



# National Voluntary Laboratory Accreditation Program



## SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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### CALIBRATION LABORATORIES

**NVLAP LAB CODE 200311-0**

Scope Revised: 2011-10-25

*NVLAP Code:* 20/A01

ANSI/NCSL Z540-1-1994; Part 1

Compliant

### DIMENSIONAL

*NVLAP Code:* 20/D05

Length

<i>Range</i>	<i>Best Uncertainty</i> ( $\pm$ ) <sup>note 1</sup>	<i>Remarks</i>
Laboratory and Field Service Calibration of Extensometers		
Extensometer Linear Calibrator		
(0 to 1.0) in	(14.6 + 34.8L) <sup>note 9</sup> $\mu\text{m}$	ASTM E83
(0 to 25.4) mm	(0.371 + 0.0346L) <sup>note 10</sup> $\mu\text{m}$	ASTM E83
Extensometer Gage Length		
0.5 in	19 $\mu\text{m}$	ASTM 83, Gage Blocks
1.0 in	39 $\mu\text{m}$	ASTM 83, Gage Blocks
2.0 in	77 $\mu\text{m}$	ASTM 83, Gage Blocks
(0 to 4) in	0.001 in	ASTM E83, Caliper
(0 to 102) mm	25.4 $\mu\text{m}$	ASTM E83, Caliper
(0 to 12) in	0.0015 in	ASTM E83, Caliper
(0 to 305) mm	38 $\mu\text{m}$	ASTM E83, Caliper

2011-04-01 through 2012-03-31

*Effective dates*

*For the National Institute of Standards and Technology*



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### Laboratory and Field Service Calibration

#### Crosshead / Actuator Travel / Position Transducer

(0 to 24) in	0.002 in	ASTM E2309, Caliper
(0 to 601) mm	50.8 $\mu$ m	ASTM E2309, Caliper
(0 to 2) in	0.00015 in	ASTM E2309, Micrometer Head
(0 to 50.8) mm	3.8 $\mu$ m	ASTM E2309, Micrometer Head
(0 to 12 in)	0.0015 in	ASTM E2309, Caliper
(0 to 305) mm	38 $\mu$ m	ASTM E2309 Caliper
(0 to 1) in	(14.6 + 34.8L) <sup>note 9</sup> $\mu$ m	ASTM E2309, Linear Calibrator
(0 to 25.4) mm	(0.371 + 0.0346L) <sup>note 10</sup> $\mu$ m	ASTM E2309, Linear Calibrator

#### Crosshead Speed / Actuator Speed

(0 to 40) in/min	0.25%
(0 to 1000) mm/min	0.25%

Time	200 ms	Time component by comparison to digital stopwatch
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#### DC Current

(0 to 20)mA	0.028%
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#### DC MV/V Voltage ratio measurement – Laboratory Service

<b>Range in mV/V</b>	<b>Best Uncertainty (<math>\pm</math>) in % <sup>note 1</sup></b>	<b>Remarks</b>
(0 to 5)mV/V	0.01% of rdg	
(0.1V to 20)V	0.01% of rdg	

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### MECHANICAL

NVLAP Code: 20/M06

Alignment

<b>Range</b>	<b>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></b>	<b>Remarks</b>
(0 to 100)% Bending	3.8% Bending	ASTM E1012

Force-Laboratory Service

<b>Range in lbf</b>	<b>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></b>	<b>Remarks</b>
to 112 404	0.025% of rdg	ASTM E74 <sup>note 8</sup>
to 300 000	0.05% of rdg	ASTM E74 <sup>note 8</sup>

Force – Field Service  
Tension/Compression

to 1 000 000	0.25% of rdg	ASTM E4
to 112 404	0.125% of rdg	

Torque – Laboratory Service

	<b>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></b>	<b>Remarks</b>
Clockwise/Counter Clockwise	(0.1 to 5000)Nm	0.05% of rdg
		DIN 51309/ ASTM 2428/ ASME B107.14
	50000 lb in	

Torque – Field Service

Clockwise/Counter Clockwise	(0.1 to 5000)Nm	0.25% of rdg	DIN 51309
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NLAP Code: 20/M13

Durometer - Laboratory Service

Indenter Tip Extension

<b>Range</b>	<b>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></b>	<b>Remarks</b>
(0 to 6.35) mm	0.66 mm	
(0 to 0.25) in	26 $\mu$ m	

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Force  
(0 to 45) N 0.25% of rdg  
ASTM 2240, Gage Blocks  
Durometer Scales A, B, C, D, E 0, 00,  
000, 0005

(0 to 100) Durometer Units 0.25% of rdg

### Field Service and Laboratory Calibration of Rockwell Hardness Testers

	<b>Range</b>	<b>Best Uncertainty (<math>\pm</math>)<sup>note 1</sup></b>	<b>Remarks</b>
Force	3 kgf to 150 kgf	0.25 %	ASTM E4 Direct verification of Force is applicable to all Rockwell Testers.
Depth	0 mm to 12 mm	0.0002 mm	Direct verification of Depth is limited to United True Blue II model hardness testers.

### Rockwell Hardness – Laboratory and Field Service

#### Indirect Verification of Rockwell Hardness Testers and Rockwell Superficial Hardness

<b>Range in Rockwell Units</b>	<b>Best Uncertainty (<math>\pm</math>)<sup>note 1,2,4</sup> in Rockwell Units</b>	<b>Remarks</b>
Low (20 to 60) HRA	0.42 HRA	ASTM E18, ISO 6508-2, ASTM E110
Med (60 to 80) HRA	0.19 HRA	ASTM E18, ISO 6508-2, ASTM E110
High (80 to 100) HRA	0.20 HRA	ASTM E18, ISO 6508-2, ASTM E110
Low (20 to 50) HRBW	1.03 HRBW	ASTM E18, ISO 6508-2, ASTM E110
Med (40 to 60) HRBW	0.73 HRBW	ASTM E18, ISO 6508-2, ASTM E110
High (60 to 70) HRBW	0.47 HRBW	ASTM E18, ISO 6508-2, ASTM E110
Low (20 to 50) HRC	0.39 HRC	ASTM E18, ISO 6508-2, ASTM E110
Med (40 to 60) HRC	0.33 HRC	ASTM E18, ISO 6508-2, ASTM E110
High (60 to 70) HRC	0.31 HRC	ASTM E18, ISO 6508-2, ASTM E110
Low 29.18 HRC <sup>note 3</sup>	0.18 HRC	ASTM E18, ISO 6508-2, ASTM E110
Med 45.43 HRC <sup>note 3</sup>	0.17 HRC	ASTM E18, ISO 6508-2, ASTM E110
High 64.54 HRC <sup>note 3</sup>	0.17 HRC	ASTM E18, ISO 6508-2, ASTM E110

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Low (40 to 55) HRD	0.12 HRD	ASTM E18, ISO 6508-2, ASTM E110
Med (55 to 65) HRD	0.10 HRD	ASTM E18, ISO 6508-2, ASTM E110
High (65 to 77) HRD	0.09 HRD	ASTM E18, ISO 6508-2, ASTM E110
Low (50 to 80) HREW	0.44 HREW	ASTM E18, ISO 6508-2, ASTM E110
Med (80 to 90) HREW	0.55 HREW	ASTM E18, ISO 6508-2, ASTM E110
High (90 to 100) HREW	0.55 HREW	ASTM E18, ISO 6508-2, ASTM E110
Low (60 to 70) HRFW	0.54 HRFW	ASTM E18, ISO 6508-2, ASTM E110
Med (70 to 85) HRFW	0.45 HRFW	ASTM E18, ISO 6508-2, ASTM E110
High (85 to 100) HRFW	0.45 HRFW	ASTM E18, ISO 6508-2, ASTM E110
Low (27 to 80) HRGW	0.68 HRGW	ASTM E18, ISO 6508-2, ASTM E110
Med (80 to 94) HRGW	0.18 HRGW	ASTM E18, ISO 6508-2, ASTM E110
Low (80 to 95) HRHW	0.41 HRHW	ASTM E18, ISO 6508-2, ASTM E110
Med (95 to 100) HRHW	0.38 HRHW	ASTM E18, ISO 6508-2, ASTM E110
High (100 to 105) HRHW	0.39 HRHW	ASTM E18, ISO 6508-2, ASTM E110
Low (40 to 60) HRKW	0.65 HRKW	ASTM E18, ISO 6508-2, ASTM E110
Med (60 to 85) HRKW	0.63 HRKW	ASTM E18, ISO 6508-2, ASTM E110
High (85 to 100) HRKW	0.65 HRKW	ASTM E18, ISO 6508-2, ASTM E110
Low (100 to 120) HRLW	0.17 HRLW	ASTM E18, ISO 6508-2, ASTM E110
Med (120 to 130) HRLW	0.12 HRLW	ASTM E18, ISO 6508-2, ASTM E110
Low (80 to 100) HRMW	0.53 HRMW	ASTM E18, ISO 6508-2, ASTM E110
Med (100 to 110) HRMW	0.49 HRMW	ASTM E18, ISO 6508-2, ASTM E110
High (110 to 120) HRMW	0.41 HRMW	ASTM E18, ISO 6508-2, ASTM E110
Low (58 to 100 ) HRPW	0.56 HRPW	ASTM E18, ISO 6508-2, ASTM E110
Med (100 to 112) HRPW	0.34 HRPW	ASTM E18, ISO 6508-2, ASTM E110
Low (100 to 115) HRRW	0.28 HRRW	ASTM E18, ISO 6508-2, ASTM E110
Med (115 to 125) HRRW	0.32 HRRW	ASTM E18, ISO 6508-2, ASTM E110
High 100 to 130) HRRW	0.21 HRRW	ASTM E18, ISO 6508-2, ASTM E110

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Low (100 to 120) HRSW	0.78 HRSW	ASTM E18, ISO 6508-2, ASTM E110
Med (120 to 125) HRSW	0.25 HRSW	ASTM E18, ISO 6508-2, ASTM E110
Low (100 to 110) HRVW	0.24 HRVW	ASTM E18, ISO 6508-2, ASTM E110
Med (110 to 121) HRVW	0.25 HRVW	ASTM E18, ISO 6508-2, ASTM E110
Low (70 to 80) HR15N	0.46 HR15N	ASTM E18, ISO 6508-2, ASTM E110
Med (70 to 90) HR15N	0.27 HR15N	ASTM E18, ISO 6508-2, ASTM E110
High (90 to 94) HR15N	0.22 HR15N	ASTM E18, ISO 6508-2, ASTM E110
Low (42 to 60) HR30N	0.39 HR30N	ASTM E18, ISO 6508-2, ASTM E110
Med (60 to 77.5) HR30N	0.31 HR30N	ASTM E18, ISO 6508-2, ASTM E110
High (77.5 to 86) HR30N	0.27 HR30N	ASTM E18, ISO 6508-2, ASTM E110
Low (20 to 45) HR45N	0.45 HR45N	ASTM E18, ISO 6508-2, ASTM E110
Med (45 to 66.5) HR45N	0.13 HR45N	ASTM E18, ISO 6508-2, ASTM E110
High (66.5 to 77) HR45N	0.16 HR45N	ASTM E18, ISO 6508-2, ASTM E110
Low (67 to 75) HR15TW	0.42 HR15TW	ASTM E18, ISO 6508-2, ASTM E110
Med (75 to 85) HR15TW	0.37 HR15TW	ASTM E18, ISO 6508-2, ASTM E110
High (86 to 93) HR15TW	0.35 HR15TW	ASTM E18, ISO 6508-2, ASTM E110
Low (25 to 50) HR30TW	0.54 HR30TW	ASTM E18, ISO 6508-2, ASTM E110
Med (50 to 70) HR30TW	0.34 HR30TW	ASTM E18, ISO 6508-2, ASTM E110
High (70 to 82) HR30TW	0.32 HR30TW	ASTM E18, ISO 6508-2, ASTM E110
Low (1 to 30) HR45TW	0.47 HR45TW	ASTM E18, ISO 6508-2, ASTM E110
Med (30 to 50) HR45TW	0.61 HR45TW	ASTM E18, ISO 6508-2, ASTM E110
High (50 to 75) HR45TW	0.41 HR45TW	ASTM E18, ISO 6508-2, ASTM E110
Low (70 to 90) HR15WW	0.33 HR15WW	ASTM E18, ISO 6508-2, ASTM E110
Med (90 to 100) HR15WW	0.26 HR15WW	ASTM E18, ISO 6508-2, ASTM E110
Low (60 to 80) HR30WW	0.40 HR30WW	ASTM E18, ISO 6508-2, ASTM E110
Med (80 to 95) HR30WW	0.40 HR30WW	ASTM E18, ISO 6508-2, ASTM E110

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Low (25 to 60) HR45WW	0.75 HR45WW	ASTM E18, ISO 6508-2, ASTM E110
Med (60 to 95) HR45WW	0.37 HR45WW	ASTM E18, ISO 6508-2, ASTM E110
Low (80 to 90) HR15XW	0.38 HR15XW	ASTM E18, ISO 6508-2, ASTM E110
Med (90 to 100) HR15XW	0.09 HR15XW	ASTM E18, ISO 6508-2, ASTM E110
Low (65 to 85) HR30XW	0.83 HR30XW	ASTM E18, ISO 6508-2, ASTM E110
Med (85 to 100) HR30XW	0.12 HR30XW	ASTM E18, ISO 6508-2, ASTM E110
Low (50 to 85) HR45XW	0.54 HR45XW	ASTM E18, ISO 6508-2, ASTM E110
Med (85 to 95) HR45XW	0.11 HR45XW	ASTM E18, ISO 6508-2, ASTM E110
Low (85 to 91) HR15YW	0.97 HR15YW	ASTM E18, ISO 6508-2, ASTM E110
Med (91 to 96) HR15YW	0.46 HR15YW	ASTM E18, ISO 6508-2, ASTM E110
High (96 to 100) HR15YW	0.46 HR16YW	ASTM E18, ISO 6508-2, ASTM E110
Low (75 to 90) HR30 YW	0.18 HR30YW	ASTM E18, ISO 6508-2, ASTM E110
Med (90 to 100) HR30YW	0.22 HR30YW	ASTM E18, ISO 6508-2, ASTM E110
Low (65 to 85) HR45YW	0.45 HR45YW	ASTM E18, ISO 6508-2, ASTM E110
Med (85 to 100) HR45YW	0.25 HR45YW	ASTM E18, ISO 6508-2, ASTM E110

Laboratory and Field Service  
Vickers Hardness Scale  
Machine Parameter

	<b>Range</b>	<b>Best Uncertainty(±)<sup>note 1</sup></b>	<b>Remarks</b>
Indentation	(0 to 7) mm	0.8 μm	Stage Micrometer

Vickers Hardness Scale

Calibration of Vickers Hardness Testers

<b>Load</b>	<b>Range in HV</b>	<b>Best Uncertainty(±)<sup>note 1,5</sup> in HV</b>	<b>Remarks</b>
1 kgf	278	4.3	ASTM E92, ISO 6507-2
1 kgf	565	11.2	

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2.5 kgf	253	7.2	ASTM E92, ISO 6507-2
2.5 kgf	474	5.5	ASTM E92, ISO 6507-2
2.5 kgf	760	10.4	ASTM E92, ISO 6507-2
5 kgf	263	6.3	ASTM E92, ISO 6507-2
5 kgf	457	10.6	ASTM E92, ISO 6507-2
5 kgf	717	11.2	ASTM E92, ISO 6507-2
10 kgf	264	4.8	ASTM E92, ISO 6507-2
10 kgf	443	5.5	ASTM E92, ISO 6507-2
10 kgf	713	10.6	ASTM E92, ISO 6507-2
15 kgf	251	3.0	ASTM E92, ISO 6507-2
15 kgf	466	5.4	ASTM E92, ISO 6507-2
15 kgf	752	11.2	ASTM E92, ISO 6507-2
30 kgf	253	3.7	ASTM E92, ISO 6507-2
30 kgf	470	4.0	ASTM E92, ISO 6507-2
30 kgf	749	13.5	ASTM E92, ISO 6507-2
50 kgf	174	1.6	ASTM E92, ISO 6507-2
50 kgf	482	4.7	ASTM E92, ISO 6507-2
50 kgf	774	5.6	ASTM E92, ISO 6507-2

### Knoop Hardness Scale

Calibration of Knoop Micro Hardness Testers – Laboratory and Field Service

<b>Load</b>	<b>Range</b>	<b>Best Uncertainty(±)<sup>note 1,6</sup></b>	<b>Remarks</b>
25 gf	233 HK	12.6 HK	ASTM E384, ISO 4545
50 gf	231 HK	12.3 HK	ASTM E384, ISO 4545
100 gf	193 HK	10.5 HK	ASTM E384, ISO 4545
100 gf	318 HK	11.4 HK	ASTM E384, ISO 4545
200 gf	311 HK	13.6 HK	ASTM E384, ISO 4545
200 gf	703 HK	27.2 HK	ASTM E384, ISO 4545

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300 gf	219 HK	10.3 HK	ASTM E384, ISO 4545
300 gf	570 HK	16.8 HK	ASTM E384, ISO 4545
500 gf	217 HK	8.7 HK	ASTM E384, ISO 4545
500 gf	559 HK	16.7 HK	ASTM E384, ISO 4545
1000 gf	215 HK	7.5 HK	ASTM E384, ISO 4545
1000 gf	528 HK	9.6 HK	ASTM E384, ISO 4545

### Vickers Hardness Scale

Calibration of Vickers Micro Hardness Testers – Laboratory and Field Service

<b>Load</b>	<b>Range</b>	<b>Best Uncertainty(±)<sup>note 1,6</sup></b>	<b>Remarks</b>
25 gf	110 HV	6.5 HV	ASTM 384, ISO 6507-2
50 gf	106 HV	4.9 HV	ASTM 384, ISO 6507-2
100 gf	194 HV	9.1 HV	ASTM 384, ISO 6507-2
100 gf	261 HV	11.4 HV	ASTM 384, ISO 6507-2
200	260 HV	10.7 HV	ASTM 384, ISO 6507-2
200	516 HV	15 HV	ASTM 384, ISO 6507-2
300	913 HV	5.2 HV	ASTM 384, ISO 6507-2
300	510 HV	13.2HV	ASTM 384, ISO 6507-2
500 gf	193 HV	4.0 HV	ASTM 384, ISO 6507-2
500 gf	507 HV	11.2 HV	ASTM 384, ISO 6507-2
1000 gf	194 HV	4.3 HV	ASTM 384, ISO 6507-2
1000 gf	514 HV	11.2 HV	ASTM 384, ISO 6507-2

### Brinell Hardness Machine Parameters – Laboratory and Field Services

	<b>Range</b>	<b>Best Uncertainty(±)<sup>note 1</sup></b>	<b>Remarks</b>
Force	To 3000 kgf	0.25% of rdg	ASTM E4
Indentation	(0 to 7) mm	0.8 μm	Stage Micrometer

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### Brinell Hardness Scale

Calibration of Brinell Hardness Testers – Laboratory and Field Service

<b>Load</b>	<b>Range</b>	<b>Best Uncertainty(±)<sup>note 1,7</sup></b>	<b>Remarks</b>
500 kgf	(15 to 100) HBW	1.2 HBW	ASTM E10, ISO 6506-2
500 kgf	(100 to 158) HBW	4.8 HBW	ASTM E10, ISO 6506-2, ASTM E110
3000 kgf	(200 to 400) HBW	1.9 HBW	ASTM E10, ISO 6506-2, ASTM E110
300 kgf	(400 to 600) HBW	5.0 HBW	ASTM E10, ISO 6506-2, ASTM E110

### LEEB Hardness

<b>Range</b>	<b>Best Uncertainty(±)<sup>note 1</sup></b>	<b>Remarks</b>
783 HLD	17 HLD	ASTM A956

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1. Represents an expanded uncertainty using a coverage factor,  $k = 2$ , at an approximate level of confidence of 95 %.
2. The HRC standardized test blocks used for verification are calibrated at the David Ellis Company Inc. Hardness Calibration Laboratory in accordance with ASTM E18 section C using NIST Rockwell HRC Standard References Materials (SRM) 2810, 2811, and 2812. All other Rockwell Scales are traceable to David L. Ellis Co. Inc. hardness levels through laboratory standardizing machines. The standardizing machines are directly verified according to ASTM E18 using devices that are traceable to NIST.
3. Scale is Rockwell HRC SRM'S 2810, 2811, and 2812 purchased from NIST and maintained by UTS.
4. The standardized test blocks used for verification are calibrated at the David Ellis Company Inc. Hardness Calibration Laboratory in accordance with ASTM E18 Section C. Rockwell Scales are traceable to David L. Ellis Co. Inc. hardness levels through laboratory standardizing machines. The standardizing machines are directly verified according to ASTM E18 using devices that are traceable to NIST.
5. The standardized test blocks used for verification are calibrated in accordance with ASTM E92 using indenter / load combinations that are traceable to D. L. Ellis Co. hardness levels, through laboratory standardizing machines. The standardizing machines are directly verified according to ASTM E92 using devices that are traceable to NIST.
6. The standardized test blocks used for verification are calibrated in accordance with ASTM E384 using indenter / load combinations that are traceable to D. L. Ellis Co. hardness levels, through laboratory standardizing machines. The standardizing machines are directly verified according to ASTM E384 using devices that are traceable to NIST.
7. The standardized test blocks used for verification are calibrated in accordance with ASTM E10 using indenter / load combinations that are traceable to D. L. Ellis Co. hardness levels, through laboratory standardizing machines. The standardizing machines are directly verified according to ASTM E10 using devices to that are traceable NIST.
8. Different uncertainties are available depending upon which standards are used. Please contact the laboratory for more information.
9. L in inches
10. L in mm

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