



U.S. Department  
of Transportation

Pipeline and Hazardous  
Materials Safety  
Administration

1200 New Jersey Avenue, SE  
Washington, DC 20590

NOV 16 2017

Jared Sherman

Reference No. 17-0035

Dear Mr. Sherman:

This letter is in response to your April 6, 2017, e-mail requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the requalification of cylinders. Specifically, you ask about filling a Department of Transportation (DOT) cylinder in excess of 10 percent in accordance with § 173.302a(b). You provide an example of a DOT 3AA cylinder that was marked with a service pressure of 3,000 psi and a plus (+) at the time of manufacturing.

We have paraphrased and answered your questions as follows:

- Q1. You ask for confirmation of your understanding that a cylinder with a service pressure of 3,000 psi is allowed to use a service pressure of 3,300 psi, provided the cylinder passes hydrostatic inspection at the 3,300-psi rating.
- A1. Your understanding is incorrect. A DOT 3AA cylinder may be filled with a Division 2.2 non-flammable, non-liquefied gas to 10 percent in excess of its marked service pressure if all requirements contained in § 173.302a(b)(1) through (5) are met. The plus sign (+) is marked on a cylinder to indicate compliance with the testing and evaluation requirements in § 173.302a(b)(2) through (4).

For requalification of a cylinder previously marked with a plus sign, the hydrostatic retest must be performed using the water jacket method to determine the cylinder's elastic expansion (see § 173.302a(b)(2)). The cylinder requalifier must know the elastic expansion rejection (REE) value to ensure the cylinder's average wall stress or the maximum wall stress does not exceed the wall stress limitation specified in § 173.302a(b)(3).

- Q2. You ask whether any hydrostatic test shop can apply the plus (+) rating, or if the rating must be applied by the manufacturer.
- A2. The initial plus sign marking is typically applied by the manufacturer. A cylinder requalifier may apply subsequent plus sign (+) markings. Both the manufacturer and requalifier must ensure the conditions of § 173.302a(b)(2) through (4) are met in order to mark the plus sign. Only a plus sign (+) marked after the last (most recent) test or retest

date applies to determine whether the cylinder can continue to be filled to 10 percent in excess of its marked service pressure. The HMR contain no limitations on the number of times a cylinder that meets the requirements in § 173.302a(b) may be marked with a plus sign.

- Q3. You ask whether DOT keeps REE information on file for DOT 3AA cylinders.
- A3. DOT neither collects nor maintains REE values or other information from the manufacturer's design for DOT specification cylinders. Manufacturers of DOT cylinders comply with the recordkeeping requirements specified in § 178.35. Requalifiers of DOT cylinders comply with the recordkeeping requirements specified in § 180.215.
- Q4. You ask whether the test facility or owner may stamp the REE value on a cylinder using the test log data obtained by following the Compressed Gas Association (CGA) Pamphlet C-5 to determine allowance to fill a cylinder to 10 percent in excess of its marked service pressure.
- A4. Only the manufacturer is authorized to apply the REE marking on a cylinder. If the manufacturer did not mark the REE number, then the requalifier must either use the tabulated data or compute the limit using CGA Pamphlet C-5. See the final rule titled, "Hazardous Materials: Requirements for Maintenance, Requalification, Repair and Use of DOT Specification Cylinders (HM-220D)," published August 8, 2002 for additional information [67 FR 51633].
- Q5. You ask if—in the event one or more cylinders are tested and a REE number(s) is recorded in the test shop(s) logs—the DOT will accept a record of three such tests as being substantially correct for that specific cylinder model, and allow that number to be used for any other cylinder from the same production group. You specify by asking, "If my cylinder is tested and a REE number is found, can that be recorded or registered with the DOT or other organization, for future use by owners of other 'same' cylinders?"
- A5. It is the opinion of this Office that a REE value determined at the time of manufacture for a DOT 3AA cylinder would only be valid for other DOT 3AA cylinders of the same cylinder model that were also manufactured from the same "lot."

DOT permits computing the REE value in accordance with CGA Pamphlet C-5. Under CGA Pamphlet C-5 section 3.3.1, the "k factor" may be determined through procedures followed for "three (3) cylinders typical of the design." This "k factor" can be used in calculations related to the REE value. CGA Pamphlet C-5 also provides procedures for other calculations that require information from the manufacturer to determine the "k factor" or REE value. DOT also permits reference to data tabulated in CGA Pamphlet C-5, which was determined by CGA through an analysis of manufacturer data. Neither the computations or data tabulations in CGA Pamphlet C-5 include a registry for cylinder requalifiers.

- Q6. You ask whether any provision allows the REE number that has been determined for a cylinder to be recorded for future use of that cylinder, if it has not been stamped on the cylinder itself. You specify by asking, "Can the hydrostatic shop that obtained the number document it in their test log, and then supply a copy of the log page?"
- A6. In accordance with § 180.215(b)(2), "for each cylinder marked pursuant to § 173.302a(b)(5) of this subchapter, the test sheet must indicate the method by which any average or maximum wall stress was computed." Test records are not prohibited from including additional information. Additional information about the source of the REE value may be helpful to a requalifier determining compliance with § 173.302a(b)(2) through (4).

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

Sincerely,

A handwritten signature in cursive script that reads "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  
Standards and Rulemaking Division

**Goodall, Shante CTR (PHMSA)**

Lehman  
178.274  
Specifications for Un Portable  
Tank  
17-0035

**From:** INFOCNTR (PHMSA)  
**Sent:** Thursday, April 06, 2017 10:58 AM  
**To:** Hazmat Interps  
**Subject:** FW: Clarification of SCUBA tank hydrostatic test pressure regulations for recertification

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Shante/Alice,

Please submit this as a letter of interpretation. I spoke with Mr. Sherman on some of these questions.

Please let me know if you have any questions.

Thanks,  
Jordan

**From:** Jared Sherman [mailto:the.jared.sherman@gmail.com]  
**Sent:** Wednesday, April 05, 2017 4:53 PM  
**To:** INFOCNTR (PHMSA) <INFOCNTR.INFOCNTR@dot.gov>  
**Subject:** Clarification of SCUBA tank hydrostatic test pressure regulations for recertification

**Sir or Ma'am:**

**I am trying to clarify DOT policy and regulations in regard to hydrostatic pressure testing and certification of SCUBA tanks. The tank in question is a steel "96.2" that was produced by Pressed Steel (PST) in 1982.**

**The information stamped on the tank at manufacture reads:  
DOT 3AA 3000  
44307Y  
7 [PST] 82+**

**And as I understand it, that means the tank received DOT certification as a 3AA (steel) tank for service at 3000 pounds, with service at 3300psi being allowed as long as the tank can pass a hydrostatic inspection at the "plus" pressure rating of 3300 pounds.**

**From published statements by the DOT, I am told that any hydrostatic test shop can test the tank at 3300psi and give a "+" rating if the tank complies with standards for elastic expansion, compared to what is called a "REE" rating for the tank.**

**This is the "Rejection Elastic Expansion" (REE) or how much the manufacture specifies the cylinder should expand before it is considered unsafe.**

**Normally a REE rating would be determined, according to DOT publications, by a procedure published in the CGA-5 manual, which most hydrostatic test shops are unable to perform either because they lack the equipment or do not understand the procedure. And the SCUBA industry, and the hydro shops they use, almost all claim that this "+" rating cannot be given except upon manufacture, which according to the DOT publications is materially incorrect. (We might call it a lie.)**

The DOT publications and the CGA-5 manual appear to be silent on some key aspects of the REE rating, and I require your formal clarification of any DOT regulations on that subject. Specifically:

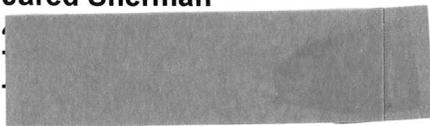
- 1- If the REE rating was not stamped at the time of manufacture, and the manufacturer has thrown out the data, and the data is not available from other sources, would that data be on file with the DOT someplace? Is there any way to access this data from the DOT?
- 2- If the data is obtained (i.e. b following the CGA-5 procedure for an individual tank) are there any prohibitions against that data then being stamped into that specific tank, either by the test facility or by the owner upon reading them from the test log?
- 3- If one or more tanks are tested, and a REE number(s) recorded in the test shop(s) logs, is it true that the DOT will accept a record of three such tests as being substantially correct for that specific tank model, and allow that number to be used for any other tank from the same production group? i.e. If my tank is tested and a REE number found, can that be recorded or registered with the DOT or other organization, for future use by owners of other "same" tanks?
- 4- Is there any provision to allow the REE number, once determined for one tank, to be recorded for future use for that tank, if it has not been stamped on the tank? (i.e. can the hydrostatic shop that obtained the number document it in their test log, and then supply a copy of the log page, including the tank serial number, which can be used during future retesting, so the expensive and uncommon test procedure only has to be performed once, and the results used again in the future?

I ask you these questions because the two industries (SCUBA and hydrostatic test) both consistently lie about whether recertification can be done to the + pressure rating, and their action forces divers to spend considerable money replacing perfectly good equipment, if the divers wish to maintain that 10% extra amount of air in the tanks. This is a safety issue. The industry effectively is stealing the safety margin (10%) from divers by falsely claiming they cannot perform a simple hydro test to the DOT/CGA standards for a + rating.

Considering that the typical 3000psi rated tank is normally tested to 5000psi, and that the typical individual diver will in their entire lifetime use the tank for less than 10% of the rated 5000 psi duty cycle of the tank, there should be little concern about having the tanks properly tested and recertified to the 3300psi "+ rating. It is well within the tested limits of the tank, and it gives the divers a significant safety margin in use.

I would greatly appreciate your research into this somewhat arcane issue, and your formal reply on point to the questions about determining, recording, and re-using REE numbers once they have been obtained.

Jared Sherman

You are requested to please withhold my personal information (address and phone) from any public records access, it is supplied for correspondence purposes only.