



Tinius Olsen Testing Machine Company  
Corporate Headquarters  
1065 Easton Road  
Horsham, PA 19044-8009

Tel (215) 675-7100  
Fax (215) 441-0899  
[www.TiniusOlsen.com](http://www.TiniusOlsen.com)

May 8, 2023

US Army Research Laboratory  
6375 Johnson Road  
Bldg 321  
Aberdeen Proving Ground, MD 21005

Attn: David Gray

Re: Service Visit S830124

Ladies/Gentlemen:

Enclosed please find your Report and Certificate(s) of Verification covering the following equipment:

S/N 345412 - 200000 lbf Model 1000SL Universal - w/ Digital Indicator - No Adjustments - Good Condition  
S/N 345412-D - Displacement Ascending - w/ Computer Display #345412 - No Adjustments - Good Condition

We trust these certificates complete your files.

Very truly yours,

Tinius Olsen Testing Machine Company

A handwritten signature in black ink that reads "Shannon Camp".

Shannon Camp  
Authorized Signature

Encl.

Since 1880 . . . a tradition of leadership in materials testing

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Horsham, PA USA 19044-8009  
+1 (215) 675-7100;  
Fax +1 (215) 441-0899  
Services@TiniusOlsen.com  
www.TiniusOlsen.com



Page No:1

Order No : 830124

## Field Service Report

**Date Printed:** 8-May-2023

**Service Order Number:** 830124

**Customer:** David Gray  
US Army Research Laboratory  
6375 Johnson Road  
Bldg 321  
Aberdeen Proving Ground, MD - 21005  
US

**Purchase Order Number:** Gray, David

**Account Number:**

### Scheduled Work Completed

Date	Serial Number	Capacity	Name
	345412	200000 lbf	Model 10005L
05-02-2023	Calibration No : 1	Universal - w/ Digital Indicator - No Adjustments - Good Condition	
	345412-D		Displacement
05-02-2023	Calibration No : 1	Ascending - w/ Computer Display #345412 - No Adjustments - Good Condition	

**Service Technician Notes :**

**Work Performed by:** Matthew Piechoski

**Arrive :** 05-02-2023 08:00 AM

**Depart :** 05-02-2023 01:30 PM

**Tinius Olsen Testing Machine Company  
Testing Machine Verification Report & Certificate  
Specifications per ASTM E 4**



Issue Date May 08, 2023

Certificate Number HSJ0PP01

Issued by:

Tinius Olsen Testing Machine Company  
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Horsham, PA 19044-8009

Tel (215) 675-7100  
Fax (215) 441-0899  
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Page 1 of 3  
Authorized Signature

Shannon Camp

**Owner/Location** US Army Research Laboratory, 6375 Johnson Road Bldg 321, Aberdeen Proving Ground, MD 21005  
**Calibration Location** SAME  
**Item Description** S/N 345412 - 200000 lbf Model 1000SL Universal - w/ Digital Indicator - As Found/As Left - No Adjustments - Good Condition  
**Serial Numbers:** Machine # 345412 LC # N/A  
Computer # 345412 REC # N/A  
**Year of Manufacture** UNKNOWN Cal-Check No. 188412  
**Verification Date** May 02, 2023

This is to certify that the above testing equipment has been verified by Tinius Olsen Testing Machine Company personnel on Order Number 830124. The listed data is in accordance with ASTM E 4-2021, and Tinius Olsen Procedure #1000, and have been temperature corrected as necessary. Tinius Olsen's Quality System is maintained in compliance with ANSI / NCSL Z540-1 1994, ISO/IEC 17025:2017 (Demonstrates technical competence for Calibration Activity and the operation of a laboratory quality management system per the joint January 2009 Communiqué from ISO-ILAC-IAF), ISO 10012:2003, and MIL-STD-45662A.

Capacity Range lbf	Loading Range lbf	Percent Error	Range Pass/Fail
0 to 200000	402.00 TO 200000.00	0.31	Pass

**ASTM E 4 Allowable Tolerance ± 1.0%**

Statements of conformity (e.g. Pass/Fail) to specifications are made in this report without taking measurement uncertainty into account, unless specifically requested by the customer. This is a shared risk decision rule which the customer also has responsibility for determining acceptance of the results. Collective uncertainty of the measurement standard typically does not exceed 25% of the acceptable tolerance. This 25% equates to a TUR of 4:1.

These results relate only to the items calibrated. This Report and Certificate shall not be reproduced except in full, without the written approval of Tinius Olsen. The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.



**Tinius Olsen Testing Machine Company**  
**Testing Machine Verification Report & Certificate**  
**Specifications per ASTM E 4**

Verification Date May 02, 2023

Certificate Number HSJ0PP01

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All verification devices comply with the latest practices of ASTM E 74, and are traceable to the International System of Units (SI) through National Institute of Standards and Technology (NIST) or the National Physical Laboratory (NPL). Serial Number, Manufacturer, Class A Loading Range, Calibration Vendor, Expiry Date, and Certificate Number for each standard used during the Certification is listed below. The class of the verification equipment was equal to or better than the requirements of the classification to which this device has been verified.

Eqp # S/N	Manufacturer	Class A Loading Range	Calib. Vendor	Calib. Date	Expiry Date
1 122440A (HD)	Tovey	9000.00 to 400000.00 lbf	Morehouse	11-May-22	11-May-24
2 122440A (LO)	Tovey	3094.00 to 60000.00 lbf	Morehouse	11-May-22	11-May-24
3 P-10286 (HD)	Morehouse	204.00 to 10000.00 lbf	Morehouse	19-Dec-22	19-Dec-24

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This Calibration was performed in Compression for increasing forces only. For Universal Testing Machines that have two work areas with a common force application and indicating device, calibration performed in the lower test area in compression is the same for tension in the upper work area and vice versa.

The constant indicated/constant true force method was used for the verification. The following method was used for this verification: Use of force-measuring instruments.

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**Informative Notes:**

The expanded uncertainties reported are estimates of the measurement uncertainty in the errors determined during the verification. They are expressed as percentages of their respective verification readings. The expanded uncertainties reported are based on combined standard uncertainties, multiplied by a coverage factor of 2, which provide a confidence interval of approximately 95%. The uncertainties reported do not represent the uncertainty of the testing machine or the results of any subsequent tests performed with the testing machine. The accuracy of the testing equipment has been found to conform with the tolerance(s) indicated above.

The uncertainties stated refer to the values obtained during verification and make no allowance for factors such as long-term drift, temperature and alignment effects – the influences of such factors should be taken into account by the user of the testing machine.

**Tinius Olsen Testing Machine Company**  
**Testing Machine Verification Report & Certificate**  
**Specifications per ASTM E 4**

Verification Date May 02, 2023

Certificate No. HSJOPP01

Page 3 of 3

Owner/Location US Army Research Laboratory, 6375 Johnson Road Bldg 321 Aberdeen Proving Ground, MD 21005

Calibration Location SAME

Item Description S/N 345412 - 200000 lbf Model 1000SL Universal - w/ Digital Indicator - As Found/As Left - No Adjustments - Good Condition

Customer ID No. N/A Year of Mfg. UNKNOWN Cal-Check No. 188412

Order No. 830124 Customer PO No. Gray, David Temperature Start 20.3 °C End 20.7 °C

Serial Numbers: TM 345412 LC N/A

REC N/A COMP 345412

LOAD RANGE	VERIFIC. * READ #1	MACHINE READ #1	VERIFIC. READ #2	MACHINE READ #2	FIXED ERROR	ERROR % OF VALUE	DIFFER. % OF VALUE	UNCERTAINTY % OF VALUE	RESOLUTION FOR RANGE(S)
lbf	lbf	lbf	lbf	lbf	lbf				lbf
200000	3 404.8	404.7	402.3	402.2	-0.2	-0.04	0.01	0.47	2.0
	3 802.7	802.3	805.1	805.7	0.6	0.08	-0.13	0.30	2.0
	3 1623.1	1623.9	1641.1	1642.2	1.1	0.06	-0.02	0.24	2.0
	3 2796.8	2799.9	2800.9	2803.6	3.1	0.11	0.02	0.22	2.0
	2 4069.9	4082.4	4048.7	4060.5	12.5	0.31	0.02	0.26	2.0
	2 8022.9	8031.5	7977.9	7988.4	10.5	0.13	-0.02	0.22	2.0
	1 16152.2	16150.6	16132.9	16126.0	-6.9	-0.04	0.03	0.23	2.0
	1 27791.8	27800.1	27874.9	27874.5	8.4	0.03	0.03	0.22	2.0
	1 40698.9	40695.2	40482.3	40487.2	4.9	0.01	-0.02	0.22	2.0
	1 80269.2	80249.3	80557.7	80601.5	43.8	0.05	-0.08	0.22	2.0
	1 119998.7	119940.4	120097.5	120020.9	-76.6	-0.06	0.02	0.22	2.0
	1 160090.0	160149.7	159791.3	159748.9	59.7	0.04	0.06	0.22	2.0
	1 200003.7	200070.0	200492.3	200486.7	66.3	0.03	0.04	0.22	2.0
	0.0	5.1	0.0	4.5	0	0.00	0.00	N/A	0.0

Notes/Corrections and/or other parts checked:

Calibration Technician/Engineer Matt Piechoski

Witness N/A



**Tinius Olsen Testing Machine Company**  
**Displacement Measuring System Verification Report & Certificate**  
**Specifications per ASTM E 2309**

Issue Date May 08, 2023

Certificate Number HSJ0PP02



Issued by:

Tinius Olsen Testing Machine Company  
 1065 Easton Road  
 Horsham, PA 19044-8009

Tel (215) 675-7100  
 Fax (215) 441-0899  
 www.TiniusOlsen.com

Page 1 of 3  
 Authorized Signature

Shannon Camp

**Owner/Location** US Army Research Laboratory, 6375 Johnson Road Bldg 321, Aberdeen Proving Ground, MD 21005

**Calibration Location** SAME

**Item Description** S/N 345412-D - Displacement Ascending - w/ Computer Display #345412 - As Found/As Left - No Adjustments - Good Condition

**Year of Manufacture** UNKNOWN

**Verification Date** May 02, 2023

This is to certify that the above testing equipment has been verified by Tinius Olsen Testing Machine Company personnel on Order Number 830124. The listed data is in accordance with ASTM E 2309-2020, and Tinius Olsen Procedure #2600, and have been temperature corrected as necessary. Tinius Olsen's Quality System is maintained in compliance with ANSI / NCSL Z540-1 1994, ISO/IEC 17025:2017 (Demonstrates technical competence for Calibration Activity and the operation of a laboratory quality management system per the joint January 2009 Communique' from ISO-ILAC-IAF), ISO 10012:2003, and MIL-STD-45662A.

Range in	Class Range in	Class
9.0000	0.1000 TO 9.0000	B
9.0000	0.9000 TO 9.0000	A

Statements of conformity (e.g. Pass/Fail) to specifications are made in this report without taking measurement uncertainty into account, unless specifically requested by the customer. This is a shared risk decision rule which the customer also has responsibility for determining acceptance of the results. Collective uncertainty of the measurement standard typically does not exceed 25% of the acceptable tolerance. This 25% equates to a TUR of 4:1.

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**Tinius Olsen Testing Machine Company**  
**Displacement Measuring System Verification Report & Certificate**  
**Specifications per ASTM E 2309**

Verification Date May 02, 2023

Certificate Number HSJ0PP02

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All verification devices are traceable to the International System of Units (SI) through National Institute of Standards and Technology (NIST) or the National Physical Laboratory (NPL). Serial Number, Manufacturer, Type, Maximum Device Error, Calibration Vendor, and Expiry Date for each standard used during the Certification is listed below.

Serial No.	Manufacturer	Type	Max Device Error	Vendor	Expiry Date
786-8	Starrett	INDICATOR	.0012500	Olsen	08-Feb-24

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The expanded uncertainties reported are estimates of the measurement uncertainty in the errors determined during the verification. They are expressed as percentages of their respective verification readings. The expanded uncertainties reported are based on combined standard uncertainties, multiplied by a coverage factor of 2, which provide a confidence interval of approximately 95%. The uncertainties reported do not represent the uncertainty of the testing machine or the results of any subsequent tests performed with the testing machine.

The Follow-the-Displacement Method per ASTM E2309, was used for this verification.



**Tinius Olsen Testing Machine Company**  
**Displacement Measuring System Verification Report & Certificate**  
**Specifications per ASTM E 2309**

Certificate Number H5JOPP02

Page 3 of 3

Verification Date May 02, 2023

Owner/Location US Army Research Laboratory, 6375 Johnson Road Bldg 321, Aberdeen Proving Ground, MD 21005

Calibration Location SAME

Item Description S/N 345412-D - Displacement Ascending - w/ Computer Display #345412 - As Found/As Left - No Adjustments - Good Condition

Order No. 830124 Customer PO No. Gray, David Year of Mfg. UNKNOWN  
 Backlash As Found 0.000 Backlash As Left 0.000 Customer ID No. N/A Temp. Start 21.5°C End 21.6°C

Range	Resolution	Ver Read 1	Mach Read 1	Ver Read 2	Mach Read 2	Fixed Error	Error	Difference	Uncertainty	Class
in	in	in	in	in	in	in	%	%	%	
9	0.000001	0.100000	0.100139	0.100000	0.100038	0.000139	0.14	0.10	1.20	B
	0.000001	0.225000	0.225087	0.225000	0.225237	0.000237	0.11	-0.07	0.54	B
	0.000001	0.450000	0.450323	0.450000	0.450273	0.000323	0.07	0.01	0.29	B
	0.000001	0.675000	0.675360	0.675000	0.675109	0.000360	0.05	0.04	0.28	B
	0.000001	0.900000	0.900947	0.900000	0.900947	0.000947	0.11	0.00	0.28	A
	0.000001	2.250000	2.247857	2.250000	2.247356	-0.002644	-0.12	0.02	0.28	A
	0.000001	4.500000	4.499925	4.500000	4.499825	-0.000176	0.00	0.00	0.28	A
	0.000001	6.750000	6.752543	6.750000	6.751942	0.002543	0.04	0.01	0.28	A
	0.000001	9.000000	8.997745	9.000000	9.002005	-0.002255	-0.03	-0.05	0.28	A

Calibration Technician/Engineer Matt Picchoski

Witness N/A

1.6.28/1.1.89/93