



U.S. Department
of Transportation

1200 New Jersey Avenue SE
Washington, DC 20590

**Pipeline and Hazardous
Materials Safety
Administration**

NOV 15 2011

Mr. John Fox
NitroxFox LLC.
P.O. Box 32091
Sarasota, Florida 34239

Reference No.: 11-0238

Dear Mr. Fox:

This responds to your September 16, 2011 letter regarding the cleaning requirements for compressed gas cylinders containing breathing enriched air (Nitrox) under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Specifically, this is a follow-up letter in response to your previous request for a letter of interpretation (Ref. No. 11-0175) and asks additional questions pertaining to the cleaning requirements for cylinders used for the containment of Nitrox with elevated levels of oxygen ranging from 21% to 100%. Your questions are paraphrased and answered as follows:

- Q1: If an aluminum Department of Transportation (DOT) specification cylinder is to be used to transport Nitrox with elevated levels of oxygen ranging from 21% to 100%, must the cylinder cleaning conform to the cleanliness requirements specified in 173.302(b)?
- A1: The answer is yes. As noted in the response to your previous request for a letter of interpretation (Ref. No. 11-0175), if the oxygen concentration is greater than 23.5%, the conditions specified in § 173.302(b) must be met. Each DOT aluminum cylinder in oxygen service must be cleaned in accordance with the requirements of General Services Administration (GSA) Federal Specification RR-C-901D, paragraphs 3.3.1 and 3.3.2 (Incorporated By Reference (IBR), see § 171.7). Cleaning agents equivalent to those specified in GSA Federal Specification RR-C-901D may be used, provided they do not react with oxygen. One cylinder, selected at random from a group of 200 or fewer and cleaned at the same time, must be tested for oil contamination in accordance with GSA Federal Specification RR-C-901D, paragraph 4.3.2, and meet the specified standard of cleanliness.
- Q2. If an Aluminum United Nations (UN) pressure receptacle is to be used to transport Nitrox with elevated levels of oxygen ranging from 21% to 100%, must the cylinder cleaning conform to the cleanliness standards specified in § 173.302(b)?

A2: The answer is yes. If the oxygen concentration is greater than 23.5%, the conditions specified in § 173.302(b) must be met. Each Aluminum UN pressure receptacle in oxygen service, must be cleaned in accordance with the requirements of International Standards Organization (ISO) 11621 (IBR, see §171.7).

Q3: In your current incoming letter, you state it is your opinion that GSA Federal Specification RR-C-901D does not contain “detailed cleaning procedures.” Based on this lack of “detailed cleaning procedures” you ask if a cleaning standard equivalent to those specified in § 173.302(b) may be used to clean aluminum DOT specification cylinders and UN pressure receptacles used to transport Nitrox with elevated levels of oxygen ranging from 21% to 100%?

A3: As provided in § 173.302(b), PHMSA requires that each DOT aluminum cylinder in oxygen service meet the “requirements” of GSA Federal Specification RR-C-901D, paragraphs 3.3.1 and 3.3.2, not a specific “detailed cleaning procedure.” Although GSA Federal Specification RR-C-901D does not provide a specific procedure for the cleaning of aluminum DOT cylinders used in oxygen service, it does provide requirements for the cleaning of cylinders including, but not limited to, the amount of rust bloom permitted, oil and hydrocarbon guidance and cleanliness verification methods. Provided the requirements of GSA Federal Specification RR-C-901D, paragraphs 3.3.1 and 3.3.2 are met, the requirements of § 173.302(b) are satisfied.

For aluminum DOT specification cylinders in oxygen service, other standards such as ISO 11621, Compressed Gas Association (CGA) guidelines, and MIL STD 1330D are permitted to be used provided they are equal to or more stringent than the requirements specified in GSA Federal Specification RR-C-901D, the cleaning agents are equivalent to those specified in GSA Federal Specification RR-C-901D and the cleaning agents do not react with oxygen.

Aluminum UN pressure receptacles in oxygen service, must be cleaned in accordance with the requirements of ISO 11621 (IBR, see §171.7) and no other equivalent standard may be used.

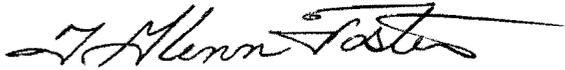
Q4. If an aluminum cylinder, used to transport Nitrox with elevated levels of oxygen ranging from 21% to 100%, is marked with a DOT specification marking, must it be maintained to that specification, including the cleaning requirements specified in § 173.302(b), if applicable, when it is no longer in commerce?

A4. The answer is yes. Cylinders that are filled and used solely on a private work-site and not offered for transportation in commerce are subject to the Occupation Safety and Health Administration (OSHA) Standards. In accordance with OSHA standard 29 CFR § 1910.101, each employer shall determine that compressed gas cylinders under their control are in a safe condition to the extent that this can be determined by visual inspection conducted as prescribed in the HMR, specifically 49 CFR § 180.205. Therefore, based on § 180.205(b), which states no person may mark a cylinder to represent that it meets a DOT specification unless all applicable

requirements of 49 CFR subpart C of Part 180 have been met, a cylinder that is marked to certify that it conforms to HMR requirements, including the requirements specified in § 173.302 if applicable, must be maintained in accordance with applicable specification requirements in the HMR whether or not it is in transportation in commerce. If the owner of the DOT specification cylinder wishes to continue to use the cylinder but does not wish to re-qualify the cylinder as a specification cylinder, the owner must obliterate or cover any specification markings whether or not it is being used to transport hazardous materials in commerce.

I hope this satisfies your inquiry.

Sincerely,

A handwritten signature in cursive script, appearing to read "T. Glenn Foster". The signature is written in black ink and is positioned above the typed name.

T. Glenn Foster
Chief, Regulatory Review and Reinvention Branch
Standards and Rulemaking Division

09/16/2011

Benedict
§173.302
Cylinders
11-0238

Dear Mr. Foster,

I thank you for your response to my inquiry and your interpretation #11-0175. In the answer to question # 1 you state to clean the cylinders according to RR-C-901D when I want to use a cylinder containing more than 23.5% O₂ for enriched air (nitrox). This is a Federal Specification Procurement document. I can find no detailed cleaning procedure in this document to guide me in the cleaning of cylinders. For example, 3.3.1 and 3.3.2 state respectively:

3.3 Cylinder processing.

3.3.1 Preconditioning and internal preservation. After hydrostatic and any other testing, the cylinder internal surface shall be cleaned and dried to be free of moisture, oil, grease, grit, machining products, loose scale, slag, or other foreign materials. Rust bloom or particulate matter (approximately 1.0 to 1.5 grams) generated subsequent to inspection as a result of handling and shipping is acceptable. Cleaning agents used shall be compatible with the cylinder materials and the intended gas service.

3.3.2 Oil and hydrocarbon residue. Residual oil and other hydrocarbons resulting from the manufacture of the cylinder shall be removed to a level not greater than 2.5 milligrams (mg) per square foot of internal surface area, but shall not exceed 20 mg per cylinder regardless of the size of the cylinder. Trailer tubes shall not contain more than 40 mg of oil or residual hydrocarbons. Verification of cleanliness shall be measured by gravimetric or infrared analysis or any equivalent chemical analysis method.

173.302(b) lists ISO 11621 as well as RR-C-901D for the cleaning of cylinders. ISO 11621 is an International Standards document but does list a detailed cleaning method procedure. It is available from ANSI and the CGA. It is copyrighted so I can't reproduce the steps for you in this letter. Is it acceptable to use this procedure as there is no procedure listed in RR-C-901D? Additionally, 171.7 is listed. 171.7 is a standards reference statute and it refers me to the appropriate CGA documents for cleaning and change of gas service. Is it acceptable to use CGA guidelines or the ISO 11621 procedures for the cleaning of cylinders as they both have detailed procedures for change of gas service?

Additionally, the US Navy Diving Manual Rev 6, which was revised and published on 15 April 2008 and is the most current manual as of this time, refers to MIL STD 1330D for cleaning procedures. It is printed as such:

10-9 EQUIPMENT CLEANLINESS

Cleanliness and the procedures used to obtain cleanliness are a concern with NITROX systems. MIL-STD-1330 is applicable to anything with an oxygen level higher than 25 percent by volume.

Therefore, MIL-STD-1330 must be followed when dealing with NITROX systems. Personnel

involved in the maintenance and repair of NITROX equipment shall complete an oxygen clean worker course, as described in MIL-STD-1330. Even with oxygen levels of 25 to 40 percent, there is still a greater risk of fire than with compressed air. Materials that would not normally burn in air may burn at these higher O₂ levels. Normally combustible materials require less energy to ignite and will burn faster. The energy required for ignition can come from different sources, for example adiabatic compression or particle impact/spark. Another concern is that if improper cleaning agents or processes are used, the agents themselves can become fire or toxic hazards. It is therefore important to adhere to MIL-STD-1330 to reduce the risk of damage or loss of equipment and injury or death of personnel.

I understand that 173.302(b) requires cleaning for O₂ percentages above 23.5% O₂ if I wish to transport a cylinder by rail, water, air or roadway. Would any of those detailed documents for cleaning of cylinders and equipment be acceptable as there is no detailed procedure in RR-C-901D?

Additionally, I have read interpretation 10-0207 of March 24, 2011 and it seems that these regulations would be in effect whether or not a cylinder is used in commerce if I want to transport the cylinder. Must these cleanliness standards be met if a cylinder is not used in commerce but still used to transport the cylinder? Interpretation 10-0207 states:

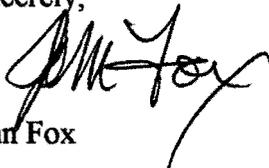
01. If a cylinder is marked with a DOT specification marking, must it be maintained to that specification when it is no longer in commerce?

A1. The answer is yes.....

AS I read this interpretation it would seem one needs to obliterate the DOT markings if they want to use the cylinder solely on private property and not maintain the DOT PHMSA standards. Do I understand this correctly?

I thank you again for the attention, patience, and detail you have paid to my inquiries.

Sincerely,



John Fox

NitroxFox LLC

PO Box 32091,

Sarasota, FL, 34239