

Troemner Calibration Services – Mass



Precision & Balance Matched Only By Nature.



Troemner is the country's largest independent commercial mass metrology laboratory offering complete, full-time mass calibration services. Troemner's mass calibration laboratories and processes are ISO/IEC 17025 compliant. Troemner's Calibration Laboratories have the capability of providing mass calibrations from 0.050 mg to 2000 kg (0.00001 oz to 5000 lb).

Troemner has earned dual accreditations for performing mass calibrations from the National Institute of Standards and Technology (NIST) -administered National Voluntary Laboratory Accreditation Program (NVLAP) and the United Kingdom Accreditation Service (UKAS). These accreditations, as well as our ISO 9001 registration, require Troemner to routinely undergo rigorous audits assuring our customers that their precision calibration weights and mass

standards meet the highest quality standards around the world. Troemner has the added distinction of being the only United States Mass Metrology Laboratory with both NVLAP and UKAS accreditations.

Facility and Environment

Troemner's Mass Laboratories are constructed to meet the strict environmental guidelines listed in NVLAP Handbook 150-2. In fact, our Level I Laboratory exceeds the Environmental Cleanliness System according to Class 1,000 requirements. Troemner's Level I Laboratory has been accredited for mass calibrations by both NVLAP and UKAS since 1995.

Troemner's Level I Laboratory is comprised of two rooms, the Calibration Laboratory and the Automated Mass Comparator Laboratory. The climate in the

Level I Laboratory is strictly monitored and controlled. Temperature in the laboratory is measured to 0.01 degree C and controlled to within 0.2 degree C, with no more than a 0.2 degree C change per hour. Humidity is measured to $\pm 2\%$ with no more than a 5% change per hour. Barometric pressure is measured to 0.01 mm Hg. Multiple Hepa-filtered air vents comprise 50% of the ceiling. This reduces air velocity and air currents in the laboratory, which increases mass comparator performance while maintaining close environmental control.

Troemner's Level III Laboratory is also accredited by NVLAP. Here weights are calibrated to NIST Class F tolerances in the range from 300 g to 1,000 kg (0.05 lb to 3,000 lb) as outlined in NIST Handbook 105-1, Specifications and Tolerances for Reference Standards and Field Standard Weights and Measures.

Equipment

All mass comparators used in Troemner's Calibration Laboratories are state-of-the-art with the highest precision possible. Troemner currently has 34 mass comparators, four of which are automated for calibrating ultra precise mass standards. All mass comparators are positioned on marble tables. Troemner's most recent acquisition is a Mettler Toledo, Inc. AX64004 Automated Mass Comparator for large precision weights from 10 kg to 60 kg. Troemner is the only independent calibration laboratory in the United States that can provide calibrations with this type of balance.

Each mass comparator has its own temperature probe mounted within the weighing chamber to measure the temperature at the time of calibration in order to make an accurate air buoyancy correction. Comparators are interfaced to a file server outside the lab for processing calibration data. Custom software programs ensure the accuracy of the data collection process and eliminate transposition errors. The laboratory staff takes many precautions to ensure that these sensitive instruments work to their maximum level of accuracy. Measurements for OIML Class E1 and ASTM Class O Weights are made in the Automated Mass Comparator Laboratory, as well as the surveillance of Troemner's primary standards.

Staff

Troemner's four person metrology staff has received training in mass calibrations at NIST and has extensive experience in mass calibration. Many of the calibration technicians have also received training from NIST in addition to extensive in house training.

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Processes

Calibration procedures for the highest precision weights include redundant measurements against multiple standards to assure that your calibration is of the highest quality. During a calibration of high precision weights, the values of the two standards used are verified against one another to assure accuracy of the calibration. Troemner maintains three sets of Primary Mass Standards directly traceable to NIST.

Mass Calibration Services Include:

- **Calibration "as found" and "as left" calibrated values**
- **Cleaning** – Foreign contaminants on weights will be removed
- **Adjustment** – If weights are found to be out of tolerance, then the weights can be adjusted (2 piece weights only)
- **Detailed certificate provided with your weights**
- **Fast turnaround time**

The following services are available at an extra charge:

- **NVLAP accredited Density Determination** – For type one, one-piece weights only
- **NVLAP accredited Magnetic Susceptibility Determination** – For type one, one-piece weights only
- **Repair of weights**
- **Repair or replacement of weight cases**
- **Storage case repair or replacement**
- **Calibration management program**

Troemner offers a variety of standard calibration services and certificates to meet your particular needs. We can also customize documentation to meet your requirements. Below is a description of the various certificates available from Troemner:

- **NVLAP Weight Calibration Certificate** – a detailed, multi-page weight certificate designed to meet all of your ISO (including ISO/IEC 17025), FDA, GMP, GLP, DOD, ANSI/NCSL Z540-1, and nuclear requirements. The NIST-administered National Voluntary Laboratory Accreditation Program

(NVLAP Lab Code 105013-0) approves all procedures for this detailed weight certificate. The measurement process follows the recommendations of NIST Handbook 145. To review the document details please visit our website at www.troemner.com.

- **UKAS Certificate of Weight Calibration** – similar to the NVLAP Certificate in content and form, however, it is more widely accepted in the European community. It meets the requirements of the United Kingdom Accreditation Service (UKAS). This Certificate of Weight Calibration is universally accepted throughout the world. Troemner (UKAS International Calibration No. 0516) is presently the only UKAS-accredited U.S. mass metrology laboratory offering its customers this internationally recognized Certificate of Weight Calibration. Additionally, Troemner's UKAS accreditation fulfills the requirements of ISO/IEC 17025 - the widely accepted standard for competence of calibration laboratories.

- **NVLAP Density Determination Calibration for Weights and Mass Standards** – Troemner's mass metrology laboratory can determine the actual density of one-piece mass standards that range in size from 1 g to 5 kg. Troemner is the only private accredited laboratory in the United States for this calibration. Troemner provides this service to reduce the uncertainty of calibrating one-piece precision ASTM Class O and OIML Class E1 and E2 weights. Utilizing a state of the art balance immersed in a fluorinated fluid, a series of measurements are compared to a NIST traceable density standard to determine the density value.



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- **NVLAP Magnetic Susceptibility Determination Calibration for Weights and Mass Standards** – Troemner has the capability of measuring the magnetic field intensity and the potential magnetic susceptibility of stainless steel mass standards between 1 g and 10 kg. Troemner is the only private accredited laboratory in the United States for this calibration.

Troemner's Calibration Laboratories can also provide the following certificates with our calibration service.

- **Traceable Weight Certificate** – Designed for those laboratories and companies that require traceability, but do not need to meet any stringent regulatory requirements. In contrast to NVLAP or UKAS calibration procedures, the Traceable Weight Certificate measurement process is based on a single standard and utilizes one series of comparisons. To review the document details please visit our website at www.troemner.com.
- **Troemner MMAP Report of Mass Values** - Troemner offers a detailed statistical analysis of mass values. Troemner MMAP report follows a carefully designed high-end calibration procedure that compares the customer's weights to Troemner's primary standards. This results in the highest possible statistical confidence level for our customer's weights. The multi-page Troemner MMAP report is the same report one would receive if weights were calibrated directly by NIST.

On the next page is a comparison of the various mass calibrations and certificates available.

TROEMNER MASS UNCERTAINTY TABLE			
Range	Balance Used *	NVLAP (Code 105013-0) Accredited Uncertainty (±)	Troemner Best Uncertainty (±)
1000 kg	R-50 RUSSELL	10.34 g	10.34 g
500 kg	KB500	5.03 g	5.03 g
200 kg	KB500	3.26 g	3.26 g
100 kg	KB500	1.64 g	1.64 g
50 kg	AX64004	0.087 g	5.0 mg
30 kg	AX64004	10.0 mg	3.0 mg
20 kg	AX64004	4.0 mg	1.0 mg
10 kg	AT10005	0.7 mg	0.59 mg
5 kg	AT10005	0.3 mg	0.30 mg
3 kg	AT10005	0.19 mg	0.15 mg
2 kg	AT10005	0.14 mg	0.10 mg
1 kg	AT1006	0.05 mg	0.049 mg
500 g	AT1006	0.05 mg	0.024 mg
300 g	AT1006	0.04 mg	0.04 mg
200 g	AT1006	0.033 mg	0.027 mg
100 g	AT106H	0.017 mg	0.014 mg
50 g	AT106H	0.010 mg	0.007 mg
30 g	AT106H	0.006 mg	0.004 mg
20 g	AT106H	0.005 mg	0.003 mg
10 g	AT106H	0.004 mg	0.002 mg
5 g	AT106H	0.002 mg	0.001 mg
3 g	UMT-5	0.002 mg	0.0021 mg
2 g-1 g	UMT-5	0.0015 mg	0.0015 mg
500 mg-10 mg	UMT-5	0.0006 mg	0.0006 mg
5 mg-1 mg	UMT-5	0.0006 mg	0.0004 mg

* Balances used are Mettler Toledo, Inc. (except for the R-50 Russell Balance)



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TROEMNER CERTIFICATES COMPARISON TABLE					
	NIST/NVLAP Calibration Certificate	UKAS Certificate of Calibration	Traceable Certificate	Statement of Accuracy	Troemner MMAP Report of Mass Values
Name, address, purchase order number	•	•	•		•
Date of calibration	•	•	•	•	•
Serial number	•	•	•	•	•
Equipment and standards used:					
Balance – calibration due dates	•	•			
Standards – calibration due dates	•	•			
Standards – corrections					•
Accuracy Class	•	•	•	•	•
Nominal value	•	•	•	•	•
Conventional mass value:					
"As found data" *	•	•			•
"As left data"	•	•			•
Conventional mass correction:					
"As found data" *	•	•	•		•
"As left data"	•	•	•		•
True mass value: (mass in a vacuum)					
"As found data" *	•	•			•
"As left data"	•	•			•
Uncertainty of measurement process	•	•	•		•
Environmental conditions during test	•	•			•
Construction and density of weights	•	•	•	•	•
Calibration procedures used	•	•			•
Statement of traceability to NIST	•	•	•		•
Measurement assurance data					•
Helpful list of terms and definitions	•	•			•
Use only one series of comparisons using a single standard	ANSI/ASTM Classes 2, 3, 4, 5, 6 OIML Classes F2, M1, M2 NIST Class F		All Classes		
Multiple comparisons using a check standard	ANSI/ASTM Classes 0, 1 Troemner UltraClass OIML Classes E1, E2, F1				All Classes
Meets ISO, FDA, GMP, DOD, ANSI/NCCL Z540-1, NCR 10CFR50 Appendix B	•	•			•

*As found data is not provided with new weights



Weight Selector
TROEMNER

Troemner's online Weight Selector takes the guess work out of choosing the correct weight for your application. Visit us at www.troemner.com and let us help you find exactly what you need.

