PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

Doble Engineering Company

1520 South Hellman Avenue, Ontario, CA 91761

(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):

Dimensional, Electrical, 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:	*Issue Date:*	*Expiration Date:*
September 30, 2017	July 10, 2021	October 31, 2023

Accreditation No.:	*Certificate No.:*
85299	L21-443

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

Certificate of Accreditation: Supplement

Doble Engineering Company
1520 South Hellman Avenue, Ontario, CA 91761
Contact Name: Tim Nguyen Phone: 909-923-9390

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

Dimensional

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure Distance -Linear Transducer [F]	0.001 in to 1 in	0.01 in/in + 0.07 in	Vanguard CT-7500 Caliper Starrett 723 Proc. # 25" Linear Transducer Calibration, Rev A
	1 in to 2 in	0.008 in/in + 0.06 in	
	2 in to 3 in	0.012 in/in + 0.21 in	

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure DC Voltage [F]	100 mV to 1 V	267 µV/V + 1.1 mV	Fluke 8845A RFD-200 S3 Procedure
	1 V to 10 V	331 µV/V + 1.4 mV	
	10 V to 100 V	15.5 mV/V + 272 mV	
	100 V to 200 V	19.7 mV/V + 346 mV	
	200 V to 250 V	15.5 mV/V + 272 mV	
	250 V to 300 V	35 mV/V + 623 mV	
	300 V to 1 kV	42 mV/V + 742 mV	
	1 kV to 10 kV	5.77 mV/V + 101.2 V	CPS HVP-500 High Voltage Probe with Fluke 8845A VBT-75 Procedure
	10 kV to 20 kV	5.77 mV/V + 101.2 V	
	20 kV to 30 kV	5.77 mV/V + 101.2 V	
	30 kV to 40 kV	17.32 mV/V + 303.6 V	
	40 kV to 50 kV	23.09 mV/V + 404.8 V	
	50 kV to 60 kV	11.3 mV/V + 202.4 V	
	60 kV to 70 kV	11.5 mV/V + 202.4 V	
	70 kV to 75 kV	5.77 mV/V + 101.2V	
Equipment to Output DC Voltage [F]	0.1 V to 1 V	267 µV/V + 1.1 mV	Fluke 8845A RFD-200 S3 Procedure
	1 V to 10 V	331 µV/V + 1.4 mV	
	10 V to 100 V	15.5 mV/V + 272 mV	
	100 V to 200 V	19.7 mV/V + 346 mV	
	200 V to 250 V	15.5 mV/V + 272 mV	
	250 V to 300 V	35 mV/V + 623 mV	
	300 V to 1 kV	42 mV/V + 742 mV	
	1 kV to 10 kV	5.77 mV/V + 101.2 V	CPS HVP-500 High Voltage Probe with Fluke 8845A
	10 kV to 20 kV	5.77 mV/V + 101.2 V	
	20 kV to 30 kV	5.77 mV/V + 101.2 V	
	30 kV to 40 kV	17.32 mV/V + 303.6 V	
	40 kV to 50 kV	23.09 mV/V + 404.8 V	

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Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Output DC Voltage [F]	50 kV to 60 kV	11.5.3 mV/V + 202.4 V	CPS HVP-500 High Voltage Probe with Fluke 8845A VBT-75 Procedure
	60 kV to 70 kV	11.5 mV/V + 202.4 V	
	70 kV to 75 kV	5.77 mV/V + 101.2 V	
Equipment to Measure DC Current [F]	1 mA to 10 mA	4.1 µA/A + 7.1 µA	Fluke 8845A with/Shunt RFD-200 S3 Procedure
	10 mA to 1 A	602 µA/A + 10.5 mA	
	1 A to 5 A	3.5 mA/A + 61 mA	
	5A to 10A	6 mA/A + 105 mA	
Equipment to Output DC Current [F]	1 mA to 10 mA	4.1 µA/A + 7.1 µA	Auto-Ohm 200 S3 Procedure
	10 mA to 1 A	602 µA/A + 10.5 mA	
	1 A to 5 A	3.5 mA/A + 61 mA	
	5 A to 10A	6 mA/A + 105 mA	
Equipment to Source Resistance [F]	100 µΩ	0.11 µΩ	Shunt 100 µΩ Auto-Ohm 200 S3 Procedure
Equipment to Measure Resistance [F]	1 Ω to 10 Ω	1.04 mΩ/Ω + 8.05 mΩ	Fluke 8845A Auto-Ohm 200 S3 Procedure
	10 Ω to 100 Ω	0.82 mΩ/Ω + 6.3 mΩ	
	100 Ω to 1 000 Ω	1.06 mΩ/Ω + 17.8 mΩ	
	1 000 Ω to 1 900 Ω	2.43 mΩ/Ω–+ 26.5 mΩ	
	1.9 kΩ to 200 kΩ	0.2 Ω/Ω + 3.5 Ω	
	200 kΩ to 1 MΩ	0.51 Ω/Ω + 8.9 Ω	
Equipment to Output AC Current [F]	0 A to 1 A	602 µA/A + 10.5 mA	Fluke 8845A with/Shunt RFD-200 S3 Rev A Auto-Ohm 200 S3 Rev A PCI-600 Procedure
	1 A to 5 A	5.8 mA/A + 101 mA	
	5 A to 10 A	1.5 mA/A + 26 mA	
	10 A to 100 A	10 mA/A + 175 mA	
	100 A to 400 A	10 mA/A + 175 mA	
	400 A to 600 A	10 mA/A + 175 mA	
Equipment to Measure AC Current (at the listed frequencies) [F]			
40 Hz to 100 Hz	100 mA to 1A	602 µA/A + 10.5 mA	RFD-200 S3 Procedure
	1 A to 5 A	5.8 mA/A + 101 mA	
	5 A to 10 A	1.5 mA/A + 26 mA	

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Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Measure AC Voltage (at the listed frequencies) [F]			Fluke 8845A RFD-200 S3 Procedure
40 Hz to 100 Hz	100 mV to 1 V	42.4 µV/V + 214 µV	
	1 V to 10 V	242.7 µV/V + 4.2 mV	
	10 V to 100 V	155.7 µV/V + 2.7 mV	
	100 V to 200 V	2.18 mV/V + 38.2 mV	
	200 V to 250 V	29.4 mV/V + 516.6 mV	
	250 V to 300 V	47.2 mV/V + 823.1 mV	
Equipment to Output AC Voltage (at the listed frequencies) [F]			
40 Hz to 100 Hz	100 mV to 1V	42.4 µV/V + 214 uV	RFD-200 S3 Procedure
	1 V to 10 V	242.7 µV/V + 4.2 mV	
	10 V to 100 V	155.7 µV/V + 2.7 mV	
	100 V to 200 V	2.18 mV/V + 38.2 mV	
	200 V to 250 V	29.4 mV/V + 516.6 mV	
	250 V to 300 V	47.2 mV/V + 823.1 mV	

Time & Frequency

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE OR NOMINAL DEVICE SIZE AS APPROPRIATE	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Equipment to Output Frequency at 3 Vrms [F]	1 Hz to 15 Hz	0.36 mHz/Hz + 6.34 mHz	Tektronix TDS2014B ATRT-01 S3 Procedure
	15 Hz to 60 Hz	1.86 mHz/Hz + 32.6 mHz	
	60 Hz to 250 Hz	4.01 mHz/Hz + 70 mHz	
	250 Hz to 500 Hz	9.5 mHz/Hz + 166.5 mHz	

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.

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

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.