



U.S. Department
of Transportation

Pipeline and Hazardous
Materials Safety
Administration

1200 New Jersey Avenue, SE
Washington, D.C. 20590

SEP 16 2014

Mr. Terrance Douglas
Engineer Trainee
1903 Sterling Palms Court, Apt. 102
Brandon, FL 33511

Reference No. 14-0144

Dear Mr. Douglas:

This is in response to your July 27, 2014 letter requesting clarification of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) applicable to the calibration and certification of gauges used for pressure testing cylinders. Your questions are paraphrased below:

Q1) Your customers pressure gauge is of 0 to 11,000 PSI scale with a 0.25% accuracy grade (27.5 PSI max error). When compared to your certified master gauges, the customer's pressure gauge reports a +40 PSI error (5,040) at 5,000 PSI and a +70 PSI error (8,070) at 8,000 PSI. You ask if the pressure indicating device may show tolerance errors that exceed its accuracy grade?

A1) As required by § 180.205(g)(3)(i) the pressure indicating device, itself, must be certified as having an accuracy of $\pm 0.5\%$, or better, of its full range. In the scenario described, the tolerances read at both 5,000 and 8,000 PSI exceed the accuracy of $\pm 0.5\%$. In this case, the pressure indicating device would not be authorized for use without recertification of its accuracy to of $\pm 0.5\%$, or better, of its full range.

Q2) Section 180.205(g)(3)(i) states that the pressure-indicating device, as part of the retest apparatus, is accurate within $\pm 1.0\%$ of the prescribed test pressure of any cylinder tested that day. You ask if a pressure indicating device is reporting a 70 PSI error (or 1%), that a pressure test of less than 7,000 PSI should not be conducted that day?

A2) A pressure test at 7,000 PSI could be completed that day. For additional tests to be conducted that day, the pressure-indicating device, as part of the retest apparatus, must be accurate within $\pm 1.0\%$ of each individual test pressure to be tested that day. However, if the pressure indicating device, itself, is not in compliance with an accuracy of $\pm 0.5\%$, or better, of its full range, retesting is not permitted on that day.

Q3) Your customer uses a digital scale for the expansion indicating device. This digital scale has a range from 0 to 1,000 grams with a 0.01% accuracy grade (0.1 gram max error). When

compared to your certified 100 gram weight, the customer's digital scale shows 100.4 grams. You ask if this 0.4 gram weight difference is too large?

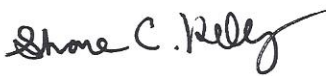
A3) As required by § 180.205(g)(3)(ii) the expansion-indicating device itself must have an accuracy of $\pm 0.5\%$, or better, of its full scale, therefore, the digital scale described could be used as it has an accuracy of 0.4% unless the accuracy exceeds $\pm 0.5\%$ at any point of its full scale.

Q4) For the scenario described in Q3), if the error is 0.4 grams, should tests conducted that day be limited to cylinders that produce less than 40 g/ml total expansion?

A5) Each day before retesting, the retester shall confirm that the expansion-indicating device, as part of the retest apparatus, gives a stable reading of expansion and is accurate to $\pm 1.0\%$ of the total expansion of any cylinder to be tested that day or 0.1 cc, whichever is larger.

I trust this information is helpful. If you have further questions, please do not hesitate to contact this office.

Sincerely,

A handwritten signature in black ink that reads "Shane C. Kelley". The signature is written in a cursive, flowing style.

Shane C. Kelley
Acting International Standards Coordinator
Standards and Rulemaking Division

Wiener
180.205(1)
Cylinders
14-0144
June 27, 2014

To: PHMSA

Standards and Rulemaking Division

Terrance Douglas

Engineer Trainee

Phone: 813-410-3117 (mostly available after 3 pm)

1903 Sterling Palms Court Apt 102

Brandon, FL 33511

Interpretation Request

One customers of ours tried to calibrate their hydro system using the calibrated cylinder method. He was getting out of limits expansion reading many times during the process. I decided to check the accuracy of their pressure and expansion indicating devices using standards to see if any of their device need to get repaired and recalibrated.

Their test pressure ranges from 3 000 to 10 000 PSI. They have a pressure gauge of 0 to 11 000 PSI scale with 20 PSI subdivision and 0.25% accuracy grade (27.5 PSI max error). I compared their pressure gauge to 3 different master gauges of 0 to 11 000 PSI scale, 0.25 % accuracy grade, 20 PSI subdivision, all of them recertified couple of months ago by local science lab against dead weights. Their pressure gauge kept giving a + 40 PSI error (5040) at 5000 PSI and 70 PSI error (8070) at 8000 PSI when compared to the master gauges which ones had 0 psi error on those pressure values based on their certification letter.

Q1: Can that pressure indicating device at 5000 PSI or 8000 PSI show these errors which way exceed 27.5 PSI based on accuracy grade? I understand 1% rule, but doesn't the 1% apply to the whole system?

Q2 : CFR 49 180.205 (i)" The pressure-indicating device, as part of the retest apparatus, is accurate within $\pm 1.0\%$ of the prescribed test pressure of any cylinder tested that day."
Does this mean if my device is 70 PSI off I should not test anything under 7 000 PSI that day?

For expansion indicating device they use a digital scale. Its range is from 0 to 1 000 g. Accuracy grade is 0.01%, ($1000 \times 0.01\% = 0.1\text{g}$ accurate). Based on test records their smallest total expansion is 8.9 ml (or gram in our case), and the largest total expansion is 520 g.

When I put 100 g certified laboratory weight on the scale it shows 100.4 g.

Q3 : I think this difference is too big. It should be 0.1 g maximum. If the error is 0.4 they should not test cylinders that day which produce less than 40 g/ml total expansion. Am I right on this? I think my max error should be 0.1 g.

Thanks, Terrance Douglas