TROEMNER
Henry Troemner LLC

Calibration Certificate

UKAS CALIBRATION
0516

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

Weight

Serial Number 120402
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

SECTION 1: NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 2: APPROVED SIGNATORY

Joseph Moran

SECTION 3: PERSON PERFORMING WORK

Katharine Ellison

SECTION 4: CERTIFICATE INFORMATION

Description of Masses: 5kg - 2mg Weight Set

Accuracy Class	: OIML R111 Class E2	Date Received	: N/A
Order Number	: 12345	Date of Calibration	: 04-DEC-2002
Construction	: One Piece	Date of Issue	: 06-DEC-2002
Material	: Stainless Steel	Weight Range	: 5kg - 10mg
	: Aluminum		: 5mg - 2mg
Serial Number	: 120402		

SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 21.00°C Pressure: 773.80 mm Hg Relative Humidity: 43%

SECTION 6: PERTINENT INFORMATION

The Weights listed on this calibration report have been compared to reference mass standards that are directly traceable to the United States National Institute of Standards and Technology under Test No. 822/265036-01.

Reference standards and balances used to perform the calibration are listed in Section 10.

The laboratory's quality system, under which this calibration was performed, meets the general requirements of ISO/IEC 17025, EN 45001 and applicable documents.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TROEMNER
Henry Troemner LLC

Calibration Certificate

UKAS CALIBRATION
0516

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

Weight
Serial Number 120402
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 7: TRUE MASS (MASS IN VACUUM) CALIBRATION DATA

Nominal Mass Value	Serial Number	True Mass	Density[1] of Weight	Uncertainty (+ or -)
5 kg		5000.00000 g	7.9500 g/cm³	0.30 mg
2 kg		2000.00001 g	7.9500 g/cm³	0.15 mg
2 kg *		2000.00007 g	7.9500 g/cm³	0.15 mg
1 kg		1000.000001 g	7.9500 g/cm³	0.050 mg
500 g		500.000500 g	7.9500 g/cm³	0.050 mg
200 g		200.000342 g	7.9500 g/cm³	0.033 mg
200 g *		200.000344 g	7.9500 g/cm³	0.033 mg
100 g		100.000145 g	7.9500 g/cm³	0.017 mg
50 g		50.000085 g	7.9500 g/cm³	0.010 mg
20 g		20.000024 g	7.9500 g/cm³	0.005 mg
20 g *		20.000062 g	7.9500 g/cm³	0.005 mg
10 g		10.000015 g	7.9500 g/cm³	0.004 mg
5 g		5.0000041 g	7.9500 g/cm³	0.0020 mg
2 g		2.0000004 g	7.9500 g/cm³	0.0015 mg
2 g *		2.0000087 g	7.9500 g/cm³	0.0015 mg
1 g		0.9999950 g	7.9500 g/cm³	0.0015 mg
500 mg		0.5000003 g	7.9500 g/cm³	0.0006 mg
200 mg		0.1999997 g	7.9500 g/cm³	0.0006 mg
200 mg *		0.2000010 g	7.9500 g/cm³	0.0006 mg
100 mg		0.0999986 g	7.9500 g/cm³	0.0006 mg
50 mg		0.0500024 g	7.9500 g/cm³	0.0006 mg
20 mg		0.0199992 g	7.9500 g/cm³	0.0006 mg
20 mg *		0.0200007 g	7.9500 g/cm³	0.0006 mg
10 mg		0.0100009 g	7.9500 g/cm³	0.0006 mg
5 mg		0.0050008 g	2.7000 g/cm³	0.0006 mg
2 mg		0.0020002 g	2.7000 g/cm³	0.0006 mg

1 Density is assumed unless otherwise stated
* Denotes weight is marked with a dot

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TROEMNER
Henry Troemner LLC

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

Weight
Serial Number 120402
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 8: MASS IN AIR CALIBRATION VALUE VS. REFERENCE DENSITY 8000 kg m $^{-3}$

Nominal Mass Value	Serial Number	Conventional Mass Value	Uncertainty (+ or -)	Tolerance (+ or -)
5 kg		4999.99528 g	0.30 mg	7.5000 mg
2 kg		1999.99801 g	0.15 mg	3.0000 mg
2 kg *		2000.00005 g	0.15 mg	3.0000 mg
1 kg		999.998999 g	0.050 mg	1.5000 mg
500 g		500.000000 g	0.050 mg	0.7500 mg
200 g		200.000142 g	0.033 mg	0.3000 mg
200 g *		200.000144 g	0.033 mg	0.3000 mg
100 g		100.000045 g	0.017 mg	0.1500 mg
50 g		50.000035 g	0.010 mg	0.1000 mg
20 g		20.000004 g	0.005 mg	0.0800 mg
20 g *		20.000042 g	0.005 mg	0.0800 mg
10 g		10.000005 g	0.004 mg	0.0600 mg
5 g		4.9999994 g	0.0020 mg	0.0500 mg
2 g		1.9999985 g	0.0015 mg	0.0400 mg
2 g *		2.0000069 g	0.0015 mg	0.0400 mg
1 g		0.9999941 g	0.0015 mg	0.0300 mg
500 mg		0.4999998 g	0.0006 mg	0.0250 mg
200 mg		0.1999995 g	0.0006 mg	0.0200 mg
200 mg *		0.2000008 g	0.0006 mg	0.0200 mg
100 mg		0.0999985 g	0.0006 mg	0.0150 mg
50 mg		0.0500023 g	0.0006 mg	0.0120 mg
20 mg		0.0199992 g	0.0006 mg	0.0100 mg
20 mg *		0.0200006 g	0.0006 mg	0.0100 mg
10 mg		0.0100009 g	0.0006 mg	0.0080 mg
5 mg		0.0050007 g	0.0006 mg	0.0250 mg
2 mg		0.0020002 g	0.0006 mg	0.0060 mg

* Denotes weight is marked with a dot

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.
The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TROEMNER
Henry Troemner LLC

Calibration Certificate

UKAS CALIBRATION
0516

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

Weight
Serial Number 120402
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 9: MASS IN AIR CALIBRATION DATA VS. REFERENCE DENSITY 8000 kg m $^{-3}$

Nominal Mass Value	Serial Number	Conventional Mass Correction	Uncertainty (+ or -)	Tolerance (+ or -)
5 kg		-4.72 mg	0.30 mg	7.5000 mg
2 kg		-1.99 mg	0.15 mg	3.0000 mg
2 kg *		0.05 mg	0.15 mg	3.0000 mg
1 kg		-1.000 mg	0.050 mg	1.5000 mg
500 g		0.001 mg	0.050 mg	0.7500 mg
200 g		0.142 mg	0.033 mg	0.3000 mg
200 g *		0.144 mg	0.033 mg	0.3000 mg
100 g		0.045 mg	0.017 mg	0.1500 mg
50 g		0.035 mg	0.010 mg	0.1000 mg
20 g		0.004 mg	0.005 mg	0.0800 mg
20 g *		0.042 mg	0.005 mg	0.0800 mg
10 g		0.005 mg	0.004 mg	0.0600 mg
5 g		-0.0006 mg	0.0020 mg	0.0500 mg
2 g		-0.0015 mg	0.0015 mg	0.0400 mg
2 g *		0.0069 mg	0.0015 mg	0.0400 mg
1 g		-0.0059 mg	0.0015 mg	0.0300 mg
500 mg		-0.0002 mg	0.0006 mg	0.0250 mg
200 mg		-0.0005 mg	0.0006 mg	0.0200 mg
200 mg *		0.0008 mg	0.0006 mg	0.0200 mg
100 mg		-0.0015 mg	0.0006 mg	0.0150 mg
50 mg		0.0023 mg	0.0006 mg	0.0120 mg
20 mg		-0.0008 mg	0.0006 mg	0.0100 mg
20 mg *		0.0006 mg	0.0006 mg	0.0100 mg
10 mg		0.0009 mg	0.0006 mg	0.0080 mg
5 mg		0.0007 mg	0.0006 mg	0.0250 mg
2 mg		0.0002 mg	0.0006 mg	0.0060 mg

* Denotes weight is marked with a dot

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TROEMNER
Henry Troemner LLC

Calibration Certificate

UKAS CALIBRATION
0516

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

Weight
Serial Number 120402
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 10: CALIBRATION PROCEDURE DATA

Nominal Mass Value	Serial Number	Standard Set No.	Balanced Used	Procedure Used
5 kg		S1	AT10005-125	Mass Code
2 kg		S1	AT10005-125	Mass Code
2 kg *		S1	AT10005-125	Mass Code
1 kg		S1	AT1005-124	Mass Code
500 g		S1	AT1005-124	Mass Code
200 g		S1	AT1005-124	Mass Code
200 g *		S1	AT1005-124	Mass Code
100 g		S1	AT106-123	Mass Code
50 g		S1	AT106-123	Mass Code
20 g		S1	AT106-123	Mass Code
20 g *		S1	AT106-123	Mass Code
10 g		S1	AT106-123	Mass Code
5 g		S1	UMT5-122	Mass Code
2 g		S1	UMT5-122	Mass Code
2 g *		S1	UMT5-122	Mass Code
1 g		S1	UMT5-122	Mass Code
500 mg		S1	UMT5-122	Mass Code
200 mg		S1	UMT5-122	Mass Code
200 mg *		S1	UMT5-122	Mass Code
100 mg		S1	UMT5-122	Mass Code
50 mg		S1	UMT5-122	Mass Code
20 mg		S1	UMT5-122	Mass Code
20 mg *		S1	UMT5-122	Mass Code
10 mg		S1	UMT5-122	Mass Code
5 mg		S1	UMT5-122	Mass Code
2 mg		S1	UMT5-122	Mass Code

* Denotes weight is marked with a dot

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TROEMNER
Henry Troemner LLC

Calibration Certificate

UKAS CALIBRATION
0516

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

Weight
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 11: GENERAL INFORMATION

This calibration was performed in Troemner's High Precision Level I Mass Metrology Laboratory at 201 Wolf Drive, Thorofare, New Jersey 08086 unless otherwise noted on page one.

SECTION 12: DEFINITIONS AND TERMS

MASS IN A VACUUM - The mass of a weight as if it were measured in a vacuum. Also known as True Mass.

MASS IN AIR - The conventional value of the result of weighing in air, in accordance to International Recommendation OIML R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of a density of 8000 kg·m^{-3} which it balances in air of a density of 1.2 kg·m^{-3}.

AS FOUND MASS IN A VACUUM - The measured value of the mass(es) as they were received by Troemner. If the customer requires cleaning prior to calibration, the after cleaning value would be reported.

AS LEFT MASS IN A VACUUM - The measured value of the mass(es) after they were adjusted, repaired or replaced when necessary. The As Found Mass in a Vacuum will equal the As Left Mass in a Vacuum if the mass(es) did not require adjustment, repair or replacement.

NOMINAL MASS - The mass value as marked on the weight.

CORRECTION - The difference between the mass value of a weight and its nominal value. A positive correction indicates that the mass value is greater than the nominal value by the amount of the correction.

AS FOUND CONVENTIONAL MASS CORRECTION - The conventional correction of the result, as it was received by Troemner, of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 kg·m^{-3} which it balances in air density of 1.2 kg·m^{-3}. If the customer requires cleaning prior to calibration, the after cleaning correction would be reported.

AS LEFT CONVENTIONAL MASS CORRECTION - The conventional correction of the result, after adjustment repair, or replacement of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density of 8000 kg·m^{-3} which it balances in air density of 1.2 kg·m^{-3}. The As Found will equal the As Left Conventional Mass Correction if the mass(es) did not require adjustment, repair or replacement.

UNCERTAINTY - The error in assignment of the correction due to the measurement process. Uncertainty is calculated in accordance with UKAS document M3003 using a coverage factor of $k = 2$ ($k = 2$ defines an interval having a level of confidence of approximately 95 percent).

(continued on next page)

TROEMNER
Henry Troemner LLC

Calibration Certificate

UKAS CALIBRATION
0516

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

Weight
Certificate Number 03008-1
Date of Calibration 04-DEC-2002

NAME AND ADDRESS OF CUSTOMER

End user
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

Client
Henry Troemner LLC
201 Wolf Drive
Thorofare, NJ 08086

SECTION 12: DEFINITIONS AND TERMS (continued)

TOLERANCE - Defines the limits in which the correction value must fall to meet the tolerance specification for the given Class.

AS FOUND CONVENTIONAL MASS VALUE - The measured value of the mass(es) as they were received by Troemner, of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. If the customer requires cleaning prior to calibration, the after cleaning value would be reported.

AS LEFT CONVENTIONAL MASS VALUE - The measured value of the mass(es) after they were adjusted, repaired or replaced when necessary, of weighing in air in accordance to International Recommendation R 33. For a weight taken at 20° C, the Conventional Mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density if 1.2 $kg \cdot m^{-3}$. The As Found will equal the As Left Conventional Mass Value if the mass(es) did not require adjustment, repair or replacement.