



# 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/Operations Manager

*Initial Accreditation Date:*

July 31, 2012

*Issue Date:*

July 25, 2018

*Expiration Date:*

September 30, 2020

*Revision Date:*

August 20, 2019

*Accreditation No.:*

71484

*Certificate No.:*

L18-347-R1

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

*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.pjlabs.com](http://www.pjlabs.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
CO and CO <sub>2</sub> Analyzers and Transmitters <sup>FO</sup>	Zero Air	2 % of reading	Calibration Gas Mixture
	50 % CO	2 % of reading	
	5 % CO <sub>2</sub>	2 % of reading	
	10 % CO <sub>2</sub>	2 % of reading	
	20 % CO <sub>2</sub>	2 % of reading	
CO <sub>2</sub> Measurement for Spot-Check Applications and Environmental Chambers <sup>FO</sup>	5 % to 10 %	1.5 % of range + 2 % of reading	Vaisala GM70 w/ GMP221
Conductivity <sup>FO</sup>	10 $\mu$ S/cm	0.5 $\mu$ S/cm	Certified Conductivity Reference Material Traceable through NIST
	100 $\mu$ S/cm	0.8 $\mu$ S/cm	
	500 $\mu$ S/cm	3 $\mu$ S/cm	
	1 000 $\mu$ S/cm	4 $\mu$ S/cm	
	1 200 $\mu$ S/cm	5.5 $\mu$ S/cm	
	1 413 $\mu$ S/cm	7 $\mu$ S/cm	
	1 430 $\mu$ S/cm	7 $\mu$ S/cm	
pH Meter <sup>FO</sup>	2 pH	0.02 pH	Certified pH Reference Material Traceable through NIST
	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	

### 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
Bore Gages and Bore Micrometers <sup>F</sup>	Up to 14 in	(6.7 + 1.8D) $\mu$ in	P & W Labmaster™ ULM175 w\ GageCal control CCS-0029-CAL P&W D10554010
		(20 + 10L) $\mu$ in	Gage Blocks Master Ring Gages CCS-0029-CAL P&W D10554010
Calipers <sup>FO</sup>	Up to 12 in	(102 + 2L) $\mu$ in	Gage Blocks, Plain Ring Gage; CCS-0008-CAL
	12 in to 80 in	(127 + 4L) $\mu$ in	



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Thickness Gages <sup>F</sup> (Feeler Type)	0.001 to 0.05 in	45 $\mu$ in	Super Micrometer, P & W Labmaster™ ULM175 w\ GageCal control NAVAIR 17-20MD-15
Height Gage <sup>F</sup>	Up to 24 in	210 $\mu$ in	Gage Blocks
Linear Indicators Dial and Test <sup>F</sup>	0.05 in to 6 in	(0.6 + 10L) $\mu$ in	Gage Blocks CCS-0012-CAL
	Up to 12 in	(6.7 + 1.8L) $\mu$ in	P & W Labmaster™ ULM175 w\ GageCal control CCS-0012-CAL P&W D10554010
Outside Micrometers <sup>F</sup>	Up to 1 in	4.2 $\mu$ in	Gage Blocks and Optical Flat CCS-0009-CAL
	0.05 in to 40 in	(6.6 + 2.0L) $\mu$ in	
Inside Micrometers <sup>F</sup>	Up to 40 in	(15 + 2.0L) $\mu$ in	Gage Blocks and Master Ping Gages; CCS-0009-CAL CCS-0011-CAL CCS-0012-CAL CCS-0063-CAL
Depth Micrometers <sup>F</sup>	Up to 12 in	(12 + 2.0L) $\mu$ in	
V-Anvil Micrometers <sup>F</sup>	Up to 2 in	(31 + 18L) $\mu$ in	
Pitch Micrometers <sup>F</sup>	1 in to 6 in	(53 + 8L) $\mu$ in	
Indicating and Snap Micrometers <sup>F</sup>	Up to 1 in	4.2 $\mu$ in	
Micrometer Heads <sup>F</sup>	Up to 2 in	32L $\mu$ in	P & W Labmaster™ ULM175 w\ GageCal control
Radius Gages <sup>F</sup>	0.062 5 in to 1 in	510 $\mu$ in	Optical comparator
Diameter External <sup>F</sup>	0.05 in to 10 in	(20 + 11L) $\mu$ in	Gage Blocks Mitutoyo MDH-1-M, Micrometers Master Ring Gages Electronic Gaging and Amp
Diameter Internal <sup>F</sup>	0.05 in to 12 in	(20 + 11L) $\mu$ in	
Major Diameter Thread Plugs <sup>F</sup>	0.04 in to 7 in	(7 + 1.8D) $\mu$ in	P & W Labmaster™ ULM175 w\ GageCal control and Thread Wires
Pitch Diameter Thread Plugs <sup>F</sup>		(98 + 0.25D) $\mu$ in	
Thread Ring Pitch Diameter <sup>F</sup>	0.125 in to 14 in	(7 + 1.8D) $\mu$ in	P & W Labmaster™ ULM175 w\ GageCal control and Thread Wires
Angle Block, Levels/Protractor <sup>F</sup>	0.1° to 90°	0.07°	Angle Blocks, Gage Blocks, Sine Bar, Cylindrical Square Electronic Gaging and Amp; CCS-0061-CAL
Rules-Scale <sup>F</sup>	0.05 in to 144 in	340 $\mu$ in	Master Glass Precision Rule w\ Reticle Master Rule, Gage Blocks; CCS-0055- CAL CCS-0010- CAL
Tape Measure <sup>F</sup>	0.05 in to 540 in	0.006 1 in	
Height Master <sup>F</sup>	Up to 24 in	(4.6 + 2L) $\mu$ in	Comparison to master gage blocks CCS-0010-CAL
Linear Gage with Counter/ Reader <sup>F</sup>	Up to 2 in long	15 $\mu$ in	



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Squares <sup>F</sup>	Up to 40 in	8.9 $\mu$ in/in	Gage Blocks, Sine Bar, Cylindrical Square
Profilometer (Ra) <sup>F</sup> Surface Finish	Up to 400 $\mu$ in	3.7 $\mu$ in	Roughness Standard ASME B46.1-2009 Surface finish specimen
Coating Thickness Gage <sup>F</sup> (Digi-Derm and Lamina Checker)	Up to 0.06 in thick	47 $\mu$ in	Comparison to Master Films NAVAIR 17-20MD-15
	Up to 1.5 mm thick	1.2 $\mu$ m	
V-Blocks <sup>F</sup>	Up to 18 in	70 $\mu$ in	Comparison to Electronic Gaging and Amp, Cylindrical Square; TO 33K6-4-731-1 TO 33K6-4-2847-1
Right Angle <sup>F</sup>	Up to 6 in		
Parallel Bars <sup>F</sup>	Up to 6 in width and height	34 $\mu$ in	Electronic Gaging and Amp, Super Micrometer, Cylindrical Square; TO 33K6-4-731-1
1-2-3 Blocks <sup>F</sup> Parallelism Squareness	(1 x 2 x 3) in (2 x 3 x 4) in		
Mu-Checker <sup>F</sup>	0.5 in	8.5 $\mu$ in	Comparison to Master Gage Blocks
Gage Blocks <sup>F</sup>	0.05 in to 4 in	(4.5 + 1.5L) $\mu$ in	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) $\mu$ in	
	12.1 in to 20 in	(8.1 + 1.5L) $\mu$ in	
Cylindrical Measure Rings Gages <sup>F</sup>	0.125 in to 14 in	(6.7 + 1.8D) $\mu$ in	P & W Labmaster™ ULM175 w\ GageCal control
Cylindrical Plugs, Pins, Wires, Discs, Spheres – External Diameter Gages <sup>F</sup> High Accuracy	0.1 in to 13 in	(6.7 + 1.8D) $\mu$ in	Master Gage Blocks Master Rings Gages CCS-0027-CAL CCS-0028-CAL P&W D10554010
Cylindrical Plugs, Pins, Disks Gages <sup>F</sup> Class XX, X, Z & ZZ	0.04 to 1 in	17 $\mu$ in	Mitutoyo MDH-1-M CCS-0027-CAL P&W D10554010
Cylindrical Plug Gages <sup>F</sup> Class X, Z & ZZ	0.04 in to 0.4 in	18.8 $\mu$ in	Mitutoyo Laser Scan Micrometer LSM-6000 & LSM-501 CCS-0027-CAL P&W D10554010
	0.4 in to 1.18 in	28.4 $\mu$ in	Mitutoyo Laser Scan Micrometer LSM-6000 & LSM-503 CCS-0027-CAL P&W D10554010



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Temperature Indication and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-210 °C to 1 200 °C	0.45 °C	ECTRON 1120 ITS-90 Does not include errors in external thermocouple wire; CCS-0005-Cal
Temperature Indication and Control Equipment used with Thermocouple Type K <sup>FO</sup>	- 270 °C to 1 372 °C	0.5 °C	
Temperature Indication and Control Equipment used with Thermocouple Type T <sup>FO</sup>	-270 °C to 400 °C	0.4 °C	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type B <sup>FO</sup>	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 <sub>cal</sub> ); Does not include errors in external thermocouple wire; CCS-0005-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 <sup>FO</sup>	0 °C to 250 °C	0.16 °C	
	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	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type D <sup>FO</sup>	2 200 °C to 2 315.56 °C	0.26 °C	
	0 °C to 100 °C	0.23 °C	
	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 <sup>FO</sup>	-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 <sub>cal</sub> ); Does not include errors in external thermocouple wire; CCS-0005-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 <sup>FO</sup>	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 <sup>FO</sup>	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 <sup>FO</sup>	-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	
Temperature Calibrators Thermometers Indication and Control Equipment used with Thermocouple Type N <sup>FO</sup>	-115 °C to -55 °C	0.08 °C	
	-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 <sup>FO</sup>	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 <sub>cal</sub> ); Does not include errors in external thermocouple wire; CCS-0005-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 <sup>FO</sup>	-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 <sup>FO</sup>	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 <sup>FO</sup>	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	
	-40 °C to 100 °C	0.07 °C	
Temperature Indication and Control Equipment used with RTD 100 $\Omega$ <sup>FO</sup>	100 °C to 400 °C	0.06 °C	Fluke 712
	-200 °C to 800 °C	0.4 °C	
Temperature Indication and Control Equipment used with RTD 1 000 $\Omega$ <sup>FO</sup>	-200 °C to 630 °C	0.4 °C	



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Temperature Indication and Control Equipment used with Thermocouple Type J <sup>FO</sup>	-120 °C to 0 °C	0.6 °C	Fluke 714
	0 °C to 800 °C	0.4 °C	
	800 °C to 1 200 °C	0.5 °C	
Temperature Indication and Control Equipment used with Thermocouple Type K <sup>FO</sup>	-200 °C to 0 °C	0.8 °C	
	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 <sup>FO</sup>	-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 <sup>FO</sup>	-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 <sup>FO</sup>	-250 °C to 0 °C	0.8 °C	
	0 °C to 400 °C	0.4 °C	
Temperature Indication and Control Equipment used with mV <sup>FO</sup>	10 mV to 75 mV	10 $\mu$ V + 0.15 % of reading	
Resistance and Pt 385/Pt 392 Measure <sup>F</sup>	0 $\Omega$ to 300 $\Omega$	1.5 m $\Omega$ + 0.009 % of reading	PREMA 5017 DMM w\ PREMA 2080 Multiplexer
	300 $\Omega$ to 3 k $\Omega$	12 m $\Omega$ + 0.005 % of reading	
	30 k $\Omega$	1.2 $\Omega$ + 0.005 % of reading	
Equipment to Output DC Voltage <sup>F</sup>	0 mV to 300 mV	0.6 $\mu$ V + 0.012 % of reading	PREMA 5017 DMM
	300 mV to 3 V	0.006 $\mu$ V + 0.005 % of reading	
	3 V to 30 V	0.06 $\mu$ V + 0.002 % of reading	
Equipment to Output DC Current <sup>F</sup>	2 mA Range	40 $\mu$ A + 0.009 % of reading	
	20 mA Range	0.4 mA + 0.008 % of reading	
Equipment to Output Frequency <sup>F</sup>	1 kHz at 5 V	0.002 8 Hz	
	10 kHz at 5 V	0.002 8 Hz	
	100 kHz at 5 V	0.28 Hz	
	1 MHz at 1 V	2.8 Hz	
Equipment to Measure DC Voltage <sup>F</sup>	5 mV to 22 mV	1.7 $\mu$ V + 0.003 4 % of reading	XITRON 2000M
	22 mV to 220 mV	1.75 $\mu$ V + 0.002 9 % of reading	
	220 mV to 2.2 V	11.5 $\mu$ V + 0.002 4 % of reading	
	2.2 V to 22 V	5.52 $\mu$ V + 0.007 5 % of reading	





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Equipment to Measure DC Current <sup>F</sup>	Up to 22 $\mu$ A	0.62 nA + 0.008 5 % of reading	XITRON 2000M
	22 $\mu$ A to 220 $\mu$ A	0.77 nA + 0.007 5 % of reading	
	0.2 $\mu$ 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 <sup>FO</sup>	-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
Resistance Fixed Points and Decade Steps <sup>F</sup>	100 M $\Omega$	3 m $\Omega$ + 0.01 % of Reading	$\Delta$ MITohm P4061
	1 $\Omega$ to 10 M $\Omega$	2 m $\Omega$ + 0.01 % of Reading	General Resistance RDS76-A
	0.01 $\Omega$ to 10 K $\Omega$	0.2 m $\Omega$ + 0.01 % of Reading	General Resistance 1433-W
	10 $\Omega$ to 99.999 $\Omega$	0.002 7 % of reading	General Resistance RTD 100X
	100 $\Omega$ to 999.999 $\Omega$	0.001 5 % of reading	
	1 000 $\Omega$ to 1 100 $\Omega$	0.001 2 % of reading	
Equipment to Output DC Voltage <sup>FO</sup>	-11 V	58 $\mu$ V	ECTRON 1140A, Copper Junction
	-10 V	52 $\mu$ V	
	-5 V	35 $\mu$ V	
	-2.5 V	18 $\mu$ V	
	-1.377 V	9.6 $\mu$ V	
	-0.5	3.5 $\mu$ V	
	-0.088 V	0.6 $\mu$ V	
	0 V	0.1 $\mu$ V	
	0.088 V	0.6 $\mu$ V	
	0.5 V	3.5 $\mu$ V	
	1.377 V	9.6 $\mu$ V	
	2.5	18 $\mu$ V	
	5 V	35 $\mu$ V	
	10 V	52 $\mu$ V	
11 V	58 $\mu$ V		



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Equipment to Measure DC Voltage <sup>FO</sup>	-11 V	60 $\mu$ V	ECTRON 1140A, Copper Junction
	-10 V	50 $\mu$ V	
	-5 V	35 $\mu$ V	
	-2.5 V	18 $\mu$ V	
	-1.377 V	10 $\mu$ V	
	-0.5	3.5 $\mu$ V	
	-0.088 V	0.6 $\mu$ V	
	0 V	0.1 $\mu$ V	
	0.088 V	0.6 $\mu$ V	
	0.5 V	3.5 $\mu$ V	
	1.377 V	10 $\mu$ V	
	2.5	18 $\mu$ V	
	5 V	35 $\mu$ V	
10 V	50 $\mu$ V		
11 V	60 $\mu$ 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 <sup>FO</sup>	1 mg	0.016 mg	ASTM E617, Class 1
	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	



# Certificate of Accreditation: Supplement

## Certified Calibration Svc.

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 <sup>FO</sup>	5 g	0.015 mg	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	
Scales and Balances <sup>FO</sup>	1 g	0.86 mg	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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### Mechanical

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
Atmospheric Pressure <sup>FO</sup> (Vacuum)	-14 psi to 0.03 psi	0.01 psi	Fluke 700PV4 Differential Pressure Module Fluke 717 Pressure Calibrator Fluke 744 Documenting Process Calibrator
Pressure <sup>FO</sup>	- 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
	- 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 <sup>FO</sup>	-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
	-14 psig to 0 psig	0.013 psig	
	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	
Surface Speed Measurement <sup>FO</sup>	5 rpm to 300 rpm	0.26 rpm	Monarch TACH-4A Optical Tachometer Frequency Generator plus pulsing LED
	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	
Torque Wrenches Screwdriver <sup>F</sup>	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
Durometers <sup>FO</sup> Spring Calibration (Force Only) Type A & D Type M	Up to 100 Duro	0.43 N	Note: this is a limited calibration of ASTM D-2240 Balance, ASTM Class 1 Weights; ASTM D 2240-03: CCS-0026-CAL
		0.67 N	
Hardness <sup>F</sup>	Barcol Hardness		ASTM D2583
Force Gages <sup>FO</sup> Tension/Compression Dial/Digital	0 lbf to 1 000 lbf	0.05 % of reading	Himmelstein 2540 Load Cell Interface INF-USB2-C53-2 Interface INF-USB2 Software Weights; CCS-0038-CAL; ASTM E 617
	Up to 400 lbf	0.01 % of reading	



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### Mechanical

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Torque Wrenches, Screwdrivers <sup>F</sup>	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 Tester, Torque Transducers <sup>F</sup>	15 in•oz to 200 in•oz	0.6 % of reading	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 1000 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	

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



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## Certified Calibration Svc.

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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 <sup>FO</sup>	0 °C	1.16 °C	Fluke 1586A Super DAQ Fluke 1586-5688 DAQ-STAQ Multiplexer
	300 °C	0.64 °C	
	1 200 °C	0.48 °C	
	1 600 °C	0.50 °C	
Temperature Measurement Thermocouple Type S <sup>FO</sup>	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 <sup>FO</sup>	-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 <sup>FO</sup>	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 <sup>FO</sup>	600 °C	0.37 °C	
	1 200 °C	0.45 °C	
	2 000 °C	0.66 °C	
Temperature Measurement Thermocouple Type D <sup>FO</sup>	600 °C	0.34 °C	
	1 200 °C	0.39 °C	
	2 000 °C	0.56 °C	
Temperature Measurement Thermocouple Type E <sup>FO</sup>	-200 °C	0.64 °C	
	0 °C	0.27 °C	
	300 °C	0.21 °C	
Temperature Measurement Thermocouple Type J <sup>FO</sup>	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 <sup>FO</sup>	400 °C to 1 000 °C	1.4 °C	



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### Thermodynamic

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Temperature Measurement Thermocouple Type E <sup>FO</sup>	-270 °C to 1 000 °C	0.74 °C	Fluke 1586A Super DAQ Fluke 1586-5688 High-Capacity Modules TQAero Software
Temperature Measurement PRT/RTD 100 $\Omega$ 2 - 3 Wire <sup>FO</sup>	-200 °C to 660 °C	0.1 °C	
Temperature Measurement PRT/RTD 100 $\Omega$ 4 Wire <sup>FO</sup>	-200 °C to 660 °C	0.072 5 °C	
Temperature Measurement Spot-Check Application, Environmental Chambers, Field Calibrations <sup>FO</sup>	-196 °C	0.3 °C	Fluke 1523/1524 w/ Fluke 5627A
	0 °C	0.05 °C	
	300 °C	0.45 °C	
	420 °C	0.15 °C	
Temperature Measure Spot-Check <sup>FO</sup>	-200 °C to 0 °C	0.6 °C	Fluke 1523/1524 w/ Type T Thermocouple
	0 °C to 400 °C	0.25 °C	
	-196 °C	0.002 7 °C	Fluke 1524 w/ Fluke 5609-20 PRT
	-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	
	0 °C to 500 °C	1 °C	Fluke 1523/1524 w/ Type S Probe
	500 °C to 1 750 °C	1.3 °C	
Temperature and Relative Humidity Measurement Spot-Check Application, Environmental Chambers, Field Calibrations <sup>FO</sup>	-40 °C to 85 °C	0.2 °C	Rotronic HC2A-S and HW4; CCS-0001-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	
	20 °C to 100 °C	0.4 °C	Vaisala HM70 and HMP77; CCS-0001-CAL
	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	
	11 % RH	1.3 % RH at 20 °C	
	33 % RH	1.2 % RH at 20 °C	Certified Calibration Salts; CCS- 0001-CAL
	75 % RH	1.5 % RH at 20 °C	
	97 % RH	2 % RH at 20 °C	
	0 % RH to 90 % RH	1.5 % RH	
	90 % RH to 100 % RH	2.7 % RH	Vaisala HM70 w/ HMP70
	-40 °C to 85 °C	0.2 °C	
	0 % RH to 100 % RH	1.5 % RH	
		Rotronic HYGROCLIP S	





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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
Equipment to Measure Validation and Calibration of RTD's, Thermocouples, Thermometers and Sensors <sup>FO</sup>	-95 °C	0.045 °C	Fluke 9190A Ultra-Cool Dry Block Calibrator
	-45 °C	0.035 °C	
	0 °C	0.025 °C	
	25 °C	0.025 °C	
	100 °C	0.025 °C	
	125 °C	0.025 °C	
RTD/PRT/Thermistor <sup>F</sup> Verification by Comparison	-196 °C	0.011 °C	Kaye IRTD-400 w/ IRTD Win Fluke 1524 w/ Fluke 5609-20 PRT
	-38 °C	0.011 °C	
	0 °C	0.011 °C	
	100 °C	0.011 °C	
	200 °C	0.02 °C	
	400 °C	0.02 °C	
	660 °C	0.046 °C	
Temperature Digital, Dial and Liquid in Glass Thermometer <sup>F</sup>	-80 °C to 0 °C	0.57 °C	Kaye IRTD-400 w/ IRTD Win Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT Liquid Baths, Ultra Cool Dry-Blocks and Dry Wells
	50 °C to 100 °C	0.59 °C	
	100 °C to 400 °C	0.57 °C	
Equipment to Measure Temperature Dial Thermometer <sup>FO</sup> , Liquid in Glass Thermometer <sup>F</sup>	-80 °C to 0 °C	0.57 °C	Liquid Bath GE Kaye
	50 °C to 100 °C	0.59 °C	Liquid Bath Hart Scientific 6025 w/ IRTD-400, IRTDWin
	100 °C to 200 °C	0.57 °C	
	-5 °C to 0 °C	0.53 °C	Liquid Bath Fluke Hart Scientific 7102 w/ IRTD-400, IRTDWin
	0 °C to 125 °C	0.58 °C	
	-196 °C	0.52 °C	



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Temperature Measurement Data Acquisition/Logger <sup>FO</sup> System/Loop Calibration Temperature Uniformity Survey/Study (TUS)	-30 °C to 0 °C	0.4 °C	Kaye LTR-140 Kaye IRTD-400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	0 °C to 125 °C	0.34 °C	
	50 °C to 100 °C	0.34 °C	Kaye HTR-400 Kaye IRTD-400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	100 °C to 400 °C	0.32 °C	
	-80 °C to 0 °C	0.4 °C	Kaye CTR-80 Kaye IRTD- 400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	50 °C to 100 °C	0.34 °C	Fluke 6025 Kaye IRTD-400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	100 °C to 200 °C	0.32 °C	
	-5 °C to 0 °C	0.33 °C	Fluke 7102 Kaye IRTD-400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	0 °C to 125 °C	0.52 °C	
	-196 °C	0.52 °C	LN <sub>2</sub> Kaye IRTD-400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	-95 °C to 0 °C	0.5 °C	Fluke 9190A Kaye IRTD-400 Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	0 °C to 140 °C	0.4 °C	



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Temperature Measurement Data Acquisition/Logger <sup>FO</sup> System/Loop Calibration	0 °C to 260 °C	0.21 °C	Fluke 1502A w/ Fluke 5626 PRT Fluke 1524 w/ Fluke 5609-20 PRT Fluke 1529 w/ Rosemount 162CE SPRT
	260 °C to 660 °C	0.63 °C	
Temperature Uniformity Survey/Study (TUS)	0 °C to 500 °C	1 °C	Fluke 9150 Fluke 1529 Fluke 1523/1524 w/ Type S Probe
	500 °C to 1 000 °C	1.64 °C	
Relative Humidity <sup>FO</sup> (Fixed Points)	11.3 % RH	1.3 % RH at 20 °C	Certified Saturated Reference Salts
	33 % RH	1.2 % RH at 20 °C	
	75.3 % RH	1.5 % RH at 20 °C	
	97 % RH	2 % RH at 20 °C	
Infra Red (IR) Thermometers <sup>F</sup>	-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 w/ IRTD Win Omega Black Body, Freezer
Temperature Measure <sup>FO</sup> Spot-Check	-200 °C	0.01 °C	Kaye/MASY IRTD-400;CCS-0005-CAL
	0 °C		
	100 °C	0.02 °C	
	400 °C	0.038 °C	

### 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 <sup>FO</sup>	10 s to 86 400 s	0.49 s per 24 hr	NIST Time Frequency Boulder Colorado
Digital Stopwatches <sup>F</sup>	10 800 s (3 hr)	0.038 ms	NIST Time SOP 2281 Altek, Fluke/Philips PM 6665, PREMA 5017 DMM



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

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<sup>F</sup> would mean that the laboratory performs this calibration at its fixed location.
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<sup>FO</sup> 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.