United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200012-0

IPS Corporation Nagano Calibration Center

Nagano-ken
Japan

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Calibration Laboratories

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 Communique dated January 2009).

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Effective Dates

For the National Voluntary Laboratory Accreditation Program

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SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

IPS Corporation Nagano Calibration Center	**Fields of Calibration**
1878-1, Ono, Tatsuno-machi, Kamiina-gun, Nagano-ken 399-0601 JAPAN Mr. Shuichi Aruga Phone: +81-266-44-5200 Fax: +81-266-44-5300 E-mail: qa@ips-emc.co.jp URL: http://www.ips-emc.co.jp	Electromagnetics – DC/Low Frequency Time and Frequency Electromagnetics – RF/Microwave

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	**Range**	**Expanded Uncertainty** [Notes 3, 5]	**Remarks**
ELECTROMAGNETICS – DC/LOW FREQUENCY			
AC RESISTANCE and CURRENT (20/E02)			
AC Resistance			
Field calibrations available [Note 4]			
50 Hz to 1 kHz	0.04 Ω to 1 Ω	5.6 %	LCR Meter
50 Hz, 60 Hz	0.04 Ω to 1 Ω	5.1 %	Oscilloscope, Current Coil, HV Probe
Inductance			
Field calibrations available [Note 4]			
50 Hz to 1 kHz	Up to 1 H	5.6 %	LCR Meter
50 Hz, 60 Hz	Up to 1 H	5.1 %	Oscilloscope, Current Coil, HV Probe
Reactance (X_L)			
Field calibrations available [Note 4]			
50 Hz to 1 kHz	0.04 Ω to 1 Ω	5.5 %	LCR Meter
50 Hz, 60 Hz	0.04 Ω to 1 Ω	5.1 %	Oscilloscope, Current Coil, HV Probe
Capacitance			
Field calibrations available [Note 4]			
50 Hz to 1 kHz	Up to 1 µF	5.4 %	LCR Meter

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
DC RESISTANCE and CURRENT (20/E05)			
Surge Generator Field calibrations available [Note 4] Peak Current, Short circuit current waveform (rise time/duration: 8/20 µs or 5/320 µs)	(0.05 to 3) kA	2.6 %	IEC 61000-4-5 Oscilloscope
ESD Simulators Peak current (2 to 30) kV Discharge current (30 to 800) ns	(6 to 130) A (0.2 to 78) A	3.9 % 4.9 %	IEC 61000-4-2, ISO 10605 Oscilloscope, ESD Target
DC VOLTAGE (20/E06)			
Surge Generator Field calibrations available [Note 4] Peak Voltage, Open circuit voltage waveform (1.2/50 µs, 10/700 µs)	100 V to 5 kV	2.8 %	IEC 61000-4-5 Oscilloscope, HV Probe
Overshoot/Undershoot Field calibrations available [Note 4] Voltage	0 mV to 300 V	3.2 % + 64 mV	Oscilloscope
EFT/Burst Field calibrations available [Note 4] Peak Voltage Peak Voltage with capacitive clamp	100 V to 6 kV	3.0 % 2.8 %	IEC 61000-4-4 Oscilloscope, Attenuator
Transient Generator Field calibrations available [Note 4] Peak Voltage	(10 to 600) V	4.1 %	ISO 7637-2, Annex C ISO-7637-3

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
DC Voltage - Measure			
Field calibrations available [Note 4]	0.01 V to 1000 V	0.11 %	DMM
ESD Simulators			IEC 61000-4-2, ISO 10605
DC High Voltage	0.5 kV to 1 kV	2.3 %	DHM-40/10
	1 kV to 3 kV	1.2 %	
	3 kV to 40 kV	1.1 %	
LF AC VOLTAGE (20/E09)			
AC Voltage - Measure			
Field calibrations available [Note 4]			
0.1 V to 750 V	3 Hz to 5 Hz	3.1 %	DMM
	5 Hz to 10 Hz	0.46 %	
	10 Hz to 20 kHz	0.12 %	
	20 kHz to 50 kHz	0.18 %	
	50 kHz to 100 kHz	0.79 %	
	100 kHz to 300 kHz	5.2 %	
10 mV to 5 V	DC to 100 MHz	3.3 %	Oscilloscope
5 V to 4 kV	DC to 50 MHz	3.8 %	Oscilloscope, HV Probe
Voltage Dip Simulator			
Field calibrations available [Note 4]			
AC Voltage – (50 to 60) Hz	10 V to 500 V	0.4 %	DMM
MAGNETICS (20/E13)			
Magnetic Field Generator [Note 4]			IEC 61000-4-8
50 Hz or 60 Hz			
Coil Current	1 A to 100 A	1.0 %	
	0.1 A to 1 A	1.3 %	
Coil Factor			
(I ≥ 1A)	0.10 to 20	2.4 %	
(I < 1 A)		2.5 %	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
TIME and FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
EFT/Burst (100 V to 6 kV) Field calibrations available [Note 4]			IEC 61000-4-4 Oscilloscope, Attenuator
Repetition frequency	1 kHz to 500 kHz	0.6 %	
Burst duration	0.5 ms to 20 ms	0.6 %	
Burst period	100 ms to 500 ms	0.4 %	
Voltage Dip Simulator Field calibrations available [Note 4]			
Duration Time	10 ms to 5 s	2.4 %	Oscilloscope
Frequency - Measure Field calibrations available [Note 4]	1 Hz to 1 GHz (45 to 65) Hz	0.5 % 0.1 %	Oscilloscope DMM
Differential - Time Measure Field calibrations available [Note 4]	1 ns to 5 s	0.6 %	Oscilloscope
Differential - Phase Field calibrations available [Note 4]	0° to 360°	2.5°	Oscilloscope
PULSE WAVEFORM (20/F04)			
ESD Simulators (2 kV to 30 kV) Rise time	0.6 ns to 1 ns	6.9 %	IEC 61000-4-2, ISO 10605 (Excluding RC time constant) Oscilloscope
EFT/Burst (100 V to 6 kV) Field calibrations available [Note 4] Without Capacitive Clamp			IEC 61000-4-4 Oscilloscope, Attenuator
Rise time	1 ns to 10 ns	1.5 %	
Impulse duration	10 ns to 500 ns	1.0 %	
With Capacitive Clamp			
Rise time	1 ns to 10 ns	1.4 %	
Impulse duration	10 ns to 500 ns	0.6 %	

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Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Surge Generator Field calibrations available [Note 4] Open-circuit voltage waveform (100 V to 5 kV) (Rise time/duration: 1.2/50 µs or 10/700 µs) Rise Time Half value duration Short-circuit current waveform (50 A to 2 kA) (Rise time/duration: 8/20 µs or 5/320 µs) Rise Time Half value duration	 0.5 µs to 20 µs 10 µs to 1000 µs 1 µs to 20 µs 10 µs to 500 µs	 3.5 % 3.7 % 3.4 % 2.3 %	IEC 61000-4-5 Oscilloscope, HV Probe
Transient Generator (10 V to 600 V) Field calibrations available [Note 4] Rise Time Pulse Width	 1 ns to 50 ms 50 ns to 3 s	 5.8 % 5.9 %	ISO 7637-2, Annex C ISO 7637-3 Oscilloscope
Voltage Dip Simulator (10 V to 500 V; 50 Hz or 60 Hz) Field calibrations available [Note 4] Rise/Fall Time	 1 µs to 5 µs	 2.7 %	IEC 61000-4-11 IEC 61000-4-34 Oscilloscope
ELECTROMAGNETICS – RF/MICROWAVE			
MICROWAVE ANTENNA PARAMETERS (20/R08)			
Dipole Antenna (such as the HA9103/UHA9105) Horizontal Antenna Factor (D = 10 m, H = 2 m)	 30 MHz to 80 MHz (Tuned at 80 MHz) 30 MHz to 300 MHz 300 MHz to 1 GHz	 0.6 dB 0.6 dB 0.8 dB	Substitution method Network Analyzer

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Biconical Antenna,			Substitution method
Antenna Factor			
Horizontal (D = 10 m, H = 2 m)	30 MHz to 300 MHz	0.7 dB	Network Analyzer
Horizontal (D = 3 m, H = 2 m)		0.6 dB	
Horizontal (D = 3 m, H = 1 m)		0.7 dB	
Vertical (D = 3 m, H = 1.5 m)		0.8 dB	
Vertical (D = 3 m, H = 1 m)		0.9 dB	
Log-Periodic Antenna			Substitution method
Antenna Factor			
Horizontal (D = 10 m, H = 2 m)	200 MHz to 1 GHz	1.1 dB	Network Analyzer
Horizontal (D = 3 m, H = 2 m)		1.1 dB	
Horizontal (D = 3 m, H = 1 m)		1.1 dB	
Vertical (D = 3 m, H = 1.5 m)		1.1 dB	
Vertical (D = 3 m, H = 1 m)		1.2 dB	
Bi-log Antenna			Substitution method
Horizontal Antenna Factor	30 MHz to 1 GHz		
(D = 10 m, H = 2 m)		1.3 dB	Network Analyzer
(D = 3 m, H = 2 m)		1.3 dB	
Biconical Antenna			SAE ARP958
Antenna Factor	25 MHz to 300 MHz		Network Analyzer
Horizontal (D = 1 m, H = 3 m)		0.9 dB	
Vertical (D = 1 m, H = 3 m)		0.8 dB	
Log-Periodic Antenna			SAE ARP958
Antenna Factor			
Horizontal (D = 1 m, H = 3 m)	150 MHz to 300 MHz	0.8 dB	Network Analyzer
Horizontal (D = 1 m, H = 3 m)	300 MHz to 1 GHz	0.5 dB	
Horizontal (D = 1 m, H = 3 m)	1 GHz to 1.8 GHz	0.7 dB	
Vertical (D = 1 m, H = 3 m)	150 MHz to 300 MHz	0.6 dB	
Vertical (D = 1 m, H = 3 m)	300 MHz to 1 GHz	0.5 dB	
Vertical (D = 1 m, H = 3 m)	1 GHz to 1.8 GHz	0.6 dB	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Horn Antenna			
Antenna Factor			SAE ARP958
Free Space (D = 1 m, H = 3 m)	0.75 GHz to 18 GHz	1.0 dB	Network Analyzer
	0.75 GHz to 18 GHz	1.4 dB	Spectrum Analyzer
NSA Measurement			CISPR 16-1-4, and
Field calibrations available [Note 4]			ANSI C63.4
Horizontal	30 MHz to 200 MHz	1.4 dB	Network Analyzer
Vertical		1.7 dB	
Horizontal	200 MHz to 1 GHz	1.4 dB	
Vertical		1.5 dB	
SVSWR Measurement			CISPR 16-1-4, and
Field calibrations available [Note 4]			ANSI C63.4
Horizontal	1 GHz to 3 GHz	2.2 dB	Network Analyzer
Vertical		2.1 dB	Spectrum Analyzer
Horizontal	3 GHz to 6 GHz	2.4 dB	
Vertical		2.7 dB	
Horizontal	6 GHz to 12 GHz	2.5dB	
Vertical		1.9 dB	
Horizontal	12 GHz to 18 GHz	2.0 dB	
Vertical		1.9 dB	
Absorbing Clamp			CISPR 16-1-3
Clamp Factor	30 MHz to 300 MHz	0.8 dB	Original Method
	300 MHz to 1 GHz	1.1 dB	Network Analyzer
Decoupling Factor (DF)	30 MHz to 150 MHz	1.3 dB	
	150 MHz to 1 GHz	4.4 dB	
Decoupling Factor (DR)	30 MHz to 150 MHz	0.9 dB	
	150 MHz to 1 GHz	6.1 dB	
Biconical, Log-periodic, Hybrid Antenna			Standard Site Method
Horizontal Antenna Factor			ANSI C63.5 , CISPR 16-1-6
(D = 10 m, H = 2 m)	30 MHz to 300 MHz	1.1 dB	(OATS Calibration)
	300 MHz to 1 GHz	0.9 dB	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Horizontal Antenna Factor	30 MHz to 300 MHz	1.3 dB	
(D = 10 m, H = 1 m)	300 MHz to 1 GHz	1.1 dB	
Vertical Antenna Factor	30 MHz to 300 MHz	1.4 dB	
(D = 10 m, H = 1 m)	300 MHz to 1 GHz	1.5 dB	
Vertical Antenna Factor	30 MHz to 300 MHz	1.3 dB	
(D = 10 m, H = 1.5 m)	300 MHz to 1 GHz	1.2 dB	
Horizontal Antenna Factor	30 MHz to 300 MHz	1.1 dB	
(D = 3 m, H = 2 m)	300 MHz to 1 GHz	1.0 dB	
Horizontal Antenna Factor	30 MHz to 300 MHz	1.3 dB	
(D = 3 m, H = 1 m)	300 MHz to 1 GHz	1.1 dB	
Vertical Antenna Factor	30 MHz to 300 MHz	1.3 dB	
(D = 3 m, H = 1 m)	300 MHz to 1 GHz	1.5 dB	
Vertical Antenna Factor	30 MHz to 300 MHz	1.2 dB	
(D = 3 m, H = 1.5 m)	300 MHz to 1 GHz	1.2 dB	
Horizontal GSCF	30 MHz to 300 MHz	1.3 dB	
(D = 10 m, H = 1 m)	300 MHz to 1 GHz	1.1 dB	
Vertical GSCF	30 MHz to 300 MHz	1.6 dB	
(D = 10 m, H = 1 m)	300 MHz to 1 GHz	1.4 dB	
Vertical GSCF	30 MHz to 300 MHz	1.7 dB	
(D = 10 m, H = 1.5 m)	300 MHz to 1 GHz	1.2 dB	
Horizontal GSCF	30 MHz to 300 MHz	1.2 dB	
(D = 3 m, H = 2 m)	300 MHz to 1 GHz	0.9 dB	
Horizontal GSCF	30 MHz to 300 MHz	1.4 dB	
(D = 3 m, H = 1 m)	300 MHz to 1 GHz	1.2 dB	
Vertical GSCF	30 MHz to 300 MHz	1.5 dB	
(D = 3 m, H = 1 m)	300 MHz to 1 GHz	1.5 dB	
Vertical GSCF	30 MHz to 300 MHz	1.6 dB	
(D = 3 m, H = 1.5 m)	300 MHz to 1 GHz	1.2 dB	
Biconical, Log-periodic, Hybrid Antenna			ANSI C63.5 (OATS Calibration)
Antenna Symmetry	20 MHz to 300 MHz	0.6 dB	
	300 MHz to 1 GHz	0.6 dB	
	1 GHz to 1.8 GHz	0.5 dB	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
Horn Antenna, Log Periodic			Standard Site Method
Free Space Antenna Factor			ANSI C63.5 , CISPR 16-1-6
(D = 3 m)	0.75 GHz to 18 GHz	1.0 dB	Network Analyzer
	0.75 GHz to 18 GHz	1.2 dB	Spectrum Analyzer
Loop Antenna – Antenna Factor	9 kHz to 30 MHz	1.2 dB	Standard Field Strength Method
Large Loop Antenna – Validation Factor	9 kHz to 30 MHz	0.8 dB	CISPR 16-1-4 Annex C
Field calibrations available [Note 4]			
SCATTERING PARAMETERS (20/R18)			
Impedance & VSWR - Measure			Network Analyzer
Field calibrations available [Note 4]			
0 to 0.5 (Linear)	9 kHz to 300 kHz	2.0 % + 0.002	
	300 kHz to 10 MHz	2.0 % + 0.002	
	10 MHz to 3 GHz	2.4 % + 0.002	
	3 GHz to 6 GHz	3.5 % + 0.002	
	6 GHz to 18 GHz	7.1 % + 0.002	
	18 GHz to 20 GHz	8.4 % + 0.006	
0.5 to 1 (Linear)	9 kHz to 300 kHz	3.7 % + 0.002	
	300 kHz to 10 MHz	3.7 % + 0.002	
	10 MHz to 3 GHz	4.3 % + 0.002	
	3 GHz to 6 GHz	6.8 % + 0.002	
	6 GHz to 18 GHz	13.3 % + 0.002	
	18 GHz to 20 GHz	16.2 % + 0.006	
Directional Coupler (9 kHz to 6 GHz)			
Field calibrations available [Note 4]			
Insertion Loss	0 dB to 60 dB	0.20 dB	Network Analyzer
Coupling Factor	0 dB to 60 dB	0.20 dB	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Notes 3, 5	Remarks
EM Clamp / Decoupling Clamp 0.1 MHz to 230 MHz Field calibrations available Note 4			IEC 61000-4-6
Insertion Loss	100 kHz to 230 MHz	0.4 dB	
Impedance	100 kHz to 100 MHz 100 MHz to 230 MHz	6.0 % 8.8 %	
Decoupling Factor	100 kHz to 100 MHz 100 MHz to 230 MHz	0.6 dB 0.7 dB	
Coupling Factor	100 kHz to 100 MHz 100 MHz to 230 MHz	0.7 dB 0.6 dB	
50 ohm to 150 ohm Adaptor 0.1 MHz to 230 MHz Field calibrations available Note 4			Network Analyzer
Insertion Loss	0 dB to 60 dB	0.3 dB	
Current Probe/Current Injection Probe 10 kHz to 500 MHz Field calibrations available Note 4			
Insertion Loss	0 dB to 60 dB	0.5 dB	
Transfer Impedance	0 dBΩ to 60 dBΩ	0.5 dB	
Calibration Jig of Current Injection Probe Field calibrations available Note 4			
Transmission Loss	150 kHz to 230 MHz	0.6 dB	IEC 61000-4-6
Hi-Impedance Probe 9 kHz to 30 MHz Field calibrations available Note 4			
Voltage Division Factor (VDF)	0 dB to 60 dB	0.3 dB	

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CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Notes 3, 5]	Remarks
RF Insertion Loss/Gain Measure Field calibrations available [Note 4]			
9 kHz to 300 kHz	0 dB to 60 dB	0.30 dB	
300 kHz to 10 MHz		0.25 dB	
10 MHz to 3 GHz		0.18 dB	
3 GHz to 6 GHz		0.24 dB	
6 GHz to 18 GHz		0.34 dB	
18 GHz to 20 GHz		0.41 dB	
LISN Field calibrations available [Note 4]			CISPR 16-1-2, CISPR 25, ISO 7637-1 and -2
Insertion Loss/VDF	9 kHz to 108 MHz	0.18 dB	ANSI C63.4
Impedance	9 kHz to 100 kHz	5.1 %	
	100 kHz to 108 MHz	1.1 %	
Phase	9 kHz to 30 MHz	4.9°	
	30 MHz to 108 MHz	6.6°	
Isolation	9 kHz to 108 MHz	2.9 dB	
CDN Field calibrations available [Note 4]			
Insertion Loss (-30 to 10) dB	100 kHz to 230 MHz	0.1 dB	
Impedance (90 to 210) Ω	100 kHz to 80 MHz	4.2 %	
	80 MHz to 230 MHz	9.2 %	
CMAD Field calibrations available [Note 4]			
Transmission Coefficient	30 MHz to 200 MHz	0.0051 (linear)	
Reflection Coefficient	30 MHz to 200 MHz	0.013 (linear)	
END			

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Notes

Note 1: A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

Note 2: Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

Note 3: The uncertainty associated with a measurement in a CMC is an expanded uncertainty with a level of confidence of approximately 95 %, typically using a coverage factor of $k = 2$. However, laboratories may report a coverage factor different than $k = 2$ to achieve the 95 % level of confidence. Units for the measurand and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

> **Note 3a:** The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.
> **Note 3b:** As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.
> **Note 3c:** As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions.* However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.1.h. of NIST Handbook 150, Procedures and General Requirements.

Note 4: Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)

Note 5: Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

Note 6: NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

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