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Volumetric Prover Calibration and Use

30-second drain times are critical on 5-gallon truck-mounted provers!

by Val Miller

Recent testing at the NIST Weights and Measures Division Training Laboratory reinforces the concept that significant measurement errors will result if the instructions in NIST HB 105-3, Section 7, Test Methods and References, are not followed.

NIST HB 105-3, Section 7 states: “Volume certification of test measures or provers shall be by a documented NIST procedure or other nationally or internationally recognized procedure. Hand held test measures require a 30 s ($\pm$ 5 s) pour followed by a 10 s drain, with the measure held at a 10° to 15° angle from vertical, during calibration and use. Provers are emptied, followed by a 30 s drain following the cessation of flow.”

A series of tests are being conducted using a 5-gallon truck-mounted bottom drain prover that many jurisdictions are using for enforcement activities. Current results show that an error of approximately 0.5 in³ results when the 30-second final drain time specified in NIST HB 105-3 is not used. This error is somewhat proportional to the total volume of the prover so that a larger prover volume results in a larger error. Differences in prover internal condition, i.e., corrosion or contamination, will affect this error making use of the proper drain time even more critical.

Use of volumetric provers is fraught with potential sources of error. This significant error (0.5 in³ on 5 gallons) is preventable and prevention is simple. The field user of a prover MUST follow the drain time both specified by NIST HB 105-3 and used by the calibrating laboratory, or significant errors will result. A correction factor cannot be used to correct for this error, as each prover is unique. This error can only be corrected by ensuring that the prover drain time specified in NIST HB 105-3 is used during use in the field and during the calibration process.