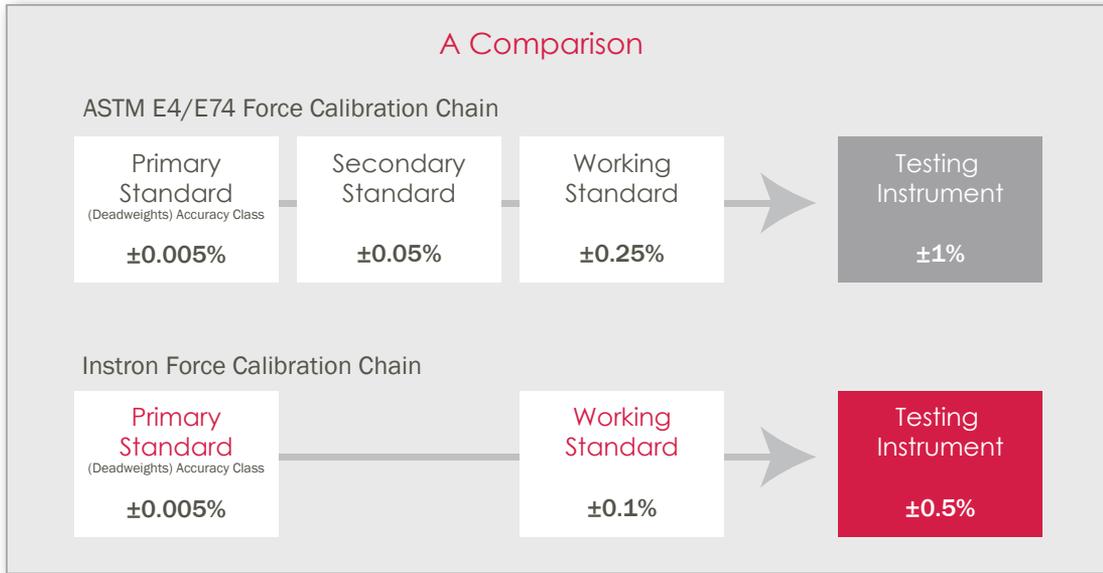


Factory Verification and Calibration Services

Instron® maintains primary force standards for delivery of laboratory ASTM E74 and ISO 376 verification services and the calibration of our on-site service standards. Instron is able to achieve a significantly higher level of accuracy for on-site force verification given the need for a secondary standard “in the calibration chain” is eliminated. The largest deadweight stack in North America - outside of the National Institute of Standards and Technology (NIST) - is maintained at Instron’s corporate headquarters.



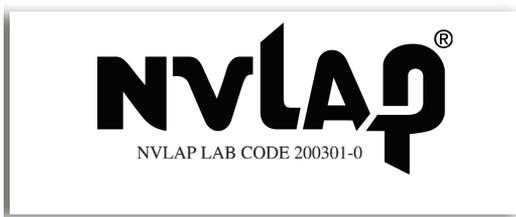
Instron Force Laboratory Verification Services — Partial Listing

		0.1 - 130,000 lbf	130,000 - 240,000 lbf	240,000 - 1,000,000 lbf
ASTM E74 and ISO 376 Verification Services	Mode	Tension and Compression	Tension and Compression	Compression
	*Uncertainty (k=2)	0.005%	0.01%	0.05%

* Uncertainties of the measured value are determined by the statistics of the test and the specimen tested, but are typically better than $\pm 0.05\%$ for class AA instruments, $\pm 0.1\%$ for class A1 instruments, and $\pm 0.25\%$ for class A instruments.

Our Accreditations

Our accreditations are accepted by all members of the International Laboratory Accreditation Cooperative (ILAC). Details of the scope of our accreditations can be accessed from www.instron.com



Instron Laboratories for factory and on-site field calibrations in North America are accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP®), lab code 200301-0. NVLAP is administered by the National Institute of Standards and Technology (NIST).

Our NVLAP accreditation, lab code 200301-0, also includes Instron's on-site field service operations in North America, Europe, Asia, and Australia.



Instron's Brazil Field operation is accredited to ABNT NBR ISO/IEC 17025 for force, displacement, and strain by Cgcre/Inmetro (CAL # 0443).

Glossary

Uncertainty of Measurement:

Is the doubt that exists about the result of a comparison test PROCESS. In even the most carefully executed test, there is always a margin of doubt and chance of false acceptance or rejection.

Two numbers are needed in order to quantify an uncertainty: one being the width of the margin, or interval and the other being a confidence level stating how sure we are that the 'true value' is within that margin.

It is also a means for comparing the "quality" of two verification processes. Expanded measurement uncertainty combines through calculation a calculated uncertainty of resolution, uncertainty of repeatability, and uncertainty of the standard used. It is important to make this calculation using the actual "in-situ" verification process data rather than nominal or best case estimates.

The International Laboratory Accreditation Cooperative (ILAC) requires that the expanded measurement uncertainty needs to be indicated on verification certificates for each test level verified.

Accuracy:

Is commonly defined as the difference between a measured value and the true value. Accuracy gets referred to in specifications in the form of 'accurate to $\pm X$ '.

Note:

Accuracy is usually a design specification of a product feature. Uncertainty is always a performance characteristic of a measurement process.

Calibration:

Is the process of comparing an unknown value to a known value. To calibrate a device is to compare a characteristic of that device with the characteristic of a similar device called a "standard". A calibration result most often indicates a difference between the two values.

Verification:

Is used to determine if the unit under test fulfills specified requirements. For example, ASTM and ISO standards define processes to be used for verification. If the measurement/calculation is made using these defined processes, with a defined level of accuracy, and is within the specified limits, the device is verified as conforming. Instron's services are typically verifications to ASTM and/or ISO standards.

Adjustment:

A common misconception is that calibration or verification means adjusting the output of a device to bring its performance "within limits". Adjustments made to the output of the device is separate from calibration and verification processes, and must be followed by a further calibration and verification to prove the adjustment was successful.

Learn More

Visit our website to learn more about the need for and requirements of materials testing equipment verification and the full range of capabilities Instron can provide to address your specific needs. Links to the detailed scope of our accreditations can always be found within the "About Us/Calibration" or calibration services section of www.instron.com.



Implementation Assistance



Installation



Training



Calibration



Preventive Maintenance



Technical Support



Repair & Parts



Upgrades



Relocation Assistance



Resources

Global Support Local to You

Instron® has a global infrastructure that is local to you and remains committed to being the leader in mechanical testing instrumentation. To find an office local to you, visit go.instron.com/locations

www.instron.com



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Tel: +1 800 564 8378 or +1 781 575 5000

European Headquarters
Coronation Road, High Wycombe, Bucks HP12 3SY, UK
Tel: +44 1494 464646



Verification and Calibration Services

Instron understands that the quality of verification and calibration services is critical to your test operations. We offer an extensive range of verification services in addition to force including strain, speed, displacement, alignment, impact, torque, temperature, and hardness, as well as dimensional verification of impact and CEAST® system components. Many of our calibration and verification services are available for non-Instron materials testing equipment.

Instron verification certificates address the requirements for verification in conformance with audited test application standard requirements.

Throughout the world Instron calibration laboratories and local on-site service operations are accredited to ISO/IEC 17025, the global recognized standard for testing and calibration laboratories.

Instron's proprietary CalproCR Software has been developed, validated, and extensively audited to automatically take data from the measurement standard and the testing instrument being calibrated. Instron verification software structures and monitors the verification process to eliminate (where possible) the potential for human error.

Instron maintains calibration certificate data in an audited repository for a minimum of six years. Our customers in North America may choose to access their certificates via a secure web site. However, you may contact your local Instron Professional Services office anywhere in the world to quickly access your systems' Instron verification certificates.

The Instron Difference

When you select Instron as your verification services provider the value extends well beyond the "calibration sticker". Our on-site verification services team can provide invaluable suggestions and training regarding test methods, perform preventive maintenance before issues arise, and quickly address non-conformance repair and/or instrument adjustment requirements (followed by re-verification if necessary) with minimum disruption and downtime – often without the need for additional service visits or travel charges.

If required by your quality system Instron Professional Services can provide additional services, beyond system performance verification certificates, to help you address your IQ/OQ software verification and installation requirements.

Instron equipment can often operate at higher performance levels than those specified as the minimum in verification standards. We have the tools and skills to verify system performance at those levels.

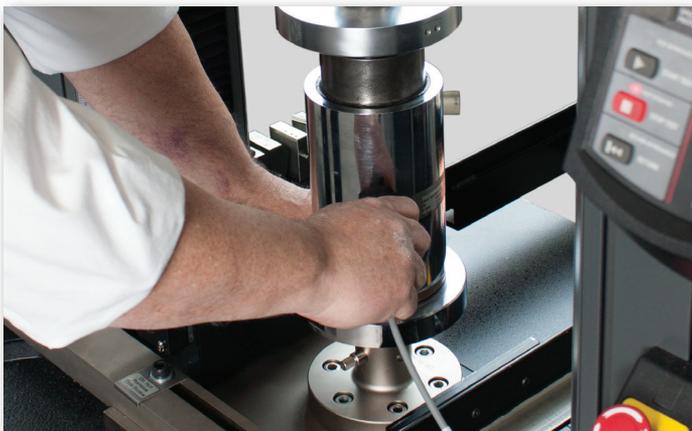
Additionally, we take great pride in the fact that we are directly involved with numerous standard-setting groups and are able to respond to changing standard requirements that impact our customers across a wide range of required verifications for materials testing applications.

The full range of Instron verification services and our support of developing standards will help you address verification requirements as your application and audit requirements change.

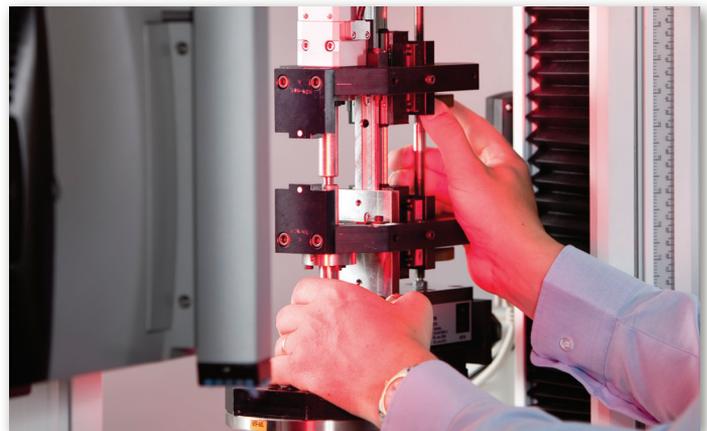
On-Site Verification and Calibration Services — Partial Listing

Type	Applicable Standard	Description
Force	ASTM E4 ISO 7500-1	Compression and Tension from 0.01 N (1 gf) to 4.5 MN (1,000,000 lb.)
	—	Compression 1 - 5 M lbf
Speed	ASTM E2658	Verification of Crosshead Speed in a Materials Testing Machine
Strain	ASTM E83 ISO 9513 ISO 527 ISO 5893	Verification & Classification of all Extensometer Types - Contacting and Non-Contacting
Alignment	ASTM E1012 Nadcap AC 7101 Nadcap AC 7122	Providing Alignment Verifications that meet the Exacting Demands of Nadcap and other Inspecting Authorities
Temperature	—	Environmental Cabinets, Furnaces, and Other Devices (-200°C to 900°C)
Displacement - Linear	ASTM E2309	Verification of Crosshead and Actuator Displacement up to 1000 mm Travel for a Wide Variety of Materials Testing Machines
Displacement - Rotary	—	Rotary Displacement of Torsion Actuator
Torque	ASTM E2624	Verification of Torsion and Angular Displacement Parameters now Common on many Biomedical Testing Systems up to 50k lb/in
C.O.D. Gauge	ASTM E399	Verification of Open Crack Displacement Gauge
Hardness	ASTM E10 ASTM E18 ASTM E384	Brinell for Metallic Materials Rockwell and Rockwell Superficial Hardness Microhardness (Knoop and Vickers)
Creep/Stress Rupture	ASTM E4	Creep, Creep Rupture, Stress Rupture
Pendulum Impact	ASTM E23	Verification of Conventional Pendulum Metals and Plastics Impact Testers to ASTM and ISO Standards, as well as the more Modern Drop Tower Impact Testing Systems
Strain Gauge Channel	—	Verification of Strain Gauge Channel using Simulator Device
CEAST Systems	—	Verification of Melt Flow, HDT, and Rheometer Testing Systems

Note:
In many ASTM application standards, force, displacement, and speed verifications in the test direction(s) used are jointly prescribed.



Load Cell Verification



Video Extensometer Verification

What to Look for in a Verification Certificate

CERTIFICATE OF CALIBRATION

ISSUED BY: INSTRON CALIBRATION LABORATORY

DATE OF ISSUE: _____ CERTIFICATE NUMBER: **104111413144458**

Instron
825 University Avenue
Norwood, MA 02062-2643
Telephone: (800) 473-7838
Fax: (781) 575-5750
Email: service_requests@instron.com

NVLAP Lab Code 200301-0

Page 1 of 4 pages

APPROVED SIGNATORY

Digitally signed by James O'Donovan
DN: cn=James O'Donovan, c=US,
ou=Instron, email=
Reason: I attest to the accuracy
and integrity of this document.
Date: 2013.11.15 09:35:51 -0500

Customer Requested Due Date: _____

Type of Calibration: Force
Relevant Standard: ASTM E4-13
Date of Calibration: _____

On-site service or laboratory verification process accreditation is listed with laboratory code.

A printed, "laboratory signatory" signed report and certificate is provided, typically immediately following completion of services at your location. If preferred, this report can be sent to you via email utilizing a digital signature.

A unique identifier - sufficient to identify unit being verified - is listed.

CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER:
104111413144458

Page 2 of 4 pages

Summary of Results

Temperature at start of verification: 74.00 °F.

Indicator 1 - Digital Readout (N)

Range	Full Scale (%)	Tested Force Range (N)	Mode	ASTM E4 Error (%)	ASTM E4 Max Error (%)	ASTM E4 Max Repeat Error (%)	Zero Return	Resolution (N)	ASTM E4 Lower Limit (N)
100	0.999802 to 99.9802	T		-0.22	0.17	Pass	0.0001	0.02	

Temperature at end of verification: 74.20 °F.

Data Point Summary - Indicator 1 - Digital Readout (N)

TENSION	Run 1 Error (%)	Run 2 Error (%)	Run 3 Error (%)	ASTM E4 Repeat Error (%)	Relative Uncertainty* (%)	Uncertainty of Measurement* (± N)
100% Range (Full Scale: 99.9802 N)						
1	0.02	-0.08	0.02	0.10	0.14	0.0014
2	-0.08	0.02	0.02	0.10	0.14	0.0029
4	-0.05	-0.22	0.02	0.17	0.19	0.0076
7	0.02	-0.05	0.02	0.07	0.13	0.0094
10	-0.08	-0.03	0.02	0.05	0.14	0.014
20	0.02	-0.08	0.07	0.10	0.15	0.031
40	-0.03	-0.03	0.04	0.10	0.13	0.054
70	0.02	0.02	0.05			
100	0.05	0.02	0.05			

** The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of approximately 95%.*

Data - Indicator 1 - Digital Readout (N)

TENSION	Run 1 Indicated (N)	Applied (N)	Run 2 Indicated (N)
0 Return	0		0
1	1	0.999802	1
2	2	2.00156	2
4	4	4.00215	4
7	7	6.99881	7
10	10	10.0078	10
20	20	19.996	20
40	40	40.0117	40
70	70	69.9861	70
100	100	99.9508	100

Instron CalproCR Version 3.26

Expanded Measurement Uncertainty for each test level verified is reported in compliance with the International Laboratory Accreditation Cooperative (ILAC) Policy for Uncertainty in Calibration. The expanded measurement uncertainty (as a % and value) is calculated from the combined uncertainty of resolution, uncertainty of repeatability, and the uncertainty of the standard used.

Should adjustment or repair be necessary, "as found" and "as left" data is reported.

The method of verification and standard conformance pass fail criteria is clearly stated.

The Expanded Measurement Uncertainty reported is an indicator of the verification process quality and repeatability about the value used to determine Pass/Fail. Instron takes numerous steps to minimize reported expanded measurement uncertainty beginning with metrological best practices and comprehensive staff training. For example, in the data summary and data tables shown above there is approximately a 95% confidence (k=2) that the indicated tension during run 1 at 10% of range would have fallen within a ± .14% band of uncertainty about the reported error in this example of -.08%, -.22% to +.06% of the indicated value.

All measurement standards used are listed and traceable to the International System of Units (SI) through standards maintained by internationally recognized National Metrology Institutes.

CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER:
104111413144458

Page 3 of 4 pages

Data - Indicator 1 - Digital Readout (N)

TENSION

The Return to Zero tolerance is ± the indicator resolution, 0.1% of the maximum force verified in the range, or 1% of the lowest force verified in the range, whichever is greater.

Graphical Data - Indicator 1 - Digital Readout (N)

Verification Equipment

Make/Model	Serial Number	Description	Calibration Agency	Capacity	Cal Date	Cal Due
Extech 445580	1000348	temp. indicator	Tektronix	NA	25-Oct-12	25-Oct-14
Troemner Dead Weights - Metric	126 (Metric)	dead weight set	Instron	NA	10-Jun-11	10-Jun-16

The value of acceleration due to gravity used to calculate the force exerted by the mass was 9.80349 m/s².

Verification Equipment Usage

Range Full Scale (%)	Mode	Standard Serial Number	Percent(s) of Range	Lower Limit for Standard (N)	Accuracy (+/-)
100	T	126 (Metric)	1/2 4/ 7/ 10/ 20/ 40/ 70/ 100	NA	0.1% of reading
All	T	1000348	All	NA	2 °F

Instron standards are traceable to the SI (The International System of Units) through standards maintained by the National Institute of Standards and Technology (NIST) or other internationally recognized National Metrology Institutes (NMIs).

Standard forces have been temperature compensated as necessary.

The accuracy of the verification equipment used was equal to or better than the accuracy indicated in the table above.

Comments

Instron CalproCR Version 3.26

Verification Equipment

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Comments

Instron CalproCR Version 3.26

Instron® Service Options

Scheduled On-Site Services	Scheduled Services	Annual CalPlus Services	Annual Comprehensive Services	Annual Warranty Extension Services ¹	Annual Online Services (WSA)
Preventive Maintenance	Available	Included	Included	Included	—
Verification / Calibration	Available	As Purchased	As Purchased	As Purchased	—
NIST Traceable Verification	Included	Included	Included	Included	—
Services Discount	Available With Multi-Year PO	Yes	Yes	Yes	—

As Needed Services

On-Site Repair: Parts & Labor ^{2,5}	Available	30% Discount	Included	Included	—
Priority Response On-Site Service ³	Available	≤ 3 Business Days	≤ 2 Business Days	≤ 3 Business Days	—
Verification After Machine Repair	Available	30% Discount	30% Discount	Included ⁶	—
On-Site Training Discount	—	30% Discount	30% Discount	—	—
On-Site Consulting Services Discount	—	30% Discount	30% Discount	—	—
Priority Online Technical Helpdesk	—	Included	Included	Included	Included
Verification Certificate Online Access	—	Included	Included	Included	Included
Software Update Availability Notification	—	Included	Included	Included	Included
Downloadable Software Updates ⁴	—	Included	Included	Included	Included
Online Seminars (Webinars)	—	Included	Included	Included	Included
Access To Online FAQs	Included	Included	Included	Included	Included

Remote Support

Priority Response Phone Support	Available	Included	Included	Included	Recommended Option
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Return To Factory Repair Services Return

RMA / Return To Factory Repair	Available	30% Discount ²	Included ²	Included ²	—
If Required: Priority Service Fee Waived	—	—	Yes	—	—

Notes:

1. Warranty extension services for Instron 3300 and 5900 systems are available for purchase with calibration verification services prior to expiration of the standard 12-month warranty period. Available through travel zone 5.
2. Consumable replacement is not included or discountable; e.g. servohydraulic hoses, filters, oil, jaw faces, extensometer knife edges, anvils, etc. Purchase of software, return-for-exchange assemblies, and/or accessories are not eligible for discount.
3. Priority response available for locations in travel zone 4 or lower.
4. Downloads are for software revisions; new software versions are available for purchase.
5. PC maintenance and repair services are excluded. A three year on-site priority service agreement from the PC manufacture is provided with PCs purchased from Instron.
6. Should a significant component within a force, speed, strain, temperature, or displacement "measurement system" be repaired the effected "measurement system" will be re-verified, as necessary, by Instron at no additional charge during the extended warranty period if Instron performed an identical verification of the "measurement system" within 12 months prior to the repair. IQ/OQ services are excluded.