

Calibration Date: 9/7/2021

**Certificate of Calibration  
of Volume Transfer**

Certificate Number: 2021-130-1

**Items Submitted:**

Quantity	Nominal Volume	Manufacturer	Type
2	100 gal	Seraphin / Detterman	Bottom Drain Prover

**Submitted By:** FSCP Area 70  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Scott Arner  
402-471-3422  
scott.arner@nebraska.gov

**Test Results**

Nominal Volume	Serial Number	Material	Cubical Coefficient of Expansion (1/°F)	As Found Volume Delivered @ 60 °F	As left Volume Delivered @ 60 °F	Uncertainty (U)	(k)
100 gal	18969	SS	0.0000265	99.998 gal	99.998 gal	0.013 gal	2.01
100 gal	8851397	SS	0.0000265	100.009 gal	100.009 gal	0.013 gal	2.01

*The data in this report only applies to those items specifically listed on this report.*

Volume delivered at 60°F after a 30 second pour and 10 second drain for test measures. For provers a 30 second drain time would apply.

**Conversion Factors:**

1 gal = 231 in<sup>3</sup>  
1 gal = 3.785 412 E-03 m<sup>3</sup>

**Traceability Statement:**

The artifact(s) described in this report have been compared to the Standards of the State of Nebraska. The Standards of the State of Nebraska are traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The calibration number for this report is the only unique calibration number to be used in referencing measurement traceability for the artifact(s) described in this report.

**Uncertainty Statement:**

The combined standard uncertainty includes uncertainties reported for the standard, uncertainties associated with the measurement process, uncertainties for any observed deviations from reference values which are less than surveillance limits and the standard uncertainty for any uncorrected errors. The combined standard uncertainty is multiplied by a coverage factor (k), to give the expanded uncertainty, which defines an interval with a 95.45 percent level of confidence. The expanded uncertainty presented in this report is consistent with the Guide to the Expression of Uncertainty in Measurement (2008, revised 2012). Some components of the calibration can be evaluated through a Type A evaluation, or the method of evaluation of uncertainty by the statistical analysis (standard deviation) from the observations taken.

**Pertinent Information:**

The artifact(s) listed above have been found and/or left within the maximum permissible error for the specification stated above, except as noted. An artifact is considered in-compliance when the correction plus the measurement uncertainty is equal to or less than the maximum permissible error. It is the decision of the Laboratory to adjust the artifact(s) when the sum of the correction and uncertainty exceed 95% of the maximum permissible error. All of the tolerances and specifications were evaluated according to NIST HB 105-3 (2010).

**Condition of Item(s) Submitted for Calibration:**

Good

**Laboratory Reference Standard Used:**

100 gal NE 44158

**Treatment of Item(s) before Calibration:**

Tested as Found

**Procedure Used:**

NISTIR 7383, SOP 19 (2019)

**Environmental conditions at time of calibration:**

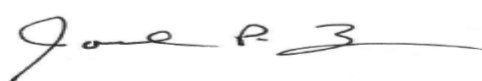
Temp °C	24.9	Humidity %	51.1
Pressure mmHg	729.49		

**Water temperature at time of calibration:**

69.35 °F

**Date Submitted:** 9/7/2021

E-signature is copy only



9/14/2021

Joel P. Lavicky, Metrologist

Issue Date:

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**Calibration Certificate for Volume Transfer of LPG**

**Calibration Date:** September 9, 2021

**Certificate Number:** 2021-130-2

**Submitted by:** FSCP Area 70  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Scott Arner  
**Phone:** 402-471-2087

**Date Received:** 09/06/2021

**PO Number:** N/A  
**Job Order #:** N/A

**Artifact(s) Description**

**Test Item(s):** 20 gal LPG Prover  
**Serial No:** 88220  
**Manufacture:** Midwest Meter  
**Condition:** good

**Material:** Steel, Prover, Low Carbon  
**Specification:** NIST HB 105-4  
**Cubical Coefficient of Expansion:** 0.0000186 / °F

**Calibration Information**

**Reference Standards Used:**

NE-1586-5 gal

**Procedure:** NIST SOP 21(2019)

**Metrologist:** JPL

**Temperature:** 22.5 °C

**Humidity:** 52.6 % RH

**Water Temperature:** 21.0 °C

**Calibration Results**

Nominal Volume (at zero mark on gauge)	Prover Volume As Found @ 60 °F and 100 psig (gal)	Prover Volume As Left @ 60 °F and 100 psig (gal)	Spec. Tol. ± (gal)	Uncertainty ± (gal)	k factor	Degrees of Freedom
20 gal	19.99	19.99	0.04	0.022	2.013	200

**Conversion Factors**

1 gallon (U.S.) (gal) = 231 in<sup>3</sup>  
1 gallon (U.S.) (gal) = 3.785 412 E-03 m<sup>3</sup>

**Pertinent Information**

- The artifact is considered in-tolerance when the correction plus the measurement uncertainty is equal to or less than the specified tolerance. **RED** print indicates an out-of-tolerance reading. It is the decision of the Laboratory to adjust the artifact when the sum of the correction and the uncertainty exceed 95% of the maximum permissible error. All of the tolerances and specifications were evaluated according to NIST HB 105-4 (2019)
- Enter the Pressure Correction from Table 1 that corresponds with the pressure being tested on your LPG Meter Test form.
- The calibration item was calibrated in a 'wet down' condition using water. The calibration data above applies when the prover bottom zero is obtained during a 30 (± 5) second period after cessation of the main flow.
- The drain time (using gravity) to the bottom zero was approximately 2 minute(s) 30 seconds.
- The Top Security Seal Number is "NE Lab" and the Bottom Security Seal Number is "NE Lab".

**Traceability Statement**

The artifact(s) described in this report have been compared to the Standards of the State of Nebraska. The Standards of the State of Nebraska are traceable to the SI through the National Institute of Standards and Technology (NIST) and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The International System of Units (SI) for volume is the cubic meter (m<sup>3</sup>) (see Conversion Factors below). The report number for this report is the only unique report number to be used in referencing measurement traceability for the artifact(s) described in this report.

**Uncertainty Statement**

The combined standard uncertainty includes uncertainties for the standard(s), for the measurement process, for the material cubical coefficient of expansion, for reading meniscus, for the pressure gauge, for graduated neck errors and for the thermometer(s) used for measuring the water temperature. The combined standard uncertainty is multiplied by a coverage factor, *k*, to give the expanded uncertainty, which defines an interval with a 95.45 % level of confidence. The expanded uncertainty presented in this report is consistent with JCGM 100:2008, *Evaluation of measurement data — Guide to the expression of uncertainty in measurement (GUM 1995 with minor corrections)*. A component for the effects of viscosity was not included in the uncertainty budget.

Signature:

Joel P. Lavicky, State Metrologist

Date:

9/14/2021

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- Attachments: Table 1 and Chart 1 - LPG Prover Pressure Corrections  
Table 2 - LPG Prover Temperature Corrections  
Table 3 - Volume Corrections for Thermal Expansion or Contraction of Prover  
Table 4 - Volume Correction Factors to 60 °F

**Calibration Certificate for Volume Transfer of LPG**

**Calibration Date:** September 9, 2021

**Certificate Number:** 2021-130-3

**Submitted by:** FSCP Area 70  
3721 West Cuming St.  
Lincoln, NE 68524

**POC:** Scott Arner  
**Phone:** 402-471-2087

**Date Received:** 09/06/2021

**PO Number:** N/A  
**Job Order #:** N/A

**Artifact(s) Description**

**Test Item(s):** 103 gal LPG Prover  
**Serial No:** A-4-L6998  
**Manufacture:** Unknown  
**Condition:** good

**Material:** Steel, Pressure Vessel, Low Carbon  
**Specification:** NIST HB 105-4  
**Cubical Coefficient of Expansion:** 0.000016 / °F

**Calibration Information**

**Reference Standards Used:**  
NE-44158-100gal

**Procedure:** NIST SOP 21(2019)

NE-514-1 gal

**Metrologist:** JPL

**Temperature:** 22.5 °C

**Humidity:** 52.6 % RH

**Water Temperature:** 21.0 °C

**Calibration Results**

Nominal Volume (at zero mark on gauge)	Prover Volume As Found @ 60 °F and 100 psig (gal)	Prover Volume As Left @ 60 °F and 100 psig (gal)	Spec. Tol. ± (gal)	Uncertainty ± (gal)	k factor	Degrees of Freedom
103 gal	102.883	102.883	0.206	0.022	2	5079

**Conversion Factors**

1 gallon (U.S.) (gal) = 231 in<sup>3</sup>  
1 gallon (U.S.) (gal) = 3.785 412 E-03 m<sup>3</sup>

**Pertinent Information**

- The artifact is considered in-tolerance when the correction plus the measurement uncertainty is equal to or less than the specified tolerance. **RED** print indicates an out-of-tolerance reading. It is the decision of the Laboratory to adjust the artifact when the sum of the correction and the uncertainty exceed 95% of the maximum permissible error. All of the tolerances and specifications were evaluated according to NIST HB 105-4 (2019)
- Enter the Pressure Correction from Table 1 that corresponds with the pressure being tested on your LPG Meter Test form.
- The calibration item was calibrated in a 'wet down' condition using water. The calibration data above applies when the prover bottom zero is obtained during a 30 (± 5) second period after cessation of the main flow.
- The drain time (using gravity) to the bottom zero was approximately 2 minute(s) 30 seconds.
- The Top Security Seal Number is "NE Lab" and the Bottom Security Seal Number is "NE Lab".

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Signature:

Date:

9/14/2021

Joel P. Lavicky, State Metrologist

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