



National Voluntary Laboratory Accreditation Program



CALIBRATION LABORATORIES

NVLAP LAB CODE 200867-0

Scope Revised: 2009-09-23

NVLAP Code: 20/D05

Length and Diameter

Micrometers and Calipers

Range

(8 to 24) in
(0.05 to 8) in

Best Uncertainty (\pm) ^{note 1, 2}

(20 + 14L) μ in
(8 + 14L) μ in

Remarks

Comparison to Gage Blocks
Comparison to Gage Blocks

Anvil Flatness

Range

0 to 1 in

Best Uncertainty (\pm) ^{note 1, 2}

6.4 μ in

Remarks

Optical Flats

Anvil Parallelism

Range

0 to 1 in

Best Uncertainty (\pm) ^{note 1, 2}

13 μ in

Remarks

Optical Parallels

Length Measurement – Single Axis

Range

(0.01 to 20) in

Best Uncertainty (\pm) ^{note 1}

(9 + 4.1L) μ in

Remarks

Helios Supra 500 Comparator

Inner Diameter – Ring Gages

Range

(0.125 to 20) in

Best Uncertainty (\pm) ^{note 1}

(14 + 3.5L) μ in

Remarks

Helios Supra 500 Comparator

Height Measuring Equipment – Height Gages, Dial and Digital Indicators

Range

(0 to 24) in

Best Uncertainty (\pm) ^{note 1, 2}

(51 + 6L) μ in

Remarks

Comparison to Gage Blocks

Height Measure – Height Masters, 1-2-3 Blocks, Caliper Masters, Parallels

Range

(0 to 4) in

Best Uncertainty (\pm) ^{note 1}

(51 + 6L) μ in

Remarks

Gage Blocks w/Amplifier

2009-05-04 through 2010-03-31

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Magnification – Optical Comparators

Range 10x to 50x (0 to 6) in NVLAP Code: 20/D11 Spherical Diameter	Best Uncertainty (\pm) ^{note 1, 2} (600 + 23L) μ m (370 + 12L) μ m	Remarks Glass Scale and Magnification Glass Scale and Magnification
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Outer Spherical Diameter Range (0.1 to 1.0)	Best Uncertainty (\pm) ^{note 1} 46 μ m	Remarks Helios Supra 500 Comparator
NVLAP Code: 20/D12 Surface Texture		

Surface Plate Flatness Range (12 to 100) in	Best Uncertainty (\pm) ^{note 1, 2} (45 + \sqrt{D}) μ m	Remarks Differential Levels ^{note 4}
NVLAP Code: 20/D14 Threaded Plug and Ring Gages		

Outer Pitch Diameter Range (0 to 6) in Inner Pitch Diameter	Best Uncertainty (\pm) ^{note 1} 80 μ m	Remarks Comparator w/Thread Wires
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Range (0 to 6) in	Best Uncertainty (\pm) ^{note 1} 150 μ m	Remarks Comparison to Master Setting Plugs
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ELECTROMAGNETICS – DC/LOW FREQUENCY

NVLAP Code: 20/E02

AC Current

AC Current – Measuring Equipment

Range	Frequency	Best Uncertainty (\pm) in % + A ^{note 1, 2}	Remarks
(11 to 20) A	20A @ (45 to 1000Hz)	0.15 % + 5 mA	Fluke 5520A
	20A @ (1 to 5 kHz)	3.0 % + 5 mA	Fluke 5520A
(2.2 to 11) A	(0.04 to 1) kHz	0.05 % + 170 μ A	Fluke 5720A
	(1 to 5) kHz	0.10 % + 380 μ A	Fluke 5720A
	(5 to 10) kHz	0.36 % + 750 μ A	Fluke 5720A
(0.22 to 2.2) A	(20 to 40) Hz	0.07 % + 35 μ A	Fluke 5720A
	(0.04 to 1) kHz	0.07 % + 35 μ A	Fluke 5720A
	(1 to 5) kHz	0.08 % + 80 μ A	Fluke 5720A
	(5 to 10) kHz	0.85 % + 160 μ A	Fluke 5720A
(22 to 220) mA	(10 to 20) Hz	0.07 % + 4 μ A	Fluke 5720A
	(20 to 40) Hz	0.04 % + 3.5 μ A	Fluke 5720A
	(0.04 to 1) kHz	0.02 % + 3.5 μ A	Fluke 5720A
	(1 to 5) kHz	0.06 % + 40 μ A	Fluke 5720A
	(5 to 10) kHz	0.16 % + 80 μ A	Fluke 5720A
(2.2 to 22) mA	(10 to 20) Hz	0.07 % + 400 nA	Fluke 5720A
	(20 to 40) Hz	0.04 % + 350 nA	Fluke 5720A
	(0.04 to 1) kHz	0.02 % + 350 nA	Fluke 5720A
	(1 to 5) kHz	0.06 % + 4 μ A	Fluke 5720A
	(5 to 10) kHz	0.16 % + 8 μ A	Fluke 5720A
(0.22 to 2.2) mA	(10 to 20) Hz	0.07 % + 40 nA	Fluke 5720A
	(20 to 40) Hz	0.04 % + 35 nA	Fluke 5720A
	(0.04 to 1) kHz	0.02 % + 35 nA	Fluke 5720A

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	(1 to 5) kHz	0.06 % + 400 nA	Fluke 5720A
	(5 to 10) kHz	0.16 % + 800 nA	Fluke 5720A
(0 to 220) μ A	(10 to 20) Hz	0.07 % + 25 nA	Fluke 5720A
	(20 to 40) Hz	0.04 % + 20 nA	Fluke 5720A
	(0.04 to 1) kHz	0.02 % + 16 nA	Fluke 5720A
	(1 to 5) kHz	0.06 % + 40 nA	Fluke 5720A
	(5 to 10) kHz	0.16 % + 80 nA	Fluke 5720A

Clamp-on Ammeter Torodial Type

Range	Frequency	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(150 to 1000) A	(65 to 440) Hz	1.3 % + 0.35 A	Fluke 5500A/COIL w/Fluke 5520A
(150 to 1000) A	(45 to 65) Hz	0.37 % + 0.19 A	Fluke 5500A/COIL w/Fluke 5520A
(20 to 150) A	(65 to 440) Hz	0.86 % + 77 mA	Fluke 5500A/COIL w/Fluke 5520A
(20 to 150) A	(45 to 65) Hz	0.33 % + 35 mA	Fluke 5500A/COIL w/Fluke 5520A

Clamp-on Ammeter Non-Torodial Type

Range	Frequency	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(150 to 1000) A	(65 to 440) Hz	1.44 % + 1.15 A	Fluke 5500A/COIL w/Fluke 5520A
(150 to 1000) A	(45 to 65) Hz	0.61 % + 1.0 A	Fluke 5500A/COIL w/Fluke 5520A
(20 to 150) A	(65 to 440) Hz	1.1 % + 0.3 A	Fluke 5500A/COIL w/Fluke 5520A
(20 to 150) A	(45 to 65) Hz	0.59 % + 0.26 A	Fluke 5500A/COIL w/Fluke 5520A

AC Current – Measure

Range	Frequency	Best Uncertainty (\pm) in % + A ^{note 1, 2}	Remarks
(0.1 to 1) A	(0.1 to 1) kHz	0.10 % + 200 μ A	H.P. 3458A Opt. 002
	(45 to 100) Hz	0.09 % + 200 μ A	H.P. 3458A Opt. 002
	(20 to 45) Hz	0.16 % + 200 μ A	H.P. 3458A Opt. 002
	(10 to 20) Hz	0.40 % + 200 μ A	H.P. 3458A Opt. 002
(10 to 100) mA	(0.1 to 1) kHz	0.04 % + 20 μ A	H.P. 3458A Opt. 002
	(45 to 100) Hz	0.07 % + 20 μ A	H.P. 3458A Opt. 002
	(20 to 45) Hz	0.15 % + 20 μ A	H.P. 3458A Opt. 002
	(10 to 20) Hz	0.40 % + 20 μ A	H.P. 3458A Opt. 002

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(1 to 10) mA	(0.1 to 1) kHz	0.07 % + 2 μ A	H.P. 3458A Opt. 002
	(45 to 100) Hz	0.07 % + 2 μ A	H.P. 3458A Opt. 002
	(20 to 45) Hz	0.15 % + 2 μ A	H.P. 3458A Opt. 002
	(10 to 20) Hz	0.40 % + 2 μ A	H.P. 3458A Opt. 002
(0.1 to 1) mA	(0.1 to 1) kHz	0.04 % + 200 nA	H.P. 3458A Opt. 002
	(45 to 100) Hz	0.07 % + 200 nA	H.P. 3458A Opt. 002
	(20 to 45) Hz	0.15 % + 200 nA	H.P. 3458A Opt. 002
	(10 to 20) Hz	0.40 % + 200 nA	H.P. 3458A Opt. 002
(0 to 100) μ A	(0.1 to 1) kHz	0.08 % + 30 nA	H.P. 3458A Opt. 002
	(45 to 100) Hz	0.08 % + 30 nA	H.P. 3458A Opt. 002
	(20 to 45) Hz	0.16 % + 30 nA	H.P. 3458A Opt. 002
	(10 to 20) Hz	0.40 % + 30 nA	H.P. 3458A Opt. 002

NVLAP Code: 20/E05

DC Current and Resistance

DC Current – Measuring Equipment

Range	Best Uncertainty (\pm) <small>note 1, 2</small>	Remarks
(11 to 20) A	1269 ppm + 750 μ A	Fluke 5520A
(2.2 to 11) A	416 ppm + 480 μ A	Fluke 5720A w/5725A Amplifier
(0.22 to 2.2) A	139 ppm + 25 μ A	Fluke 5720A
(22 to 220) mA	71.1 ppm + 0.8 μ A	Fluke 5720A
(2.2 to 22) mA	58.4 ppm + 80 nA	Fluke 5720A
(0.22 to 2.2) mA	58.4 ppm + 8 nA	Fluke 5720A
(0 to 220) μ A	58.4 ppm + 8 nA	Fluke 5720A

Clamp-on Ammeter Torodial Type

Range	Best Uncertainty (\pm) <small>note 1, 2</small>	Remarks
(150 to 1000) A	0.32 % + 88 mA	Fluke 5500A/Coil w/Fluke 5520A
(20 to 150) A	0.30 % + 17 mA	Fluke 5500A/Coil w/Fluke 5520A

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Clamp-on Ammeter Non-Torodial Type

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(150 to 1000) A	0.59 % + 0.54 A	Fluke 5500A/Coil w/Fluke 5520A
(20 to 150) A	0.58 % + 0.14 A	Fluke 5500A/Coil w/Fluke 5520A

DC Current – Measure

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(1 to 3) A	0.15% + 0.6 mA	HP 34401A
(0.1 to 1) A	133 ppm + 10 μ A	HP 3458A Opt. 002
(10 to 100) mA	41.7 ppm + 500 nA	HP 3458A Opt. 002
(1 to 10) mA	25.2 ppm + 50 nA	HP 3458A Opt. 002
(0.1 to 1) mA	29.3 ppm + 5 nA	HP 3458A Opt. 002
(0 to 100) μ A	35.6 ppm + 0.8 nA	HP 3458A Opt. 002

DC Resistance – Measuring Equipment

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
10 G Ω	1.31 % + 5 ppm	IET VRS-100
10 G Ω	0.64 % + 2 ppm	IET VRS-100
1 G Ω	0.61 % + 1.2 ppm	IET VRS-100
100 m Ω	159 ppm	Standard Resistor
10 m Ω	159 ppm	Standard Resistor
1 m Ω	159 ppm	Standard Resistor

DC Resistance – Measure

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(0.1 to 1) G Ω	0.58 % + 10 k Ω	H. P. 3458A Opt. 002
(10 to 100) M Ω	0.06 % + 1 k Ω	H. P. 3458A Opt. 002
(1 to 10) M Ω	60.2 ppm + 100 Ω	H. P. 3458A Opt. 002
(0.1 to 1) M Ω	21.1 ppm + 2 Ω	H. P. 3458A Opt. 002
(40 to 100) k Ω	13.9 ppm + 50 m Ω	H. P. 3458A Opt. 002
(1 to 40) k Ω	10.3 ppm	Hart 1590 w/Ref Resistor
(0.4 to 1) k Ω	4.6 ppm	Hart 1590 w/Ref Resistor
(25 to 400) Ω	2.3 ppm	Hart 1590 w/Ref Resistor
(0 to 25) Ω	0.04 m Ω	Hart 1590 w/Ref Resistor

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NVLAP Code: 20/E06

DC Voltage

DC Voltage –Measure

Range	Best Uncertainty (\pm) <small>note 1, 2</small>	Remarks
(0.8 to 1) kV	18.3 ppm + 100 μ V	HP 3458A Opt. 002
(500 to 800) V	12.5 ppm + 100 μ V	HP 3458A Opt. 002
(100 to 500) V	9.6 ppm + 100 μ V	HP 3458A Opt. 002
(10 to 100) V	6.8 ppm + 30 μ V	HP 3458A Opt. 002
(1 to 10) V	4.7 ppm + 0.5 μ V	HP 3458A Opt. 002
(0.1 to 1) V	4.7 ppm + 0.5 μ V	HP 3458A Opt. 002
(0 to 100) mV	6.8 ppm + 0.5 μ V	HP 3458A Opt. 002

DC Voltage – Measuring Equipment

Range	Best Uncertainty (\pm) <small>note 1, 2</small>	Remarks
(20 to 120) kV	1.2%	Gamma HVD150/AC w/HP 34401A
(2 to 20) kV	0.50 % + 4 V	Vitrek 4600A
(1 to 2) kV	0.50 % + 0.4 V	Vitrek 4600A
(0.22 to 1.1) kV	9.1 ppm + 400 μ V	Fluke 5720A w/5725A
(22 to 220) V	8.1 ppm + 40 μ V	Fluke 5720A w/5725A
(11 to 22) V	7.1 ppm + 4.0 μ V	Fluke 5720A
(2.2 to 11) V	7.1 ppm + 2.5 μ V	Fluke 5720A
(0.22 to 2.2) V	7.1 ppm + 0.7 μ V	Fluke 5720A
(0 to 220) mV	8.2 ppm + 0.4 μ V	Fluke 5720A

NVLAP Code: 20/E09

LF AC Voltage

AC Voltage – Measuring Equipment

Range	Frequency	Best Uncertainty (\pm) <small>note 1, 2</small>	Remarks
(0.22 to 1.1) kV	(20 to 30) kHz	0.06 % + 11 mV	Fluke 5720A w/5725A
	(1 to 20) kHz	0.02 % + 6 mV	Fluke 5720A w/5725A
	(0.04 to 1) kHz	0.01 % + 4 mV	Fluke 5720A w/5725A

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(220 to 750) V	(50 to 100) kHz	0.23 % + 45 mV	Fluke 5720A w/5725A
	(30 to 50) kHz	0.06 % + 11 mV	Fluke 5720A w/5725A
(22 to 220) V	(0.5 to 1) MHz	1.15 % + 190 mV	Fluke 5720A w/5725A
	(300 to 500) kHz	0.47 % + 90 mV	Fluke 5720A w/5725A
	(100 to 300) kHz	0.15 % + 90 mV	Fluke 5720A w/5725A
	(50 to 100) kHz	0.05 % + 8 mV	Fluke 5720A w/5725A
	(20 to 50) kHz	0.02 % + 3.5 mV	Fluke 5720A w/5725A
	(0.04 to 20) kHz	0.008 % + 0.8 mV	Fluke 5720A w/5725A
	(20 to 40) Hz	0.02 % + 2.5 mV	Fluke 5720A w/5725A
	(10 to 20) Hz	0.05 % + 8 mV	Fluke 5720A w/5725A
(2.2 to 22) V	(0.5 to 1) MHz	0.27 % + 8.5 mV	Fluke 5720A
	(300 to 500) kHz	0.13 % + 4.3 mV	Fluke 5720A
	(100 to 300) kHz	0.05 % + 1.5 mV	Fluke 5720A
	(50 to 100) kHz	0.03 % + 0.35 mV	Fluke 5720A
	(20 to 50) kHz	0.01 % + 0.16 mV	Fluke 5720A
	(0.04 to 20) kHz	0.01 % + 60 μ V	Fluke 5720A
	(20 to 40) Hz	0.02 % + 0.25 mV	Fluke 5720A
(0.22 to 2.2) V	(10 to 20) Hz	0.05 % + 0.8 mV	Fluke 5720A
	(0.5 to 1) MHz	0.23 % + 850 μ V	Fluke 5720A
	(300 to 500) kHz	0.11 % + 350 μ V	Fluke 5720A
	(100 to 300) kHz	0.05 % + 130 μ V	Fluke 5720A
	(50 to 100) kHz	0.03 % + 70 μ V	Fluke 5720A
	(20 to 50) kHz	0.01 % + 16 μ V	Fluke 5720A
	(0.04 to 20) kHz	0.01 % + 6 μ V	Fluke 5720A
(22 to 220) mV	(20 to 40) Hz	0.02 % + 25 μ V	Fluke 5720A
	(10 to 20) Hz	0.05 % + 80 μ V	Fluke 5720A
	(0.5 to 1) MHz	0.34 % + 80 μ V	Fluke 5720A
	(300 to 500) kHz	0.17 % + 35 μ V	Fluke 5720A
	(100 to 300) kHz	0.11 % + 25 μ V	Fluke 5720A
	(50 to 100) kHz	0.09 % + 25 μ V	Fluke 5720A
	(20 to 50) kHz	0.03 % + 8 μ V	Fluke 5720A
(0.04 to 20) kHz	0.01 % + 8 μ V	Fluke 5720A	
(20 to 40) Hz	0.02 % + 8 μ V	Fluke 5720A	
(10 to 20) Hz	0.06 % + 13 μ V	Fluke 5720A	

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(2.2 to 22) mV	(0.5 to 1) MHz	0.38 % + 25 μ V	Fluke 5720A
	(300 to 500) kHz	0.20 % + 25 μ V	Fluke 5720A
	(100 to 300) kHz	0.14 % + 12 μ V	Fluke 5720A
	(50 to 100) kHz	0.09 % + 7 μ V	Fluke 5720A
	(20 to 50) kHz	0.04 % + 5 μ V	Fluke 5720A
	(0.04 to 20) kHz	0.02 % + 5 μ V	Fluke 5720A
	(20 to 40) Hz	0.03 % + 5 μ V	Fluke 5720A
	(10 to 20) Hz	0.06 % + 5 μ V	Fluke 5720A
(0 to 2.2) mV	(0.5 to 1) MHz	0.69 % + 25 μ V	Fluke 5720A
	(300 to 500) kHz	0.52 % + 25 μ V	Fluke 5720A
	(100 to 300) kHz	0.35 % + 13 μ V	Fluke 5720A
	(50 to 100) kHz	0.21 % + 7 μ V	Fluke 5720A
	(20 to 50) kHz	0.15 % + 4.5 μ V	Fluke 5720A
	(0.04 to 20) kHz	0.09 % + 4.5 μ V	Fluke 5720A
	(20 to 40) Hz	0.09 % + 4.5 μ V	Fluke 5720A
	(10 to 20) Hz	0.12 % + 4.5 μ V	Fluke 5720A

AC Voltage – Measure

Range	Frequency	Best Uncertainty (\pm)^{note 1, 2}	Remarks
(20 to 80) kV	60 Hz	0.59 %	Gamma HVD/AC w/H.P. 34401A
(2 to 20) kV	60 Hz	2.09 % + 20 V	Vitrek 4600A H. V. Meter
(1 to 2) kV	60 Hz	0.93 % + 2 V	Vitrek 4600A H. V. Meter
(100 to 700) V	(1 to 20) kHz	0.06 % + 20 mV	HP 3458A Opt. 002
	(0.04 to 1) kHz	0.04 % + 20 mV	HP 3458A Opt. 002
	(1 to 40) Hz	0.04 % + 40 mV	HP 3458A Opt. 002
(10 to 100) V	(50 to 100) kHz	0.12 % + 2 mV	HP 3458A Opt. 002
	(20 to 50) kHz	0.04 % + 2 mV	HP 3458A Opt. 002
	(1 to 20) kHz	0.02 % + 2 mV	HP 3458A Opt. 002
	(0.04 to 1) kHz	0.02 % + 2 mV	HP 3458A Opt. 002
	(1 to 40) Hz	0.02 % + 4 mV	HP 3458A Opt. 002
(1 to 10) V	(1 to 2) MHz	1.5 % + 1 mV	HP 3458A Opt. 002
	(0.3 to 1) MHz	1.0 % + 1 mV	HP 3458A Opt. 002

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	(100 to 300) kHz	0.31 % + 1 mV	HP 3458A Opt. 002
	(50 to 100) kHz	0.08 % + 200 μ V	HP 3458A Opt. 002
	(20 to 50) kHz	0.03 % + 200 μ V	HP 3458A Opt. 002
	(1 to 20) kHz	0.02 % + 200 μ V	HP 3458A Opt. 002
	(0.04 to 1) kHz	0.008 % + 200 μ V	HP 3458A Opt. 002
	(1 to 40) Hz	0.008 % + 400 μ V	HP 3458A Opt. 002
(0.1 to 1) V	(1 to 2) MHz	1.5 % + 100 μ V	HP 3458A Opt. 002
	(0.3 to 1) MHz	1.0 % + 100 μ V	HP 3458A Opt. 002
	(100 to 300) kHz	0.31 % + 100 μ V	HP 3458A Opt. 002
	(50 to 100) kHz	0.08 % + 20 μ V	HP 3458A Opt. 002
	(20 to 50) kHz	0.03 % + 20 μ V	HP 3458A Opt. 002
	(1 to 20) kHz	0.02 % + 20 μ V	HP 3458A Opt. 002
	(0.04 to 1) kHz	0.008 % + 20 μ V	HP 3458A Opt. 002
	(1 to 40) Hz	0.008 % + 40 μ V	HP 3458A Opt. 002
(10 to 100) mV	(1 to 2) MHz	1.5 % + 10 μ V	HP 3458A Opt. 002
	(0.3 to 1) MHz	1.0 % + 10 μ V	HP 3458A Opt. 002
	(100 to 300) kHz	0.30 % + 10 μ V	HP 3458A Opt. 002
	(50 to 100) kHz	0.08 % + 2 μ V	HP 3458A Opt. 002
	(20 to 50) kHz	0.03 % + 2 μ V	HP 3458A Opt. 002
	(1 to 20) kHz	0.02 % + 2 μ V	HP 3458A Opt. 002
	(0.04 to 1) kHz	0.008 % + 2 μ V	HP 3458A Opt. 002
	(1 to 40) Hz	0.008 % + 4 μ V	HP 3458A Opt. 002
(0 to 10) mV	(100 to 300) kHz	4.0 % + 2 μ V	HP 3458A Opt. 002
	(50 to 100) kHz	0.50 % + 1 μ V	HP 3458A Opt. 002
	(20 to 50) kHz	0.11 % + 1 μ V	HP 3458A Opt. 002
	(1 to 20) kHz	0.05 % + 1 μ V	HP 3458A Opt. 002
	(0.04 to 1) kHz	0.02 % + 1 μ V	HP 3458A Opt. 002
	(1 to 40) Hz	0.03 % + 3 μ V	HP 3458A Opt. 002

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Scope Revised: 2009-09-23

NVLAP Code: 20/E10

LF Capacitance

Capacitance – Measuring Equipment

Range	Frequency (Hz)	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(0.33 to 1.09999) mF	DC to 20	0.47 % + 1 μ F	Fluke 5520A
(110 to 329.999) μ F	DC to 50	0.46 % + 0.3 μ F	Fluke 5520A
(33 to 109.999) μ F	10 to 80	0.46 % + 0.1 μ F	Fluke 5520A
(11 to 32.9999) μ F	10 to 120	0.41 % + 30 nF	Fluke 5520A
(3.3 to 10.9999) μ F	10 to 150	0.26 % + 10 nF	Fluke 5520A
(1.1 to 3.29999) μ F	10 to 300	0.26 % + 3 nF	Fluke 5520A
(0.33 to 1.0999) μ F	10 to 600	0.26 % + 1 nF	Fluke 5520A
(110 to 329.999) nF	10 to 1 k	0.26 % + 0.3 nF	Fluke 5520A
(33 to 109.9999) nF	10 to 1 k	0.26 % + 0.1 nF	Fluke 5520A
(11 to 32.9999) nF	10 to 1 k	0.26 % + 0.1 nF	Fluke 5520A
(3.3 to 10.9999) nF	10 to 1 k	0.26 % + 0.01 nF	Fluke 5520A
(1.1 to 3.2999) nF	10 to 3 k	0.51 % + 0.01 nF	Fluke 5520A
(0.19 to 1.0999) nF	10 to 10 k	0.53 % + 0.01 nF	Fluke 5520A

NVLAP Code: 20/E20

Oscilloscopes

Sinewave Flatness

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
(100 to 300) MHz	2.18%	Fluke 5500A/SC300
(0.05 to 100) MHz	1.72%	Fluke 5500A/SC300

Rise Time

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
\leq 1 ns	2.6%	Fluke 5500A/SC300

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MECHANICAL

NVLAP Code: 20/M06

Force

Torque – Measuring Equipment

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
250 in/lb to 800 ft/lb	0.09 %	40 inch Torque Arm w/F Class Weights
50 in/lb to 250 ft/lb	0.09 %	10 inch Torque Butterfly w/F Class Weights
2.5 in/lb to 50 in/lb	0.07 %	5 inch Torque Wheel w/F Class Weights

Torque – Measure

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
5 in/lb to 250 ft/lb	1.0 %	C.D.I. 950-DT

NVLAP Code: 20/M08

Mass

Mass – Scales and Balances

Range	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
20 kg	61 mg	ASTM Class 1 Mass Standards
5 kg	10 mg	ASTM Class 1 Mass Standards
3 kg	2 mg	ASTM Class 1 Mass Standards
2 kg	2 mg	ASTM Class 1 Mass Standards
1 kg	3 mg	ASTM Class 1 Mass Standards
500 g	0.55 mg	ASTM Class 1 Mass Standards
300 g	0.55 mg	ASTM Class 1 Mass Standards
200 g	0.19 mg	ASTM Class 1 Mass Standards
100 g	0.19 mg	ASTM Class 1 Mass Standards
50 g	0.076 mg	ASTM Class 1 Mass Standards
30 g	0.031 mg	ASTM Class 1 Mass Standards
20 g	0.031 mg	ASTM Class 1 Mass Standards
10 g	0.011 mg	ASTM Class 1 Mass Standards
5 g	0.011 mg	ASTM Class 1 Mass Standards
2 g	0.011 mg	ASTM Class 1 Mass Standards

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1 g	0.011 mg	ASTM Class 1 Mass Standards
500 mg	0.003 mg	ASTM Class 1 Mass Standards
200 mg	0.003 mg	ASTM Class 1 Mass Standards
50 mg	0.003 mg	ASTM Class 1 Mass Standards
20 mg	0.003 mg	ASTM Class 1 Mass Standards
10 mg	0.003 mg	ASTM Class 1 Mass Standards
5 mg	0.003 mg	ASTM Class 1 Mass Standards
2 mg	0.003 mg	ASTM Class 1 Mass Standards
1 mg	0.003 mg	ASTM Class 1 Mass Standards

Mass

Range	Best Uncertainty (\pm) ^{note 1}	Remarks
30 kg	0.3 g	Echelon III
20 kg	0.2 g	Echelon III
10 kg	0.1 g	Echelon III
5 kg	50 mg	Echelon III
2 kg	20 mg	Echelon III
1 kg	10 mg	Echelon III
0.5 kg	5 mg	Echelon III

Mass – Avoirdupois

Range	Best Uncertainty (\pm) ^{note 1}	Remarks
65 lb	0.3 g	Echelon III
50 lb	0.23 g	Echelon III
30 lb	0.14 g	Echelon III
20 lb	91 mg	Echelon III
10 lb	46 mg	Echelon III
5 lb	23 mg	Echelon III
3 lb	14 mg	Echelon III
2 lb	9.1 mg	Echelon III
1 lb	4.6 mg	Echelon III

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NVLAP Code: 20/M13

Hardness

Rockwell Hardness – Measuring Equipment

<i>Range in Rockwell Units</i>	<i>Best Uncertainty (±) ^{note 1, 2}</i>	<i>Remarks</i>
20 to 40 HRC	0.38	Hardness Blocks
40 to 60 HRC	0.36	Hardness Blocks
60 to 70 HRC	0.32	Hardness Blocks
Tungsten Carbide Balls		
20 to 50 HRBW	1.1	Hardness Blocks
50 to 75 HRBW	0.64	Hardness Blocks
75 to 105 HRBW	0.46	Hardness Blocks

THERMODYNAMIC

NVLAP Code: 20/T02

Humidity

Relative Humidity – Measuring Equipment

<i>Range</i>	<i>Best Uncertainty (±) ^{note 1, 2}</i>	<i>Remarks</i>
(0 to 80) % RH	1.3 % RH	Vaisala HMI41/HMP46 w/Salt Solutions

NVLAP Code: 20/T03

Laboratory Thermometers

Temperature – Measuring Equipment

<i>Range</i>	<i>Best Uncertainty (±) ^{note 1, 2}</i>	<i>Remarks</i>
(400 to 600) °C	20.9 mK	Hart 5699 SPRT w/Furnace
(270 to 400) °C	4.8 mK	Hart 5699 SPRT w/Precision Bath
(100 to 270) °C	2.4 mK	Hart 5699 SPRT w/Precision Bath
(-40 to 100) °C	1.2 mK	Hart 5699 SPRT w/Precision Bath
(-100 to -40) °C	7.6 mK	

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Temperature – Measure

Range (-40 to 600) °C	Best Uncertainty (\pm) ^{note 1, 2} 26.1 mK	Remarks Hart Black Stack w/SPRT
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NVLAP Code: 20/T05
Pressure

Pressure – Pneumatic

Range (-15 to 25) (25 to 500) psi (72 to 804) inH ₂ O (60 to 72) inH ₂ O (22 to 60) inH ₂ O (-22 to 22) inH ₂ O (-36 to -22) inH ₂ O (-2 to 2) inH ₂ O	Best Uncertainty (\pm) ^{note 1, 2} 0.0017 psi 74.4 ppm 90ppm + 150 μ inH ₂ O 0.0067 in 90ppm + 150 μ inH ₂ O 0.002 in 90ppm + 150 μ inH ₂ O 0.0010 inH ₂ O	Remarks Ruska 7250xi Pressure Controller Ruska 7250xi Pressure Controller DHI PPC 4 Controller DHI PPC 4 Controller DHI PPC 4 Controller DHI PPC 4 Controller DHI PPC 4 Controller Dwyer 1430 Microtector
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Pressure – Hydraulic

Range (500 to 15,000) psi	Best Uncertainty (\pm) ^{note 1, 2} 0.0084%	Remarks Ametek T-150 Deadweight Tester
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Pressure – Absolute

Range (25 to 500) psiA (0 to 25) psiA	Best Uncertainty (\pm) ^{note 1, 2} 76.1 ppm + 0.001 psi 0.0019 psi	Remarks Ruska 7250xi Pressure Controller Ruska 7250xi Pressure Controller
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NVLAP Code: 20/T07
Resistance Thermometry

Fixed Point Cells

Range	Best Uncertainty (\pm) ^{note 1}	Remarks
660.323 °C	8.6 mK	Comparison to Al Fixed Point Cell
419.527 °C	3.5 mK	Comparison to Zn Fixed Point Cell
231.928 °C	2.1 mK	Comparison to Sn Fixed Point Cell
156.598 °C	1.9 mK	Comparison to In Fixed Point Cell
0.010 °C	0.6 mK	Comparison to TPW Cell

SPRT Comparison

Range	Best Uncertainty (\pm) ^{note 1}	Remarks
-38.8 °C	1.1 mK	Hart 5699 SPRT w/Precision Bath
-78 °C	1.8 mK	Hart 5699 SPRT w/Dry Ice
-195 °C	2.4 mK	Hart 5699 SPRT w/NBPLN2

NVLAP Code: 20/T08
Thermocouples

Thermocouple Devices

Thermocouple Type	Best Uncertainty (\pm) ^{note 1, 2}	Remarks
Type R	0.24 °C	T/C Half-Junction w/H.P. 3458A
Type S	0.22 °C	T/C Half-Junction w/H.P. 3458A
Type E	0.093 °C	T/C Half-Junction w/H.P. 3458A
Type T	0.098 °C	T/C Half-Junction w/H.P. 3458A
Type K	0.091 °C	T/C Half-Junction w/H.P. 3458A
Type J	0.090 °C	T/C Half-Junction w/H.P. 3458A

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TIME AND FREQUENCY

NVLAP Code: 20/F01
Frequency Dissemination

Frequency Measuring Equipment

<i>Range</i>	<i>Best Uncertainty</i> (\pm) ^{<i>note 3</i>}	<i>Remarks</i>
10 MHz	5.8×10^{-10}	Rubidium Frequency Standard

1. Represents an expanded uncertainty using a coverage factor, k=2 at an approximate level of confidence of 95%.
2. Onsite calibration is available.
3. Uncertainty values of derivates of 10 MHz will differ due resolution, noise, and gating errors.
4. *D* is the diameter of the plate in feet.

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