



CERTIFICATE OF ACCREDITATION

ANSI National Accreditation Board

11617 Coldwater Road, Fort Wayne, IN 46845 USA

This is to certify that

Advantage Center Co., Ltd.

59/494 Moo 6, Frakham Road, T.Kukhot, Lumlookkar
Pathumthani 12130 Thailand

has been assessed by ANAB and meets the requirements of international standard

ISO/IEC 17025:2017

while demonstrating technical competence in the field of

CALIBRATION

Refer to the accompanying Scope of Accreditation for information regarding the types of activities to which this accreditation applies

AC-2662

Certificate Number



ANAB Approval

Certificate Valid Through: 03/21/2021
Version No. 003 Issued: 04/23/2019



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. 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).



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Advantage Center Co., Ltd.

59/494 Moo 6, Frakham Road, T.Kukhot, Lumlookkar,
Pathumthani 12130 Thailand

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CALIBRATION

Valid to: **March 21, 2021**

Certificate Number: **AC-2662**

Acoustics and Vibration

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Sound Level Meter ¹	94 dB 114 dB	0.1 dB 0.1 dB	Sound Calibrator

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
pH Meter ¹	4.00 pH 7.00 pH 10.00 pH	0.01 pH 0.01 pH 0.017 pH	pH Solution Buffer
Conductivity Meter ¹	84 µS/cm 1 413 µS/cm 12.88 mS/cm 111.3 mS/cm	1.2 µS /cm 20 µS /cm 0.18 mS/cm 1.6 mS/cm	Conductivity Solution
Turbidity Meter ¹	15 NTU 50 NTU 500 NTU 1 000 NTU	0.12 NTU 0.21 NTU 3.1 NTU 5.1 NTU	Turbidity Solution



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature-Simulation Resistance Temperature Detector ¹	RTD (Pt100) (-200 to 0) °C (0 to 400) °C (400 to 650) °C	0.15 °C 0.25 °C 0.48 °C	Fluke 744 Process Calibrator
Temperature-Simulation Thermocouple ¹	Type E (-200 to -100) °C (-100 to 0) °C (0 to 1 000) °C Type J (-200 to 0) °C (0 to 600) °C (600 to 900) °C (900 to 1 200) °C Type K (-200 to 0) °C (0 to 150) °C (150 to 1 100) °C (1 100 to 1 372) °C Type N (-200 to 0) °C (0 to 150) °C (150 to 900) °C (900 to 1 300) °C Type R (0 to 200) °C (200 to 400) °C (400 to 1 760) °C Type S (0 to 200) °C (200 to 1 760) °C Type T (-200 to -100) °C (-100 to 0) °C (0 to 400) °C	0.47 °C 0.3 °C 0.29 °C 0.44 °C 0.3 °C 0.29 °C 0.3 °C 0.54 °C 0.4 °C 0.4 °C 0.4 °C 0.83 °C 0.62 °C 0.62 °C 0.4 °C 1.6 °C 1.2 °C 1.2 °C 1.6 °C 1.3 °C 0.56 °C 0.52 °C 0.4 °C	Fluke 744 Process Calibrator
DC Voltage - Source ¹	Up to < 330 mV 330 mV to < 3.3 V (3.3 to < 33) V (33 to < 330) V (330 to 1 000) V	48 μV/V + 9 μV 40 μV/V + 60 μV 40 μV/V + 0.6 mV 45 μV/V + 6 mV 45 μV/V + 60 mV	Fluke 5500A Multiproduct Calibrator

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current - Source ¹	Up to < 3.3 mA (3.3 to < 33) mA (33 to < 330) mA (0.33 to < 2.2) A (2.2 to 11) A	0.11 mA/A + 0.085 μA 0.080 mA/A + 0.65 μA 0.080 mA/A + 8 μA 0.25 mA/A + 0.085 mA 0.47 mA/A + 0.75 mA	Fluke 5500A Multiproduct Calibrator
AC Voltage - Source ¹	(1 to < 33) mV (10 to 45) Hz > 45 Hz to 10 kHz (> 10 to 20) kHz (> 20 to 50) kHz (> 50 to 100) kHz (> 100 to 450) kHz (33 to < 330) mV (10 to 45) Hz > 45 Hz to 10 kHz (> 10 to 20) kHz (> 20 to 50) kHz (> 50 to 100) kHz (> 100 to 450) kHz (0.33 to < 3.3) V (10 to 45) Hz > 45 Hz to 10 kHz (> 10 to 20) kHz (> 20 to 50) kHz (> 50 to 100) kHz (> 100 to 450) kHz (3.3 to < 33) V (10 to 45) Hz > 45 Hz to 10 kHz (> 10 to 20) kHz (> 20 to 50) kHz (> 50 to 90) kHz (33 to < 330) V 45 Hz to 1 kHz (> 1 to 10) kHz (> 10 to 18) kHz (330 to 1 000) V 45 Hz to 1 kHz (> 1 to 5) kHz (> 5 to 10) kHz	2.8 mV/V + 16 μV 1.2 mV/V + 16 μV 1.6 mV/V + 16 μV 2 mV/V + 16 μV 2.8 mV/V + 26 μV 8 mV/V + 50 μV 2 mV/V + 20 μV 0.4 mV/V + 20 μV 0.8 mV/V + 20 μV 1.3 mV/V + 32 μV 1.9 mV/V + 0.15 mV 5.5 mV/V + 0.3 mV 1.2 mV/V + 0.21 mV 0.3 mV/V + 0.1 mV 0.7 mV/V + 0.08 mV 1.1 mV/V + 0.25 mV 1.9 mV/V + 1.4 mV 4 mV/V + 2.6 mV 1.2 mV/V + 2.2 mV 0.32 mV/V + 0.75 mV 0.63 mV/V + 2.2 mV 1.5 mV/V + 4 mV 1.9 mV/V + 14 mV 0.4 mV/V + 7.8 mV 0.7 mV/V + 13 mV 0.7 mV/V + 27 mV 0.4 mV/V + 0.085 V 1.6 mV/V + 0.11 V 1.6 mV/V + 0.4 V	Fluke 5500A Multiproduct Calibrator



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment		
AC Current - Source ¹	(0.029 to < 0.33) mA (20 to 45) Hz > 45 Hz to 1 kHz (> 1 to 5) kHz (> 5 to 10) kHz	2 mA/A + 0.12 μA 1 mA/A + 0.2 μA 3.2 mA/A + 0.12 μA 9.8 mA/A + 0.12 μA	Fluke 5500A Multiproduct Calibrator		
	(0.33 to < 3.3) mA (20 to 45) Hz > 45 Hz to 1 kHz (> 1 to 5) kHz (> 5 to 10) kHz	1.6 mA/A + 0.25 μA 0.80 mA/A + 0.25 μA 1.6 mA/A + 0.25 μA 4.4 mA/A + 0.25 μA			
	(3.3 to < 33) mA (20 to 45) Hz > 45 Hz to 1 kHz (> 1 to 5) kHz (> 5 to 10) kHz	1.6 mA/A + 2.5 μA 0.7 mA/A + 2.5 μA 1.6 mA/A + 2.5 μA 4.7 mA/A + 2.5 μA			
	(33 to < 330) mA (20 to 45) Hz > 45 Hz to 1 kHz (> 1 to 5) kHz (> 5 to 10) kHz	1.6 mA/A + 25 μA 0.7 mA/A + 25 μA 1.6 mA/A + 25 μA 4.7 mA/A + 25 μA			
	(0.33 to < 2.2) A (10 to 45) Hz > 45 Hz to 1 kHz (> 1 to 5) kHz	1.6 mA/A + 0.25 mA 0.78 mA/A + 0.25 mA 6 mA/A + 0.25 mA			
	(2.2 to 11) A (45 to 65) Hz (> 65 to 500) Hz > 500 Hz to 1 kHz	0.5 mA/A + 2 mA 0.8 mA/A + 2 mA 2.6 mA/A + 2 mA			
	Resistance - Source ¹	(0 to < 11) Ω		0.1 mΩ/Ω + 8.5 mΩ	Fluke 5500A Multiproduct Calibrator
		(11 to < 33) Ω		0.1 mΩ/Ω + 15 mΩ	
		(33 to < 110) Ω		0.07 mΩ/Ω + 15 mΩ	
		(110 to < 330) Ω		0.07 mΩ/Ω + 15 mΩ	
		330 Ω to < 1.1 kΩ		0.07 mΩ/Ω + 0.1 Ω	
		(1.1 to < 3.3) kΩ		0.07 mΩ/Ω + 0.1 Ω	
		(3.3 to < 11) kΩ		0.07 mΩ/Ω + 0.9 Ω	
		(11 to < 33) kΩ		0.07 mΩ/Ω + 0.9 Ω	
(33 to < 110) kΩ		0.09 mΩ/Ω + 7.5 Ω			
(110 to < 330) kΩ		0.1 mΩ/Ω + 9 Ω			
330 kΩ to < 1.1 MΩ	0.13 mΩ/Ω + 0.08 kΩ				
(1.1 to < 3.3) MΩ	0.13 mΩ/Ω + 0.1 kΩ				

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Resistance - Source ¹	(3.3 to < 11) MΩ (11 to < 33) MΩ (33 to 100) MΩ	0.48 mΩ/Ω + 1 kΩ 0.8 mΩ/Ω + 1.3 kΩ 0.4 mΩ/Ω + 4.3 kΩ	Fluke 5500A Multiproduct Calibrator
Frequency - Source ¹	(0.01 to 500) Hz > 500 Hz to 5 kHz (> 5 to 50) kHz (> 50 to 100) kHz	20 μHz/Hz + 5.9 mHz 20 μHz/Hz + 58 mHz 20 μHz/Hz + 0.58 Hz 20 μHz/Hz + 5.8 Hz	Fluke 5500A Multiproduct Calibrator
Capacitance - Source ¹	50 to 1 000) Hz (0.33 to 0.5) nF (0.5 to 1.09) nF (1.1 to 3.29) nF (3.3 to 10.9) nF (11 to 32.9) nF (33 to 109.9) nF (110 to 329.9) nF (0.33 to 1.09) μF (1.1 to 3.29) μF (50 to 400) Hz (3.3 to 10.9) μF (11 to 32.9) μF (50 to 200) Hz (33 to 109.9) μF (50 to 100) Hz (110 to 329.9) μF (0.33 to 1) mF	0.4 % of Reading + 8 pF 0.4 % of Reading + 10 pF 0.4 % of Reading + 10 pF 0.4 % of Reading + 12 pF 0.2 % of Reading + 0.1 nF 0.2 % of Reading + 0.1 nF 0.2 % of Reading + 0.65 nF 0.2 % of Reading + 1.3 nF 0.2 % of Reading + 6.5 nF 0.2 % of Reading + 10 nF 0.32 % of Reading + 0.08 μF 0.37 % of Reading + 0.1 μF 0.54 % of Reading + 0.65 μF 0.78 % of Reading + 0.65 μF	Fluke 5500A Multiproduct Calibrator
Source DC Current Clamp-On Ammeters ¹	Up to 20 A (> 20 to 300) A (> 300 to 550) A	3.8 mA/A + 0.06 A 3.3 mA/A + 0.08 A 3.2 mA/A + 0.06 A	Fluke 5500A Multiproduct Calibrator with 50 turns coil
Source AC Current Clamp-On Ammeters ¹	Up to 20 A (45 to 100) Hz (> 100 to 440) Hz (> 20 to 200) A (45 to 100) Hz (> 100 to 440) Hz (> 200 to 550) A (45 to 65) Hz (> 65 to 100) Hz	5.2 mA/A + 0.08 A 12 mA/A + 0.08 A 5.2 mA/A + 0.08 A 12 mA/A + 0.08 A 3.5 mA/A + 0.072 A 3.6 mA/A + 0.06 A	Fluke 5500A Multiproduct Calibrator with 50 turns coil



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Source Electrical Simulation of Thermocouple Indicating Devices ¹	Type K		Fluke 5500A Multiproduct Calibrator
	(-200 to -100) °C	0.46 °C	
	(-100 to -25) °C	0.26 °C	
	(-25 to 120) °C	0.23 °C	
	(120 to 1 000) °C	0.37 °C	
	(1 000 to 1 372) °C	0.56 °C	
	Type E		
	(-250 to -100) °C	0.7 °C	
	(-100 to -25) °C	0.23 °C	
	(-25 to 350) °C	0.2 °C	
	(350 to 650) °C	0.23 °C	
	(650 to 1 000) °C	0.3 °C	
	Type J		
	(-210 to -100) °C	0.38 °C	
	(-100 to -25) °C	0.23 °C	
	(-25 to 150) °C	0.2 °C	
	(150 to 760) °C	0.24 °C	
	(760 to 1 200) °C	0.33 °C	
	Type N		
	(-250 to -100) °C	0.56 °C	
	(-100 to -25) °C	0.32 °C	
	(-25 to 120) °C	0.28 °C	
	(120 to 410) °C	0.26 °C	
	(410 to 1 300) °C	0.38 °C	
Type R			
(0 to 250) °C	0.8 °C		
(250 to 400) °C	0.5 °C		
(400 to 1 000) °C	0.47 °C		
(1 000 to 1 767) °C	0.56 °C		
Type S			
(0 to 250) °C	0.66 °C		
(250 to 400) °C	0.51 °C		
(400 to 1 000) °C	0.52 °C		
(1 000 to 1 767) °C	0.65 °C		
Type T			
(-250 to -150) °C	0.88 °C		
(-150 to 0) °C	0.34 °C		
(0 to 120) °C	0.23 °C		
(120 to 400) °C	0.21 °C		

Source Electrical Simulation of Resistance Temperature Detector (RTD) Indicating Devices ¹	100 Ω , Pt385		
	(-200 to 0) °C		0.09 °C
	(0 to 300) °C		0.14 °C
	(300 to 400) °C		0.15 °C
	(400 to 630) °C		0.18 °C
	(630 to 800) °C		0.33 °C
	200 Ω , Pt385		
	(-200 to 100) °C		0.08 °C
	(100 to 260) °C		0.09 °C
	(260 to 300) °C		0.18 °C
	(300 to 400) °C		0.19 °C
	(400 to 600) °C		0.2 °C
	(600 to 630) °C		0.23 °C
	500 Ω , Pt385		
	(-200 to - 80) °C		0.08 °C
	(-80 to 100) °C		0.09 °C
	(100 to 260) °C		0.1 °C
	(260 to 400) °C		0.13 °C
	(400 to 600) °C		0.14 °C
	(600 to 630) °C		0.16 °C
	1000 Ω , Pt385		
	(-200 to - 80) °C		0.08 °C
	(-80 to 100) °C		0.09 °C
	(100 to 260) °C		0.1 °C
	(260 to 400) °C		0.13 °C
	(400 to 600) °C		0.14 °C
	(600 to 630) °C		0.16 °C
	100 Ω , Pt3916		
	(-200 to - 190) °C		0.36 °C
	(-190 to - 80) °C		0.08 °C
(- 80 to 0) °C		0.09 °C	
(0 to 260) °C		0.11 °C	
(260 to 300) °C		0.13 °C	
(300 to 400) °C		0.14 °C	
(400 to 600) °C		0.15 °C	
(600 to 630) °C		0.33 °C	
100 Ω , Pt3926			
(-200 to 0) °C		0.09 °C	
(0 to 100) °C		0.12 °C	
(100 to 300) °C		0.14 °C	
(300 to 400) °C		0.16 °C	
(400 to 630) °C		0.18 °C	
10 Ω , Cu 427			
(-100 to 260) °C		0.42 °C	
			Fluke 5500A Multiproduct Calibrator



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Power – Source ¹	(0.33 to 1 000) V, <0.33 A (0.108 9 W to < 330) W (0.33 to 1 000) V, (0.33 to < 2.2) A 330 W to < 2.2 kW (0.33 to 1 000) V, (2.2 to 10) A (2.2 to 10) kW	0.1 mW/W + 6 mW 0.34 mW/W + 60 mW 0.58 mW/W + 0.6 W	Fluke 5500A Multiproduct Calibrator
AC Power – Source ¹	(45 to 65) Hz, PF=1 (0.33 to 1 000) V, up to 0.329 A (0.1089 to < 10.9) W (10.9 to < 330) W (0.33 to 1 000) V, (0.33 to < 3) A 330 W to < 2.2 kW (0.33 V to 1 000) V, (3 A to < 10) A (2.2 to < 3.3) kW (3.3 to 10) kW	0.94 mW/W + 1.3 mW 1.6 mW/W + 6 mW 1.1 mW/W + 6 mW 0.85 mW/W + 0.06 W 0.78 mW/W + 0.6 W	Fluke 5500A Multiproduct Calibrator
High Resistance, Insulation Testers, Resistivity Meters ¹ @ (50 to 1 000) V	(0.1 to 10) MΩ (10 to 20) MΩ (20 to 30) MΩ (30 to 50) MΩ (50 to 100) MΩ (100 to 200) MΩ (200 to 500) MΩ (500 to 1 000) MΩ 10 GΩ	0.005 8 MΩ 0.032 MΩ 0.069 MΩ 0.075 MΩ 0.094 MΩ 2.8 MΩ 4.5 MΩ 7.1 MΩ 0.072 GΩ	Resistance Decade Box
Resistance – Source ¹	(0.1 to 1) Ω (1 to 500) Ω (0.5 to 5) kΩ (5 to 10) kΩ (10 to 100) kΩ	5.8 mΩ 0.058 Ω 0.001 2 kΩ 0.06 kΩ 0.058 kΩ	Resistance Decade Box
DC Voltage – Measure ¹	Up to 10 mV (> 10 to 100) mV (> 0.1 to 1) V (> 1 to 10) V (> 10 to 100) V (>100 to 1 000) V	0.06 mV/V + 2 μV 0.06 mV/V + 5 μV 0.046 mV/V + 10 μV 0.04 mV/V + 60 μV 0.052 mV/V + 0.7 mV 0.052 mV/V + 12 mV	Digital Multimeter 34401A



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage – Measure ¹	10 Hz to 20 kHz Up to 10 mV (> 10 to 100) mV (> 0.1 to 1) V (> 1 to 10) V (> 10 to 100) V (> 100 to 750) V (20 to 50) kHz Up to 100 mV (> 0.1 to 1) V (> 1 to 10) V (> 10 to 100) V (> 100 to 750) V	0.7 mV/V + 50 μV 0.7 mV/V + 0.05 mV 0.7 mV/V + 0.4 mV 0.7 mV/V + 3.6 mV 0.7 mV/V + 36 mV 0.7 mV/V + 0.3 V 1.5 mV/V + 0.06 mV 1.5 mV/V + 0.5 mV 15 mV/V + 5 mV 1.5 mV/V + 50 mV 1.5 mV/V + 0.36 V	Digital Multimeter 34401A
DC Current – Measure ¹	Up to 1 mA (> 1 to 10) mA (> 10 to 100) mA (> 0.1 to 1) A (> 1 to 3) A	0.6 mA/A + 0.25 μA 0.6 mA/A + 2.5 μA 0.6 mA/A + 6 μA 1.2 mA/A + 0.12 mA 1.4 mA/A + 0.7 mA	Digital Multimeter 34401A
AC Current – Measure ¹	10 Hz to 5 kHz Up to 0.1 mA (> 0.1 to 1) mA (> 1.0 to 10) mA (> 10 to 100) mA (> 0.1 to 1) A (> 1 to 3) A	1.2 mA/A + 0.6 μA 1.2 mA/A + 1.2 μA 1.2 mA/A + 7 μA 1.2 mA/A + 70 μA 1.2 mA/A + 0.7 mA 2.7 mA/A + 2.0 mA	Digital Multimeter 34401A
Resistance Fixed Points, Resistance Measure ¹	Up to 100 Ω (> 100 to 1 000) Ω (> 1.0 to 10) kΩ (> 10 to 100) kΩ (> 0.1 to 1) MΩ (> 1 to 2) MΩ (> 2 to 10) MΩ (> 10 to 100) MΩ	0.12 mΩ / Ω + 5 mΩ 0.12 mΩ / Ω + 12 mΩ 0.12 mΩ / Ω + 0.12 Ω 0.12 mΩ / Ω + 1.2 Ω 0.12 mΩ / Ω + 13 Ω 0.12 mΩ / Ω + 0.12 kΩ 0.47 mΩ / Ω + 0.16 kΩ 0.93 mΩ / Ω + 12 kΩ	Digital Multimeter 34401A
DC High Voltage – Measure ¹	Up to 1 kV (> 1 to 2) kV (> 2 to 3) kV (> 3 to 4) kV	1.9 V 2.5 V 3.1 V 3.7 V	Digital Multimeter with Fluke 80K-40 High voltage probe



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Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC High Voltage – Measure ¹	(> 4 to 5) kV (>5 to 6) kV (> 6 to 7) kV (> 7 to 8) kV (> 8 to 9) kV (> 9 to 10) kV	4.3 V 4.9 V 5.5 V 6.1 V 6.7 V 7.3 V	Digital Multimeter with Fluke 80K-40 High voltage probe
AC High Voltage – Measure ¹	@ 50 Hz Up to 1 kV (> 1 to 2) kV (> 2 to 3) kV (> 3 to 4) kV (> 4 to 5) kV (> 5 to 6) kV (> 6 to 7) kV (> 7 to 8) kV (> 8 to 9) kV (> 9 to 10) kV	5.1 V 9.2 V 14 V 19 V 23 V 27 V 31 V 35 V 39 V 44 V	Digital Multimeter with Fluke 80K-40 High voltage probe

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Caliper ¹ (External/Internal/Depth)	Up to 300 mm (> 300 to 450) mm (> 450 to 600) mm (> 600 to 1 000) mm	16 µm 18 µm 21 µm 30 µm	Gauge Block Set (Steel)
Height Gauge ¹ Dial and Digital	Up to 200 mm (> 200 to 300) mm (> 300 to 600) mm (> 600 to 1 000) mm	15 µm 16 µm 21 µm 30 µm	Gauge Block Set (Steel)

Length – Dimensional metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Outside /Inside Micrometer ¹	(0 to 25) mm	1 μm	Gauge Block Set (Steel)
	(> 25 to 50) mm	1.6 μm	
	(> 50 to 75) mm	2.2 μm	
	(> 75 to 100) mm	2.8 μm	
	(> 100 to 125) mm	3.5 μm	
	(> 125 to 150) mm	4.1 μm	
	(> 150 to 175) mm	4.8 μm	
	(> 175 to 200) mm	5.4 μm	
	(> 200 to 225) mm	6.6 μm	
	(> 225 to 250) mm	6.8 μm	
	(> 250 to 275) mm	7.4 μm	
	(> 275 to 300) mm	8.1 μm	
	(> 300 to 325) mm	8.8 μm	
	(> 325 to 350) mm	9.4 μm	
	(> 350 to 375) mm	10 μm	
	(> 375 to 400) mm	11 μm	
	(> 400 to 425) mm	12 μm	
(> 425 to 450) mm	13 μm		
(> 450 to 475) mm	13 μm		
(> 475 to 500) mm	14 μm		

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales, Load cell and Balances ¹	1 mg to 10 g	0.18 mg	Standard Weight E2, F1, M1
	(> 10 to 20) g	0.19 mg	
	(> 20 to 100) g	0.2 mg	
	(> 100 to 200) g	0.31 mg	
	(> 200 to 300) g	1 mg	
	(> 300 to 500) g	1.1 mg	
	> 500 g to 1 kg	1.8 mg	
	(> 1 to 2) kg	12 mg	
	(> 2 to 5) kg	18 mg	
	(> 5 to 10) kg	0.087 g	
	(> 10 to 20) kg	0.12 g	



Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Scales, Load cell and Balances ¹	(> 20 to 30) kg (> 30 to 60) kg (> 60 to 100) kg (> 100 to 150) kg (> 150 to 200) kg (> 200 to 300) kg (> 300 to 400) kg (> 400 to 500) kg (> 500 to 600) kg (> 600 to 1 000) kg	8.2 g 8.3 g 8.5 g 8.9 g 17 g 18 g 43 g 44 g 45 g 85 g	Standard Weight E2, F1, M1
Push-Pull Gauge, Force Gauge, Tension, Tensile ¹	(0 to 29.4) N (> 29.4 to 98) N (> 98 to 980) N	0.058 N 0.3 N 0.6 N	Standard Weight E2, F1, M1
Pressure Gauge ¹ (Pneumatic) Digital Pressure Gauge, Pressure Transducer, Differential Pressure Gauge, Manometer, Pressure Switch	(0 to 200) kPa (> 200 to 2 000) kPa	0.12 kPa 1.2 kPa	Pressure Calibrator
Pressure Gauge ¹ (Hydraulic) Digital Pressure Gauge, Pressure Transducer, Differential Pressure Gauge, Manometer, Pressure Switch	(0 to 10) MPa (>10 to 20) MPa (> 20 to 70) MPa	8.5 kPa 15 kPa 53 kPa	Pressure Calibrator
Vacuum Gauge ¹	(- 90 to 0) kPa	53 Pa	Pressure Calibrator
Pressure Transmitter ¹	(- 90 to 0) kPa (> 0 to 200) kPa (> 200 to 2 000) kPa	0.09 kPa 0.2 kPa 2 kPa	Pressure Calibrator/ Process Calibrator
Flow Meter ¹ (Liquid flow)	(0 to 8.334) l/s (> 8.334 to 16.668) l/s (> 16.668 to 30.56) l/s	0.21 % of reading 0.12 % of reading 0.31 % of reading	Ultrasonic flow meter



Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass ¹	50 mg	0.082 mg	Standard Weight Set Class E2, F1, M1
	100 mg	0.083 mg	
	200 mg	0.083 mg	
	500 mg	0.083 mg	
	1 g	0.084 mg	
	2 g	0.085 mg	
	5 g	0.088 mg	
	10 g	0.094 mg	
	20 g	0.12mg	
	50 g	0.2 mg	
	100 g	0.37 mg	
	200 g	0.72 mg	
	500 g	2.8 mg	
	1 kg	4.2 mg	
	2 kg	12 mg	
	5 kg	23 mg	
10 kg	89 mg		
20 kg	105 mg		

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature Controlled Chamber ¹ Hot Air Oven, Incubator, Refrigerator, Freezer	(-10 to 0) °C	0.31 °C	Agilent 34970A
	(> 0 to 10) °C	0.25 °C	
	(> 10 to 70) °C	0.32 °C	
	(> 70 to 150) °C	0.68 °C	
	(> 150 to 250) °C	1.3 °C	
Autoclave ¹	(105 to 135) °C	0.68 °C	Agilent 34970A
Liquid Bath, Micro Bath ¹	(-10 to 0) °C	0.29 °C	Agilent 34970A
	(> 0 to 100) °C	0.31 °C	
	(> 100 to 200) °C	0.29 °C	
Temperature Gauge & Dial Thermometer ¹	(-10 to 0) °C	0.31 °C	PRT Standard
	(> 0 to 200) °C	0.32 °C	
	(> 200 to 400) °C	0.6 °C	
Thermocouple Sensor ¹	Types K, J, E, T, N, R, S		PRT Standard
	(-10 to 0) °C	0.36 °C	
	(> 0 to 200) °C	0.38 °C	
	(> 200 to 400) °C	0.43 °C	

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Thermocouple Sensor ¹	Types K, J, E, T, N, R, S (> 400 to 550) °C (> 550 to 700) °C (> 700 to 1 200) °C	1.8 °C 2.8 °C 3.1 °C	Thermocouple Standard
Temperature Indicator with sensor Thermocouple ¹	Types K, J, E, T, N (-10 to 200) °C (> 200 to 400) °C	0.23 °C 0.61 °C	PRT Standard
Temperature Indicator with sensor Thermocouple ¹	Types K, J, E, T, N (> 400 to 550) °C (> 550 to 700) °C (> 700 to 1 200) °C	1.7 °C 2.8 °C 3.1 °C	Thermocouple Standard
Temperature Indicator with sensor Thermocouple ¹	Types R, S (0 to 200) °C (> 200 to 400) °C	0.2 °C 0.6 °C	PRT Standard
Temperature Indicator with sensor Thermocouple ¹	Types R, S (> 400 to 550) °C (> 550 to 700) °C (> 700 to 1 200) °C	1.7 °C 2.8 °C 3.1 °C	Thermocouple Standard
Temperature Indicator with sensor RTD or Thermistor Sensor ¹	(-10 to 100) °C (>100 to 300) °C (>300 to 400) °C	0.07 °C 0.1 °C 0.11 °C	PRT Standard
Temperature Indicator with sensor RTD or Thermistor Sensor ¹	(> 400 to 550) °C (> 550 to 650) °C	1.7 °C 2.8 °C	Thermocouple Standard
RTD Sensor ¹	(-10 to 400) °C	0.15 °C	PRT Standard
RTD Sensor ¹	(> 400 to 550) °C (> 550 to 650) °C	1.7 °C 2.8 °C	Thermocouple Standard
Liquid in Glass Thermometer ¹	(-10 to 200) °C	0.07 °C	PRT Standard
Dry Block, Dry Well ¹	(-10 to 400) °C	0.36 °C	PRT Standard
Dry Block, Dry Well ¹	(>400 to 550) °C (>550 to 700) °C (>700 to 1 200) °C	0.8 °C 2.4 °C 2.7 °C	Thermocouple Standard
Thermo-Hygrometer ¹ Temperature Humidity	(20 to 40) °C (30 to 80) %RH	0.5 °C 1.8 %RH	Data Logger

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Digital Tachometer ¹ (Photo Type)	(2.5 to 999.99) rpm (> 999.99 to 9 999.9) rpm (> 9 999.9 to 99 999) rpm	0.005 8 rpm 0.058 rpm 0.58 rpm	Fluke 5500A Multiproduct Calibrator with Light Emitting Diode (LED)

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope
2. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2662.



Vice President