



# PERRY JOHNSON LABORATORY ACCREDITATION, INC.

## Certificate of Accreditation

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

***Miguel Vázquez Contreras/ Capacitación y Metrología***

***Ave. Fortuna No. 184 Local 3 Col. Tepeyac Insurgentes  
Alcaldía Gustavo A Madero, Ciudad de México, México C.P. 07020***

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

**ISO/IEC 17025:2017**

This accreditation demonstrates technical competence for a defined scope and the  
operation of a laboratory quality management system  
(as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

***Mechanical, Thermodynamic, Chemical, Time and Frequency, Optical, Volume,  
Mass, Force and Weighing Devices and Dimensional 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:

*Initial Accreditation Date:*

June 20, 2013

*Issue Date:*

June 10, 2019

*Expiration Date:*

September 30, 2021

*Accreditation No.:*

75834

*Certificate No.:*

L19-287

Tracy Szerszen  
President/Operations Manager

Perry Johnson Laboratory  
Accreditation, Inc. (PJLA)  
755 W. Big Beaver, Suite 1325  
Troy, Michigan 48064

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



# Certificate of Accreditation: Supplement

## Miguel Vázquez Contreras/ Capacitación y Metrología

Av. Fortuna No. 184 Local 3, Col. Tepeyac Insurgentes  
 Alcaldía Gustavo A Madero, Ciudad de México, México C.P. 07020  
 Contact Name: Miguel Vázquez Phone: 555-577-1702

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

### 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 Balance <sup>O</sup>	1 mg to 500 000 mg (Res.= 0.01 mg)	$(1.16 \times 10^{-1} + 9.23 \times 10^{-7}Wt)$ mg	E2 (OIML) Weights CENAM Technical Guide
Mechanical and Electronic Top Loader Balance <sup>O</sup>	1 g to 20 000 g (Res.= 0.01 g)	$(1.16 \times 10^{-1} + 2.29 \times 10^{-5}Wt)$ mg	F1 (OIML) Weights CENAM Technical Guide
Scale <sup>O</sup>	5 kg to 500 kg (Res.= 0.01)	$(3.8 \times 10^{-1} + 6.06 \times 10^{-4}Wt)$ mg	M1 (OIML) Weights CENAM Technical Guide

### 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
Pressure Gauge (Manometric Pressure) <sup>FO</sup>	0.19 kg/cm <sup>2</sup> to 14 kg/cm <sup>2</sup> (18.63 kPa to 1.37 MPa)	0.066 kg/ cm <sup>2</sup> (6.5 kPa)	Electronic Pressure/ Vacuum Gage Digital Brand: Ametek/ Jofra Model: CE PPC 15 BAR CENAM Technical Guide
Pressure Gauge (Negative / Vacuum Pressure) <sup>FO</sup>	-20 inHg to -0.42 inHg (-67.72 kPa to -1.42 kPa)	0.14 inHg (0.48 kPa)	
Electronic Gauge and Pressure Indicator (Manometric Pressure) <sup>FO</sup>	0.06 kg/cm <sup>2</sup> to 14 kg/ cm <sup>2</sup> (5.88 kPa to 1.37 kPa)	0.019 kg/cm <sup>2</sup> (1.9 kPa)	
Electronic Vacuum Gauge and Vacuum Indicator (Negative / Vacuum Pressure) <sup>FO</sup>	-20 inHg to -0.3 inHg (-67.72 kPa to 1.01 kPa)	0.084 inHg (0.28 kPa)	
Pressure Registers (Manometric Pressure) <sup>FO</sup>	0.06 kg/cm <sup>2</sup> to 14 kg//cm <sup>2</sup> (5.88 kPa to 1.37 kPa)	0.019 kg/cm <sup>2</sup> (1.9 kPa)	
Vacuum Registers (Negative / Vacuum Pressure) <sup>FO</sup>	-20 inHg to -0.3 inHg (-67.72 kPa to 1.01 kPa)	0.084 inHg (0.3 kPa)	
Mercurial and Aneroid Sphygmomanometer <sup>FO</sup>	3.9 mmHg to 300 mmHg (0.519 kPa to 40 kPa)	1.3 mmHg (0.2 kPa)	



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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
Differential Pressure Electronic Gauge <sup>FO</sup>	0.002 4 inH <sub>2</sub> O to 2 inH <sub>2</sub> O (0.597 Pa to 498.16 Pa)	0.000 8 inH <sub>2</sub> O (0.2 Pa)	Liquid Column Master Pressure Gage Differential Liquid Column Type: Brand: Dwyer Model: Microtector CENAM Technical guide
Differential Pressure Electronic Gauge <sup>FO</sup>	0.06 inH <sub>2</sub> O to 4 inH <sub>2</sub> O (14.94 Pa to 996.328 Pa)	0.02 inH <sub>2</sub> O (5.3 Pa)	Electronic Pressure Master Pressure Gage Differential Digital, Brand: Dwyer Model: 477-00-FM CENAM Technical Guide
Differential Pressure Analogical Gauge <sup>FO</sup>	0.06 inH <sub>2</sub> O to 4 inH <sub>2</sub> O (14.94 Pa to 996.328 Pa)	0.02 inH <sub>2</sub> O (5.3 Pa)	
Differential Pressure Analogical Gauge <sup>FO</sup>	0.007 8 inH <sub>2</sub> O to 2 inH <sub>2</sub> O (1.943 Pa to 498.16 Pa)	0.002 6 inH <sub>2</sub> O (0.65 Pa)	Liquid Column Master Pressure Gage Differential Liquid Column type, Brand: Dwyer Model: Microtector CENAM Technical Guide

### Volume

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
Micropipettes <sup>F</sup>	10 $\mu$ L	0.046 $\mu$ L	Method Gravimetric Semi Micro Balance Brand: Radwag Model AS 82/220 RD CENAM Technical Guide
	20 $\mu$ L	0.06 $\mu$ L	
	50 $\mu$ L	0.15 $\mu$ L	
	100 $\mu$ L	0.35 $\mu$ L	
	200 $\mu$ L	0.6 $\mu$ L	
	500 $\mu$ L	1.5 $\mu$ L	
	1 000 $\mu$ L	3 $\mu$ L	
	2 000 $\mu$ L	6 $\mu$ L	
	5 000 $\mu$ L	15 $\mu$ L	
	10 000 $\mu$ L	20 $\mu$ L	
Pipettes <sup>F</sup>	1 mL	2 $\mu$ L	
	2 mL	2 $\mu$ L	
	5 mL	2 $\mu$ L	
	10 mL	3 $\mu$ L	



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## Volume

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Pipettes <sup>F</sup>	25 mL	5 $\mu$ L	Method Gravimetric Semi Micro Balance Brand: Radwag Model AS 82/220 RD CENAM Technical Guide
	50 mL	5 $\mu$ L	
	100 mL	1 $\mu$ L	
	200 mL	20 $\mu$ L	
Dispensers <sup>F</sup>	0.01 mL	0.09 $\mu$ L	
	0.02 mL	0.15 $\mu$ L	
	0.05 mL	0.25 $\mu$ L	
	0.1 mL	0.5 $\mu$ L	
	0.2 mL	0.6 $\mu$ L	
	0.5 mL	1.5 $\mu$ L	
	1 mL	2 $\mu$ L	
	2 mL	4 $\mu$ L	
	5 mL	10 $\mu$ L	
	10 mL	20 $\mu$ L	
	25 mL	50 $\mu$ L	
	50 mL	100 $\mu$ L	
	100 mL	200 $\mu$ L	
	200 mL	400 $\mu$ L	
Burettes <sup>F</sup>	0.01 mL	0.09 $\mu$ L	
	0.02 mL	0.091 $\mu$ L	
	0.05 mL	0.15 $\mu$ L	
	0.1 mL	0.3 $\mu$ L	
	0.2 mL	0.6 $\mu$ L	
	0.5 mL	1 $\mu$ L	
	1 mL	2 $\mu$ L	
	2 mL	4 $\mu$ L	
	5 mL	5 $\mu$ L	
	10 mL	10 $\mu$ L	
	25 mL	18 $\mu$ L	
	50 mL	25 $\mu$ L	
	100 mL	30 $\mu$ L	
200 mL	60 $\mu$ L		



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Flask <sup>F</sup>	1 mL	7 $\mu$ L	Method Gravimetric Semi Micro Balance Brand: Radwag Model: AS 82/220 RD CENAM Technical Guide	
	2 mL	14 $\mu$ L		
	5 mL	3.5 $\mu$ L		
	10 mL	5 $\mu$ L		
	25 mL	3.8 $\mu$ L		
	50 mL	7.5 $\mu$ L		
	100 mL	11 $\mu$ L		
	200 mL	14 $\mu$ L		
	500 mL	0.64 mL	Method Gravimetric Balance, Brand: Mettler, Model: PM6000 CENAM Technical Guide	
	1 000 mL	0.64 mL		
	2 000 mL	0.64 mL		
	5 000 mL	0.65 mL		
	Cylinders <sup>F</sup>	1 mL	7 $\mu$ L	Method Gravimetric Semi Micro Balance, Brand: Radwag Model AS 82/220 RD CENAM Technical Guide
		2 mL	14 $\mu$ L	
5 mL		3.5 $\mu$ L		
10 mL		5 $\mu$ L		
25 mL		3.8 $\mu$ L		
50 mL		7.5 $\mu$ L		
100 mL		11 $\mu$ L		
200 mL		15 $\mu$ L		
500 mL		0.64 mL	Method Gravimetric Balance, Brand: Mettler, Model: PM6000 CENAM Technical Guide	
1 000 mL		0.64 mL		
2 000 mL		0.64 mL		
5 000 mL		0.65 mL		

### Time and 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
Velocity Meters & Centrifuges <sup>FO</sup>	50 rpm (5.24 rad/s)	0.28 rpm (0.029 rad/s)	Direct Comparison Master: Optic Tachometer Brand: Extech Model: Q201936 Procedure PCM-03-10



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### Time and Frequency

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Velocity Meters & Centrifuges <sup>FO</sup>	100 rpm (10.47 rad/s)	0.28 rpm (0.029 rad/s)	Direct Comparison Master: Optic Tachometer Brand: Extech Model: Q201936 Procedure PCM-03-10
	500 rpm (52.36 rad/s)	0.28 rpm (0.029 rad/s)	
	999.9 rpm (104.71 rad/s)	0.29 rpm (0.03 rad/s)	
	1 000 rpm (104.72 rad/s)	2.7 rpm (0.28 rad/s)	
	5 000 rpm (523.6 rad/s)	2.8 rpm (0.29 rad/s)	
	9 999 rpm (1 047.09 rad/s)	2.9 rpm (0.3 rad/s)	
	10 000 rpm (1 047.2 rad/s)	27 rpm (2.9 rad/s)	
	50 000 rpm (5 235.99 rad/s)	28 rpm (3 rad/s)	
	99 900 rpm (10 461.5 rad/s)	29 rpm (3.04 rad/s)	

### 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
Glass Thermometer <sup>F</sup>	-40 °C to 0 °C	0.27 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer CENAM Technical Guide
	0 °C to 100 °C	0.31 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Liquid Bath) CENAM Technical Guide
	30 °C to 150 °C	0.13 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Dry Block Calibrator CENAM Technical Guide
	150 °C to 300 °C	0.14 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12
Bimetallic and Capillary Thermometer <sup>F</sup>	-40 °C to 0 °C	0.37 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12



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### Thermodynamic

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Bimetallic and Capillary Thermometer <sup>F</sup>	0 °C to 100 °C	0.13 °C	RTD Digital, Brand: Control Company Model: 6412MX and Liquid Bath Direct Comparison Procedure: PCM-03-12
	50 °C to 150 °C	0.077 °C	RTD Digital, Brand: Control Company Model: 6412MX and Dry Block Calibrator, Direct Comparison Procedure: PCM-03-12
	150 °C to 300 °C	0.16 °C	
Indicators and Register Temperature Devices with RTD Sensor <sup>F</sup>	-80 °C to 0 °C	0.23 °C	RTD Digital, Brand: Control Company Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12
	0 °C to 100 °C	0.078 °C	RTD Digital, Brand: Control Company Model: 6412MX and Liquid Bath, Direct Comparison Procedure: PCM-03-12
	50 °C to 150 °C	0.089 °C	RTD Digital, Brand: Control Company Model: 6412MX and Dry Block Calibrator, Direct Comparison Procedure: PCM-03-12
	150 °C to 300 °C	0.11 °C	
Equipment with Indicators and Register with RTD Temperature Sensor <sup>O</sup>	-30 °C to 200 °C	0.12 °C	Master: RTD Digital, Brand: Control Company Model: 6412MX, The Equipment is used to Control the Temperature Direct Comparison Procedure: PCM-03-12
Indicators Temperature with Thermistor Sensor <sup>F</sup>	-50 °C to 0 °C	0.23 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12



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Indicators Temperature with Thermistor Sensor <sup>F</sup>	0 °C to 100 °C	0.077 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Liquid Bath Direct Comparison Procedure: PCM-03-12
	30 °C to 300 °C	0.063 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Dry Block Calibrator Direct Comparison Procedure: PCM-03-12
Equipment with Indicators and Thermistor Sensor <sup>O</sup>	-30 °C to 300 °C	0.14 °C	RTD Digital, Brand: Control Company, Model: 6412MX, the Equipment is used to Control the Temperature Direct Comparison Procedure: PCM-03-12
Indicators Temperature with Thermocouple T Sensor <sup>F</sup>	-80 °C to 0 °C	0.23 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12
	0 °C to 100 °C	0.13 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Liquid Bath Direct Comparison Procedure: PCM-03-12
	30 °C to 300 °C	0.064 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Dry Block Calibrator Direct Comparison Procedure: PCM-03-12
Indicators Temperature with Thermocouple T Sensor <sup>FO</sup>	-30 °C to 200 °C	0.17 °C	RTD Digital, Brand: Control Company, Model: 6412MX, the Equipment is used to Control the Temperature Direct Comparison Procedure: PCM-03-12





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### Thermodynamic

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Indicators Temperature with Thermocouple J Sensor <sup>F</sup>	-40 to 0 °C	0.23 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12
Indicators Temperature with Thermocouple J Sensor <sup>FO</sup>	0 °C to 100 °C	0.13 °C	Electronic PRT RTD Digital, Brand: Control Company, Model: 6412MX and Liquid Bath, Direct Comparison Procedure: PCM-03-12
	30 °C to 300 °C	0.064 °C	RTD Digital, Brand: Control Company, Model: 6412MX and Dry Block Calibrator Direct Comparison Procedure: PCM-03-12
Equipment with Indicators and Register with Thermocouple J Sensor <sup>O</sup>	-30 °C to 300 °C	0.17 °C	Electronic PRT RTD Digital, Brand: Control Company, Model: 6412MX, the Equipment is used to Control the Temperature, Direct Comparison Procedure: PCM-03-12
Indicators Temperature with Thermocouple K Sensor <sup>FO</sup>	-80 to 0 °C	0.22 °C	Master: RTD Digital, Brand: Control Company, Model: 6412MX and Ultra Low Temperature Freezer Direct Comparison Procedure: PCM-03-12
	0 °C to 100 °C	0.061 °C	
	30 °C to 300 °C	0.064 °C	
Furnace with Thermocouple K Sensor <sup>FO</sup>	100 °C to 1 000 °C	1.9 °C	Master: Digital Thermocouple K Calibrator, Brand: Extech Instruments Model: 421502 Calibrator Direct Comparison Procedure: PCM-03-12
Thermohygrometer – Humidity <sup>F</sup>	10 % RH to 90 % RH	1.9 % RH	Hygro-Thermometer Extech Instruments, Model: SDL500 CENAM Technical Guide
Thermohygrometer – Temperature <sup>F</sup>	10 °C to 50 °C	0.64 °C	
Equipment with Control and Register with Electronic Hygrometer <sup>O</sup>	10 % RH to 90 % RH	1.7 % RH	Hygro-Thermometer Extech Instruments, Model: SDL500 CENAM Technical Guide



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## Chemical

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pH Meter <sup>FO</sup>	4 pH to 10 pH	0.016 pH	pH Certified Standard (4 pH; 6.86 pH; 7 pH; 9.18 pH & 10.01 pH) Direct Comparison Procedure: PCM-03-20

## 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
Microscope Reticule Measurement <sup>FO</sup>	0.001 mm to 1 mm	2.1 $\mu$ m	Graduated Reticule Direct Comparison Procedure: PCM-03-34

## Optical

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
Spectrophotometers Wavelength <sup>O</sup>	190 nm to 1 110 nm (Photometric Scale: 0.000 1 uA to 3 uA)	0.03 nm (0.003 1 uA)	SRM Glass Filter UV/Vis Photometric Glass Filters CENAM Technical Guide
Spectrophotometers Straight Light <sup>O</sup>	0.05 % T	0.012 % T	Stray Light Glass Filters CENAM Technical Guide

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.



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4. The presence of a superscript O means that the laboratory performs calibration of the indicated parameter onsite at customer locations. Example: Outside Micrometer<sup>O</sup> would mean that the laboratory performs this calibration onsite at the customer's location.
5. 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.
6. 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.
7. The term Wt represents weight in pounds or grams (including SI multiple and submultiple units) appropriate to the uncertainty statement.

