



PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

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

TESCO-The Eastern Specialty Company
925 Canal Street, Bristol, PA 19007

*(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):

Electrical and Time and 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

Initial Accreditation Date:

April 11, 2019

Issue Date:

November 14, 2023

Expiration Date:

November 14, 2025

Accreditation No.:

101105

Certificate No.:

L23-826

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.pjllabs.com*



Certificate of Accreditation: Supplement

TESCO-The Eastern Specialty Company

925 Canal Street, Bristol, PA 19007

Contact Name: Carson Scaccetti Phone: 609-752-1238

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

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
Watt-Hour Standards ^F	0.01 A to 2 A unity (10 mWh to 2.016 kWh)	18 μWh/VAh	Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
	2 A to 5 A unity (2.016 mWh to 5.04 kWh)	20 μWh/VAh	
	5 A to 80 A unity (5.04 kWh to 80.64 kWh)	21 μWh/VAh	
	0.01A to 2 A 60 degrees lag (10 mWh to 2.016 kWh)	26 μWh/VAh	
	2 A to 5 A 60 degrees lag (2.016 Wh to 5.04 kWh)	27 μWh/VAh	
	5 A to 80 A 60 degrees lag (5.04 kWh to 80.64 kWh)	28 μWh/VAh	
Equipment to Output AC Phase (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.25 A to 50 A	0.003 °	
45 Hz to 65 Hz	0.25 A to 50 A	0.002 3 °	
65 Hz to 69 Hz	0.25 A to 50 A	0.003 °	
69 Hz to 180 Hz	0.25 A to 50 A	0.007 °	
180 Hz to 450 Hz	0.25 A to 50 A	0.018 °	
450 Hz to 850 Hz	0.25 A to 50 A	0.033 °	
850 Hz to 3 kHz	0.25 A to 50 A	0.12 °	
3 kHz to 6 kHz	0.25 A to 50 A	0.23 °	
Equipment to Output AC Phase (at the listed frequencies) ^F			
16 Hz to 45 Hz	50 A to 80 A	0.003 °	
45 Hz to 65 Hz	50 A to 80 A	0.003 °	
65 Hz to 69 Hz	50 A to 80 A	0.003 °	
69 Hz to 180 Hz	50 A to 80 A	0.008 °	
180 Hz to 450 Hz	50 A to 80 A	0.025 °	
450 Hz to 850 Hz	50 A to 80 A	0.05 °	
850 Hz to 3 kHz	50 A to 80 A	0.003 °	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.1 V to 90 V	60 μV/V + 0.8 mV	
45 Hz to 65 Hz	0.1 V to 90 V	42 μV/V + 0.2 mV	
65 Hz to 850 Hz	0.1 V to 90 V	60 μV/V + 0.8 mV	



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Equipment to Output AC Voltage (at the listed frequencies) ^F			Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
16 Hz to 45 Hz	90 V to 180 V	60 μV/V + 0.16 mV	
45 Hz to 65 Hz	90 V to 180 V	44 μV/V + 0.16 mV	
65 Hz to 850 Hz	90 V to 180 V	60 μV/V + 0.16 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	180 V to 215 V	61 μV/V + 3.2 mV	
45 Hz to 65 Hz	180 V to 215 V	61 μV/V + 3.2 mV	
65 Hz to 850 Hz	180 V to 215 V	61 μV/V + 3.2 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
45 Hz to 65 Hz	215 V to 246 V	44 μV/V + 0.16 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	246 V to 425 V	61 μV/V + 5.8 mV	
45 Hz to 65 Hz	246 V to 425 V	61 μV/V + 5.8 mV	
65 Hz to 850 Hz	246 V to 425 V	61 μV/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
45 Hz to 65 Hz	425 V to 490 V	44 μV/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	490 V to 740 V	61 μV/V + 5.8 mV	
45 Hz to 65 Hz	490 V to 740 V	61 μV/V + 5.8 mV	
65 Hz to 850 Hz	490 V to 740 V	61 μV/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
45 Hz to 65 Hz	740 V to 850 V	44 μV/V + 5.8 mV	
Equipment to Output AC Voltage (at the listed frequencies) ^F			
16 Hz to 45 Hz	850 V to 1 008 V	61 μV/V + 10 mV	
45 Hz to 65 Hz	850 V to 1 008 V	61 μV/V + 10 mV	
65 Hz to 850 Hz	850 V to 1 008 V	61 μV/V + 10 mV	



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Equipment to Output AC Current (at the listed frequencies) ^F			Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
45 Hz to 65 Hz	0.01 A to 0.1 A	60 μ A/A + 5 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.1 A to 0.25 A	60 μ A/A + 5 μ A	
45 Hz to 65 Hz	0.1 A to 0.25 A	46 μ A/A + 2.5 μ A	
65 Hz to 850 Hz	0.1 A to 0.25 A	60 μ A/A + 5 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	0.5 A to 1 A	61 μ A/A + 10 μ A	
45 Hz to 65 Hz	0.5 A to 1 A	47 μ A/A + 6 μ A	
65 Hz to 850 Hz	0.5 A to 1 A	61 μ A/A + 10 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	1 A to 2 A	61 μ A/A + 40 μ A	
45 Hz to 65 Hz	1 A to 2 A	46 μ A/A + 20 μ A	
65 Hz to 850 Hz	1 A to 2 A	61 μ A/A + 40 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	2 A to 5 A	64 μ A/A + 100 μ A	
45 Hz to 65 Hz	2 A to 5 A	49 μ A/A + 50 μ A	
65 Hz to 850 Hz	2 A to 5 A	64 μ A/A + 100 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	5 A to 10 A	65 μ A/A + 200 μ A	
45 Hz to 65 Hz	5 A to 10 A	49 μ A/A + 100 μ A	
65 Hz to 850 Hz	5 A to 10 A	65 μ A/A + 200 μ A	
Equipment to Output AC Current (at the listed frequencies) ^F			
16 Hz to 45 Hz	10 A to 21 A	69 μ A/A + 400 μ A	
45 Hz to 65 Hz	10 A to 21 A	49 μ A/A + 200 μ A	
65 Hz to 850 Hz	10 A to 21 A	69 μ A/A + 400 μ A	



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Equipment to Output AC Current (at the listed frequencies) ^F			Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
40 Hz to 45 Hz	21 A to 50 A	74 µA/A + 1 000 µA	
45 Hz to 65 Hz	21 A to 50 A	49 µA/A + 500 µA	
65 Hz to 850 Hz	21 A to 50 A	74 µA/A + 1 000 µA	
Equipment to Output AC Current (at the listed frequencies) ^F			
40 Hz to 450 Hz	50 A to 80 A	106 µA/A + 2 800 µA	
450 Hz to 850 Hz	50 A to 80 A	118 µA/A + 2 800 µA	
Equipment to Output AC Sinwave (at the listed frequencies) ^F			HP 3325A opt. WI-00-10-010
0.001 Hz to 100 Hz	0.1 V to 3.535 Vrms	3.8 mV/V	
100 Hz to 100 kHz	0.1 V to 3.535 Vrms	2.7 mV/V	
Equipment to Output AC Squarewave (at the listed frequencies) ^F			
0.001 Hz to 100 Hz	0.1 V to 5 Vrms	2.2 mV/V	
100 Hz to 100 kHz	0.1 to 5 Vrms	4.5 mV/V	
Equipment to Output AC Trianglewave (at the listed frequencies) ^F			
0.001 Hz to 100 Hz	0.1 V to 2.88 Vrms	1.4 mV/V	
0.01 Hz to 1.9 kHz	0.1 V to 2.88 Vrms	1.7 mV/V	
1.9 k Hz to 10 kHz	0.1 V to 2.88 Vrms	0.15 mV/V	
Equipment to Generate AC Frequency ^F			
0.1 Hz to 20 MHz		2.3 µHz/Hz	HP 3325A, WI-00-10-010
Equipment to Output AC High Voltage (at the listed frequencies) ^F			1G2-S8 WI-00-10-004
60 Hz	1 000 Vrms to 4 200 Vrms	0.12 mV/V	
60 Hz	4 200 Vrms to 4 800 Vrms	0.37 mV/V	
60 Hz	4 800 Vrms to 8 400 Vrms	0.14 mV/V	
60 Hz	8 400 Vrms to 14 400 Vrms	0.16 mV/V	
Equipment to Output AC High Current (at the listed frequencies) ^F			GCT-1-S4 WI-19-10-021
60 Hz	1 A to 6 000 A	47 µA/A	



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Equipment to Generate DC Voltage ^F	0.1 μ V to 0.019 99 V	5.68 μ V/V + 5 μ V	Fluke 5100B opt 3, WI-00-10-030
	0.01999 V to 0.199 9 V	2.58 μ V/V + 5 μ V	
	0.1999 V to 1.999 V	11.8 μ V/V + 5 μ V	
	1.999V to 199.9 V	16.4 μ V/V + 5 μ V	
	199.9 V to 1 000 VDC	31.6 μ V/V + 5 μ V	
Equipment to Generate AC Voltage ^F	0.1 μ V to 1 000V 50 Hz to 1 kHz	0.024 4 % + 50 μ V	IET CS-301, WI-00-10-031
	0.1 μ V to 1 000V 1 k Hz to 10k Hz	0.032 % + 50 μ V	
	0.1 μ V to 1 000V 10 k Hz to 50 k Hz	0.044 6 % + 50 μ V	
Equipment to Generate Resistance ^F	1 Ω to 10 Ω	0.004 56 %	
	10 Ω to 100 Ω	0.005 66 %	
	100 Ω to 1 k Ω	0.000 756 %	
	1 k Ω to 100 k Ω	0.001 97 %	
	100 k Ω to 10 M Ω	0.005 7 %	
Equipment to Generate DC Current ^F	10 μ A to 0.199 999 mA	21.6 μ A/A + 0.02 μ A	
	0.199 999 mA to 1.999 99 mA	18.9 μ A/A + 0.02 μ A	
	1.999 99 mA to 19.999 9 mA	38.2 μ A/A + 0.02 μ A	
	19.999 9 mA to 199.999 mA	16.2 μ A/A + 0.02 μ A	
	199.999 mA to 1.999 99 A	86.6 μ A/A + 0.02 μ A	
Equipment to Generate AC Current ^F	10 μ A to 0.2 mA 50 Hz to 1 kHz	842 μ A/A + 0.02 μ A	
	0.2 mA to 2 mA 50 Hz to 1 kHz	936 μ A/A + 0.02 μ A	
	2 mA to 20 mA 50 Hz to 1 kHz	864 μ A/A + 0.02 μ A	
	20 mA to 200 mA 50 Hz to 1 kHz	188 μ A/A + 0.02 μ A	
	200 mA to 1.999 99A 50 Hz to 1 kHz	636 μ A/A + 0.02 μ A	
Equipment to Generate Capacitance (at the listed frequencies) ^F			IET CS-301, WI-00-10-031
120 Hz	0.000 1 μ F to 10 μ F	4.4 nF/ μ F + 6.5pF	
1 kHz	10 μ F to 99.999 9 μ F	4.5 nF/ μ F + 9 nf	



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Equipment to Output Frequency ^F	16 Hz to 850 Hz	50 μ Hz/Hz + 10 μ Hz/Hz of range	Fluke 6105A opt 80A TESCO WI: WI-19-10-029; Z540.1
Equipment to Output DC Voltage ^F	Up to 11.5 V	91 μ V/V + 2 mV	
	11.5 V to 22.5 V	91 μ V/V + 4 mV	
	22.5 V to 45 V	91 μ V/V + 8 mV	
	45 V to 90 V	91 μ V/V + 16 mV	
	90 V to 180 V	91 μ V/V + 32 mV	
	180 V to 325 V	92 μ V/V + 60 mV	
	325 V to 504 V	92 μ V/V + 100 mV	
Equipment to Output DC Current ^F	0.01 A to 0.25 A	89 μ A/A + 25 μ A	
	0.25 A to 0.5 A	89 μ A/A + 50 μ A	
	0.5 A to 1 A	89 μ A/A + 100 μ A	
	1 A to 2 A	89 μ A/A + 200 μ A	
	2 A to 5 A	89 μ A/A + 500 μ A	
	5 A to 10.5 A	89 μ A/A + 1 000 μ A	
Equipment to Generate AC Current ^F (at the listed frequencies)			Fluke 9100-200 & Fluke 5100B, WI-00-10-031
50 Hz	1 A to 200 A	890 μ A/A + 0.11 A	
60 Hz	1 A to 200 A	0.3 A	
400 Hz	1 A to 200 A	13 mA/A + 0.2 A	
Equipment to Generate AC Current ^F (at the listed frequencies)			
50 Hz	200 A to 1 000 A	1.4 A	
60 Hz	200 A to 1 000 A	3.5 A	HP 3458A opt 001 & 002 TESCO WI: WI-19-10-029; Z540.1
400 Hz	200 A to 500 A	4 600 μ A/A + 2.6 A	
Equipment to Measure Frequency ^F	1 Hz to 40 Hz	500 μ Hz/Hz	
	40 Hz to 10 MHz	100 μ Hz/Hz	
Equipment to Measure DC Voltage ^F	10 μ V to 100 mV	1.9 μ mV/mV + 0.74 μ V	
	100 mV to 1 V	6 μ V/V + 0.23 μ V	
	1 V to 10 V	5.9 μ V/V + 0.3 μ V	
	10 V to 100 V	20 μ V/V	
	100 V to 1 000 V	23 μ V/V	
	60 V to 1 000 V	150 μ V/V + 4.4 mV	
			TESCO DCT-200, WI-19-10-039



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Equipment to Measure DC Current ^F	0.01 nA to 100 nA	30 μ A/A + 0.04 nA	HP 3458A opt 001 & 002 TESCO WI: WI-19-10-029; Z540.1
	100 nA to 1 μ A	20 μ A/A + 0.04 nA	
	1 μ A to 10 μ A	20 μ A/A + 0.1 nA	
	10 μ A to 100 μ A	20 μ A/A + 0.8 nA	
	100 μ A to 1 mA	20 μ A/A + 5 nA	
	1 mA to 10 mA	20 μ A/A + 0.05 μ A	
	10 mA to 100 mA	35 μ A/A + 0.5 μ A	
	100 mA to 1 A	600 μ A/A + 10 μ A	
Equipment to Measure DC Current ^F	5 A to 200 A	45 μ A/A + 850 μ A	TESCO DCT-200, WI-19-10-039
Equipment to Measure DC Resistance ^F	10 $\mu\Omega$ to 10 Ω	0.2 m Ω	HP 3458A opt 001 & 002 TESCO WI: WI-19-10-029; Z540.1
	10 Ω to 100 Ω	8.2 $\mu\Omega/\Omega$ + 48 $\mu\Omega$	
	100 Ω to 1 k Ω	9.4 $\mu\Omega/\Omega$	
Equipment to Measure DC Resistance ^F	1 k Ω to 10 k Ω	5.9 $\mu\Omega/\Omega$ + 3.4 m Ω	
	10 k Ω to 100 k Ω	17 $\mu\Omega/\Omega$	
	100 k Ω to 1 M Ω	110 $\mu\Omega/\Omega$	
	1 M Ω to 10 M Ω	89 $\mu\Omega/\Omega$ + 21 Ω	
	10 M Ω to 100 M Ω	630 $\mu\Omega/\Omega$	
	100 M Ω to 1 G Ω	8.3 m Ω/Ω	
AC Energy - Watt-Hour Measure ^F	Up to 5 MHz	10 mWh/VAh + 100 nWh	Fluke 6105A TESCO WI: WI-19-10-029Z540.1
Equipment to Measure AC Current (at the listed frequencies) ^F			HP 3458A opt 001 & 002 TESCO WI: WI-19-10-029; Z540.1
10 Hz to 20 Hz	0 μ A to 100 μ A	4 000 μ A/A + 0.03 % of range	
20 Hz to 45 Hz	0 μ A to 100 μ A	1 500 μ A/A + 0.03 % of range	
45 Hz to 100 Hz	0 μ A to 100 μ A	600 μ A/A + 0.03 % of range	
100 Hz to 5 kHz	0 μ A to 100 μ A	600 μ A/A + 0.03 % of range	
Equipment to Measure AC Current (at the listed frequencies) ^F			
10 Hz to 20 Hz	100 μ A to 100 mA	4 000 μ A/A + 0.22 % of range	
20 Hz to 45 Hz	100 μ A to 100 mA	1 500 μ A/A + 0.02 % of range	
45 Hz to 100 Hz	100 μ A to 100 mA	600 μ A/A + 0.03 % of range	
100 Hz to 5 kHz	100 μ A to 100 mA	300 μ A/A + 0.02 % of range	
5 kHz to 20 kHz	100 μ A to 100 mA	600 μ A/A + 0.02 % of range	
20 kHz to 50 kHz	100 μ A to 100 mA	4 000 μ A/A + 0.04 % of range	
50 kHz to 100 kHz	100 μ A to 100 mA	5 500 μ A/A + 0.15 % of range	



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Equipment to Measure AC Current (at the listed frequencies) ^F			HP 3458A opt 001 & 002 TESCO WI: WI-19-10-029; Z540.1
10 Hz to 20 Hz	100 mA to 1 A	4 000 µA/A + 0.22 % of range	
20 Hz to 45 Hz	100 mA to 1 A	1 500 µA/A + 0.02 % of range	
45 Hz to 100 Hz	100 mA to 1 A	600 µA/A + 0.02 % of range	
100 Hz to 5 kHz	100 mA to 1 A	1 000 µA/A + 0.02 % of range	
Equipment to Measure AC Current (at the listed frequencies) ^F			HP 3458A Opt 001 & 002, WI-00-10-032
40 Hz to 1 kHz	10 mV to 120 V	170 µV/V + 1.1 µV	
1 kHz to 20 kHz	10 mV to 120 V	110 µV/V + 2.6 µV	
>20 k Hz to 50 k Hz	10 mV to 120 V	120 µV/V + 2.4 µV	
>50 k Hz to 100 k Hz	10 mV to 120 V	540 µV/V + 38 µV	
>100 k Hz to 300 k Hz	10 mV to 120 V	500 µV/V + 4 mV	
Equipment to Measure AC Voltage (at the listed frequencies) ^F			
>300 k Hz to 1 M Hz	>12 m V to 12 V	9.2 mV/V + 0.75 mV	
Equipment to Measure AC Current (at the listed frequencies) ^F			
40 Hz to 1 k Hz	120 V to 7 00 V	170 µV/V	
>1 k H to 20 k Hz	120 V to 7 00 V	330 µV/V	
>20 k Hz to 50 k Hz	120 V to 7 00 V	330 µV/V	
>50 k Hz to 100 k Hz	120 V to 7 00 V	280 µV/V + 0.031 V	
Equipment to Measure High AC Voltage (at the listed frequencies) ^F			Fluke 80K-15 & HP 3458A WI-00-10-034
60 Hz	1 000 V to 4 800 V	3.1 mV/V	
60 Hz	4 800 V to 14 400 V	0.03 V/V	
60 Hz	14 00 V to 40 000 V	0.02 V/V	Keithley 2015 WI-00-10-011
Temperature Calibration, Equipment used with Thermocouple Type K ^{FO}	-190 °C to 1 350 °C	(0.13 °mK/°C·(x) + 624.7) °mK	



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Equipment to Measure Hi AC Voltage Phase (at the listed frequencies) ^F			
60 Hz	1 A to 5 000 A	0.08 mA/A	1G2-S8, & KACT-V WI-19-10-021
Equipment to Measure Hi AC Voltage Ratio (at the listed frequencies) ^F			
60 Hz	0.1 V to 14 400 V	0.08 mV/V	1G2-S8, & KACT-V WI-19-10-004
Equipment to Measure Hi AC Current Amplitude (at the listed frequencies) ^F			
60 Hz	1 A to 5 000 A	0.05 mA/A	GCT-1-S4 & LFR 6/60/500, WI-19-10-021
Equipment to Measure Hi AC Current Ratio Error (at the listed frequencies) ^F			
60 Hz	1A to 5 000 A	0.05 mA/A	GCT-1-S4 & & KATC-C, WI-19-10-021
Equipment to Measure Hi AC Current Phase Angle (at the listed frequencies) ^F			
60 Hz	1 A to 5 000 A	0.19 mR	
Equipment to Measure AC Current (at the listed frequencies) ^F			TESCO ACT-100, WI-19-10-040
60Hz)	0.2 A to 20 A	59 μA/A + 13 μA	
	20 A to 80 A	100 μA/A + 3.9 mA	
Equipment to Measure AC Voltage (at the listed frequencies) ^F			
60 Hz	60 V to 350 V	60 μV/V	



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Equipment to Measure AC Energy (at the listed frequencies) ^F			TESCO ACT-100, WI-19-10-040
Voltage	60 V to 500 V	60 μ V/V	
Current	0.2 A to 20 A	59 μ A/A + 13 μ a	
	20 A to 80 A	100 μ A/A + 3.9 mA	
Phase	60 V to 500 V 0.2 A to 80 A	8 m°	
Time	1 s to 3 600 s	7.5 μ s/s	

To calculate AC Energy of a given point, RSS the uncertainty of Vac, Iac, Phase (expressed in terms of power factor), and Time. See Worked Example of key values below.

Frequency (Hz)	Time (s)	Voltage (V)	Current (A)	Equivalent Power (Wh)	CMC \pm Uc (μ Wh/Wh)	
					PF 1.0 (0°)	PF 0.5 (60°)
60	10	208	0.5	0.289	104	263
		240		0.000	104	263
		208	1	0.578	94	259
		240		0.667	94	259
		208	2	1.156	89	258
		240		1.333	89	258
		208	5	2.889	86	257
		240		3.333	86	257
		208	10	5.778	85	256
		240		6.667	85	256
		208	20	11.556	85	256
		240		13.333	85	256
		208	30	17.333	238	339
		240		20.000	238	339
		208	50	28.889	188	306
		240		33.333	188	306
		208	80	46.222	161	290
		240		53.333	161	290



Certificate of Accreditation: Supplement

TESCO-The Eastern Specialty Company

925 Canal Street, Bristol, PA 19007

Contact Name: Carson Scaccetti Phone: 609-752-1238

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

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 Energy (at the listed frequencies) ^F			TESCO DCT-200, WI-19-10-039	
Voltage	60 V to 1 000 V	28 µV/V + 11 mV		
Current	5 A to 200 A	47 µA/A + 1.5 mA		
Time	1 s to 3 600 s	6.8 µs/s		
To calculate DC Energy of a given point, RSS the uncertainty of Vdc, Idc, and Time. See Worked Example of key values below.				
Time (s)	Voltage (V)	Current(A)	Equivalent Power (Wh)	CMC ±Uc (µWh/Wh)
10	120	5	1.667	367
	240		3.333	355
	480		6.667	351
	960		13.333	349
	120	10	3.333	230
	240		6.667	210
	480		13.333	203
	960		26.667	201
	120	20	6.667	169
	240		13.333	142
	480		26.667	132
	960		53.333	128
	120	30	10	152
	240		20	121
	480		40	109
	960		80	104
	120	50	16.667	140
	240		33.333	105
	480		66.667	91
	960		133.333	86
	120	80	26.667	135
	240		53.333	97
	480		106.667	82
	960		213.333	76
	120	100	33.333	133
	240		66.667	95



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To calculate DC Energy of a given point, RSS the uncertainty of Vdc, Idc, and Time. See Worked Example of key values below.

Time (s)	Voltage (V)	Current(A)	Equivalent Power (Wh)	CMC $\pm U_c$ (μ Wh/Wh)
10	480	200	133.333	79
	960		266.667	73
	120		66.667	129
	240		133.333	90
	480		266.667	73
	960		533.333	66

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
Equipment to Measure Frequency ^F	1 Hz to 1 MHz	6.1 μ Hz/Hz	Agilent 54181A WI-00-10-012
	1 MHz to 100 MHz	8.4 mHz/Hz	
	100 MHz to 200 MHz	16 mHz/Hz	
	200 MHz to 225 MHz	20 mHz/Hz	
	225 MHz to 3 GHz	17 mHz/Hz	
	0.01 Hz to 3 GHz	2.1 μ Hz /Hz	Agilent 54181A WI-00-10-012

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.