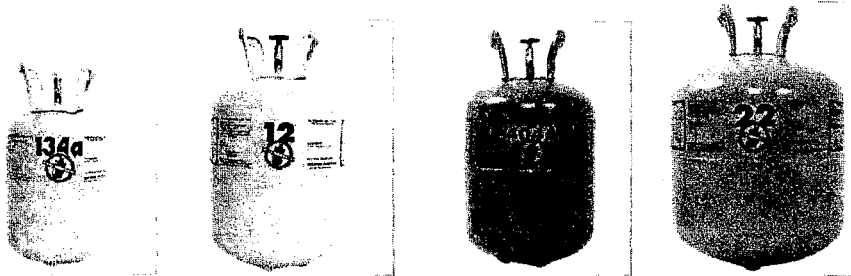
Sincerely,



Duane A. Pfund
International Standards Coordinator
Standards and Rulemaking Division

REFRIGERANT

DOT 39 NON-REFILLABLE

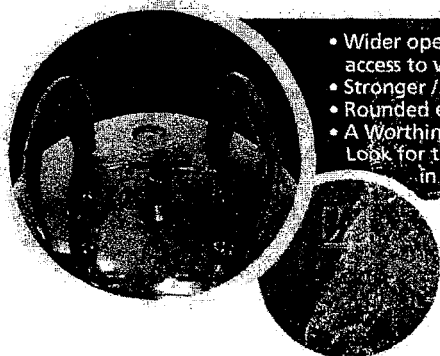


SPECIFICATIONS

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HEIGHT (MM)	369.8	416.7	416.7		446
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All dimensions are approximate.

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MAR 13 2015

Mr. Richard Maruya
President
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Ref. No.: 14-0169

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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?

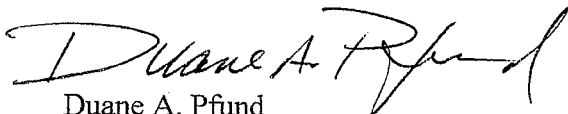
A4. In accordance with § 178.65, cylinders built to meet a DOT 39 specification may not have a maximum water capacity that exceeds 55 pounds (1,526 cubic inches) for cylinders with service pressure of 500 p.s.i.g. or less, and 10 pounds (277 cubic inches) for cylinders with service pressure in excess 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)(6) Marking

Dodd, Alice (PHMSA)

14-0169

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

Comments justifying my conclusion are below.

++_+_+

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 pertains to the transportation of Class 2.1 (flammable) liquefied 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.

Frank J. Doyle, P.E.
Affiliation: Public
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The Woodlands Township, TX 77381
Phone: 713.501.6432
Fax:
Email: frank.doyle@sbcglobal.net