

# CERTIFICATE OF CALIBRATION

ISSUED BY : INSTRON CALIBRATION LABORATORY

DATE OF ISSUE : 10-Sep-2014

CERTIFICATE NUMBER: 019091014144103



Lab code: 200301-0

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**Instron**  
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APPROVED SIGNATORY

**John  
Dowd**

Digitally signed by John Dowd  
DN: cn=John Dowd, c=US, l=Norwood,  
st=MA, o=Instron, ou=America's - MAR,  
Calibration Laboratory, A division of  
Illinois Tool Works, Inc. (ITW, Inc.),  
email=John\_Dowd@Instron.com  
Date: 2014.09.12 08:58:29 -04'00'

**Type of Calibration:** Displacement  
**Relevant Standard:** ASTM E2309/E2309M-05(2011)e1  
**Date of Calibration:** 10-Sep-2014

**Customer Requested Due Date: 10-Mar-2016**

**Customer**  
US Army Rodman Testing Center  
Bldg. 4600  
Aberdeen Proving Grounds, MD 21005

**Machine**  
Serial No : 5500R11234665  
Make : Instron  
Model : 1123

P.O. Number :  
Contact :

## Readout Verified

1. Digital Readout (in)

## Certification Statement

This certifies that the displacements verified with machine indicator 1 (listed above) were verified by Instron in accordance with ASTM E2309/E2309M (Follow-the-Displacement Method) and Instron work instruction ICA-8-07.

The verification and equipment used conform to a controlled Quality Assurance program which meets the specifications outlined in ANSI/NCSL Z540-1, ISO 10012, ISO 9001:2008, and ISO/IEC 17025:2005. The Instron measurement equipment used for verification is traceable to NIST.

The testing machine was verified on-site at customer location. The testing machine was verified in the 'As Found' condition with no adjustments or repairs carried out. This is also the 'As Left' condition.

## Summary of Results

Indicator 1- Digital Readout (in)

Verified Range (in)	Max Error (in)	Max Error (%)	Max Repeat Error (in)	Max Repeat Error (%)	System Class*	Resolution (in)	Resolution Class	ASTM Lower Limit (in)
2 - 10	0.00168	-0.032	0.00096	0.041	A	.0001	A	2

\*System Class is derived from assessment of the following: error, repeatability, resolution, and standard device classification.

The results indicated on this certificate and report relate only to the items verified. 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 verification will be indicated in the comments. This report must not be used to claim product endorsement by NVLAP or the United States government. This report shall not be reproduced, except in full, without the approval of Instron.

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*The Verified Range of Displacement includes only those displacements which are greater than or equal to the ASTM Lower Limit.*

Direction of Displacement : Ascending

## Datapoint Summary - Indicator 1 - Digital Readout (in)

Suggested Value (in)	Run 1 Error (in)	Run 1 Error (%)	Run 2 Error (in)	Run 2 Error (%)	Run 3 Error (in)	Run 3 Error (%)	Repeat Error (in)	Uncertainty (in)*	Coverage Factor = k
2	-0.00036	-0.018	0.00018	0.009	-0.00065	-0.032	0.00083	0.0011	2.31
4	-0.00020	-0.005	0.00037	0.009	-0.00046	-0.011	0.00083	0.0013	2.26
6	-0.00004	-0.001	0.00052	0.009	-0.00039	-0.006	0.00091	0.0016	2.26
8	0.00034	0.004	0.00111	0.014	0.00017	0.002	0.00094	0.0020	2.26
10	0.00119	0.012	0.00168	0.017	0.00072	0.007	0.00096	0.0069	2.26

*\*The reported expanded uncertainty of measurement is based on a combined uncertainty multiplied by a coverage factor k to provide a level of confidence of approximately 95 %.*

Runs 1 and 2 are performed to comply with the requirements of ASTM E2309/E2309M, run 3 is performed to calculate the uncertainty of measurement.

## Data - Indicator 1 - Digital Readout (in)

Temperature at start of verification : 74.3 °F

Suggested Value	Run 1			Run 2			Run 3	
	Applied	Indicated	Error Class	Applied	Indicated	Error Class	Applied	Indicated
2	2.00036	2.000	A	1.99982	2.000	A	2.00065	2.000
4	4.00020	4.000	A	3.99963	4.000	A	4.00046	4.000
6	6.00004	6.000	A	5.99948	6.000	A	6.00039	6.000
8	7.99966	8.000	A	7.99889	8.000	A	7.99983	8.000
10	9.71381	9.715	A	9.95832	9.96	A	9.95928	9.960

*For runs 1 and 2: the worst Resolution Class is A and the worst Repeatability Class is A.*

Temperature at end of verification : 73.5 °F

Starting Point of crosshead : 15 in

## Verification Equipment

Make/Model	Serial No.	Description	Cal Agency	Cal Date	Due Date
Instron LDS-10	051613C	Linear Gage	A.A. Janson, Inc.	10-Jun-13	10-Jun-15
Thermo-Hygro 445580	1057123	Thermometer	Masy Systems, Inc.	22-Jul-14	22-Jul-16

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## Verification Equipment Specifications

Serial No.	Resolution	Accuracy (+/-)
051613C	0.00001 in	0.0002 in
1057123	0.1 °F	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).*

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

## Comments

Verified By: Daniel Dehay  
Field Service