

Calibration Date:	9/9/2019	Certificate of Calibration of Volume Transfer	Certificate Number:	2019-121-1
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Items Submitted:

Quantity	Nominal Volume	Manufacturer	Type
1	100 gal	Dettnerman	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	8851397	SS	0.0000265	100.006 gal	100.006 gal	0.010 gal	2.02

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 in³

1 gal = 3.785 412 E-3 m³

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. 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 (2016)

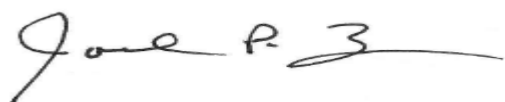
Environmental conditions at time of calibration:

Temp °C	23.0	Humidity %	53.9
Pressure mmHg	762.25		

Water temperature at time of calibration:

68.14 °F

Date Submitted: 9/6/2019



Joel P. Lavicky, Metrologist

9/11/2019

Date:

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Calibration Certificate for Volume Transfer of LPG

Calibration Date: September 9, 2019

Certificate Number: 2019-121-2

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

POC: Scott Arner
Phone: 402-471-2087

Date Received: 09/06/2019

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

NE-514-1 gal

Procedure: NIST SOP 21

Metrologist: JPL

Temperature: 19.8 °C

Humidity: 45.0 % RH

Water Temperature: 20.1 °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	102.901	102.901	0.206	0.022	2	6518

Conversion Factors

1 gallon (U.S.) (gal) = 231 in³
1 gallon (U.S.) (gal) = 3.785 412 E-03 m³

Pertinent Information

- The artifact is considered in-tolerance when the error is equal to or less than the specified tolerance minus the measurement uncertainty. **RED** print indicates an out-of-tolerance reading. All of the tolerances and specifications were evaluated according to NIST HB 105-4 (2016)
- 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 10 minute(s) 30 seconds.
- The Top Security Seal Number is Ne lab and the Bottom Security Seal Number is "NE Lab".

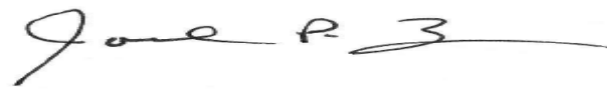
Traceability Statement

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 (m³) (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:

9/9/2019

The results in this certificate only applies to those items specifically listed in this certificate. The certificate cannot be considered complete unless it contains all pages. The document may not be reproduced except in full, without the written consent of the Nebraska Standards Laboratory

- 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 11, 2019

Certificate Number: 2019-121-3

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

POC: Scott Arner
Phone: 402-471-2087

Date Received: 09/06/2019

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

Artifact(s) Description

Test Item(s): 20 gal LPG Prover
Serial No: 88220
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-1586-5 gal

Procedure: NIST SOP 21(2016)

Metrologist: JPL

Temperature: 24.0 °C

Humidity: 52.9 % RH

Water Temperature: 20.3 °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	19.991	19.991	0.04	0.019	2.008	307

Conversion Factors

1 gallon (U.S.) (gal) = 231 in³
1 gallon (U.S.) (gal) = 3.785 412 E-03 m³

Pertinent Information

- The artifact is considered in-tolerance when the error is equal to or less than the specified tolerance minus the measurement uncertainty. **RED** print indicates an out-of-tolerance reading. All of the tolerances and specifications were evaluated according to NIST HB 105-4 (2016)
- 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 3 minute(s) 0 seconds.
- The Top Security Seal Number is Ne lab and the Bottom Security Seal Number is "NE Lab".

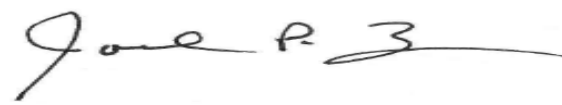
Traceability Statement

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 (m³) (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

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Signature:



Joel P. Lavicky, State Metrologist

Date:

9/13/2019

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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 Date: 9/9/2019

**Certificate of Calibration
of Volume Transfer**

Certificate Number: 2019-121-4

Items Submitted:

Quantity	Nominal Volume	Manufacturer	Type
1	100 gal	Seraphin	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	304 SS	0.0000288	99.993 gal	99.993 gal	0.010 gal	2.02

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 in³

1 gal = 3.785 412 E-3 m³

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.

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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. 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 (2016)

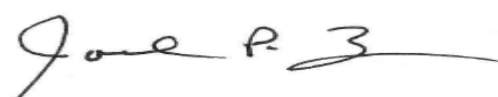
Environmental conditions at time of calibration:

Temp °C	23.0	Humidity %	53.9
Pressure mmHg	762.25		

Water temperature at time of calibration:

68.05 °F

Date Submitted: 9/6/2019



Joel P. Lavicky, Metrologist

9/11/2019

Date:

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