

Weight Calibration Certificate

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Page 1 of 7 Pages

SECTION 1: NAME AND ADDRESS OF CUSTOMER

Certificate Number 188706-1
Date of Calibration 13-MAR-2001

End user
Southwest Res Institute
Bldg-57
5704 Business Park
San Antonio TX 78218

Client
Fisher Scientific (Pittsburgh)
P O Box 1768
Pittsburgh PA 15230

SECTION 2: APPROVED SIGNATORY


Robert Thompson

SECTION 3: PERSON PERFORMING WORK

Derek Lazzaro

SECTION 4: CERTIFICATE INFORMATION

Description of Masses: Troemner 20g S/S S/K Ind. Weight

Accuracy Class	: ASTM E617-97 Class 1	Date Received	: N/A
Order Number	: 1.20.0754	Date of Calibration	: 13-MAR-2001
Construction	: Two Piece	Date of Issue	: 13-MAR-2001
Material	: Stainless Steel	Weight Range	: 20g

SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 21.95°C Pressure: 749.67 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 National Institute of Standards and Technology under Test No. 822/264157-00.

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

The weights calibrated for this report have been calibrated in accordance with Troemner's calibration process. The calibration performed meets Level I criteria as described in the NIST/NVLAP Technical Guide 150-2.

This calibration also meets specifications as outlined in ISO 9001, ISO Guide 25, ANSI/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable documents.

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Pittsburgh PA 15230

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

Nominal Mass Value	Serial Number	True Mass	Density ¹ of Weight	Uncertainty (+ or -)
20 g	66388	20.0000921 g	7.8500 g/cm ³	0.0151 mg

¹ Density is assumed unless otherwise stated

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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 -)
20 g	66388	20.0000348 g	0.0151 mg	0.0740 mg

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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 -)
20 g	66388	0.0348 mg	0.0151 mg	0.0740 mg

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Pittsburgh PA 15230

SECTION 10: CALIBRATION PROCEDURE DATA

Nominal Mass Value	Serial Number	Standard Set No.	Balance Used	Procedure Used	Finish Grade	Type
20 g	66388	S118	AT106-118	3-1 Modified		

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Fisher Scientific (Pittsburgh)
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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 133. 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 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)

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Pittsburgh PA 15230

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·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 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·m⁻³ which it balances in air density of 1.2 kg·m⁻³. The As Found will equal the As Left Conventional Mass Value if the mass(es) did not require adjustment, repair or replacement.

SOUTHWEST RESEARCH INSTITUTE

Calibration Laboratory

WORK ORDER

Received by MROMERO, 4/15/02 10:58:54AM

||||| ||||| ||||| ||||| ||||| ||||| |||||

Arrived 4/15/02

Work Order **444048153**

Asset No. 009341 Manufacturer TROEMNER

Model 20G

Equipment Type WEIGHT, CLASS 1

Serial No. 66388

Accessory No.

Interval 12 M

Calibration Procedure _____ Location _____

Div/Client DIV20

Custodian BRADLEY WERLING

Mail Stop B57

Tel 6565

IN LINE

Special Instructions _____

Notify before adjustments or repairs. () Provide data with certificate () Certificate Type _____

Charge/Project No. 00751.006 1.20

Requester / Telephone BRADLEY

This information is correct for the work requested.

Bradley Werling

WORK NOTES

Date	Hours	Remarks/Notes
<u>4-19-02</u>		<u>Troemner (w/ #38⁰⁰ T.A.T. 3-4 Wks)</u>
		<u>ST # 399452 Req # 584262</u>

NVLAP

Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code 105013.

TROEMNER

SERIAL NO

66388

RECAL DUE 6-3-03

CERT NO 0197041

201 WOLF DRIVE, PO BOX 87

THOROFARE, NJ 08086 USA

DATE CAL

6-3-02

CLASS 1

PHONE: 856-686-1800

FAX: 856-686-1801

Date	Hours	Part Name	Part Number	Failure Description	Cost

WORK SUMMARY

Failure Description NA

Repair Action _____

Tech Troemner Cal Hrs. _____ Repair Hrs _____ Parts Cost _____ Temp 71 F Hum. 42 %

Standards Used Vander

Date Picked Up 6-10-2002

Picked Up By *Bradley Werling*

48153

**SOUTHWEST RESEARCH INSTITUTE
CALIBRATION LABORATORY
MEMORANDUM**

June 10, 2002

To: BRADLEY WERLING DIV20 B57

From: Walt Hill, Metrology Group Leader 
Institute Calibration Laboratory

Subject: Status of Calibration Supplier

Manufacturer/Model: TROEMNER 20G

Description: WEIGHT, CLASS 1

Serial Number: 66388

Asset Number: 009341

Work Order Number: 444048153

Date Calibrated: June 3, 2002

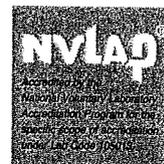
Supplier: TROEMNER, THOROFARE, N.J.

Remarks: Troemner Cert # 222904A-1

- Supplier is on the Approved Suppliers List (ASL) and is accredited.
- Supplier is on the Approved Suppliers List (ASL) but is not accredited.
- There is no known accredited supplier at this time.
- Supplier is not on the Approved Suppliers List (ASL). Please contact Don Dunavant at ext. 2942 if you wish to add the supplier to the ASL.

Please notify the Institute Calibration Laboratory, extension 5215, of any discrepancies with the item or calibration documentation.

Attachment(s) 7



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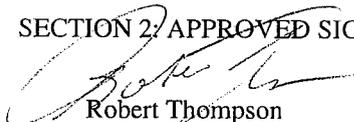
SECTION 1: NAME AND ADDRESS OF CUSTOMER

Certificate Number 222904A-1
Date of Calibration 03-JUN-2002

End user
Southwest Research Inst.
6220 Culbera Road
San Antonio TX 78238-5166

Client
Southwest Research Inst.
P.O.Box 28510
Attn: Accounts Payable
San Antonio TX 78228-0510

SECTION 2: APPROVED SIGNATORY


Robert Thompson

SECTION 3: PERSON PERFORMING WORK

Heather Trautner

SECTION 4: CERTIFICATE INFORMATION

Description of Masses: Troemner S/S S/K 20g Individual Weight

Accuracy Class	: ASTM E617-97* Class 1	Date Received	: 23-APR-2002
Order Number	: 280473R	Date of Calibration	: 03-JUN-2002
Construction	: Two Piece	Date of Issue	: 04-JUN-2002
Material	: Stainless Steel	Weight Range	: 20g

SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 21.90°C Pressure: 761.25 mm Hg Relative Humidity: 42%

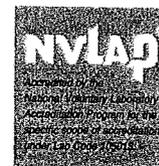
SECTION 6: PERTINENT INFORMATION

The Weights listed on this calibration report have been compared to reference mass standards that are directly traceable to the 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 weights calibrated for this report have been calibrated in accordance with Troemner's calibration process. The calibration performed meets Level I criteria as described in the NIST/NVLAP Technical Guide 150-2.

This calibration also meets specifications as outlined in ISO 9001, ISO/IEC 17025, ANSI/NCSL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable documents.



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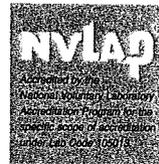
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SECTION 7: TRUE MASS (MASS IN VACUUM) CALIBRATION DATA

Nominal Mass Value	Serial Number	True Mass		Density ¹ of Weight	Uncertainty (+ or -)
		As Found	As Left		
20 g	66388	20.0000950 g	20.0000950 g	7.8500 g/cm ³	0.0144 mg

¹ Density is assumed unless otherwise stated



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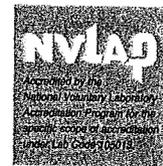
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SECTION 8: MASS IN AIR CALIBRATION VALUE VS. REFERENCE DENSITY 8000 kg m⁻³

Nominal Mass Value	Serial Number	---- Conventional Mass Value ----		Uncertainty (+ or -)	Tolerance (+ or -)
		As Found	As Left		
20 g	66388	20.0000376 g	20.0000376 g	0.0144 mg	0.0740 mg



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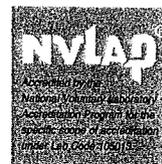
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SECTION 9: MASS IN AIR CALIBRATION DATA VS. REFERENCE DENSITY 8000 kg m⁻³

Nominal Mass Value	Serial Number	-- Conventional Mass Correction --		Uncertainty (+ or -)	Tolerance (+ or -)
		As Found	As Left		
20 g	66388	0.0376 mg	0.0376 mg	0.0144 mg	0.0740 mg



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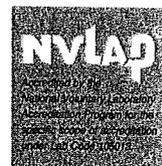
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SECTION 10: CALIBRATION PROCEDURE DATA

Nominal Mass Value	Serial Number	Standard Set No.	Balance Used	Procedure Used	Finish Grade	Type
20 g	66388	S118	AT106-118	3-1 Modified		



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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.

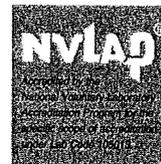
CORRECTION - The difference between the mass value of a weight and its nominal value. A positive correction indicates that the mass value is greater than the nominal value by the amount of the correction.

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 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).

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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·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 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·m⁻³ which it balances in air density of 1.2 kg·m⁻³. The As Found will equal the As Left Conventional Mass Value if the mass(es) did not require adjustment, repair or replacement.

ASTM E617-97* - Weights meet the tolerance specification for ASTM E617-97