

Calibration Certificate

201 Wolf Drive • P.O. Box 87 • Thorofare, NJ 08086-0087 • Phone: 856-686-1600 • Fax: 856-686-1601 • www.troemner.com • e-mail: troemner@troemner.com

SECTION 1: NAME AND ADDRESS OF CUSTOMER

Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

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Pipette Gravimetric

Certificate Number 19365
Date of Calibration 27-NOV-2002

SECTION 2: APPROVED SIGNATORY

Beth E. Hammell

SECTION 3: PERSON PERFORMING WORK

Joseph Moran

SECTION 4: CERTIFICATE INFORMATION

Description of Pipette: MLA 50-200 UL
Manufacturer of Pipette: VISTALAB (MLA)

Order Number	: 9000000	Date Received	: 27-NOV-2002
Serial Number	: 19365	Date of Calibration	: 27-NOV-2002
Balance Used	: AX205	Date of Issue	: 27-NOV-2002

SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 21.40°C	Pressure: 762.35 mm Hg	Humidity: 43.00%
Air Density: 0.001198	Cubic Expansion: 0.000017	Z-Factor: 1.003130

SECTION 6: PERTINENT INFORMATION

The Pipette listed on this calibration report have been tested on balances calibrated with reference mass standards that are directly traceable to the National Institute of Standards and Technology under Test No. 822/264157-00.

This calibration meets specifications as outlined in DIN 12650, ISO 8655, ASTM E1154, ISO 9001, ISO/IEC 17025.

The uncertainty is the error in volume due to the measurement process. Uncertainty is calculated per NIST Technical Note 1297 using a coverage factor of $k = 2$ ($k = 2$ defines an interval having a level of confidence of approximately 95 percent).

The temperature humidity transmitter used to monitor the environmental conditions in the calibration laboratory has been calibrated and certified in accordance with the requirements of the United Kingdom Accreditation Service as specified in the UKAS Accreditation Standard and UKAS regulations. This is traceable to recognized national standards and to units of measurement realized at the National Physical Laboratory or other recognized national standards laboratories.

The barometric transducers used to monitor the barometric pressure of the calibration laboratory has been calibrated with primary standards that are directly traceable to the National Institute of Standards and Technology.

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SECTION 7: CALIBRATION DATA AS FOUND

Measurement Series 50.00 μ l

(μ l)	Channel	Sample #	Sample (mg)	Volume (μ l)
50.00	1	1	50.010	50.167
50.00	1	2	50.020	50.177
50.00	1	3	50.010	50.167
50.00	1	4	50.010	50.167

Mean Value	(\bar{x}):	50.169	μ l	Method:	Addition - Tare
Inaccuracy	(d):	0.338	%	Inaccuracy Limit:	\pm 2.00%
Imprecision	(CV):	0.010	%	Imprecision Limit:	\leq 0.67%
Uncertainty	:	0.300	μ l	Result:	PASSED

Measurement Series 125.00 μ l

(μ l)	Channel	Sample #	Sample (mg)	Volume (μ l)
125.00	1	1	125.000	125.391
125.00	1	2	125.020	125.411
125.00	1	3	125.000	125.391
125.00	1	4	125.010	125.401

Mean Value	(\bar{x}):	125.399	μ l	Method:	Addition - Tare
Inaccuracy	(d):	0.319	%	Inaccuracy Limit:	\pm 1.00%
Imprecision	(CV):	0.008	%	Imprecision Limit:	\leq 1.00%
Uncertainty	:	0.340	μ l	Result:	PASSED

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SECTION 7: CALIBRATION DATA AS FOUND

Measurement Series 200.00 μ l

(μ l)	Channel	Sample #	Sample (mg)	Volume (μ l)
200.00	1	1	200.010	200.636
200.00	1	2	200.000	200.626
200.00	1	3	200.000	200.626
200.00	1	4	200.020	200.646

Mean Value (\bar{x}): 200.634 μ l
Inaccuracy (d): 0.317 %
Imprecision (CV): 0.005 %
Uncertainty : 0.500 μ l

Method: Addition - Tare
Inaccuracy Limit: \pm 1.00%
Imprecision Limit: \leq 0.00%
Result: PASSED

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SECTION 8: CALIBRATION DATA AS LEFT

Measurement Series 50.00 μ l

(μ l)	Channel	Sample #	Sample (mg)	Volume (μ l)
50.00	1	1	50.010	50.167
50.00	1	2	50.020	50.177
50.00	1	3	50.000	50.157
50.00	1	4	50.010	50.167
50.00	1	5	50.010	50.167
50.00	1	6	50.010	50.167
50.00	1	7	50.020	50.177
50.00	1	8	50.020	50.177
50.00	1	9	50.010	50.167
50.00	1	10	50.010	50.167

Mean Value	(\bar{x}):	50.169	μ l	Method:	Addition - Tare
Inaccuracy	(d):	0.337	%	Inaccuracy Limit:	\pm 2.00%
Imprecision	(CV):	0.013	%	Imprecision Limit:	\leq 0.67%
Uncertainty	:	0.300	μ l	Result:	PASSED

Measurement Series 125.00 μ l

(μ l)	Channel	Sample #	Sample (mg)	Volume (μ l)
125.00	1	1	125.000	125.391
125.00	1	2	125.020	125.411
125.00	1	3	125.020	125.411
125.00	1	4	125.010	125.401
125.00	1	5	125.010	125.401
125.00	1	6	125.010	125.401
125.00	1	7	125.010	125.401
125.00	1	8	125.000	125.391
125.00	1	9	125.020	125.411
125.00	1	10	125.010	125.401

Mean Value	(\bar{x}):	125.402	μ l	Method:	Addition - Tare
Inaccuracy	(d):	0.322	%	Inaccuracy Limit:	\pm 1.00%
Imprecision	(CV):	0.006	%	Imprecision Limit:	\leq 1.00%
Uncertainty	:	0.340	μ l	Result:	PASSED

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SECTION 8: CALIBRATION DATA AS LEFT

Measurement Series 200.00 μ l

(μ l)	Channel	Sample #	Sample (mg)	Volume (μ l)
200.00	1	1	200.000	200.626
200.00	1	2	200.000	200.626
200.00	1	3	200.010	200.636
200.00	1	4	200.020	200.646
200.00	1	5	200.000	200.626
200.00	1	6	200.020	200.646
200.00	1	7	200.010	200.636
200.00	1	8	200.010	200.636
200.00	1	9	200.000	200.626
200.00	1	10	200.030	200.656

Mean Value (\bar{x}): 200.636 μ l
Inaccuracy (d): 0.318 %
Imprecision (CV): 0.005 %
Uncertainty : 0.500 μ l

Method: Addition - Tare
Inaccuracy Limit: \pm 1.00%
Imprecision Limit: \leq 1.00%
Result: PASSED

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SECTION 9: PARTS

CLEANED & GREASED PISTON