



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Certified Calibration Svc.
917 Industry Drive, Tukwila, WA 98188

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

**ISO/IEC 17025:2017
& Meets the Requirements of ANSI/NCSL Z540.3-2006**

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):

***Chemical, Dimensional, Electrical, Mass, Force, and Weighing Devices,
Mechanical, Thermodynamic, and Time & Frequency 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:

July 31, 2012

Issue Date:

August 11, 2020

Expiration Date:

September 30, 2022

Accreditation No.:

71484

Certificate No.:

L20-457

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.pjilabs.com



Certificate of Accreditation: Supplement

Certified Calibration Svc.

917 Industry Drive, Tukwila, WA 98188
 Contact Name: Ineke Wolff Phone: 425-255-1485

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

Chemical

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
CO2 Analyzers and Transmitters ^{FO}	Zero Air	2 % of reading	Calibration Gas GIDEP
	5 % CO2	2 % of reading	
	10 % CO2	2 % of reading	
	20 % CO2	2 % of reading	
CO2 Measurement for Spot- Check Applications and Environmental Chambers ^{FO}	5 % to 10 %	1.5 % of range + 2 % of reading	Vaisala GM70 w/ GMP221; Vaisala M010139 CCS-0054-CAL
Conductivity ^{FO}	10 μ S/cm	0.5 μ S/cm	Certified Conductivity Reference Material Traceable through NIST; Standard Methods 2510B – Modified
	100 μ S/cm	0.8 μ S/cm	
	500 μ S/cm	3 μ S/cm	
	1 000 μ S/cm	4 μ S/cm	
	1 200 μ S/cm	5.5 μ S/cm	
	1 413 μ S/cm	7 μ S/cm	
	1 430 μ S/cm	7 μ S/cm	
pH Meter ^{FO}	2 pH	0.02 pH	Certified pH Reference Material Traceable through NIST; CCS-0053-CAL
	4 pH	0.02 pH	
	7 pH	0.02 pH	
	10 pH	0.02 pH	
	11 pH	0.02 pH	
	12 pH	0.02 pH	
Relative Humidity Analyzers, Sensors ^F	5 %RH	0.3 %RH at 23 °C	Rotronic Calibration Salts CCS-0001-CAL
	10 %RH	0.3 %RH at 23 °C	
	11.3 %RH	0.3 %RH at 23 °C	
	35 %RH	0.4 %RH at 23 °C	
	50 %RH	0.6 %RH at 23 °C	
	65 %RH	0.6 %RH at 23 °C	
	75.3 %RH	0.7 %RH at 23 °C	
	80 %RH	0.7 %RH at 23 °C	
	95 %RH	0.8 %RH at 23 °C	
Bore Gages and Bore Micrometers ^F	Up to 14 in	(6.7 + 1.8D) μ in	P & W Labmaster™ ULM175 w\ GageCal control, Ring Gage; CCS-0029-CAL P&W D10554010
		(20 + 10L) μ in	Gage Blocks, Master Ring Gages; CCS-0029-CAL P&W D10554010
Calipers ^{FO}	Up to 12 in	(102 + 2L) μ in	Gage Blocks, Plain Ring Gage; CCS-0008-CAL
	12 in to 80 in	(127 + 4L) μ in	



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Thickness Gages ^F (Feeler Type)	0.001 to 0.05 in	45 μ in	Super Micrometer, P&W ULM175 w\ GageCal control; CCS-0063-CAL P&W D10554010 NAVAIR 17-20MD-15
Countersink Gages ^F	0.020 in to 0.250 in (60° to 120°)	500 μ in	Gage Blocks, Ring Gage; CCS-0068-CAL
Chamfer Gages ^F	0.020 in to 3.0 in (90° to 127°)	540 μ in	T.O.33K6-4-2732-1
Height Gage ^F	Up to 24 in	210 μ in	Gage Blocks; CCS-0010-CAL
Height Master ^F	Up to 24 in	(4.6 + 2L) μ in	Comparison to master gage blocks; CCS-0010-CAL
Linear Gage with Counter/ Reader ^F	Up to 2 in	15 μ in	CCS-0010-CAL
Linear Indicators Dial and Test ^F	0.05 in to 6 in	(0.6 + 10L) μ in	Gage Blocks; CCS-0012-CAL
	Up to 12 in	(6.7 + 1.8L) μ in	P & W Labmaster™ ULM175 w\ GageCal control, Gage Blocks; CCS-0012-CAL P&W D10554010
Outside Micrometers ^F	Up to 1 in	4.2 μ in	Gage Blocks and Optical Flat; CCS-0009-CAL
	0.05 in to 40 in	(6.6 + 2.0L) μ in	P&W D10554010
Inside Micrometers ^F	Up to 40 in	(15 + 2.0L) μ in	Gage Blocks and Master Ping Gages; CCS-0009-CAL
Depth Micrometers ^F	Up to 12 in	(12 + 2.0L) μ in	CCS-0011-CAL
V-Anvil Micrometers ^F	Up to 2 in	(31 + 18L) μ in	CCS-0012-CAL
Pitch Micrometers ^F	1 in to 6 in	(53 + 8L) μ in	CCS-0063-CAL
Indicating and Snap Micrometers ^F	Up to 1 in	4.2 μ in	P&W D10554010
Micrometer Heads ^F	Up to 2 in	32L μ in	P & W Labmaster™ ULM175 w\ GageCal control; CCS-0009-CAL P&W D10554010 T.O.33K6-4-15-1
Diameter External ^F	0.05 in to 10 in	(20 + 11L) μ in	Gage Blocks
Diameter Internal ^F	0.05 in to 12 in	(20 + 11L) μ in	Mitutoyo MDH-1-M, Micrometers Master Ring Gages Electronic Gaging and Amp P&W D10554010 CCS-0027-CAL CCS-0028-CAL CCS-0060-CAL



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Major Diameter Thread Plugs ^F	0.04 in to 7 in	(7 + 1.8D) μ in	P & W Labmaster™ ULM175 w\ GageCal control and Thread Wires P&W D10554010 NAVAIR 17-20MD-141
Pitch Diameter Thread Plugs ^F		(98 + 0.25D) μ in	
Thread Ring Pitch Diameter ^F	0.125 in to 14 in	(7 + 1.8D) μ in	P & W Labmaster™ ULM175 w\ GageCal control and Thread Wires; P&W D10554010 NAVAIR 17-20MD-141 NAVAIR 17-20MD-149
Angle Block, Levels/Protractor ^F	0.1° to 90°	0.07°	Angle Blocks, Gage Blocks, Sine Bar, Cylindrical Square Electronic Gaging and Amp; CCS-0061-CAL NAVAIR 17-20MD-141
Rules-Scale ^F	0.05 in to 144 in	340 μ in	Master Glass Precision Rule w\ Reticle Master Rule, Gage Blocks; CCS-0010- CAL CCS-0055- CAL
Tape Measure ^F	0.05 in to 540 in	0.006 1 in	
Squares ^F	Up to 40 in	8.9 μ in/in	Gage Blocks, Sine Bar, Cylindrical Square; CCS-0061-CAL
Profilometer (Ra) ^F Surface Finish	Up to 400 μ in	3.7 μ in	Roughness Surface ASME B46.1-2009 GIDEP



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Coating Thickness Gage ^F (Digi-Derm and Lamina Checker)	Up to 0.06 in	47 μ m	Comparison to Master Films; CCS-0064-CAL P&W D10554010 NAVAIR 17-20MD-15
	Up to 1.5 mm	1.2 μ m	
V-Blocks ^F	Up to 18 in	70 μ m	Mu-Checker with Linear or Lever Head Gage, Cylindrical Square; TO 33K6-4-731-1 TO 33K6-4-2847-1
Right Angle ^F	Up to 6 in		
Parallel Bars ^F	Up to 6 in width and height	34 μ m	Super Micrometer, Mu-Checker with Linear or Lever Head Gage, Cylindrical Square; T.O. 33K6-4-731-1 T.O. 33K6-4-157-1
1-2-3 Blocks ^F Parallelism Squareness	(1 x 2 x 3) in (2 x 3 x 4) in (1 x 2 x 12) in		
Mu-Checker with Linear or Lever Head Gage ^F	0.5 in	8.5 μ m	
Surface Plates ^{F0} Granite Grade AA, A, B Surface verification only	Up to 36 in x 48 in	8.5 μ m	Mu-Checker with Linear or Lever Head Gage; CCS-0062-CAL
Gage Blocks ^F	0.05 in to 4 in	(4.5 + 1.5L) μ m	P&W Labmaster™ ULM175 w\ GageCal control, Master Gage Blocks; CCS-0060-CAL P&W D10554010 ASME B89.7.3.1
	4.1 in to 12 in	(6.7 + 1.5L) μ m	
	12.1 in to 20 in	(8.1 + 1.5L) μ m	
Cylindrical Measure Rings Gages ^F	0.125 in to 14 in	(6.7 + 1.8D) μ m	P&W Labmaster™ ULM175 w\ GageCal control, Master Gage Blocks, Master Rings Gages; CCS-0027-CAL CCS-0028-CAL P&W D10554010
Cylindrical Plugs, Pins, Wires, Disks Gages ^F Class XX, X, Z & ZZ	0.04 to 1 in	18.8 μ m	Mitutoyo MDH-1-M CCS-0027-CAL
Cylindrical Plug Gages ^F Class X, Z & ZZ	0.04 in to 0.4 in	18.8 μ m	Mitutoyo Laser Scan Micrometer LSM-6000 & LSM-501; CCS-0027-CAL CCS-0069-CAL
	0.4 in to 1.18 in	28.4 μ m	Mitutoyo Laser Scan Micrometer LSM- 6000 & LSM-503; CCS-0027-CAL CCS-0069-CAL



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Temperature Indication and Control Equipment used with Thermocouple Type J ^{FO}	-210 °C to 1 200 °C	0.45 °C	ECTRON 1120 ITS-90 Does not include errors in external thermocouple wire; CCS-0005-CAL CCS-0037-CAL CCS-0057-CAL
Temperature Indication and Control Equipment used with Thermocouple Type K ^{FO}	- 270 °C to 1 372 °C	0.5 °C	
Temperature Indication and Control Equipment used with Thermocouple Type T ^{FO}	-270 °C to 400 °C	0.4 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type B ^{FO}	250 °C to 350 °C	0.85 °C	ECTRON 1140A ITS-90 Includes accuracy, conformity, cold-junction compensation, noise, stability and temperature (3° of T _{cal}); Does not include errors in external thermocouple wire; CCS-0005-CAL CCS-0037-CAL CCS-0057-CAL
	350 °C to 445 °C	0.60 °C	
	445 °C to 580 °C	0.49 °C	
	580 °C to 750 °C	0.38 °C	
	750 °C to 1 000 °C	0.31 °C	
	1 000 °C to 1 820 °C	0.24 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type C ^{FO}	0 °C to 250 °C	0.16 °C	ECTRON 1140A ITS-90 Includes accuracy, conformity, cold-junction compensation, noise, stability and temperature (3° of T _{cal}); Does not include errors in external thermocouple wire; CCS-0005-CAL CCS-0037-CAL CCS-0057-CAL
	250 °C to 1 000 °C	0.13 °C	
	1 000 °C to 1 500 °C	0.15 °C	
	1 500 °C to 1 800 °C	0.18 °C	
	1 800 °C to 2 000 °C	0.20 °C	
	2 000 °C to 2 200 °C	0.24 °C	
	2 200 °C to 2 315.56 °C	0.26 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type D ^{FO}	0 °C to 100 °C	0.23 °C	ECTRON 1140A ITS-90 Includes accuracy, conformity, cold-junction compensation, noise, stability and temperature (3° of T _{cal}); Does not include errors in external thermocouple wire; CCS-0005-CAL CCS-0037-CAL CCS-0057-CAL
	100 °C to 300 °C	0.17 °C	
	300 °C to 1 400 °C	0.13 °C	
	1 400 °C to 1 650 °C	0.15 °C	
	1 650 °C to 1 930 °C	0.16 °C	
	1 930 °C to 2 100 °C	0.19 °C	
	2 100 °C to 2 200 °C	0.21 °C	
	2 200 °C to 2 320 °C	0.25 °C	



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Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type E ^{FO}	-270 °C to -245 °C	1.1 °C	ECTRON 1140A ITS-90 Includes accuracy, conformity, cold-junction compensation, noise, stability and temperature (3° of T _{cal}); Does not include errors in external thermocouple wire; CCS-0005-CAL CCS-0037-CAL
	-245 °C to -195 °C	0.16 °C	
	-195 °C to -155 °C	0.09 °C	
	-155 °C to -90 °C	0.07 °C	
	-90 °C to 15 °C	0.06 °C	
	15 °C to 890 °C	0.06 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type G ^{FO}	890 °C to 1 000 °C	0.06 °C	
	0 °C to 100 °C	1.3 °C	
	100 °C to 300 °C	0.35 °C	
	300 °C to 600 °C	0.19 °C	
	600 °C to 1 760 °C	0.13 °C	
	1760 °C to 2 030 °C	0.15 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type J ^{FO}	2 030 °C to 2 200 °C	0.17 °C	
	2 200 °C to 2 315.56 °C	0.2 °C	
	-219 °C to -180 °C	0.1 °C	
	-180 °C to -120 °C	0.09 °C	
	-120 °C to -50 °C	0.07 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type K ^{FO}	-50 °C to 990 °C	0.06 °C	
	990 °C to 1 200 °C	0.07 °C	
	-270 °C to -255 °C	1.9 °C	
	-255 °C to -195 °C	0.4 °C	
	-195 °C to -115 °C	0.11 °C	
	-115 °C to -55 °C	0.08 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type N ^{FO}	-55 °C to 1 000 °C	0.07 °C	
	1 000 °C to 1 372 °C	0.08 °C	
	-270 °C to -260 °C	4 °C	
	-260 °C to -200 °C	0.93 °C	
	-200 °C to -140 °C	0.19 °C	
	-140 °C to -70 °C	0.12 °C	
	-70 °C to 25 °C	0.1 °C	
25 °C to 160 °C	0.09 °C		
160 °C to 1 300 °C	0.08 °C		



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Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type Platinel II ^{FO}	0 °C to 100 °C	0.08 °C	ECTRON 1140A ITS-90 Includes accuracy, conformity, cold-junction compensation, noise, stability and temperature (3° of T _{cal}); Does not include errors in external thermocouple wire; CCS-0005-CAL CCS-0037-CAL
	100 °C to 925 °C	0.07 °C	
	925 °C to 1 200 °C	0.08 °C	
	1 200 °C to 1 395 °C	0.09 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type R ^{FO}	-50 °C to -30 °C	0.58 °C	
	-30 °C to 45 °C	0.48 °C	
	45 °C to 160 °C	0.32 °C	
	160 °C to 380 °C	0.26 °C	
	380 °C to 775 °C	0.21 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type S ^{FO}	775 °C to 1 768.1 °C	0.18 °C	
	-50 °C to -30 °C	0.53 °C	
	-30 °C to 45 °C	0.47 °C	
	45 °C to 105 °C	0.34 °C	
	105 °C to 310 °C	0.3 °C	
	310 °C to 615 °C	0.25 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type T ^{FO}	615 °C to 1 768.1	0.22 °C	
	-270 °C to -255 °C	1.6 °C	
	-255 °C to -240 °C	0.35 °C	
	-240 °C to -210 °C	0.24 °C	
	-210 °C to -150 °C	0.15 °C	
	-150 °C to -40 °C	0.1 °C	
Temperature Indication and Control Equipment used with RTD 100 Ω ^{FO}	-40 °C to 100 °C	0.07 °C	Fluke 712 CCS-0005-CAL CCS-0057-CAL
	100 °C to 400 °C	0.06 °C	
Temperature Indication and Control Equipment used with RTD 1 000 Ω ^{FO}	-200 °C to 800 °C	0.4 °C	
Temperature Indication and Control Equipment used with Thermocouple Type J ^{FO}	-200 °C to 630 °C	0.4 °C	
Temperature Indication and Control Equipment used with Thermocouple Type J ^{FO}	-120 °C to 0 °C	0.6 °C	Fluke 714 CCS-0005-CAL CCS-0037-CAL CCS-0057-CAL
	0 °C to 800 °C	0.4 °C	
	800 °C to 1 200 °C	0.5 °C	



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Temperature Indication and Control Equipment used with Thermocouple Type K ^{FO}	-200 °C to 0 °C	0.8 °C	Fluke 714 CCS-0005-CAL CCS-0037-CAL CCS-0057-CAL
	0 °C to 1 000 °C	0.5 °C	
	1 000 °C to 1 372 °C	0.7 °C	
Temperature Indication and Control Equipment used with Thermocouple Type R ^{FO}	-20 °C to 0 °C	2 °C	
	0 °C to 1 767 °C	1.4 °C	
Temperature Indication and Control Equipment used with Thermocouple Type S ^{FO}	-20 °C to 0 °C	2 °C	
	0 °C to 1 767 °C	1.4 °C	
Temperature Indication and Control Equipment used with Thermocouple Type T ^{FO}	-250 °C to 0 °C	0.8 °C	
	0 °C to 400 °C	0.4 °C	
Temperature Indication and Control Equipment used with mV ^{FO}	10 mV to 75 mV	10 μ V + 0.15 % of reading	
Resistance and Pt 385/Pt 392 Measure ^F	0 Ω to 300 Ω	0.002 7 Ω	PREMA 5017 DMM w/ PREMA 2080 Multiplexer; CCS-0005-CAL CCS-0057-CAL
	300 Ω to 3 k Ω	0.000 018 Ω	
	30 k Ω	0.000 26 Ω	
Equipment to Output DC Voltage ^F	0 mV to 300 mV	0.000 094 mV	PREMA 5017 DMM CCS-0002-CAL CCS-0005-CAL CCS-0014-CAL CCS-0057-CAL
	300 mV to 3 V	0.000 003 8 mV	
	3 V to 30 V	0.000 12 mV	
Equipment to Output DC Current ^F	200 μ A	0.016 μ A	
	2 mA	0.000 13 mA	
	20 mA	0.000 12 mA	
	200 mA	0.016 mA	
	2 A	0.000 15 A	
Equipment to Output Frequency ^F	1 kHz at 5 V	0.069 Hz	
	10 kHz at 5 V	0.35 Hz	
	100 kHz at 5 V	3.4 HzU	
	1 MHz at 1 V	29 Hz	
Equipment to Measure DC Voltage ^F	5 mV to 22 mV	1.7 μ V + 0.003 4 % of reading	XITRON 2000M CCS-0005-CAL CCS-0014-CAL CCS-0037-CAL CCS-0057-CAL
	22 mV to 220 mV	1.75 μ V + 0.002 9 % of reading	
	220 mV to 2.2 V	11.5 μ V + 0.002 4 % of reading	
	2.2 V to 22 V	5.52 μ V + 0.007 5 % of reading	



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Equipment to Measure DC Current ^F	Up to 22 μ A	0.62 nA + 0.008 5 % of reading	XITRON 2000M; CCS-0005-CAL CCS-0014-CAL CCS-0057-CAL
	22 μ A to 220 μ A	0.77 nA + 0.007 5 % of reading	
	0.2 μ A to 2.2 mA	2.52 nA + 0.006 5 % of reading	
	2.2 mA to 22 mA	30.52 nA + 0.007 5 % of reading	
pH Meter ^{FO}	-1 000 mV to 1 000 mV (4 pH to 14 pH)	1 mV (0.02 pH)	Hanna HI931001 pH/mV Calibrator or Xitron 2000M Simulator; CCS-0053-CAL
Resistance Fixed Points and Decade Steps ^F	100 M Ω	3 m Ω + 0.01 % of Reading	Δ MItohM P4061; CCS-0005-CAL CCS-0057-CAL
	1 Ω to 10 M Ω	2 m Ω + 0.01 % of Reading	General Resistance RDS76-A; CCS-0005-CAL CCS-0057-CAL
	0.01 Ω to 10 K Ω	0.2 m Ω + 0.01 % of Reading	General Resistance 1433-W CCS-0005-CAL CCS-0057-CAL
	10 Ω to 99.999 Ω	0.002 7 % of reading	General Resistance RTD 100X CCS-0005-CAL CCS-0057-CAL
	100 Ω to 999.999 Ω	0.001 5 % of reading	
	1 000 Ω to 1 100 Ω	0.001 2 % of reading	
	Equipment to Output DC Voltage ^{FO}	-11 V	58 μ V
-10 V		52 μ V	
-5 V		35 μ V	
-2.5 V		18 μ V	
-1.377 V		9.6 μ V	
-0.5		3.5 μ V	
-0.088 V		0.6 μ V	
0 V		0.1 μ V	
0.088 V		0.6 μ V	
0.5 V		3.5 μ V	
1.377 V		9.6 μ V	
2.5		18 μ V	
5 V		35 μ V	
10 V		52 μ V	
11 V	58 μ V		



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Equipment to Measure DC Voltage ^{FO}	-11 V	60 μ V	ECTRON 1140A Copper Junction; CCS-0005-CAL CCS-0006-CAL CCS-0014-CAL CCS-0037-CAL
	-10 V	50 μ V	
	-5 V	35 μ V	
	-2.5 V	18 μ V	
	-1.377 V	10 μ V	
	-0.5	3.5 μ V	
	-0.088 V	0.6 μ V	
	0 V	0.1 μ V	
	0.088 V	0.6 μ V	
	0.5 V	3.5 μ V	
	1.377 V	10 μ V	
	2.5	18 μ V	
	5 V	35 μ V	
	10 V	50 μ V	
11 V	60 μ V		

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
Analytical and Precision Balance/Scale ^{FO}	1 mg	0.016 mg	Direct comparison with; ASTM E617, Class 1; CCS-0024-CAL CCS-0055-CAL
	2 mg	0.015 mg	
	5 mg	0.013 mg	
	10 mg	0.016 mg	
	20 mg	0.017 mg	
	30 mg	0.012 mg	
	50 mg	0.013 mg	
	100 mg	0.014 mg	
	200 mg	0.012 mg	
	500 mg	0.013 mg	
	1 g	0.015 mg	
	2 g	0.017 mg	



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917 Industry Drive, Tukwila, WA 98188
Contact Name: Ineke Wolff Phone: 425-255-1485

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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
Analytical and Precision Balance/ Scale ^{FO}	5 g	0.015 mg	Direct comparison with; ASTM E617, Class 1 CCS-0024-CAL CCS-0055-CAL
	10 g	0.022 mg	
	20 g	0.039 mg	
	50 g	0.32 mg	
	100 g	0.13 mg	
	200 g	0.13 mg	
	500 g	0.12 g	
	1 000 g	0.12 g	
	2 000 g	0.13 g	
	5 000 g	0.17 g	
	10 000 g	0.27 g	
	20 000 g	0.3 g	
Balances/ Scales ^{FO}	1 g	0.86 mg	Direct comparison with; ASTM E617, Class F; CCS-0024-CAL
	2 g	0.84 mg	
	5 g	0.91 mg	
	10 g	1.3 mg	
	20 g	2.3 mg	
	50 g	6.2 mg	
	100 g	12 mg	
	200 g	16.4 mg	
	500 g	21 mg	
	1 kg	30.3 mg	
	2 kg	67.5 mg	
	5 kg	0.14 g	
	10 kg	0.56 g	
	20 kg	0.49 g	
	50 kg	0.58 g	



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Atmospheric Pressure ^{FO} (Vacuum)	-14 psi to 0.03 psi	0.01 psi	Fluke 700PV4 Differential Pressure Module Fluke 717 Pressure Calibrator Fluke 744 Documenting Process Calibrator; CCS-0003-CAL CCS-0004-CAL CCS-0013- CAL
Pressure ^{FO}	- 14.5 psig to - 4 psig	0.001 6 psig	AMETEK - Crystal XP2i AMETEK – Crystal FastCalXP; CCS-0003-CAL CCS-0004-CAL CCS-0013-CAL T.O.33K6-4-278-1
	- 4 psig to 0.03 psig	0.004 3 psig	
	0.03 psig to 120 psig	0.019 psig	
	120 psig to 200 psig	0.03 psig	
	200 psig to 300 psig	0.038 psig	
	300 psig to 500 psig	0.054 psig	
	500 psig to 600 psig	0.072 psig	
	600 psig to 800 psig	0.097 psig	
	800 psig to 1 000 psig	0.16 psig	
	1 000 psig to 1 500 psig	0.18 psig	
	1 500 psig to 2 100 psig	0.25 psig	
	2 100 psig to 2 500 psig	0.3 psig	
	2 500 psig to 3 000 psig	0.36 psig	
	3 000 psig to 4 000 psig	0.48 psig	
	4 000 psig to 5 000 psig	0.6 psig	
	5 000 psig to 6 000 psig	0.72 psig	
6 000 psig to 7 000 psig	0.84 psig		
7 000 psig to 8 000 psig	0.96 psig		
8 000 psig to 10 000 psig	1.3 psig		



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Pressure Gages ^{FO}	-14 psi to 100 psi	0.05 psi	Fluke 700PD6 Pressure Module; Fluke 717 Pressure Calibrator Fluke 744 Documenting Process Calibrator; CCS-0003-CAL CCS-0004-CAL T.O.33K6-4-278-1
	-14 psig to 0 psig	0.013 psig	Fluke 717-300G Pressure Calibrator; CCS-0003-CAL CCS-0004-CAL CCS-0013-CAL T.O.33K6-4-278-1
	Up to 60 psig	0.016 psig	
	60 psig to 180 psig	0.022 psig	
	180 psig to 240 psig	0.023 psig	
	240 psig to 300 psig	0.047 psig	
Tachometers ^{FO}	5 rpm to 300 rpm	0.26 rpm	Monarch TACH-4A Optical Tachometer Frequency Generator plus pulsing LED; T.O.33K6-4-869-1
	301 rpm to 1 000 rpm	0.26 rpm	
	1 000 rpm to 6 000 rpm	0.29 rpm	
	6 000 rpm to 12 000 rpm	1.2 rpm	
	12 000 rpm to 24 000 rpm	1.2 rpm	
Durometers ^{FO} Spring Calibration (Force Only) Type A & D Type M	Up to 100 Duro	0.43 Duros	Note: this is a limited calibration of ASTM D-2240 Balance; CCS-0026-CAL ASTM Class 1 Weights ASTM D 2240-03
	Up to 1 000 Duro	1.9 Duros	
Hardness ^F	Barcol Hardness	0.67 N	Calibration Disk 43-48, 87/89; ASTM D2583 CCS-0070-CAL GIDEP
Force Gages ^{FO} Tension/Compression Dial/Digital	0 lbf to 1 000 lbf	0.06 % of reading	Himmelstein 2540 Load Cell Interface INF-USB2-C53-2 Interface INF-USB2 Software; CCS-0038-CAL ASTM E 617 Weights
	Up to 400 lbf	0.01 % of reading	



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Torque Wrenches, Screwdrivers ^F	15 in•oz to 200 in•oz	0.33 % of reading	CDI Torque Loader, Monitor and Transducers; CCS-0025-CAL CCS-0030-CAL CCS-0059-CAL 20-2100-CDI
	4 in•lb to 50 in•lb	0.33 % of reading	
	30 in•lb to 400 in•lb	0.33 % of reading	
	80 in•lb to 1000 in•lb	0.33 % of reading	
	20 ft•lb to 250 ft•lb	0.34 % of reading	
	60 ft•lb to 600 ft•lb	0.34 % of reading	
Torque Wrenches Screwdriver ^F	5 in•lbf to 50 in•lbf	0.3 % of reading	CLECO P-5 Digital Analyzer; CCS-0025-CAL
	60 lbf to 600 lbf	0.48 % of reading	CDI-6004-F-DTT; CCS-0059-CAL 20-2100-CDI
Torque Tester, Torque Transducers ^F	15 in•oz to 200 in•oz	0.6 % of reading	Calibration Arms and Wheels; ASTM E 617 Weights CCS-0059-CAL 20-2100-CDI
	4 in•lb to 50 in•lb	0.12 % of reading	
	30 in•lb to 400 in•lb	0.12 % of reading	
	80 in•lb to 1 000 in•lb	0.12 % of reading	
	20 ft•lb to 250 ft•lb	0.12 % of reading	
	60 ft•lb to 600 ft•lb	0.15 % of reading	



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Thermodynamic

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
Temperature Measurement Thermocouple Type J ^F	-95 °C to 0 °C	0.5 °C	Fluke MET/TEMP II Fluke 1502A w/ Fluke 5626 PRT and Fluke 1529
	0 °C to 660 °C	0.55 °C	
Temperature Measurement Thermocouple Type K ^F	-95 °C to 0 °C	0.5 °C	Fluke 1524 w/ Fluke 5609-20 PRT and Fluke 1529 Fluke 1529 w/ Rosemount 162CE SPRT
	0 °C to 660 °C	0.55 °C	
Temperature Measurement Thermocouple Type T ^F	-95 °C to 0 °C	0.37 °C	Kaye IRTD-400 Win Liquid Baths, Ultra Cool Dry- Blocks and High-Temp Dry- Blocks; CCS-0005-CAL CCS-0006-CAL CCS-0007-CAL CCS-0057-CAL
	0 °C to 400 °C	0.4 °C	
Temperature Measurement Thermocouple Type J ^{FO}	-200 °C	0.65 °C	Fluke 1586A Super DAQ Fluke 1586-5688 DAQ-STAQ Multiplexer; CCS-0005-CAL
	0 °C	0.28 °C	
	1 000 °C	0.25 °C	
Temperature Measurement Thermocouple Type K ^{FO}	-200 °C	0.76 °C	CCS-0006-CAL CCS-0007-CAL CCS-0057-CAL
	0 °C	0.29 °C	
	1 000 °C	0.32 °C	



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Thermodynamic

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
Temperature Measurement Thermocouple Type R ^{FO}	0 °C	1.16 °C	Fluke 1586A Super DAQ Fluke 1586-5688 DAQ-STAQ Multiplexer; CCS-0005-CAL CCS-0006-CAL CCS-0007-CAL CCS-0057-CAL
	300 °C	0.64 °C	
	1 200 °C	0.48 °C	
	1 600 °C	0.50 °C	
Temperature Measurement Thermocouple Type S ^{FO}	0 °C	1.14 °C	
	300 °C	0.68 °C	
	1 200 °C	0.55 °C	
	1 600 °C	0.57 °C	
Temperature Measurement Thermocouple Type T ^{FO}	-200 °C	0.76 °C	
	0 °C	0.3 °C	
	200 °C	0.23 °C	
	400 °C	0.2 °C	
Temperature Measurement Thermocouple Type B ^{FO}	300 °C	1.97 °C	
	600 °C	1.02 °C	
	1 200 °C	0.6 °C	
	1 600 °C	0.55 °C	
Temperature Measurement Thermocouple Type C ^{FO}	600 °C	0.37 °C	
	1 200 °C	0.45 °C	
	2 000 °C	0.66 °C	
Temperature Measurement Thermocouple Type D ^{FO}	600 °C	0.34 °C	
	1 200 °C	0.39 °C	
	2 000 °C	0.56 °C	
Temperature Measurement Thermocouple Type E ^{FO}	-200 °C	0.64 °C	
	0 °C	0.27 °C	
	300 °C	0.21 °C	
Temperature Measurement Thermocouple Type J ^{FO}	0 °C to 260 °C	0.21 °C	Fluke 1586A Super DAQ; Fluke 1586-5688 High- Capacity Modules Fluke 1524 w\ 1509-20 PRT, Fluke 1524 w\ S Probe, Kaye-Masy IRTD-400 Reference Ovens, TQAero Software; CCS-0057-CAL
Temperature Measurement Thermocouple Type K ^{FO}	400 °C to 1 000 °C	1.4 °C	



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Temperature Measurement Thermocouple Type E ^{FO}	-270 °C to 1 000 °C	0.74 °C	Fluke 1586A Super DAQ Fluke 1586-5688 High- Capacity Modules
Temperature Measurement PRT/RTD 100 Ω 2 - 3 Wire ^{FO}	-200 °C to 660 °C	0.1 °C	TQAero Software; CCS-0005-CAL CCS-0057-CAL
Temperature Measurement PRT/RTD 100 Ω 4 Wire ^{FO}	-200 °C to 660 °C	0.072 5 °C	CCS-0005-CAL CCS-0057-CAL
Temperature Measurement Spot-Check Applications, Environmental Chambers, Field Calibrations ^{FO}	0 °C to 475 °C	1 °C	Fluke 1523/1524 w/ Type S Probe; CCS-0005-CAL CCS-0006-CAL CCS-0054-CAL CCS-0057-CAL
	>475 °C to 1 093 °C	1.44 °C	Fluke 1523/1524 w/ Type T Thermocouple; CCS-0005-CAL CCS-0006-CAL CCS-0007-CAL CCS-0054-CAL CCS-0057-CAL
	-200 °C to 400 °C	0.6 °C	Fluke 1523/1524 w/ Type T Thermocouple; CCS-0005-CAL CCS-0006-CAL CCS-0007-CAL CCS-0054-CAL CCS-0057-CAL
	-196 °C	0.002 7 °C	Fluke 1524 w\ Fluke 5609-20 PRT; CCS-0005-CAL CCS-0007-CAL CCS-0054-CAL CCS-0057-CAL
	-39 °C	0.002 6 °C	
	0 °C	0.001 7 °C	
	232 °C	0.004 5 °C	
	420 °C	0.006 °C	
	660 °C	0.014 °C	
	Temperature Measure Spot-Check Applications, Environmental Chambers, Field Calibrations ^{FO}	-196 °C	0.007 5 °C
0 °C		0.006 4 °C	
100 °C		0.006 6 °C	
400 °C		0.007 8 °C	



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Temperature and Relative Humidity Measurement Environmental Chambers ^{FO}	-40 °C to 85 °C	0.2 °C	Rotronic HC2A-S and HW4; CCS-0001-CAL CCS-0054-CAL CCS-0057-CAL	
	10 % RH to 90 % RH	1.4 % RH at 23 \pm 2 °C		
	90 % RH to 100 % RH	1.9 % RH at 23 \pm 2 °C		
		-40 °C to 85 °C	0.2 °C	Vaisala HM70 and HMP77; CCS-0001-CAL CCS-0054-CAL CCS-0065-CAL, Vaisala M210566EN-G
		10 % RH to 90 % RH	1.5 % RH at 23 \pm 2 °C	
		>90 % RH to 100 % RH	2.0 % RH at 23 \pm 2 °C	
		0 °C to 30 °C	0.1 °C	Rotronic HC2A-S Temperature/Humidity Generator/Chamber; CCS- 0001-CAL
		5 % RH to 35 % RH	1.2 % RH at 23 °C	
		50 % RH to 95 % RH	1.3 % RH at 23 °C	
	Temperature Measurement ^F	-20 °C to 200 °C	0.07 4 °C	Fluke 1529 w/ Burns RTD CCS-0005-CAL CCS-0006-CAL CCS-0007-CAL CCS-0057-CAL
	Temperature Measurement ^F RTD/PRT/Thermistor ^F Verification by Comparison Digital and Dial Thermometers ^F	-196 °C	0.011 °C	Kaye/MASY IRTD-400 Fluke 1524 w/ Fluke 5609-20 PRT Baths and Reference Ovens; CCS-0005-CAL CCS-0006-CAL CCS-0007-CAL CCS-0057-CAL
		-39 °C	0.011 °C	
0 °C		0.011 °C		
100 °C		0.011 °C		
232 °C		0.02 °C		
400 °C		0.02 °C		
660 °C		0.046 °C		
Liquid in Glass (LiG) Thermometers ^F	-20 °C to 50 °C	0.102 °C	Kaye/MASY IRTD-400 Fluke 1524 w/ Fluke 5609-20 PRT Baths and Reference Ovens; NIST ITCL Table 2 NIST Publication 819	
	0 °C to 100 °C	0.073 °C		
	-5 °C to 300 °C	0.249 °C		
	-20 °C to 400 °C	0.477 °C		



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Infra-Red (IR) Thermometers ^F	-40 °C to 200 °C	1.2 °C	Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT Fluke 712 w/ RTD/PRT Kaye IRTD-400, Black Body, Freezer; CCS-0005-CAL GIDEP

Time & Frequency

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
Stopwatches, Timers, Counters ^{FO}	10 s to 86 400 s	0.49 s per 24 hr	NIST Time Frequency ; CCS-0002-CAL NIST Time SOP 2281
Digital Stopwatches ^F	10 800 s	0.038 ms	Altek 941, Fluke/Philips PM6665, PREMA 5017 DMM; CCS-0002-CAL NIST Time SOP 2281

1. 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.
2. 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.
3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer^F would mean that the laboratory performs this calibration at its fixed location.



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4. 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^{FO} would mean that the laboratory performs this calibration at its fixed location and onsite at customer locations.
5. 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.
6. The term L represents length in inches or millimeters as appropriate to the uncertainty statement.
7. The term D represents diameter in inches or millimeters as appropriate to the uncertainty statement.

