



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## *Certificate of Accreditation*

*Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:*

### ***HSM Sistemas de Metrología, S. de R.L. de C.V.***

***Blvd. Bernardo Quintana Arrijoja # 630, Local 21 Planta Alta, Col. Desarrollo San Pablo  
Querétaro, Querétaro, México. C.P. 76125***

*(Hereinafter called the Organization) and hereby declares that Organization 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  
(as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

***Dimensional, Mechanical, Chemical, Mass, Force and Weighing Devices,  
Thermodynamic, Time and Frequency and Electrical Calibration  
(As detailed in the supplement)***

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen  
President  
Perry Johnson Laboratory  
Accreditation, Inc. (PJLA)  
755 W. Big Beaver, Suite 1325  
Troy, Michigan 48084

*Initial Accreditation Date:*

January 14, 2019

*Issue Date:*

May 31, 2023

*Expiration Date:*

June 30, 2025

*Accreditation No.:*

102290

*Certificate No.:*

L23-448

*The validity of this certificate is maintained through ongoing assessments based on a  
continuous accreditation cycle. The validity of this certificate should be  
confirmed through the PJLA website: [www.pjllabs.com](http://www.pjllabs.com)*



## Certificate of Accreditation: Supplement

### HSM Sistemas de Metrología, S. de R.L. de C.V.

Blvd. Bernardo Quintana Arrijoja #630, Local 21 Planta Alta, Col. Desarrollo San Pablo  
 Querétaro, Querétaro, México. CP. 76125  
 Contact Name: Francisco Hernandez Phone: 442-195-9668

Accreditation is granted to the facility to perform the following calibrations:

#### Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Calipers <sup>FO</sup>	1 mm to 1 000 mm	$(5 + 0.009L) \mu\text{m}$	Gage Blocks Mitutoyo, Starret RS81B Shars 303-5311C / Check Master Mitutoyo 513-359 JIS7516
Depth Calipers <sup>FO</sup>	1 mm to 600 mm	$(5 + 0.005L) \mu\text{m}$	
Outside / Inside Micrometers <sup>FO</sup>	1 mm to 600 mm	$(0.67 + 0.009L) \mu\text{m}$	
Thickness Gage <sup>FO</sup>	0.1 mm to 5 mm	$(0.7 + 0.005L) \mu\text{m}$	Micrometer JIS B 7524
Thickness Foils <sup>FO</sup>	0.005 mm to 25 mm	$(0.65 + 4 \times 10^{-3}L) \mu\text{m}$	Inductive Probe Sylvac P5i Digital Display Sylvac D70I JIS B 7502
Thickness Meter <sup>FO</sup>	0.005 mm to 25 mm	$(0.85 + 0.1L) \mu\text{m}$	Blocks, Thickness Foil ASTM-B499
Depth Micrometers <sup>FO</sup>	1 mm to 600 mm	$(0.95 + 0.01L) \mu\text{m}$	Gage Blocks Mitutoyo Starret RS81B, Shars 303-311C Height Master Mitutoyo 513-359 JIS 7502
Digital and Dial Indicators <sup>FO</sup>	0.001 mm to 25 mm (Res.= 0.001 mm)	$(1.2 + 0.02L) \mu\text{m}$	Dial Gage Tester Mitutoyo 170-102-12 JIS 7533
	0.01 mm to 25 mm (Res.= 0.01 mm)	5 $\mu\text{m}$	
	1 mm to 25 mm (Res.= 0.01 mm)	$(5 + 0.08L) \mu\text{m}$	Gage Blocks Mitutoyo Starret RS81B Shars 303-5311C
Height Gages <sup>FO</sup>	1 mm to 600 mm	$(1 + 2.5 \times 10^{-3}L) \mu\text{m}$	Dial Gage Tester Mitutoyo 170-102-12 JIS 7517
Steel Rules <sup>FO</sup>	5 mm to 1 000 mm (Res.= 0.005 mm)	0.05 mm	Gage Blocks, Mitutoyo, Starret RS81B, Shars 303-5311C, Dimensional Digital scale JIS7516
Flexible Tape <sup>FO</sup>	5 mm to 20 000 mm	$(0.1 + 2 \times 10^{-4}L) \text{mm}$	
Glass Rule <sup>F</sup>	5 mm to 1 000 mm	0.05 mm	Dimensional Digital Scale CENAM Technical Guide
Dial Thickness Gage <sup>FO</sup>	1 mm to 25 mm (Res.= 0.001 mm)	$(0.6 + 4 \times 10^{-3}L) \mu\text{m}$	Gage Blocks Mitutoyo Starret RS81B Shars 303-5311C JIS7503



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Microscopes X Axis Linearity Y Axis Linearity	0.01 mm to 200 mm 0.01 mm to 200 mm	0.02 $\mu\text{m}$ 0.02 $\mu\text{m}$	Crystal Scale ASTM E1951
Optical Comparators X axis Linearity Y axis Linearity <sup>FO</sup>	0.5 mm to 300 mm 0.5 mm to 300 mm	(2 + 0.008L) $\mu\text{m}$ (2 + 0.008L) $\mu\text{m}$	Glass scale Mitutoyo 182-514-10, Angular Blocks HSM-DI-12, Glass Scale Mitutoyo 172-116 JIS7184
Optical Comparators Magnification <sup>FO</sup>	5X 10X 20X 30X	0.01 % of magnification 0.01 % of magnification 0.01 % of magnification 0.01 % of magnification	
Optical Comparators Angularity <sup>FO</sup>	360°	0.014°	Angle Gage Blocks JIS7184
Optical Comparators Axial Squareness <sup>FO</sup>	76 mm Displacement	(2.4 + 0.025L) $\mu\text{m}$	Glass Scale Mitutoyo 182-514-10, JIS7184
Length Measurement 3 axis (X, Y, Z) <sup>FO</sup>	5 mm to 100 mm Linear Measurements	[1.5 + (L/100 mm)] $\mu\text{m}$	Fowler Zcat Portable CMM Gage Blocks
Length Measurement 3 axis (X, Y, Z) <sup>FO</sup>	1 mm to 100 mm Diametral Measurements	[2 + (D/100 mm)] $\mu\text{m}$	HSM -PR-DI-21 & 17 Internal Methods
Length Measurement Bars <sup>FO</sup>	1 mm to 500 mm	[1.5 + (L/100 mm)] $\mu\text{m}$	Gage Blocks, Inductive Sensor HSM -PR-DI-17
Gauge Block Grade 1 and 2 <sup>FO</sup>	1 mm to 100 mm	(9.8 x 10 <sup>-5</sup> + 2 x 10 <sup>-6</sup> L) mm	Grade 0 Block and Inductive Probe Sensors HSM-PR-DI-17 ISO-3650
Pin Gages <sup>F</sup>	1 mm to 50 mm	0.25 $\mu\text{m}$	High Accuracy Micrometer, Inductive Probe Sensors ASME B89.1.5
Roughness Meter (RA) <sup>FO</sup>	2.91 $\mu\text{m}$	0.028 $\mu\text{m}$	Roughness Standard JIS B 0601
Roughness Meter (Ry) <sup>FO</sup>	9.2 $\mu\text{m}$	0.05 $\mu\text{m}$	
Angularity, Goniometer, Protractor <sup>FO</sup>	10° to 90°	0.014°	Angle Gage Blocks NMX-CH-151-IMNC



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#### Mechanical

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Indirect Verification of Rockwell Hardness Machines HRC <sup>FO</sup>	20 HRC to 100 HRC	0.38 HRC	Hardness Test Blocks Euramet-cg-16
Indirect Verification of Rockwell Hardness Machines HRBW <sup>FO</sup>	40 HRBW to 100 HRBW	1.2 HRBW	Hardness Test Blocks Euramet-cg-16
Pressure Vacuum <sup>FO</sup>	-80 kPa to 0 kPa	0.67 kPa	Digital Pressure Gage Crystal 300PSIXP2I Hydraulic Pump Crystal Gauge Pump XP Euramet-cg-17
Pressure Meter <sup>FO</sup>	2 Pa to 200 Pa	0.011 Pa	
	200 Pa to 2 000 Pa	0.12 Pa	
	0.2 MPa to 2.07 MPa	0.002 4 MPa	
	2.07 MPa to 70 MPa	4.2 kPa	Digital Pressure Gage Crystal 10000PSIXP2I, Hydraulic Pump Crystal Gauge Pump XP Euramet-cg-17
Verification of the Shore Durometer Spring Force Type A, D <sup>FO</sup>	0.55 N to 8.05 N	0.32 N	Load Cell CENAM Technical Guide
Torque Tools, Electrical and Pneumatic Screwdriver, Bottle Cap Torque Tester (Dynamic and Static Torque) <sup>FO</sup>	0.3 N·m to 1.29 N·m	0.65 % of reading	Mountz Torque Analyzer ISO 6789
	1.3 N·m to 11.35 N·m	0.25 % of reading	
	11.35 N·m to 135.6 N·m	0.25 % of reading	
	135.6 N·m to 736 N·m	0.3 % of reading	
Burette <sup>F</sup>	5 mL to 100 mL	$(4.8 \times 10^{-3} + 1.71 \times 10^{-4}V)$ mL	Analytical Balance A&D Company HR-200 Double Distilled Water Karal 3044 CENAM Technical Guide
Test Tube <sup>F</sup>	100 mL	0.95 mL	
Pipette <sup>F</sup>	1 mL to 100 mL	$(2.2 \times 10^{-3} + 1.19 \times 10^{-4}V)$ mL	
Piston Pipette <sup>F</sup>	0.1 mL to 10 mL	$(4.9 \times 10^{-4} + 1.87 \times 10^{-4}V)$ mL	
Piston Burette <sup>F</sup>	1 mL to 100 mL	$(2 \times 10^{-3} + 4.75 \times 10^{-4}V)$ mL	
volumetric flask <sup>F</sup>	1 mL to 100 mL	$(8.2 \times 10^{-3} + 1.19 \times 10^{-4}V)$ mL	

#### Chemical

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pH Meter <sup>FO</sup>	4 pH	0.02 pH	Reference Material Cole Parmer CENAM Technical Guide
	7 pH	0.12 pH	
	10 pH	0.22 pH	



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Conductivity Meter <sup>FO</sup>	84.1 $\mu$ S/cm	0.96 $\mu$ S/cm	Reference Material, Ricca Chemical CENAM Technical Guide
	12.88 mS/cm	0.06 mS/cm	
	1 413 $\mu$ S/cm	6.1 $\mu$ S/cm	Reference Material Control Company CENAM Technical Guide
Kinematic Viscosity <sup>FO</sup>	255.8 mm <sup>2</sup> /s	0.29 %	Cannon Certified Viscosity Reference Standard c100, Thermometer, StopWatch, ASTM D7945, ASTM D6299, ASTM D446, ASTM D445, ASTM D1200, ASTM D4212, ASTM D7279, ASTM D88
	230.4 mm <sup>2</sup> /s	0.26 %	Cannon Certified Viscosity Reference Standard N100, Thermometer, StopWatch, ASTM D7945, ASTM D6299, ASTM D446, ASTM D445, ASTM D1200, ASTM D4212, ASTM D7279, ASTM D88
	94 mm <sup>2</sup> /s	0.22 %	Cannon Certified Viscosity Reference Standard RT100, Thermometer, StopWatch, ASTM D7945, ASTM D6299, ASTM D446, ASTM D445, ASTM D1200, ASTM D4212, ASTM D7279, ASTM D88
	510.2 mm <sup>2</sup> /s	0.29 %	Cannon Certified Viscosity Reference Standard Rt 500, Thermometer, StopWatch, ASTM D7945, ASTM D6299, ASTM D446, ASTM D445, ASTM D1200, ASTM D4212, ASTM D7279, ASTM D88
	1 012 mm <sup>2</sup> /s	0.38 %	Cannon Certified Viscosity Reference Standard Rt1 000, Thermometer, StopWatch, ASTM D7945, ASTM D6299, ASTM D446, ASTM D445, ASTM D1200, ASTM D4212, ASTM D7279, ASTM D88



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Kinematic Viscosity <sup>FO</sup>	5 147 mm <sup>2</sup> /s	0.38 %	Cannon Certified Viscosity Reference Standard Rt5 000 Thermometer, StopWatch ASTM D7945, ASTM D6299 ASTM D446, ASTM D445 ASTM D1200, ASTM D4212 ASTM D7279, ASTM D88
	12 020 mm <sup>2</sup> /s	0.44 %	Cannon Certified Viscosity Reference Standard Rt12 500 Thermometer, Stop Watch, ASTM D794, ASTM D6299, ASTM D446 ASTM D445, ASTM D1200 ASTM 4212, ASTM D7279 ASTM D88
Refractometer Meter @ 25 °C	0 % Brix	0.16 % Brix	Certified Reference Material OIMLR108
	2.5 % Brix	0.17 % Brix	
	5 % Brix	0.17 % Brix	
	7.5 % Brix	0.17 % Brix	
	10 % Brix	0.17 % Brix	
	15 % Brix	0.17 % Brix	

#### Mass, Force and Weighing Devices

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Force - Compression and Tension – Source and Measure <sup>FO</sup>	Up to 100 kgf	(0.03 % reading + 2 x 10 <sup>-4</sup> F) kgf	Weight Set F1 and M1 ISO 7500
	10 kgf to 500 kgf	(0.03 % of reading + 2 x 10 <sup>-4</sup> F) kgf	Load Cells ISO 7500
Balances & Scales <sup>O</sup>	0.001 g to 50 g (Res.= 0.000 5 g)	(0.86 + 5.4 x 10 <sup>-3</sup> Wt) mg	Weight Master Class F1 Euramet-cg 18
	0.01 g to 150 g (Res.= 0.002 g)	(1.7 + 3.6 x 10 <sup>-3</sup> Wt) mg	
	0.025 g to 500 g (Res.= 0.005 g)	(4.3 + 2.5 x 10 <sup>-3</sup> Wt) mg	



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Balances & Scales <sup>O</sup>	0.05 g to 1 kg (Res.= 0.01 g)	(8.8 + 2.5 x 10 <sup>-3</sup> Wt) mg	Weight Master Class F1 Euramet-cg-18
	0.1 g to 2 kg (Res.= 0.02 g)	(17.7 + 2.5 x 10 <sup>-3</sup> Wt) mg	
	0.25 g to 5 kg (Res.= 0.05 g)	(43.6 + 2.5 x 10 <sup>-3</sup> Wt) mg	
	0.5 g to 1 kg (Res.= 0.1 g)	(84 + 26 x 10 <sup>-3</sup> Wt) mg	
	1 g to 2 kg (Res.= 0.2 g)	(0.16 + 26 x 10 <sup>-6</sup> Wt) g	
	0.25 g to 5 kg (Res.= 0.5 g)	(0.42 + 26 x 10 <sup>-6</sup> Wt) g	
	10 g to 12 kg (Res.= 2 g)	(1.7 + 44.5 x 10 <sup>-6</sup> Wt) g	
	25 g to 30 kg (Res.= 5 g)	(4.2 + 44.5 x 10 <sup>-6</sup> Wt) g	
	50 g to 10 kg (Res.= 10 g)	(8.4 + 0.25 x 10 <sup>-3</sup> Wt) g	
	100 g to 20 kg (Res.= 20 g)	(16.5 + 0.26 x 10 <sup>-3</sup> Wt) g	
	250 g to 50 kg (Res.= 50 g)	(42 + 0.26 x 10 <sup>-3</sup> Wt) g	
	500 g to 100 kg (Res.= 100 g)	(83 + 0.26 x 10 <sup>-3</sup> Wt) g	
	1 000 g to 500 kg (Res.= 200 g)	(166 + 0.26 x 10 <sup>-3</sup> Wt) g	
	2 500 g to 500 kg (Res.= 500 g)	(420 + 0.65 x 10 <sup>-3</sup> Wt) g	
	5 000 g to 500 kg (Res.= 1 kg)	(838 + 1.46 x 10 <sup>-3</sup> Wt) g	
	10 kg to 500 kg (Res.= 2 kg)	(1 650 + 2.3 x 10 <sup>-3</sup> Wt) g	
	25 kg to 500 kg (Res.= 5 kg)	(4 190 + 4.6 x 10 <sup>-3</sup> Wt) g	
	500 kg to 1 000 kg (Res.= 5 kg)	(5.773 5 + 4.78 x 10 <sup>-8</sup> Wt) kg	Weight Master Class M1 Euramet-cg-18
Analytical Balance <sup>FO</sup>	1 mg to 300 g	(5.15 x 10 <sup>-7</sup> + 3 x 10 <sup>-4</sup> Wt) g	Class E2 weights Euramet cg-18



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#### Thermodynamic

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Thermometer used with Thermocouple J, K, T, E Thermistor, Gas, Bimetallic	0 °C to 30 °C	0.03 °C	WIKA CTH7000 with SPRT Accumat AM1751 Ice Bath, Temperature Block Euramet-cg-8
	30 °C to 670 °C	0.26 °C	
Industrial Thermometer used with RTD <sup>FO</sup>	-25 °C to 0 °C	0.18 °C	WIKA CTH7000 with SPRT Accumat AM1751, Ice Bath Temperature Block Euramet-cg-8
	0 °C to 670 °C	0.08 °C	
Temperature Accuracy - Generation Ovens, Furnaces, Muffles <sup>FO</sup>	30 °C to 400 °C	0.025 °C	
	400 °C to 670 °C	0.035 °C	
Liquid in Glass Thermometer (Res.= 0.1 °C) <sup>F</sup>	0 °C to 500 °C	0.06 °C	
Freezers <sup>FO</sup>	-80 °C to 30 °C	0.035 °C	WIKA CTH7000 with SPRT Accumat AM1751 Euramet-cg-8 AIAG-CQI9, AMS2750 IEC 60068-3-5
Oven, Freezer Calibration / Temperature Uniformity Survey <sup>FO</sup>	-10 °C to 300 °C	0.25 °C	Fluke Hydra 2625
	300 °C to 600 °C	0.35 °C	RTD Pt-100 AIAG-CQI9, AMS2750
	-100 °C to 760 °C	0.6 °C	Fluke Hydra 2625 Thermocouple J AIAG-CQI9, AMS2750
	250 °C to 1 000 °C	1.2 °C	Fluke Hydra 2625
	1 000 °C to 1 767 °C	1.8 °C	Thermocouple R, S AIAG-CQI9, AMS2750
	-100 °C to 1 000 °C	1 °C	Fluke Hydra 2625
	1 000 °C to 1 350 °C	1.8 °C	Thermocouple K AIAG-CQI9, AMS2750
IR Thermometers <sup>FO</sup>	25 °C to 550 °C	1 °C	Fluke IR Thermometer Black Body Source Comparison CENAM Technical Guide
Temperature Measurement Thermocouple Type K <sup>F</sup>	-25 °C to 0 °C	0.31 °C	WIKA CTH7000 with SPRT Accumat AM1751 Ice Bath, Temperature Dry Well Euramet-cg-8
	0 °C to 500 °C	0.25 °C	
Temperature Measurement Thermocouple Type J <sup>F</sup>	-25 °C to 0 °C	0.31 °C	
	0 °C to 500 °C	0.25 °C	
Temperature Measurement Thermocouple Type T <sup>F</sup>	-25 °C to 0 °C	0.27 °C	
	0 °C to 500 °C	0.2 °C	
Temperature Measurement Thermocouple Type E <sup>F</sup>	-25 °C to 0 °C	0.27 °C	
	0 °C to 500 °C	0.2 °C	





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Temperature Measurement Thermocouple Type R <sup>F</sup>	-25 °C to 0 °C	0.39 °C	WIKA CTH7000 with SPRT Accumat AM1751 Ice Bath, Temperature Dry Well Euramet-cg-8
	0 °C to 500 °C	0.35 °C	
Thermocouple type S <sup>F</sup>	-25 °C to 0 °C	0.39 °C	
	0 °C to 500 °C	0.35 °C	
Temperature Measurement RTD Pt 100 <sup>F</sup>	-25 °C to 0 °C	0.2 °C	
	0 °C to 500 °C	0.2 °C	
Thermohygrometers Temperature Only <sup>FO</sup>	7 °C to 50 °C	0.2 °C	WIKA CTH7000 with SPRT Comparison Humidity Chamber CENAM Technical Guide
Thermohygrometers Humidity Only <sup>FO</sup> Climatic Chamber Humidity	10 % RH to 95 % RH	0.65 % RH	Thermohygrometer ROTRONIC Model HC2A-S Vaisala Model HM70 CENAM Technical Guide
Thermohygrometer Humidity Only <sup>F</sup> (Fixed Point)	11 % RH	0.7 % RH	Rotronic and Vaisala SRM Salt Solutions CENAM Technical Guide
	35 % RH	0.7 % RH	
	50 % RH	0.7 % RH	
	75 % RH	0.7 % RH	
	80 % RH	0.7 % RH	
	95 % RH	0.7 % RH	

#### Time and Frequency

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Low Frequency Generator Photo-Tachometer <sup>FO</sup>	0.1 Hz to 10 000 Hz (6 rpm to 600 000 rpm)	1 x 10 <sup>-6</sup> Hz/Hz	HSM Low Frequency Generator, Universal Counter HP 5335B, CPEM 2014
Stopwatch <sup>FO</sup>	10 s to 1 x 10 <sup>7</sup> s	1 x 10 <sup>-8</sup> s/s	
Function Generator, Signal Generator <sup>F</sup>	0.1 Hz to 1.3 GHz	2 x 10 <sup>-10</sup> Hz/Hz	Universal Counter GPS CENAM Technical Guide
Standard Oscillator	10 MHz	2 x 10 <sup>-10</sup> Hz/Hz	



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#### Time and Frequency

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Function Generator, Signal Generator / Period <sup>F</sup>	10 ns to 10 s	$2 \times 10^{-9}$ Hz/Hz	Universal Counter GPS CENAM Technical Guide
Time Interval Counter, Universal Counter <sup>F</sup>	10 s to 86 400 s	$2 \times 10^{-10}$ s/s	
Oscilloscope Amplitude <sup>FO</sup> 1 M $\Omega$	2 mV to 200 mV	10 $\mu$ V + 0.2 % of reading	Multiproduct T&E 5025C Series 2 9769 and 9770 options Euramet-cg-7
Oscilloscope Amplitude <sup>FO</sup> 1 M $\Omega$	0.2 V to 20 V	25 $\mu$ V + 0.05 % of reading	
Oscilloscope Amplitude <sup>FO</sup> 1 M $\Omega$	20 V up to 200 V	10 mV + 0.05 % of reading	
Oscilloscope Amplitude <sup>FO</sup> 50 $\Omega$	1 mV to 200 mV	20 $\mu$ V + 0.25 % of reading	
Oscilloscope Amplitude <sup>FO</sup> 50 $\Omega$	0.2 V to 2 V	20 $\mu$ V + 0.25 % of reading	
Equipment to Frequency <sup>FO</sup>	0.1 Hz up to 10 MHz	0.000 01 % of reading	
	Up to 100 MHz	0.000 1 % of reading	
	Up to 2.2 GHz	0.002 % of reading	
Fast Rise <sup>FO</sup>	400 ps	150 ps	Multiproduct T&E 5025C Series 2 9769 and 9770 options and 9762 Rubidium High Stability Reference Euramet cg-7
Amplitude <sup>FO</sup> At the listed Frequency Oscilloscopes and Spectrum Analyzer			
Up to 50 kHz <sup>FO</sup>	0.35 Vpp to 3.5 Vpp	400 $\mu$ Vpp + 0.5 % reading	
50 kHz up to 100 kHz <sup>FO</sup>	0.35 Vpp to 3.5 Vpp	400 $\mu$ Vpp + 1 % of reading	
100 kHz up to 300 kHz	0.35 Vpp to 3.5 Vpp	10 mVpp + 1 % of reading	
300 kHz up to 1 000 kHz	0.35 Vpp to 3.5 Vpp	35 mVpp + 1.5 % of reading	
Up to 200 MHz	0.35 Vpp to 3.5 Vpp	3 % of reading	
200 MHz up to 500 MHz	0.35 Vpp to 3.5 Vpp	4 % of reading	
500 MHz up to 1 GHz	0.35 Vpp to 3.5 Vpp	5.5 % of reading	
1 GHz up to 2.2 GHz	0.35 Vpp to 3.5 Vpp	6.5 % of reading	

#### Electrical

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Temperature Calibration Indication and Control Equipment used with Thermocouple Type B <sup>FO</sup>	200 °C to 800 °C	1.5 °C	Process Calibrator Mastech MS7220 Electrical Simulation of Thermocouple Output Euramet-cg-11



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 Querétaro, Querétaro, México. C.P. 76125  
 Contact Name: Francisco Hernandez Phone: 442-195-9668

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Temperature Calibration Indication and Control Equipment used with Thermocouple Type B <sup>FO</sup>	208 °C to 1 800 °C	1.9 °C	Process Calibrator Mastech MS7220 Electrical Simulation of Thermocouple Output Euramet-cg-11
Temperature Calibration Indication and Control Equipment used with Thermocouple Type E <sup>FO</sup>	-200 °C to 1 000 °C	0.52 °C	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-200 °C to 1 200 °C	0.36 °C	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 °C to 1 370 °C	0.43 °C	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type N <sup>FO</sup>	-200 °C to 1 300 °C	0.8 °C	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type R <sup>FO</sup>	-200 °C to 1 760 °C	0.78 °C	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type S <sup>FO</sup>	-200 °C to 1 760 °C	0.78 °C	
Temperature Calibration Indication and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-200 °C to 400 °C	0.43 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 100, 385 $\Omega$ and Pt 100, 3 926 $\Omega$ <sup>FO</sup>	-200 °C to 850 °C	0.35 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 200, 385 $\Omega$ <sup>FO</sup>	-200 °C to 250 °C	0.25 °C	Process Calibrator Mastech MS7222 Electrical Simulation of RTD Output Euramet-cg-11
	250 °C to 630 °C	0.25 °C	



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Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 500, 385 $\Omega^{FO}$	-200 °C to 500 °C	0.25 °C	Process Calibrator Mastech MS7222 Electrical Simulation of RTD Output Euramet-cg 11
	500 °C to 630 °C	0.35 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Type Pt 1 000, 385 $\Omega^{FO}$	-200 °C to 630 °C	0.25 °C	
Equipment to Measure DC Voltage	Up to 90 mV	6 $\mu$ V + 0.024 % of reading	Fluke 2635 Data Acquisition Unit CEM EL-001
	90 mV to 300 mV	20 $\mu$ V + 0.023 % of reading	
	300 mV to 900 mV	20 $\mu$ V + 0.021 % of reading	
	0.9 V to 3 V	0.2 mV + 0.024 % of reading	
	3 V to 30 V	2 mV + 0.024 % of reading	
	30 V to 300 V	20 mV + 0.024 % of reading	
Equipment to Measure AC Voltage At the listed frequencies <sup>FO</sup>			
50 Hz to 100 Hz	0.01 mV to 300 mV	0.25 mV + 0.3 % of reading	
100 Hz to 10 kHz	0.01 mV to 300 mV	0.25 mV + 0.16 % of reading	
Equipment to Measure AC Voltage At the listed frequencies <sup>FO</sup>			
50 Hz to 100 Hz	0.3 V to 3 V	0.25 mV + 0.16 % of reading	
100 Hz to 10 kHz	0.3 V to 3 V	2.5 mV + 0.29 % of reading	
Equipment to Measure AC Voltage At the listed frequencies <sup>FO</sup>			
50 Hz to 100 Hz	3 V to 30 V	0.25 mV + 0.29 % of reading	
100 Hz to 10 kHz	3 V to 30 V	2.5 mV + 0.15 % of reading	
Equipment to Measure AC Voltage At the listed frequencies <sup>FO</sup>			
50 Hz to 100 Hz	30 V to 300 V	20 mV + 0.14 % of reading	
100 Hz to 10 kHz	30 V to 300 V	0.2 mV + 0.16 % of reading	



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Equipment to Measure Resistance <sup>FO</sup>	Up to 300 $\Omega$	20 m $\Omega$ + 0.014 % of reading	Fluke 2635 Data Acquisition Unit CEM EL-001
	0.3 k $\Omega$ to 3 k $\Omega$	0.2 $\Omega$ + 0.016 % of reading	
	3 k $\Omega$ to 30 k $\Omega$	2 $\Omega$ + 0.014 % of reading	
	30 k $\Omega$ to 300 k $\Omega$	20 $\Omega$ + 0.021 % reading	
	300 k $\Omega$ to 3 M $\Omega$	200 $\Omega$ + 0.063 % of reading	
	3 M $\Omega$ to 10 M $\Omega$	2 k $\Omega$ + 0.17 % of reading	
Equipment to Output DC Voltage <sup>F</sup>	Up to 100 mV	3.5 $\mu$ V + 0.005 % of reading	DMM HP 34401A EL-001
	0.1 V to 1 V	7 $\mu$ V + 0.004 % of reading	
	1 V to 10 V	50 $\mu$ + 0.003 5 % of reading	
	10 V to 100 V	600 $\mu$ V + 0.004 5 % of reading	
	100 V to 1 000 V	100 $\mu$ V + 0.004 5 % of reading	
Equipment to Output Resistance <sup>F</sup>	Up to 100 $\Omega$	4 m $\Omega$ + 0.01 % of reading	
	0.1 k $\Omega$ to 1 k $\Omega$	0.01 $\Omega$ + 0.01 % of reading	
	1 k $\Omega$ to 10 k $\Omega$	0.1 $\Omega$ + 0.01 % of reading	
	10 k $\Omega$ to 100 k $\Omega$	1 $\Omega$ + 0.01 % of reading	
	0.1 M $\Omega$ to 1 M $\Omega$	0.01 k $\Omega$ + 0.01 % of reading	
	1 M $\Omega$ to 10 M $\Omega$	0.1 k $\Omega$ + 0.01 % of reading	
Equipment to Output DC Current <sup>F</sup>	Up to 10 mA	2 $\mu$ A + 0.05 % of reading	
	10 mA to 100 mA	5 $\mu$ A + 0.05 % of reading	
	0.1 A to 1 A	0.1 mA + 0.1 % of reading	
	1 A to 3 A	0.6 mA + 0.12 % of reading	
Equipment to Output AC Voltage At the listed frequencies 10 Hz to 20 kHz <sup>F</sup>	0.001 to 100 mV	0.04 mV + 0.06 of reading	
	0.1 V to 1 V	0.3 mV + 0.06 of reading	
	1 V to 10 V	3 mV + 0.06 of reading	
	10 V to 100 V	30 mV + 0.06 of reading	
	100 V to 750 V	225 mV + 0.06 of reading	
Equipment to Output AC Current <sup>F</sup>	10 $\mu$ A to 1 A	0.4 mA + 0.1 of reading	
	1 A to 3 A	1.8 mA + 0.15 of reading	



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DC Voltage Rectifier / Power Supply <sup>FO</sup>	0 mV to 100 mV	3.5 $\mu$ V + 0.005 % of reading	DMM HP 34401A Euramet-cg-15
	0.1 V to 1 V	7 $\mu$ V + 0.004 % of reading	
	1 V to 10 V	50 $\mu$ V + 0.003 5 % of reading	
	10 V to 100 V	600 $\mu$ V + 0.004 5 % of reading	
	0.001 mV to 100 mV 10 Hz to 20 kHz	0.04 mV + 0.06 % of reading	
	0.1 V to 1 V (10 Hz to 20 kHz)	0.3 mV + 0.06 % of reading	
	1 V to 10 V (10 Hz to 20 kHz)	3 mV + 0.06 % of reading	
	10 V to 100 V (10 Hz to 20 kHz)	30 mV + 0.06 % of reading	
Electrical Ripple Rectifier / Power Supply <sup>FO</sup>	0.1 %	0.01 % of reading	
AC Current Rectifier / Power Supply <sup>FO</sup>	10 $\mu$ A to 1 A	0.4 mA + 0.1 % of reading	DMM UNI-T Euramet cg-15 DMM UNI-T Multi-Turn Euramet cg-15
	1 A to 3 A	1.8 mA + 0.15 % of reading	
	3 A to 40 A	0.02 A + 0.5 % of reading	
	40 A to 400 A	0.2 A + 1.2 % of reading	
	400 A to 2 000 A	2 A + 1.5 % of reading	
	40 A to 400 A	0.2 A + 0.8 % of reading	
	400 A to 2 000 A	2 A + 1 % of reading	
	2 000 A to 8 000 A	2 A + 1.5 % of reading	
Equipment to Measure Voltage At listed frequencies			DMM Keysight 34461A Euramet cg-15
3 Hz to 5 Hz	20 mV to 100 mV	0.03 mV + 1 % reading	
3 Hz to 5 Hz	0.1 V to 1 V	0.000 3 V + 1 % of reading	
3 Hz to 5 Hz	1 V to 10 V	0.00 3 V + 1 % of reading	
5 Hz to 10 Hz	20 mV to 100 mV	0.03 mV + 0.35 % of reading	
5 Hz to 10 Hz	0.1 V to 1 V	0.000 3 V + 0.35 % of reading	
5 Hz to 10 Hz	1 V to 10 V	0.003 V + 0.35 % of reading	



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Equipment to Measure Voltage At listed frequencies			DMM Keysight 34461A Euramet-cg-15
10 Hz to 20 kHz	20 mV to 100 mV	0.06 % of reading + 0.03 mV	
10 Hz to 20 kHz	0.1 V to 1 V	0.06 % of reading + 0.000 3 V	
10 Hz to 20 kHz	1 V to 10 V	0.06 % of reading + 0.003 V	
Equipment to Output DC Voltage <sup>FO</sup>	20 mV to 200 mV	4 $\mu$ V + 0.001 5 % of reading	Multiproduct T&E 5025C Series 2 Euramet-cg-15
	0.2 mV to 2V	15 $\mu$ V + 0.001 5 % of reading	
	2 mV to 20 V	75 $\mu$ V + 0.001 5 % of reading	
	20 mV to 200 V	500 $\mu$ V + 0.0015 % of reading	
	200 mV to 1 010 V	1.5 mV + 0.0025 % of reading	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup> 20 Hz to 500 kHz	1 mV to 20 mV	30 $\mu$ V + 0.02 % of reading	Multiproduct T&E 5025C Series 2 and T&E 9780 Clamp Adapter Euramet cg-15
	20 mV to 200 mV	30 $\mu$ V + 0.02 % of reading	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup> 20 Hz to 1 MHz	0.2 V to 2 V	50 $\mu$ V + 0.02 % of reading	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup> 20 Hz to 100 kHz	2 V to 20 V	500 $\mu$ V + 0.02 % of reading	
Equipment to Output AC Voltage At the listed frequencies <sup>FO</sup> 40 Hz to 1 kHz	20 V to 200 V	3 mV + 0.03 % of reading	
	200 V to 1 050 V	20 mV + 0.05 % of reading	
Equipment to Output DC Current <sup>FO</sup>	0 $\mu$ A to 200 $\mu$ A	15 nA + 0.008 % of reading	
	0.2 mA to 2 mA	40 nA + 0.006 % of reading	
	2 mA to 20 mA	200 nA + 0.006 % of reading	
	20 mA to 200 mA	2 $\mu$ A + 0.006 % of reading	
	0.2 A to 2 A	70 $\mu$ A + 0.015 % of reading	
	2 A to 22 A	1 mA + 0.025 % of reading	
	22 A to 1 050 A	+ 5 mA + 0.03 % of reading	



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Equipment to Output Resistance	1 to 1 000 $\Omega$	15 m $\Omega$ + 0.01 % of reading	Multiproduct T&E 5025C Series 2 Euramet-cg-15
	1 k $\Omega$ to 10 k $\Omega$	25 m $\Omega$ + 0.02 % of reading	
	10 k $\Omega$ to 100 k $\Omega$	1 $\Omega$ + 0.01 % of reading	
	0.1 M $\Omega$ to 1 M $\Omega$	10 $\Omega$ + 0.01 % of reading	
	1 M $\Omega$ to 10 M $\Omega$	100 $\Omega$ + 0.02 % of reading	
	10 M $\Omega$ to 100 M $\Omega$	10 k $\Omega$ + 0.1 % of reading	
	0.1 G $\Omega$ to 1.1 G $\Omega$	1 M $\Omega$ + 1 % of reading	
	1 $\Omega$	5 m $\Omega$	
	10 $\Omega$	5 m $\Omega$	
	100 $\Omega$	0.008 % of reading	
	1 k $\Omega$	0.0035 % of reading	
	100 k $\Omega$	0.003 % of reading	
	100 k $\Omega$ up to 10 G $\Omega$	1 % of reading	
10 G $\Omega$ up to 100 G $\Omega$	5 % of reading		
Equipment to Output AC Current At the listed frequencies 20 Hz to 5 kHz	10 $\mu$ A to 200 $\mu$ A	150 nA + 0.05 % of reading	
	0.2 mA to 2 mA	150 nA + 0.05 % of reading	
	2 mA to 20 mA	2 $\mu$ A + 0.05 % of reading	
	20 mA to 200 mA	20 $\mu$ A + 0.05 % of reading +	
Equipment to Output AC Current At the listed frequencies 20 Hz to 500 kHz	0.2 A to 2 A	100 $\mu$ A + 0.05 % of reading	
	2 A to 22 A	3 mA + 0.1 % of reading	
	22 A to 1 050 A	5 mA + 0.2 % of reading	
Equipment to Output DC Power	Up to 0.004 W	8.7 % of reading	Multiproduct T&E 5025C Series 2 9797 Option Euramet-cg-15
	Up to 0.04 W	0.89 % of reading	
	Up to 0.4 W	0.11 % of reading	
	Up to 4 W	0.031 % of reading	
	Up to 40 W	0.007 % of reading	
	Up to 440 W	0.004 5 % of reading	
	Up to 4400 W	0.001 2 % of reading	





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Equipment to Output DC Power <sup>FO</sup>	Up to 23 100 W	0.002 5 % of reading	Multiproduct T&E 5025C Series 2, 9797 Option Euramet-cg-15
	Up to 200 kW	0.025 % of reading	Multiproduct T&E 5025C Series 2 9797 option and T&E Clamp Meter Adapter 9780 Euramet-cg-15
Equipment to Output AC Power At the listed frequencies <sup>FO</sup> 40 Hz to 500 Hz	Up to 0.04 W	3.8 % of reading	Multiproduct T&E 5025C Series 2, 9797 Option Euramet-cg-15
	0.04 W to 0.4 W	0.38 % of reading	
	0.4 W to 4 W	0.047 % of reading	
	4 W to 40 W	0.027 % of reading	
	40 W to 440 W	0.004 2 % of reading	
	440 W to 4 400 W	0.005 % of reading	
	4 400 W to 23 100 W	0.004 6 % of reading	
	23 100 W to 200 kW	0.016 % of reading	Multiproduct T&E 5025C Series 2 and T&E 9797 Option Clamp Meter Adapter 9780 Euramet-cg-15
Equipment to Output AC Phase Angle <sup>FO</sup>	90°	0.25°	Multiproduct T&E 5025C Series 2, 9797 Option Euramet-cg-15
Equipment to Output Capacitance	1 nF	10 pF + 0.2 % of reading	Multiproduct T&E 5025C Series 2, 9701 Option Euramet-cg-15
	10 nF	10 pF + 0.2 % of reading	
	20 nF	10 pF + 0.2 % of reading	
	50 nF	10 pF + 0.2 % of reading	
	100 nF	0.2 % of reading	
	200 nF	0.2 % of reading	
	500 nF	0.2 % of reading	
	1 $\mu$ F	0.2 % of reading	
	10 $\mu$ F	0.5 % of reading	
	20 $\mu$ F	0.5 % of reading	
	50 $\mu$ F	0.5 % of reading	
	100 $\mu$ F	0.5 % of reading	



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Equipment to Output Inductance <sup>FO</sup>	1 mH	5 $\mu$ H + 0.2 % of reading	Multiproduct T&E 5025C Series 2 9701 Option Euramet-cg-15
	1.9 mH	5 $\mu$ H + 0.2 % of reading	
	5 mH	5 $\mu$ H + 0.2 % of reading	
	10 mH	5 $\mu$ H + 0.2 % of reading	
	19 mH	1 % of reading	
	50 mH	1 % of reading	
	100 mH	1 % of reading	
	190 mH	1 % of reading	
	500 mH	1 % of reading	
	1 000 mH	1 % of reading	
	10 H	2 % of reading	
Equipment to Output Conductance <sup>FO</sup>	1 S	1.6 % of reading	
	100 mS	0.16 % of reading	
	10 mS	0.025 % of reading	
	1 mS	0.015 % of reading	
	100 $\mu$ S	0.021 % of reading	
	10 $\mu$ S	0.011 % of reading	
	1 $\mu$ S	0.011 % of reading	
	100 nS	0.021 % of reading	
	10 nS	0.11 % of reading	
	1 nS	1.1 % of reading	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type B <sup>FO</sup>	300 °C to 1 820 °C	0.5 °C	Multiproduct T&E 5025C Series 2, 9701 Option Electrical Simulation of Thermocouple Output Euramet-cg-08
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type E <sup>FO</sup>	-200 °C to 1 000 °C	0.5 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 °C to 1 200 °C	0.5 °C	



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Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 °C to 1 372 °C	0.09 °C	Multiproduct T&E 5025C Series 2, 9701 Option Electrical Simulation of Thermocouple Output Euramet-cg-08
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type L <sup>FO</sup>	-200 °C to 900 °C	0.2 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type N <sup>FO</sup>	-200 °C to 1 300 °C	0.1 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type R <sup>FO</sup>	-50 °C to 1 768 °C	0.35 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type S <sup>FO</sup>	-50 °C to 1 768 °C	0.4 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-200 °C to 400 °C	0.09 °C	
Temperature Calibration, Indication, and Control Equipment used with Thermocouple Type U <sup>FO</sup>	-200 °C to 600 °C	0.1 °C	
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 100 $\Omega$ <sup>FO</sup>	-180 °C to 850 °C	0.07 °C+ 0.01 % of reading	Multiproduct T&E 5025C Series 2, 9701 Option Electrical Simulation of RTD Output Euramet-cg-08
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 200 $\Omega$ <sup>FO</sup>	-180 °C to 850 °C	0.05 °C + 0.01 % of reading	
Temperature Calibration, Indication, and Control Equipment used with RTD Pt 500 $\Omega$ <sup>FO</sup>	-180 °C to 850 °C	0.05 °C + 0.01 % of reading	
	-180 °C to 850 °C	0.3 °C + 0.04 % of reading	



## Certificate of Accreditation: Supplement

### HSM Sistemas de Metrología, S. de R.L. de C.V.

Blvd. Bernardo Quintana Arrioja #630, Local 21 Planta Alta, Col. Desarrollo San Pablo  
 Querétaro, Querétaro, México. C.P. 76125  
 Contact Name: Francisco Hernandez Phone: 442-195-9668

Accreditation is granted to the facility to perform the following calibrations:

#### Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure DC Voltage	Up to 100 mV	300 $\mu$ V + 0.000 5 % of reading	Agilent 3458A Digital Multimeter with 002 Option Euramet-cg-15
	0.1 V to 1 V	300 $\mu$ V + 0.000 4 % of reading	
	1 V to 10 V	500 $\mu$ V + 0.000 4 % of reading	
	10 V to 100 V	30 $\mu$ V + 0.000 6 % of reading	
	100 V to 1000 V	100 $\mu$ V + 0.000 6 of reading	
	1 kV to 20 kV	2 % of reading	
	20 kV to 35 kV	1 % of reading	
	35 kV to 40 kV	2 % of reading	
Equipment to Measure Resistance <sup>FO</sup>	Up to 10 $\Omega$	50 $\mu\Omega$ + 0.001 5 % of reading	
	10 $\Omega$ to 100 $\Omega$	500 $\mu\Omega$ + 0.0012 % of reading	
	0.1 k $\Omega$ to 1 k $\Omega$	500 $\mu\Omega$ + 0.001 % of reading	
	1 k $\Omega$ to 10 k $\Omega$	5 m $\Omega$ + 0.001 % of reading	
	10 k $\Omega$ to 100 k $\Omega$	50 m $\Omega$ + 0.001 % of reading	
	0.1 M $\Omega$ to 1 M $\Omega$	2 m $\Omega$ + 0.001 5 % of reading	
	1 M $\Omega$ to 10 M $\Omega$	100 m $\Omega$ + 0.005 % of reading	
	10 M $\Omega$ to 100 M $\Omega$	1 $\Omega$ + 0.05 % of reading	
Equipment to Measure DC Curren <sup>FO</sup>	Up to 100 nA	0.04 nA + 0.003 % of reading	
	0.1 $\mu$ A to 1 $\mu$ A	0.002 % of reading + 0.04 nA	
	1 $\mu$ A to 10 $\mu$ A	0.002 % of reading + 0.1 nA	
	10 $\mu$ A to 100 $\mu$ A	0.002 % of reading + 0.8 nA	
	0.1 mA to 1 mA	0.002 % of reading + 5 nA	
	1 mA to 10 mA	0.002 % of reading + 50 nA	
	10 mA to 100 mA	0.003 5 % of reading + 0.5 $\mu$ A	
	0.1 mA to 1 A	0.011 % of reading + 10 $\mu$ A	
Equipment to Measure AC Voltage At the listed frequencies <sup>FO</sup> 1 Hz to 100 kHz	Up to 10 mV	0.03 % of reading + 1.1 $\mu$ V	
	10 mV to 10 V	0.007 % of reading	
	10 V to 100 V	0.02 % of reading	
	100 V to 1000 V	0.04 % of reading	
Equipment to Measure AC Voltage At the listed frequencies <sup>FO</sup> 60 Hz	1 kV to 28 kV	5 % of reading	Agilent 3458A Digital Multimeter with 002 option Fluke 80k-40 Probe Euramet-cg-15



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### Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure AC Current <sup>FO</sup> At the listed frequencies 10 Hz to 5 kHz	Up to 100 $\mu$ A	0.03 $\mu$ A + 0.03 % of reading	Agilent 3458A Digital Multimeter with 002 Option Fluke 80k-40 Probe Euramet-cg-15
	0.1 mA to 100 mA	0.03 % of reading	
	0.1 A to 1 A	0.08 % of reading	

- The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor  $k$  (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.
- The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.
- The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer<sup>F</sup> would mean that the laboratory performs this calibration at its fixed location.
- The presence of a superscript O means that the laboratory performs calibration of the indicated parameter onsite at customer locations. Example: Outside Micrometer<sup>O</sup> would mean that the laboratory performs this calibration onsite at the customer's location.
- The presence of a superscript FO means that the laboratory performs calibration of the indicated parameter both at its fixed location and onsite at customer locations. Example: Outside Micrometer<sup>FO</sup> would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
- Measurement uncertainties obtained for calibrations performed at customer sites can be expected to be larger than the measurement uncertainties obtained at the laboratories fixed location for similar calibrations. This is due to the effects of transportation of the standards and equipment and upon environmental conditions at the customer site which are typically not controlled as closely as at the laboratories fixed location.
- The term D represents diameter in inches or millimeters as appropriate to the uncertainty statement.
- The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
- The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.
- The term V represents Volume in liters or milliliters (including SI multiple and submultiple units) as appropriate to the uncertainty statement.