SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

ZWICKROELL, LP
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CALIBRATION

Valid To: January 31, 2027 Certificate Number: 1891.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the organization's compliance with A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Mechanical

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Material/Universal Testing Machines[3]			
Force; Tension & Compression	(0.01 to 200) N 40 N to 400 kN >400 kN to 2 MN	0.1 % 0.18 % 0.25 %	ASTM E4, ISO 7500-1 load cells, deadweights
Crosshead Speed	Up to 1000 mm/min	0.84 %	ASTM E2658 Linear magnetic scale or magnetic scale position sensor
Displacement (Travel) Verification	(0.2 to 60) mm (50 to 990) mm	0.11 % 0.034 %	ASTM E2309 Linear magnetic scale Magnetic scale (Class C)
Field Alignment of Material Test Machines	Up to 2500 microstrain	25 microstrain	ASTM E1012
Cross section Measuring Unit (CMU)	Up to 60 mm	0.15 %	ISO 9513 Gage blocks

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Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Extensometers[3] – Gage			ASTM E83, ISO 9513
Length	(10 to 200) mm	0.03 mm	Glass scale, digital calipers
Displacement (Travel)	(0.02 to 60) mm (50 to 990) mm	0.11 % 0.034 %	Linear incremental scale Magnetic scale (Class C)
Melt Flow Index Machines Volume & Rate[3] –			ASTM D1238, ISO 1133-1, ISO 1133 -2
Force	(3 to 250) N	0.37 %	Load cells
Time	(0.1 to 240) s	0.078 s	Stopwatch
Displacement, (Travel)	(0 to 60) mm	0.023 mm	Linear incremental scale
	(0.01 to 10) mm	0.004 mm	Gage blocks
Temperature	Up to 350 °C	0.074 °C	Instralab/RTD
Outside Diameter & Length	(0.001 to 10) mm	0.004 mm	Micrometer
Durometer Calibration Type A, B, C, D –			ASTM D2240
Indenter Extension & Shape –			
Diameter	1.27 mm	0.04 mm	Optical inspection under 62.5 % magnification
Radius Type A, Type C Radius Type B, Type D	0.79 mm 0.1 mm	0.03 mm 0.012 mm	
Angle	30°	0.02°	Gage ring
Extension	2.5 mm	0.04 mm	Shore ring
Indenter Display	(0 to 100) Duro Units	0.1 Division of the Reading	
Spring Calibration Force –			
Type A	(0 to 100) Duro Units	0.70 Duro Units	The durometer spring is verified with lever arm with weights
Type D	(0 to 100) Duro Units	1.2 Duro Units	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Pendulum Impact Testing Machines[3] – Charpy, Izod, Tensile Impact Testing			ISO 13802, ISO 8256, ASTM E23, ASTM D256
Energy	Up to 10 J (>10 to 100) J (>100 to 300) J (>300 to 450) J (>450 to 750) J	0.0068 J 0.026 J 0.054 J 0.075 J 0.13 J	
Force	(0 to 50) N (50 to 500) N	0.011 N 0.39 N	
Impact Angle	(0 to 180)°	0.06°	Digital protractor
Impact True Level			
Impact	----	0.000 045 in/in	
Dimensional	Up to 1 m	0.003 mm	
Deflection Temperature Testing Machines[3] –			ASTM D648 & ISO 75-1
Support Spacing Method A Method B	 (101.6 ± 0.5) mm (100.0 ± 0.5) mm		 Go-No Go gage
Standard Support Radius	(3 ± 0.2) mm	0.004 mm	Micrometer
HDUL Load Radius	(3 ± 0.2) mm	0.004 mm	
LVDT Readings	0.25 mm	0.01 mm	Gauge blocks
Weight: Rod & Weights	Up to 250 N	0.003 %	Load cell
Temperature	Up to 350 °C	0.074 °C	Almemo RTD
Vicat Testing Machines[3] –			ASTM D1525 & ISO 306
Vicat Needle	(1.00 ± 0.015) mm	0.004 mm	Micrometer
LVDT Readings	± 0.01 mm	0.004 mm	

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Vicat Testing Machines[3] – (cont)			ASTM D1525 & ISO 306
Weight	(10 ± 0.2) N (50 ± 1.0) N	0.003 %	Load cell
Temperature	Up to 350 °C ± 0.5 °C	0.074 °C	Almemo RTD
Direct Verification of Brinell Hardness Testers[3] –			Direct verification per ASTM E10, ISO 6506-2
Verification of Test Force	(1 to 150) kgf 50 to 750 kgf (> 750 to 3000) kgf	0.2 kgf 0.59 kgf 2.4 kgf	Verification of the test force is by load cell
Verification of the Device for Measuring Indentation Diameters	Up to 6 mm	15 µm	Stage micrometer
Verification of Testing Cycle (Time)	Up to 30 s	0.22 s	Stopwatch
Direct Verification of Rockwell Hardness Testing Machines[3] –			Direct verification method per ASTM E18, ISO 6506-2
Verification of the Test Force	(3 to 50) kgf (30 to 150) kgf	0.039 kgf 0.2 kgf	Verification of test force by an Load cell device
Verification of the Depth-Measuring Device	(0 to 0.2) mm	0.2 µm	Gage blocks
Verification of Testing Cycle (Time)	Up to 30 s	0.22 s	Stopwatch

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Direct Verification of Vickers and Knoop Hardness Testing Machines[3] –			Direct verification method per ASTM E92, ISO 6507-2
Verification of the Test Force	(10 to 100) gf (100 to 1000) gf 2000 gf to 50 kgf (> 50 to 150) kgf	0.0001 kgf 0.0008 kgf 0.2 kgf 0.12 kgf	Verification of forces by an Load cell
Verification of the Device for Measuring Indentation Diagonals	Up to 1000 µm	5 µm	Stage micrometer
Verification of Testing Cycle (Time)	Up to 30 s	0.22 s	Stopwatch
Indirect Verification of Brinell Hardness Testers at Test Conditions[3] –			Indirect verification method per ASTM E10, ISO 6506-2
10/3000 5/750 2.5/187.5 2.5/62.5 1/10	(150 to 350) HBW (150 to 355) HBW (150 to 411) HBW (70 to 150) HBW (80 to 150) HBW	3.1 HBW 3.9 HBW 4.4 HBW 1.7 HBW 1.8 HBW	
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers[3]	HRA: Low Medium High HRBW: Low Medium High HRC: Low Medium High HR15N: Low Medium High	 0.33 HRA 0.32 HRA 0.31 HRA 0.65 HRBW 0.40 HRBW 0.34 HRBW 0.37 HRC 0.31 HRC 0.30 HRC 0.37 HR15N 0.31 HR15N 0.30 HR15N	ASTM E18, ISO 6508-2

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers[3] (cont)	HR30N: Low Medium High HR45N: Low Medium High HR15T: Low Medium High HR30T: Low Medium High HR45T: Low Medium High	 0.38 HR30N 0.32 HR30N 0.35 HR30N 0.37 HR45N 0.41 HR45N 0.34 HR45N 0.32 HR15T 0.37 HR15T 0.30 HR15T 0.32 HR30T 0.37 HR30T 0.30 HR30T 0.42 HR45T 0.41 HR45T 0.34 HR45T	ASTM E18, ISO 6508-2
Indirect Verification of Vickers & Knoop Hardness Machines[3]	HV0.1: Low Medium High HV0.5: Low Medium High HV1: Low Medium High	 25 HV 48 HV 69 HV 12 HV 24 HV 49 HV 8.5 HV 18 HV 35 HV	ASTM E92/ASTM E384-11e1, ISO 6507-2

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Indirect Verification of Vickers & Knoop Hardness Machines[3] (cont)	HV5: Low Medium High HV10: Low Medium High HV30: Low Medium High	 4.1 HV 8.9 HV 13 HV 3.4 HV 6.7 HV 13 HV 2.5 HV 4.3 HV 8.3 HV	ASTM E92/ASTM E384-11e1, ISO 6507-2

[1] Commercial calibration service and field calibration service is available from this laboratory.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

[4] In the statement of CMC, percentages are percentage of reading, unless otherwise indicated.

Accredited Laboratory

A2LA has accredited

ZWICKROELL, LP

Kennesaw, GA

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 25th day of November 2024.

Mr.Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1891.01
Valid to January 31, 2027

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.