



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

1200 New Jersey Ave., S.E.
Washington, DC 20590

SEP 08 2011

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

Reference No.: 11-0175

Dear Mr. Fox:

This responds to your letter regarding the requirements for compressed gas cylinders containing breathing enriched air (Nitrox) under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180). Specifically, you state in your incoming letter that Department of Transportation (DOT) Specification 3AL (Aluminum) and 3AA (Steel) cylinders are commonly used for containment of Nitrox and the air in these cylinders will have elevated levels of Oxygen ranging from 21% to 100% depending on the application. Your questions are paraphrased and answered as follows:

- Q1: If a cylinder is to be used to transport Nitrox, at what Oxygen percentage must a cylinder used for Oxygen service be cleaned and must the cylinder cleaning conform to the cleanliness standards specified in 173.302?
- A1: Gas mixtures with Oxygen concentrations greater than 23.5% by volume should be considered to cause or contribute to combustion of other material to a greater extent than air. These gas mixtures must be described as "Compressed gas, oxidizing, n.o.s." and must be classified and labeled with a Division 2.2 (nonflammable gas) primary hazard and a Division 5.1 (oxidizer) subsidiary hazard. If the Oxygen concentration is greater than 23.5%, the conditions specified in § 173.302(b) must be met. Each DOT Aluminum cylinder, including a 3AL cylinder, 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 (IBR, see §171.7 of this subchapter). Cleaning agents equivalent to those specified in 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 Federal Specification RR-C-901D, paragraph 4.3.2, and meet the specified standard of cleanliness. The HMR does not indicate specific cleaning standards for 3AA steel cylinders used for Oxygen service.

Q2. What is the maximum pressure to which a cylinder can be filled, when charging the cylinder with enriched air containing elevated levels of Oxygen? Additionally, is this pressure the same for both aluminum and steel cylinders?

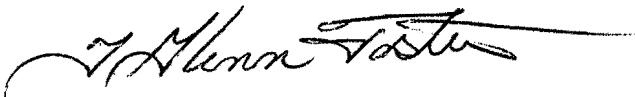
A2: For aluminum cylinders used for Oxygen service, including 3AL cylinders, the pressure in each cylinder may not exceed 3000 psig at 21 °C (70 °F) as specified in § 173.302(b). The HMR does not indicate a specific operating pressure for steel cylinders, including 3AA cylinders, used for Oxygen service, thus, the cylinder must not exceed the marked service pressure.

Q3: May a cylinder contained enriched air (Nitrox) be labeled if the cleanliness standards for Oxygen service have not been met?

A3: As provided in § 172.402, each package, including cylinders, containing a hazardous material shall be labeled with primary and subsidiary hazard labels as specified in column 6 of the Hazardous Materials Table (HMT). If a cylinder is filled with an Oxygen concentration greater than 23.5%, the conditions specified in § 173.302(b), including the appropriate cleaning standards must be met prior to being offered for shipment. There is no prohibition for labeling a cylinder which does not meet the appropriate cleaning standards specified in § 173.302(b). However, this cylinder would not be permitted to be offered for transportation until all requirements of § 173.302(b) have been satisfied.

I hope this satisfies your inquiry. Please contact us if we can be of further assistance.

Sincerely,

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

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

U.S. Department
of Transportation
**Pipeline and
Hazardous Materials Safety
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DOT/RSPA/OHMS
UNIT

11 AUG -1 PM 3:30

Benedict
3173.302
Cylinders
11-0175

Office of Hazardous Materials Standards

July 25, 2011

To whom it may concern,

My inquiry today is in regard to compressed gas cylinders used for breathing enriched air (nitrox). The air in these cylinders will have elevated levels of O₂ in the mixture of breathing gas ranging from 21% to 100% O₂ depending on the application. One commonly uses 3AL aluminum and 3AA steel cylinders for this purpose. I have read the DOT Interpretation #06-0064. I wish to clarify the DOT position.

My questions are:

1. At what O₂ percentage must one clean a cylinder for O₂ service when the cylinder is used for Nitrox and must one conform to the cleanliness standards of 173.302?
2. What is the maximum PSI of pressure can one put in the cylinder when charging the cylinder with enriched air containing elevated levels of O₂? Additionally, is this pressure maximum the same for both aluminum and steel cylinders?
3. May one label a cylinder for enriched air (nitrox) if the cleanliness standards for O₂ service have not been met?

I thank you for your time and attention paid to my inquiry.

John Fox

NitroxFox LLC

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