INSTRON®

The difference is measurable®

SPEED AND DISPLACEMENT VERIFICATION

Instron® Professional Services



Speed Verification

Displacement Verification

Instron has long been a leader in measuring and verifying speed and displacement and was an active participant in developing the ASTM Speed and Displacement Verification standards. These services ensure that testing parameters are being met and that associated results are being calculated accurately. To further maximize confidence, Instron is also accredited by NVLAP under lab code 200301-0 to ISO/IEC 17025.

ASTM E2309 OR ISO 9513:21012/COR 1:2013 - ANNEX H (DISPLACEMENT VERIFICATION):

- Displacement sensing devices verified as a system, in place, and operating as in actual use.
- Verification consists of at least two runs in the selected displacement range.
- Each run contains 5 or more displacement values (“points”) within the specified range with the difference between any two successive points being no larger than 1/3rd the difference between the selected minimum and maximum test displacement values.
- If test data is collected and reported in both directions, then verification shall be done in both directions.
- It is recommended that displacement measuring systems be verified annually or more frequently if required.

ASTM E2658 (SPEED VERIFICATION):

- Speed sensing devices verified as a system, in place, and operating as in actual use.
- Verification consists of at least two runs of data per selected speed.
- At a minimum, the most commonly used testing speeds should be chosen for verification.
- If test data is collected and reported in both directions, then verification shall be done in both directions.
- Verified at least every 18 months.

CALIBRATION CERTIFICATES

Instron calibration certificates provide you with the documentation necessary to prove compliance with industry testing standards and auditing authorities. On completion of your speed and displacement verification, you will receive one certificate for speed and a separate certificate for displacement.

Quality compliant and carry unique certificate number and date to meet program requirements.

The certificate contains a complete description of equipment being verified.

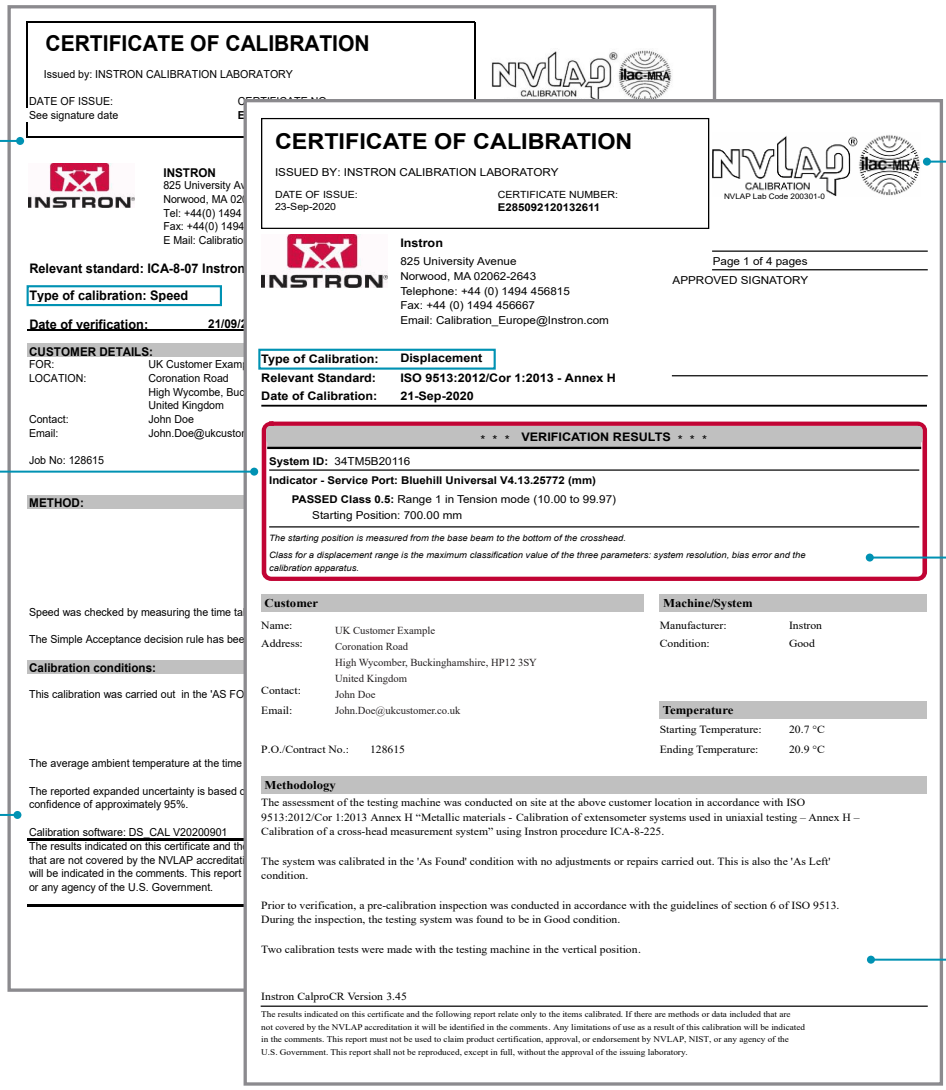
Method of conformance to relevant quality standards clearly stated for risk reduction during audits and other regulatory evaluations.

NVLAP symbol and the Accredited Laboratory Combined ILAC MRA Mark provides international recognition and acceptance.

All calibration standards used provide metrological traceability to National Standards (e.g. NIST, NPL, etc).

Each readout device classified pass/fail on the certificate.

All uncertainties are calculated per guidelines established by ASTM.



CERTIFICATE OF CALIBRATION

ISSUED BY: INSTRON CALIBRATION LABORATORY

DATE OF ISSUE: 23-Sep-2020

CERTIFICATE NUMBER: **E285092120132611**

NVLAP CALIBRATION NVLAP Lab Code 200301-0

INSTRON

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APPROVED SIGNATORY

Type of Calibration: Displacement
Relevant Standard: ISO 9513:2012/Cor 1:2013 - Annex H
Date of Calibration: 21-Sep-2020

*** * * VERIFICATION RESULTS * * ***

System ID: 34TM5B20116

Indicator - Service Port: Bluehill Universal V4.13.25772 (mm)

PASSED Class 0.5: Range 1 in Tension mode (10.00 to 99.97)
Starting Position: 700.00 mm

The starting position is measured from the base beam to the bottom of the crosshead.

Class for a displacement range is the maximum classification value of the three parameters: system resolution, bias error and the calibration apparatus.

Customer

Name: UK Customer Example
Address: Coronation Road
High Wycombe, Buckinghamshire, HP12 3SY
United Kingdom
Contact: John Doe
Email: John.Doe@ukcustomer.co.uk

P.O./Contract No.: 128615

Machine/System

Manufacturer: Instron
Condition: Good

Temperature

Starting Temperature: 20.7 °C
Ending Temperature: 20.9 °C

Methodology

The assessment of the testing machine was conducted on site at the above customer location in accordance with ISO 9513:2012/Cor 1:2013 Annex H "Metallic materials - Calibration of extensometer systems used in uniaxial testing – Annex H – Calibration of a cross-head measurement system" using Instron procedure ICA-8-225.

The system was calibrated in the 'As Found' condition with no adjustments or repairs carried out. This is also the 'As Left' condition.

Prior to verification, a pre-calibration inspection was conducted in accordance with the guidelines of section 6 of ISO 9513. During the inspection, the testing system was found to be in Good condition.

Two calibration tests were made with the testing machine in the vertical position.

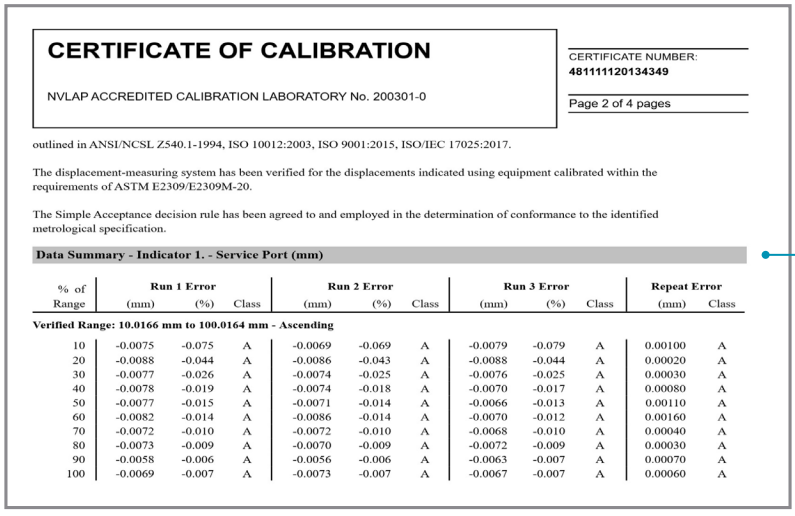
Instron CalproCR Version 3.45

The results indicated on this certificate and the following report relate only to the items calibrated. If there are methods or data included that are not covered by the NVLAP accreditation it will be identified in the comments. Any limitations of use as a result of this calibration will be indicated in the comments. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government. This report shall not be reproduced, except in full, without the approval of the issuing laboratory.

Maintain 6 years of factory backup data.

Scope of verification is always listed on the certificate.

Data summary table provided for ease of data understanding.



CERTIFICATE OF CALIBRATION

NVLAP ACCREDITED CALIBRATION LABORATORY No. 200301-0

CERTIFICATE NUMBER: **481111120134349**

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outlined in ANSI/NCSL Z540.1-1994, ISO 10012:2003, ISO 9001:2015, ISO/IEC 17025:2017.

The displacement-measuring system has been verified for the displacements indicated using equipment calibrated within the requirements of ASTM E2309/E2309M-20.

The Simple Acceptance decision rule has been agreed to and employed in the determination of conformance to the identified metrological specification.

Data Summary - Indicator 1. - Service Port (mm)

% of Range	Run 1 Error (mm)	Run 1 Error (%)	Run 1 Class	Run 2 Error (mm)	Run 2 Error (%)	Run 2 Class	Run 3 Error (mm)	Run 3 Error (%)	Run 3 Class	Repeat Error (mm)	Repeat Class
Verified Range: 10.0166 mm to 100.0164 mm - Ascending											
10	-0.0075	-0.075	A	-0.0069	-0.069	A	-0.0079	-0.079	A	0.00100	A
20	-0.0088	-0.044	A	-0.0086	-0.043	A	-0.0088	-0.044	A	0.00020	A
30	-0.0077	-0.026	A	-0.0074	-0.025	A	-0.0076	-0.025	A	0.00030	A
40	-0.0078	-0.019	A	-0.0074	-0.018	A	-0.0070	-0.017	A	0.00080	A
50	-0.0077	-0.015	A	-0.0071	-0.014	A	-0.0066	-0.013	A	0.00110	A
60	-0.0082	-0.014	A	-0.0086	-0.014	A	-0.0070	-0.012	A	0.00160	A
70	-0.0072	-0.010	A	-0.0072	-0.010	A	-0.0068	-0.010	A	0.00040	A
80	-0.0073	-0.009	A	-0.0070	-0.009	A	-0.0072	-0.009	A	0.00030	A
90	-0.0058	-0.006	A	-0.0056	-0.006	A	-0.0063	-0.007	A	0.00070	A
100	-0.0069	-0.007	A	-0.0073	-0.007	A	-0.0067	-0.007	A	0.00060	A





WHAT IS THE DIFFERENCE IN THE USE OF CROSSHEAD DISPLACEMENT VS. EXTENSOMETRY?

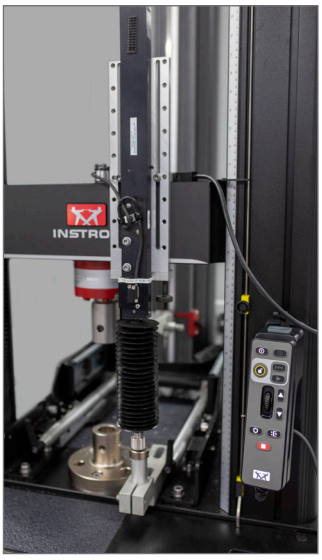
The use of extensometry is often the best solution for determination of precise measurement of specimen strain or displacement in ‘under load’ conditions. The standard displacement verification service is done under ‘no-load’ conditions. A ‘no-load’ displacement verification shows that the displacement transducer and related electronics and software are working properly and are capable of making accurate measurements. Operators need to use caution, however, when comparing ‘no-load’ displacement data to displacement data taken during a test.

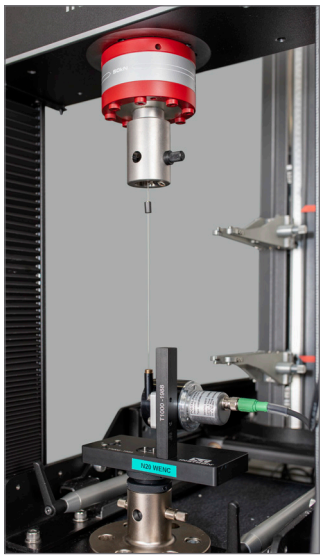
WHAT SYSTEMS CAN INSTRON SERVICES VERIFY ON SITE?

Instron can verify a variety of other testing systems including SatecTM, Dynatup®, Wilson® Instruments, WolpertTM, Schenk®, MTS®, Instron IST, Tinius Olsen, Bose, TA Instruments, Zwick, United, Lloyds Instruments, Mayes, Dennison, Shimadzu®, Rhiele, Baldwin®, ATS, Mecmesin, Galdabini, Servotest, Hegewald & Peschke, and more.

WHAT ARE TEST SYSTEM DEFLECTIONS?

Because of frame and load string issues, you cannot always make a direct comparison of ‘no-load’ data to actual specimen displacement. The displacement calibration under ‘no-load’ must be correct as a minimum if you want good performance under load. Potential errors can vary widely depending on the design and manufacturing specifications of the testing machine.





TESTS DONE AT LOW LOADS AND/OR HIGH ELONGATIONS?

This condition is normally where the use of crosshead displacement readings is most valid as long as the load frame is of high quality and in good condition. Non-specimen deflections should be either predicted or measured, then compared to the accuracy requirements of the application.

TESTING DONE AT HIGHER LOADS OR LOW ELONGATIONS?

Displacement data may still be valid if care is taken to understand what the data means and how it related to the deflection of the specimen. Use of an extensometer is usually recommended.

WHY VERIFY SPEED AND DISPLACEMENT?

You should calibrate your machine's displacement measuring system if any of the following apply to you:

- Displacement is critical to your testing needs and is reported in the test results.
- Use of an extensometer is impractical or impossible, and using crosshead displacement is an acceptable alternative.
- Crosshead or actuator displacement to characterize displacement of a specimen or component.
- LVDTs commonly found in servohydraulic systems are often not linear throughout their range.
- Displacement reading or crosshead/ actuator position must be precise and repeatable.

If any of the following apply to you, then verifying the speed accuracy of your system is highly recommended:

- The material or component under test is strain rate or speed sensitive.
- You are required to report test speed with your results.
- Your test method calls for a specific speed.
- Even if speed is not a critical parameter, it is good testing practice to ensure that the speed is constant, stable, and repeatable.

STANDARD SPEED AND DISPLACEMENT VERIFICATION SERVICE

- Verification of 3 customer selected test system speeds via 3 data runs. Additional speeds are available on resquest.
- Verification of any predefined customer displacement range.
- For this verification service Instron will verify 5 total points between 10% and 100% of the range displacement desired.

INSTRON®

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SpeedandDisplacementVerification_EU_PodV1