

Question 9.12

Topic: Appendix D and E Orifice Fuel Flowmeter Calibration

Question: A utility has an orifice fuel flowmeter system with three transmitters: a differential pressure transmitter; an absolute pressure transmitter; and a temperature transmitter. The absolute pressure and temperature transmitters are used to compensate for actual conditions. The signals from all three transmitters are combined to determine standard cubic feet per minute flow rate in order to determine the accuracy of the system.

Appendix D, Section 2.1.5 requires each fuel flowmeter to meet a flowmeter accuracy of $\pm 2.0\%$ of the upper range value (URV). The utility finds it is very difficult to calibrate all three transmitters at the same time. The temperature can be as high as 300°F, the absolute pressure is 0 to 350 psig and the differential pressure is usually 0 to 100 inches of water (@3.5 psig).

So, how should the utility calibrate and calculate the accuracy of this fuel flowmeter system?

Answer: Check the calibration for the three transmitters separately. Calibrate each transmitter at the zero level and at least two other levels (e.g., mid and high), so that the full range of transmitter or transducer readings corresponding to normal unit operation is represented. The flowmeter accuracy specification of 2.0% of the URV must be met at each level tested.

If, at a particular level, the accuracy for each transmitter is less than or equal to 1.0% when calculated according to Equation D-1a in Appendix D, then the fuel flowmeter accuracy specification of 2.0% of the URV is considered to be met at that level. At each level tested, report the highest calculated accuracy for any of the transmitters in a <TransmitterTransducerTest> record and keep the results of the tests on the other transmitters on site.

If, at a particular level, the accuracy of one or more of the transmitters is greater than 1.0%, there are two alternative ways to demonstrate compliance with the fuel flowmeter accuracy specification of 2.0% of the URV:

- (1) If the sum of the calculated accuracies for the three transmitters is less than or equal to 4.0%, the results are considered acceptable; or
- (2) If the total fuel flowmeter accuracy is $\leq 2.0\%$ when calculated according to Part 1 of American Gas Association Report No. 3, "General Equations and Uncertainty Guidelines," the results are considered acceptable.

If the required fuel flowmeter accuracy specification of 2.0% of the URV is not met at any of the levels tested, follow the applicable procedures in Section 2.1.6.3 of Appendix D ("Failure of Transducer(s) or Transmitter(s)").

References: Appendix D, Sections 2.1.5 and 2.1.6

History: First published in November 1995, Update #7; revised in October 1999
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