



U.S. Department
of Transportation

Pipeline and Hazardous
Materials Safety
Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

NOV 16 2017

Ms. Kathy McKenzie
Safety & Compliance Director
Western International Gas & Cylinders, Inc.
P.O. Box 668
Bellville, TX 77418

Reference No. 17-0074

Dear Ms. McKenzie:

This letter is in response to your July 13, 2017, email requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the transport of "Acetylene, solvent free" as a gas sample. Specifically, you request confirmation of your understanding that "Acetylene, solvent free" may be transported under the Hazardous Materials Table entry "UN3167, Gas sample, non-pressurized, flammable, n.o.s. (Acetylene), Class 2.1" in accordance with the requirements of § 173.306(a)(4).

In your email, you provided data indicating that when prepared in accordance with § 173.306(a)(4), "Acetylene, solvent free" would not meet the criteria for "forbidden" but rather only exhibit the properties of a Division 2.1 flammable gas. Additionally, you provided data indicating that the pressure in the gas sample container is below that which is required to generate an explosion, and therefore the stability issue that would typically require acetylene to be transported in solvent is not present.

As specified in § 172.101(d)(1), if any specifically listed forbidden material is diluted, stabilized, or incorporated in a device and is classed in accordance with the definitions of hazardous materials contained in Part 173 of the HMR, it is no longer considered a forbidden material. Based on the information you provided and the requirements of the HMR, it is the opinion of this Office that the material "Acetylene, solvent free" in your scenario may be described as "UN3167, Gas sample, non-pressurized, flammable, n.o.s. (Acetylene), Class 2.1," subject to the conditions prescribed in § 173.306(a)(4) as it would not be unstable at pressure of 15.22 psia or less.

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

Sincerely,

Duane A. Pfund
International Standards Coordinator
Standards and Rulemaking Division

Dodd, Alice (PHMSA)

Wiener
173.306(a)(4)
Packaging Specs
17-0074

From: Wiener, Aaron (PHMSA)
Sent: Thursday, July 13, 2017 4:23 PM
To: Dodd, Alice (PHMSA)
Subject: FW: Letter Of Interpretation request
Attachments: DOT LTR Interpretation 071317 Samples.pdf

Alice,

Please log the attached request as a formal request for interp.

Thanks

Aaron

From: Kathy McKenzie [mailto:kathymckenzie@westernintl.com]
Sent: Thursday, July 13, 2017 4:11 PM
To: Wiener, Aaron (PHMSA) <Aaron.Wiener@dot.gov>; Tarr, Richard (PHMSA) <Richard.Tarr@dot.gov>
Cc: Brian Schumann <brianschumann@westernintl.com>
Subject: Letter Of Interpretation request

Mr. Wiener,

Please find a letter requesting an interpretation with back up documentation. We have a customer that is waiting for us to be able to do this testing. If you could send the response by email first it will be greatly appreciated.

Respectfully submitted,

Kathy McKenzie, CDS
Safety & Compliance Director
Western International Gas & Cylinders, Inc.
P.O. Box 668/7173 Hwy 159E
Bellville, Tx 77418
Phone: (979) 413-2125
Mobile: (979) 885-8143
E-mail: kathymckenzie@westernintl.com
www.westernintl.com

Kathy McKenzie

From: Tarr, Richard (PHMSA) <Richard.Tarr@dot.gov>
Sent: Wednesday, July 12, 2017 10:24 AM
To: Herzog, Kenneth (PHMSA); Kathy McKenzie
Cc: Wiener, Aaron (PHMSA)
Subject: RE: Permits

Kathy,

I had a discussion with the office of Standards yesterday (Aaron Wiener) to discuss your SP request to ship acetylene (solvent free) as a gas sample in compliance with the requirements in 173.306(a)(4).

At the end of the discussion it was decided that this issue would be best resolved with a letter of interpretation.

I suggest you contact the Standard's office (Aaron) and initiate a formal request for a letter of interpretations.

It is important to make it clear in your request that the materials you need to ship "Acetylene, solvent free" would be shipped as "Gas Sample, non-pressurized, Flammable N.O.S. (Acetylene) and that acetylene does not meet the criteria of "forbidden" at 15.22 PSIA, but only exhibits the properties of a flammable gas. Include the information you provided in your SP application (DOT SP 20380), that shows that the material must exceed 20 PSIA before it can become unstable.

You can also cite that ICAO support that position.

Thanks,

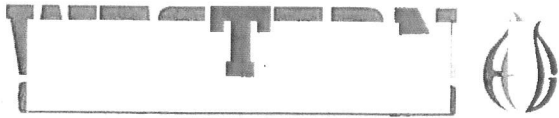
Richard Tarr, Ph.D.
Chemist/Transportation Specialist
Pipeline and Hazardous Material Safety Administration
PHH-21 (Engineering and Research Division)
Room (E21-334)
1200 New Jersey Avenue, SE
Washington, DC 20590-0001
Phone 202-366-4493 Fax 202-366-5713
Email richard.tarr@dot.gov

From: Herzog, Kenneth (PHMSA)
Sent: Tuesday, July 11, 2017 11:46 AM
To: Kathy McKenzie <kathymckenzie@westernintl.com>
Cc: Tarr, Richard (PHMSA) <Richard.Tarr@dot.gov>
Subject: Permits

Good morning Kathy,

The tech engineer working on your permits stopped by and asked who to contact at Western about your applications. I told him you were the person that we have dealt with. He asked that you give him a call when you have a chance.

Dr. Richard Tarr, 202-366-4493



July 13, 2017

Aaron Wiener
Standards Office
Department of Transportation
Pipeline and Hazardous Materials Safety Administration
1200 New Jersey Avenue, SE
East Building, 2nd Floor, PHH-30
Washington, DC 20590

Re: Letter of Interpretation Request

Dear Mr. Wiener

We are asking for an interpretation in making sure we can ship acetylene (solvent free) as a gas sample in compliance with the requirements in 173.306 (a)(4).

We do not believe this will require a special permit and will ship as:

"Gas sample, non-pressurized, Flammable N.O.S. (Acetylene)."

Our understanding is that acetylene does not meet the criteria of "forbidden" at 15.22 PSIA, but only exhibits the properties of a flammable gas.

ICAO does support our position as I was speaking to Mr. Richard Tarr yesterday concerning this matter. I am attaching some back up documentation per Mr. Tarr's suggestion.

If any further information is required please do not hesitate to contact me directly at (979) 413-2125.

Respectfully submitted,

Kathy McKenzie
Safety & Compliance Director
Email: kath.mckenzie@westernintl.com
979-413-2125 office
979-885-8143 cell

Stability

Table 1 Heat and Free Energy of Formation at 25C (see Perry Table 3-202)

Compound	Heat of Formation (Kcal/mole)	Free Energy of Formation (Kcal/mole)
n-Butane (gas)	-29.812	-3.754
Acetylene	54.194	50.000

Unlike most hydrocarbons the formation of acetylene is not thermodynamically favored compared to its component elements as can be seen in Table 1 where the heat of formation and free energy of formation are positive values unlike normal butane where the heat of formation and free energy of formation are negative values. This unfavorable thermodynamic condition allows acetylene to decompose when given a sufficient trigger. The decomposition is exothermic and the release of energy during the initial decomposition can provide the trigger to decompose the adjacent acetylene, leading to a continuing decomposition until all of the acetylene in the container has decomposed.

Jones et al. (1944) determined the minimum acetylene pressure required to generate an explosion by igniting acetylene with a platinum wire or a piece of hot carbide was 5.9 psig for dry acetylene at 25 C (77 F) and 7.2 psig for acetylene saturated with water at 25 C. The requested special permit will limit the pressure in the container to less than 15.22 psia (0.53 psig) per 49CFR173.306.

Miller (1965, pg 476) states that at one atmosphere absolute or less, the decomposition of acetylene is not self-sustaining except under certain special conditions. These special conditions (pg 489-490) include the use of explosives to start the reaction, heating the container with a kerosene flame to 500C, or an exceptionally large ignition area (1.6 cm width) created with an explosive sample, a powerful spark or a red hot chrome-nickel coil. The special conditions necessary to cause acetylene at one atmosphere to completely decompose are not going to be present during transport.

The pressure in the container is below the pressure required to generate an explosion and therefore the stability issue with acetylene that would typically require it to be shipped in solvent is not present. Under these conditions acetylene presents no more hazard than any other flammable gas shipped under 49CFR173.306. The energy contained in the acetylene sample bag is less than the energy allowed in a single lighter. Therefore, the transportation of gas sample bags is no riskier than the transportation of lighters and should be allowed.

References

Jones, G.W., Scott, G.S., Kennedy, R.E., and Huff, W.J. (1944), *Report of Investigations 3755, Explosion in Medium-Pressure Acetylene Generators*, US Bureau of Mines

Miller, S.A., (1965), *Acetylene: Its Properties, Manufacture and Uses, Volume 1*, Ernest Benn, London

Perry, R.H. and Chilton, C.H., (1973), *Chemical engineers' handbook*, McGraw-Hill, New York

US EPA, METHOD 18—MEASUREMENT OF GASEOUS ORGANIC COMPOUND EMISSIONS BY GAS CHROMATOGRAPHY, <https://www3.epa.gov/ttnemc01/promgate/m-18.pdf> retrieved 6/17/2016