CERTIFICATE OF ACCREDITATION

This is to attest that

INDUSTRIAL PHYSICS, INC
DBA UNITED TESTING SYSTEMS, INC

40 MCCULLOUGH DRIVE
NEW CASTLE, DELAWARE 19720 U.S.A.

Calibration Laboratory CL-128

has met the requirements of AC204, *IAS Accreditation Criteria for Calibration Laboratories*, and has demonstrated compliance with ISO/IEC Standard 17025:2017, *General requirements for the competence of testing and calibration laboratories.* This organization is accredited to provide the services specified in the scope of accreditation.

Effective Date March 26, 2023

Expiration Date July 1, 2024

President

Visit www.iasonline.org for current accreditation information.

SCOPE OF ACCREDITATION

International Accreditation Service, Inc.

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INDUSTRIAL PHYSICS, INC
DBA UNITED TESTING SYSTEMS, INC

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Accredited to ISO/IEC 17025:2017 *Effective Date March 26, 2023*

CALIBRATION AND MEASUREMENT CAPABILITY (CMC)*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Dimensional			
Depth meter	Up to 3 mm	0.1 µm	Direct verification per ASTM E18, Hardness Blocks Procedure 280
Extensometers	0.0001 in to 2 in 2 in to 20 in	0.00001 in 0.002 in	Verified per ASTM E83 Height Gage, Gage Blocks Procedure 115 and 125
	0.0001 in to 2 in	0.00003 in	Verified per ISO9513 & UTS Procedures 116 using Linear Calibrator and Gage Blocks
Micrometer	0.00005 in to 1 in	0.00015 in	UTS proc. 210, Gage blocks, Temp. recorder
Height Gage	0.0015 in to 40 in	0.0011 in	UTS proc. 381, Gage Blocks, setting standards, Temp recorder
Calipers	0.0005 in to 6 in	0.00073 in	UTS Proc. 211, Caliper checker, Ring gage, Temp recorder
Mechanical			
Force – Compression and Tension (Load Cells and Universal Testing Machines)	0.01 lbf to 500,000 lbf	0.05 %	Master Load Cells per ASTM E74 and ASTM E4 Procedure 100 and 105
	100 lbf to 12,000 lbf 12,000 lbf to 25,000 lbf 25,000 lbf to 200,000 lbf	0.15 % 0.06 % 0.04 %	Master load cells per ISO 376. Calibration per ISO 7500-1 and UTS Procedure 101
Force -Tension (Load Cells and Tension Creep Testing Machines)	100 lbf to 10,000 lbf	0.06 %	Master Load Cells per ISO 376, Calibration per ISO 7500-2 and UTS Procedure 101

** If information in this CMC is presented in non-SI units, the conversion factors stated in NIST Special Publication 811 "Guide for the Use of the International System of Units (SI)" apply.*

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Machine and Specimen Alignment	0.1 % to 100 % Bending	2.1 % Bending	30,000 lbf Alignment Bar, Data Acquisition System, ASTM E1012 Procedure 290
Crosshead Speed	0.001 in/min to 40 in/min	0.001 in/min	ASTM E2658 Stopwatch, Dial Indicator, Procedure 315
Crosshead Displacement	0.0001 in to 2 in 2 in to 20 in	0.001 in 0.003 in	ASTM E2309 Dial/Digital Indicator, UTS Height Gage Procedure 315
Load Rate – Compression and Tension	Up to 25,000 lbf/min (Upper limit of 100,000 psi/min)	0.25 %	ASTM E2309, E2658, and UTS Procedure 405
Strain Rate Gages	0.002 in/in/min (0.2 %/min) to 0.01 in/in/min (1 %/min)	0.25 %	ASTM E2309, E2658, and UTS Procedure 410
Pressure Gages	1 psi to 5 psi 5 psi to 500 psi 500 psi to 10,000 psi	0.15 % 0.05 % 0.06 %	Pressure Transducer, UTS Procedure 320
Brinell Hardness Testers (Indirect)	HBW (95 to 200) HBW (200 to 300) HBW (300 to 400) HBW (400 to 500) HBW (500 to 600) HBW (600 to 650) HBW	 1 HBW 2 HBW 3 HBW 4 HBW 5 HBW 6 HBW	Indirect Verification per ASTM E10 Procedure 175
Brinell Hardness Testers (Direct)	500 kgf 1000 kgf 1500 kgf 3000 kgf	0.25 kgf 0.5 kgf 0.75 kgf 1.5 kgf	Direct Verification per ASTM E10 Procedure 180
Indirect Verification of Rockwell & Rockwell Superficial Hardness Testers	HRA (80 to 84) HRA (70 to 78) HRA (20 to 65) HRA HRBW (80 to 100) HRBW (60 to 79) HRBW (40 to 59) HRBW HRC (60 to 65) HRC (35 to 55) HRC (20 to 30) HRC	 0.19 HRA 0.31 HRA 0.29 HRA 0.39 HRBW 0.30 HRBW 0.42 HRBW 0.31 HRC 0.38 HRC 0.40 HRC	Indirect verification per ASTM Standard E18 with NIST traceable blocks, Procedure 165

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Indirect Verification of Rockwell & Rockwell Superficial Hardness Testers (continued)	HRD (71 to 75) HRD (51 to 67) HRD (40 to 48) HRD HREW (93 to 100) HREW (84 to 90) HREW (70 to 79) HREW HRFW (94 to 100) HRFW (80 to 90) HRFW (60 to 75) HRFW HRGW (80 to 94) HRGW (55 to 75) HRGW (30 to 50) HRGW HRHW (96 to 100) HRHW (80 to 94) HRHW HRKW (85 to 100) HRKW (65 to 80) HRKW (40 to 60) HRKW HRLW (105 to 126) HRLW HRMW (86 to 123) HRMW HRPW (63 to 119) HRPW HRRW (114 to 120) HRRW HRSW (105 to 112) HRSW HRVW (98 to 121) HRVW	 0.18 HRD 0.31 HRD 0.27 HRD 0.49 HREW 0.49 HREW 0.49 HREW 0.45 HRFW 0.44 HRFW 0.28 HRFW 0.43 HRGW 0.29 HRGW 0.82 HRGW 0.36 HRHW 0.36 HRHW 0.25 HRKW 0.36 HRKW 0.54 HRKW 0.20 HRLW 0.54 HRMW 0.36 HRPW 0.23 HRRW 0.35 HRSW 0.79 HRVW	Indirect verification per ASTM Standard E18 with NIST traceable blocks, Procedure 165

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Indirect Verification of Rockwell & Rockwell Superficial Hardness Testers continued	HR15N (90 to 92) HR15N (78 to 88) HR15N (70 to 77) HR15N HR30N (77 to 82) HR30N (55 to 73) HR30N (42 to 50) HR30N HR45N (66 to 72) HR45N (37 to 61) HR45N (20 to 31) HR45N HR15TW (87 to 93) HR15TW (81 to 86) HR15TW (74 to 80) HR15TW HR30TW (70 to 83) HR30TW (57 to 69) HR30TW (43 to 56) HR30TW HR45TW (53 to 73) HR45TW (33 to 7352 HR45TW (13 to 32) HR45TW HR15WW (76 to 96) HR15WW HR30WW (50 to 92) HR30WW HR45WW (20 to 86) HR45WW HR15XW (86) HR15XW HR30XW (72 to 97) HR30XW HR45XW (72 to 97) HR45XW	 0.53 HR15N 0.43 HR15N 0.41 HR15N 0.52 HR30N 0.47 HR30N 0.42 HR30N 0.23 HR45N 0.27 HR45N 0.59 HR45N 0.29 HR15TW 0.39 HR15TW 0.41 HR15TW 0.36 HR30TW 0.29 HR30TW 0.66 HR30TW 0.43 HR45TW 0.40 HR45TW 0.70 HR45TW 0.26 HR15WW 0.56 HR30WW 0.31 HR45WW 0.19 HR15WX 0.26 HR30XW 0.76 HR45XW	Indirect verification per ASTM Standard E18 with NIST traceable blocks, Procedure 165

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Indirect Verification of Rockwell & Rockwell Superficial Hardness Testers continued	HR15YW (90 to 100) HR15YW HR30YW (84 to 99) HR30YW HR45YW 92 HR45YW	 0.22 HR15YW 0.43 HR30YW 0.24 HR45YW	Indirect verification per ASTM Standard E18 with NIST traceable blocks, Procedure 165
Indirect Verification of Hardness Testers -Vickers	HV 0.01 (100 to 240) HV (600 to 800) HV HV 0.025 (100 to 240) HV (600 to 800) HV HV 0.05 (100 to 240) HV (600 to 800) HV HV 0.10 (240 to 600) HV (600 to 800) HV HV 0.20 (240 to 600) HV (600 to 800) HV HV 0.30 (240 to 600) HV (600 to 800) HV HV 0.50 (240 to 600) HV (600 to 800) HV HV 1 (240 to 600) HV (600 to 800) HV HV 5 (100 to 240) HV (600 to 800) HV HV 10 (100 to 240) HV (600 to 800) HV	 24 HV 80 HV 18 HV 51 HV 12 HV 36 HV 13 HV 16 HV 13 HV 18 HV 12 HV 16 HV 12 HV 13 HV 23 HV 11 HV 14 HV 17 HV 10 HV 21 HV	Indirect Verification per ASTM E92, Procedure 380

MEASURED QUANTITY or DEVICE TYPE CALIBRATED	RANGE	UNCERTAINTY[1,2] (±)	CALIBRATION METHOD OR PROCEDURE, STANDARD EQUIPMENT (OPTIONAL)
Indirect Verification of Hardness Testers -Vickers continued	HV 30 (100 to 240) HV (600 to 800) HV	 11 HV 24 HV	Indirect Verification per ASTM E92, Procedure 380
Scales	0.005 kgf to 100 kgf	0.003 kgf	Class F1 Weights, UTS Procedure 200
Torque Measuring Instruments	1 lbf·ft to 250 lbf·ft	2.1 lbf·ft	250 lbf·ft Torque cell, UTS Proc. 240
Thermal			
Laboratory Thermometers	10 °C to 50 °C	0.3 °C	Dry Block Standard UTS Procedure 295
Ovens, Furnaces, Presses	-100 °C to 1800 °C	1.4 °C	ASTM E145 Keithley Martel Procedure 140 and 145
Relative Humidity – Measure[3]	57 %RH	2.9 %RH	Digital Hygrometer, UTS Procedure 340
Electrical – DC/LF			
DC Voltage – Measure[3]	0.1 mV to 10 mV 10 mV to 100 mV 0.1 V to 1 V 1 V to 10 V 10 V to 100 V	0.006 % + 40 nV 0.004 % + 0.5 µV 0.0032 % + 3 µV 0.0032 % + 30 µV 0.0052 % + 500 µV	Keithley 2182 Procedure 360

[1]The uncertainty covered by the Calibration and Measurement Capability (CMC) is expressed as the expanded uncertainty having a coverage probability of approximately 95 %. It is the smallest measurement uncertainty that a laboratory can achieve within its scope of accreditation when performing calibrations of a best existing device. The measurement uncertainty reported on a calibration certificate may be greater than that provided in the CMC due to the behavior of the calibration item and other factors that may contribute to the uncertainty of a specific calibration.

[2]When uncertainty is stated in relative terms (such as percent, a multiplier expressed as a decimal fraction or in scientific notation), it is in relation to instrument reading or instrument output, as appropriate, unless otherwise indicated.

[3]Capability is suitable for the calibration of measuring devices in the stated ranges.

[4]Capability is suitable for the calibration of devices intended to generate the indicated quantity in the stated ranges.