

Receipt Date: December 15, 2017
Cal. Date: December 15, 2017
Report Date: December 15, 2017

REC'D MAR 20 2018

Report No.: 338632
Serial No.: 11-06420
Barcode: 202937

Calibration Certificate

MIDWEST LIQUID SYSTEMS
1414 21ST AVENUE
ELDORA, IA 50627
Contact: DAN TIENSVOLD
Phone: 641-858-2668
PO Number: None
Procedure: NIST SOP 19
Technician ID: 19

Item(s) Submitted: 5 Gallon Measure
Manufacturer: Seraphin
Material: Stainless Steel
Type: Measure
Condition: Good
Temperature: 18.9 °C
Pressure: 733.7 mmHg
Relative Humidity: 37.1 %
Standard H₂O Temp.: 16.9 °C
Artifact H₂O Temp.: 17.0 °C

Nominal		Calibrated				
Volume (gal)		Volume (gal)	Error (in ³)	<i>k</i>	U (in ³)	CCE (°F)
5	As Found	4.99958	-0.10	2.05	0.25	0.0000265
	As Left	4.99958	-0.10			

Neck Calibration: No neck calibration was performed at this time.

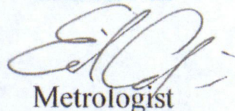
This measure has been calibrated as a "to contain after wet down" vessel with a pour time of 30 seconds followed by a drain time of 10 seconds after cessation of full flow.

The vessel listed above has been compared by volumetric transfer methods to the standards of the State of Minnesota using water as the calibration medium. The standards are traceable to the SI through NIST. Statistical process control charts indicate standards are currently in control. All gauges were sealed in place.

All tolerances and specifications were evaluated according to NIST Handbook 105-3 (2010). Uncertainty calculations contain the components in NIST SOP 19 and conform to the ISO/IEC Guide to the Expression of Uncertainty in Measurement (2008), including coverage factors (*k*) calculated at the approximate 95.45 % confidence level. Results apply to item identified in this report only.

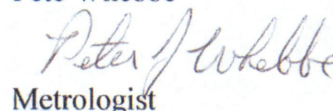
CCE is the cubical coefficient of thermal expansion, and the reference temperature is 60 °F
Conversion to SI unit: 1 gallon = 231 in³ = 0.00378541 m³.

Erik Alfvín



Metrologist

Reviewed by:
Pete Whebbe



Metrologist

Receipt Date:	December 15, 2017	Report No.:	338633
Cal. Date:	December 15, 2017	Serial No.:	13-91651
Report Date:	December 15, 2017	Barcode:	202622

Calibration Certificate

MIDWEST LIQUID SYSTEMS
1414 21ST AVENUE
ELDORA, IA 50627

Contact: DAN TIENSVOLD
Phone: 641-858-2668
PO Number: None
Procedure: NIST SOP 19
Technician ID: 19

Item(s) Submitted: 5 Gallon Measure
Manufacturer: Seraphin
Material: Stainless Steel
Type: Measure
Condition: Good
Temperature: 18.9 °C
Pressure: 733.7 mmHg
Relative Humidity: 37.1 %
Standard H₂O Temp.: 14.2 °C
Artifact H₂O Temp.: 14.3 °C

Nominal		Calibrated				
Volume (gal)		Volume (gal)	Error (in ³)	<i>k</i>	U (in ³)	CCE (°F)
5	As Found	5.00051	0.12	2.05	0.25	0.0000265
	As Left	5.00051	0.12			

Neck Calibration: No neck calibration was performed at this time.

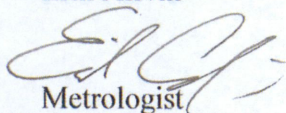
This measure has been calibrated as a "to contain after wet down" vessel with a pour time of 30 seconds followed by a drain time of 10 seconds after cessation of full flow.

The vessel listed above has been compared by volumetric transfer methods to the standards of the State of Minnesota using water as the calibration medium. The standards are traceable to the SI through NIST. Statistical process control charts indicate standards are currently in control. All gauges were sealed in place.

All tolerances and specifications were evaluated according to NIST Handbook 105-3 (2010). Uncertainty calculations contain the components in NIST SOP 19 and conform to the ISO/IEC Guide to the Expression of Uncertainty in Measurement (2008), including coverage factors (*k*) calculated at the approximate 95.45 % confidence level. Results apply to item identified in this report only.

CCE is the cubical coefficient of thermal expansion, and the reference temperature is 60 °F
Conversion to SI unit: 1 gallon = 231 in³ = 0.00378541 m³.

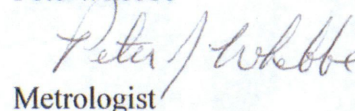
Erik Alfvin



Metrologist

Reviewed by:

Pete Whebbe



Metrologist

Receipt Date: December 15, 2017
Cal. Date: December 15, 2017
Report Date: December 15, 2017

Report No.: 338634
Serial No.: 04-20835-02
Barcode: 200307

Calibration Certificate

MIDWEST LIQUID SYSTEMS
1414 21ST AVENUE
ELDORA, IA 50627
Contact: DAN TIENSVOLD
Phone: 641-858-2668
PO Number: None
Procedure: NIST SOP 19
Technician ID: 19

Item(s) Submitted: 5 Gallon Measure
Manufacturer: Seraphin
Material: Stainless Steel
Type: Measure
Condition: Good
Temperature: 18.9 °C
Pressure: 733.7 mmHg
Relative Humidity: 37.1 %
Standard H₂O Temp.: 13.2 °C
Artifact H₂O Temp.: 13.4 °C

Nominal		Calibrated				
Volume (gal)		Volume (gal)	Error (in ³)	<i>k</i>	U (in ³)	CCE (°F)
5	As Found	4.99819	-0.42	2.05	0.25	0.0000265
	As Left	5.00010	0.02			

Neck Calibration: No neck calibration was performed at this time.

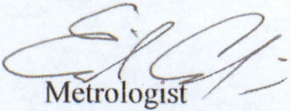
This measure has been calibrated as a "to contain after wet down" vessel with a pour time of 30 seconds followed by a drain time of 10 seconds after cessation of full flow.

The vessel listed above has been compared by volumetric transfer methods to the standards of the State of Minnesota using water as the calibration medium. The standards are traceable to the SI through NIST. Statistical process control charts indicate standards are currently in control. All gauges were sealed in place.

All tolerances and specifications were evaluated according to NIST Handbook 105-3 (2010). Uncertainty calculations contain the components in NIST SOP 19 and conform to the ISO/IEC Guide to the Expression of Uncertainty in Measurement (2008), including coverage factors (*k*) calculated at the approximate 95.45 % confidence level. Results apply to item identified in this report only.

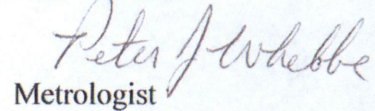
CCE is the cubical coefficient of thermal expansion, and the reference temperature is 60 °F
Conversion to SI unit: 1 gallon = 231 in³ = 0.00378541 m³.

Erik Alfvin


Metrologist

Reviewed by:

Pete Whebbe


Metrologist

Receipt Date: December 15, 2017
Cal. Date: December 15, 2017
Report Date: December 15, 2017

Report No.: 338635
Serial No.: 10-07021
Barcode: 201615

Calibration Certificate

MIDWEST LIQUID SYSTEMS
1414 21ST AVENUE
ELDORA, IA 50627
Contact: DAN TIENSVOLD
Phone: 641-858-2668
PO Number: None
Procedure: NIST SOP 19
Technician ID: 19

Item(s) Submitted: 5 Gallon Measure
Manufacturer: Seraphin
Material: Stainless Steel
Type: Measure
Condition: Good
Temperature: 18.9 °C
Pressure: 733.7 mmHg
Relative Humidity: 37.1 %
Standard H₂O Temp.: 13.5 °C
Artifact H₂O Temp.: 13.7 °C

Nominal		Calibrated				
Volume (gal)		Volume (gal)	Error (in ³)	<i>k</i>	U (in ³)	CCE (1/°F)
5	As Found	4.99893	-0.25	2.05	0.25	0.0000265
	As Left	4.99893	-0.25			

Neck Calibration: No neck calibration was performed at this time.

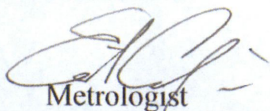
This measure has been calibrated as a "to contain after wet down" vessel with a pour time of 30 seconds followed by a drain time of 10 seconds after cessation of full flow.

The vessel listed above has been compared by volumetric transfer methods to the standards of the State of Minnesota using water as the calibration medium. The standards are traceable to the SI through NIST. Statistical process control charts indicate standards are currently in control. All gauges were sealed in place.

All tolerances and specifications were evaluated according to NIST Handbook 105-3 (2010). Uncertainty calculations contain the components in NIST SOP 19 and conform to the ISO/IEC Guide to the Expression of Uncertainty in Measurement (2008), including coverage factors (*k*) calculated at the approximate 95.45 % confidence level. Results apply to item identified in this report only.

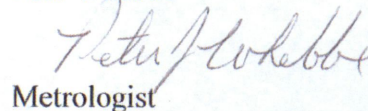
CCE is the cubical coefficient of thermal expansion, and the reference temperature is 60 °F
Conversion to SI unit: 1 gallon = 231 in³ = 0.00378541 m³.

Erik Alfvín



Metrologist

Reviewed by:
Pete Whebbe



Metrologist

Receipt Date: December 15, 2017
Cal. Date: December 15, 2017
Report Date: December 15, 2017

Report No.: 338636
Serial No.: 14-56263-02
Barcode: 202678

Calibration Certificate

MIDWEST LIQUID SYSTEMS
1414 21ST AVENUE
ELDORA, MN 50627
Contact: DAN TIENSVOLD
Phone: 641-858-2668
PO Number: None
Procedure: NIST SOP 19
Technician ID: 19

Item(s) Submitted: 50 Gallon Prover
Manufacturer: Seraphin
Material: Stainless Steel
Type: No Bottom Zero
Condition: Good
Temperature: 18.5 °C
Pressure: 731.7 mmHg
Relative Humidity: 41.1 %
Standard H₂O Temp.: 10.8 °C
Artifact H₂O Temp.: 10.8 °C

Nominal		Calibrated		<i>k</i>	U (in ³)	CCE (°F)
Volume (gal)		Volume (gal)	Error (in ³)			
50	As Found	50.0029	0.7	2.10	3.1	0.0000265
	As Left	50.0029	0.7			

Neck Calibration: No neck calibration was performed at this time.

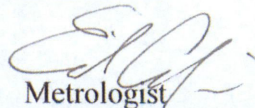
This prover has been calibrated as a "to contain after wet down" vessel with a drain time of 30 seconds after cessation of full flow.

The vessel listed above has been compared by volumetric transfer methods to the standards of the State of Minnesota using water as the calibration medium. The standards are traceable to the SI through NIST. Statistical process control charts indicate standards are currently in control. All gauges were sealed in place.

All tolerances and specifications were evaluated according to NIST Handbook 105-3 (2010). Uncertainty calculations contain the components in NIST SOP 19 and conform to the ISO/IEC Guide to the Expression of Uncertainty in Measurement (2008), including coverage factors (*k*) calculated at the approximate 95.45 % confidence level. Results apply to item identified in this report only.

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Conversion to SI unit: 1 gallon = 231 in³ = 0.00378541 m³.

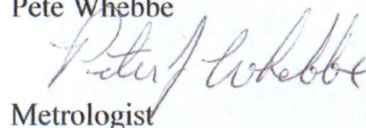
Erik Alfvín



Metrologist

Reviewed by:

Pete Whebbe



Metrologist

United States Department of Commerce

National Institute of Standards and Technology

Certificate of Metrological Traceability For:

Minnesota

This laboratory has demonstrated evidence of an unbroken chain of metrological traceability of its standards to the international system of units (SI), documented measurement uncertainties, uses documented measurement procedures, successfully completed training and proficiency tests, documented calibration intervals, submitted a quality management system, and demonstrated suitable measurement assurance for the Scope listed on this certificate.


The Office of Weights and Measures Program assesses laboratories to NIST Handbook 143 - Program Handbook for State Weights and Measures Laboratories and ISO/IEC 17025:2005.

Scope

Mass Echelon I 10 kg to 1 mg	Mass Echelon III 50 kg to 1 mg 5000 lb to 0.001 lb	Volume Gravimetric, I 20 L to 10 mL 100 gal to 0.25 qt
Mass Echelon II 50 kg to 1 mg 1000 lb to 0.001 lb 4 oz to 0.03125 oz	Weight Carts 10 000 lb to 2000 lb	Volume Transfer, II 1500 gal to 5 gal 100 gal to 25 gal LPG
	Wheel Load Weighers 20 000 lb to 2000 lb	
	Railroad Test Cars 110 000 lb to 80 000 lb	



2017


Georgia L. Harris, Acting Chief
NIST Office of Weights and Measures

Effective Dates: 2017-01-01 to 2017-12-31

Amended: 2016-12-31
Scope modified for 2017.