U.S. Department
of Transportation
**Research and
Special Programs
Administration**

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400 Seventh St., S.W.
Washington, D.C. 20590

Mr. John Anderson
Director of DOT Operations
Airgas, Inc.
P.O. Box 20067
Cheyenne, WY 82003

Ref No: 03-0159

Dear Mr. Anderson:

This is in response to your telephone conversation with Sandra Webb of this office and subsequent letter, requesting a clarification of the requirements for filling DOT specification cylinders with non-liquefied (permanent) compressed gases under the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180).

You stated that it is industry practice to add approximately 50 psi to 100 psi to the target fill pressure so that, once the cylinder has cooled, the pressure in the cylinder at 70 °F. will be as close as possible to its marked service pressure. Specifically, you ask whether a high-pressure cylinder, such as a DOT 3A, 3AA or 3AL cylinder, may be filled in excess of its marked service pressure.

A cylinder may be filled to a pressure in excess of the marked service pressure to compensate for certain factors, such as heat of compression, high ambient temperature or changes in elevation. However, § 173.301a(c) specifically states that when offered for transportation, the pressure in a cylinder at 21 °C. (70 °F.) must not exceed the service pressure for which the cylinder is marked or designated, except as provided in § 173.302a(b) of the HMR. This requirement has been in effect for many years, and it is based on standards and recommendations of the compressed gas industry.

In your letter, you imply there is an inconsistency between fill limit requirements of the HMR and those of the U.S. Department of Health and Human Services' Food and Drug Administration (FDA). We disagree. FDA concurs with RSPA that the internal pressure at 21 °C. (70 °F.) must not exceed the cylinder's service pressure. Therefore, your operating procedures must ensure that the marked service pressure is not exceeded when the cylinder is offered for transportation.

I hope this information is helpful. If we can be of further assistance, feel free to contact us.

Sincerely,

Edward T. Mazzullo

Edward T. Mazzullo
Director, Office of Hazardous
Materials Standards

030159

173.302

Airgas

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June 25, 2003

Sandra Webb
DOT/RSPA
400 Seventh St. SW
Washington, DC 20590

Dear Ms. Webb:

Per our conversation today, please provide Airgas with guidance on how to comply with the following.

The compressed gas industry fills high-pressure cylinders (such as 3A, 3AA and 3AL) by pressure and temperature, per 49 CFR 173.301a. Charts have been developed that allow for the filling of these cylinders at different pressures and temperatures to obtain the correct service pressure/product content.

The gauges and thermometers that are used are calibrated, but the manufacturer of the gauge states the gauge is accurate to 1.5%, and the thermometer is accurate to 0.5%. Even when working within this range, it is almost impossible to obtain a 100% accurate service pressure. A 2% variance on a cylinder rated at 2,015 psi is a 40-psi difference.

As a cylinder is being filled, the temperature of the compressed gas raises the temperature of the cylinder. The compressed gas inside the cylinder is getting hotter (due to compression), and it takes a while for the increased heat to penetrate the wall of the cylinder. It is difficult to obtain a 100% accurate temperature reading on the outside cylinder wall.

The filling process becomes more difficult because the DOT states the cylinder cannot be over-filled, and the FDA states the cylinder cannot be under-filled. The FDA requires that the cylinder have the correct amount of product since the product is dispensed as a medical gas.

The industry practice is to add approximately 50 to 100 psi to the target fill pressure so that once the cylinder is allowed to cool to the room temperature, the cylinder will be as close as possible to the correct service pressure when the settle pressure check is performed. As you know, the DOT removed the requirement to perform a settle pressure check (on high pressure cylinders), and the requirement to maintain a settle pressure log (on high pressure cylinders) in the October 1, 2002 update to 49 CFR.

Recently, Christopher Michalski, an inspector from the RSPA office in NJ performed an audit at one of our locations. Mr. Michalski reviewed our FDA cylinder filling records. He noted that our FDA cylinder filling record recorded a settle pressure in excess of the cylinders service pressure. Example, if the cylinder was a 3AA 2015, the cylinder might have a settle pressure of 2,055 psi at 70 degrees.

Mr. Michalski noted on the exit briefing, "173.302 & 173.301(c) Shipping oxygen, compressed, 2.2, UN1072 in a cylinder filled above the service pressure, therefore unauthorized package".

As noted above, we follow the standard industry practice that has been used safely for almost 100 years. If we are in error, please provide Airgas with guidance on how we can improve our filling process and comply with both the DOT and FDA with regard to filling high-pressure cylinders.

John Anderson

Director of DOT Operations
Airgas, Inc.