

	<b>ACCREDITATION DOCUMENT</b>	<b>F-06/02 Issue Date: 18/08/2020 Rev. No: 09 LAB 001</b>
---	-----------------------------------	---

## **Accreditation No: LAB 001**

### **Awarded to**

### **NATIONAL METRLOGY INSTITUTE OF PAKISTAN PLOT NO. 16, SECTOR H-9/1, ISLAMABAD, PAKISTAN.**

The scope of accreditation is in accordance with the standard specifications outlined in the following page(s) of this document. The accredited scope shall be visible and legible in areas such as customer service, sample-receiving section etc and shall not mislead its users.

The accreditation was first time granted on **12-02-2004** by Pakistan National Accreditation Council.

The laboratory complies with the requirements of **ISO/IEC 17025:2017**.

The accreditation requires regular surveillance, and is valid until **11-02-2025**.

The decision of accreditation made by Pakistan National Accreditation Council implies that the organization has been found to fulfill the requirements for accreditation within the scope.

The organization however, itself is responsible for the results of performed measurements/tests.

### **PAKISTAN NATIONAL ACCREDITATION COUNCIL**

14-03-2024  
Date

SD  
Director General

	<b>ACCREDITATION DOCUMENT</b>	<b>F-06/02</b> <b>Issue Date: 18/08/2020</b> <b>Rev. No: 09</b> <b>LAB 001</b>
---	-----------------------------------	---

### Testing Laboratory.

Accreditation Scope of **NATIONAL METROLOGY INSTITUTE OF PAKISTAN**  
PLOT NO. 16, SECTOR H-9/1, ISLAMABAD, PAKISTAN.

Permanent laboratory premises

Materials/ Products tested	Testing field (e.g. environmental testing or mechanical testing)	Types of test/ Properties measured	Reference to standardized method (e.g. ISO 14577-1:2003)/ Internal method reference
<b>CHEMICAL METROLOGY</b>			
Water/ Wastewater/ Industrial Effluents	Environmental testing	Measurement of Electrical Conductivity	2510-B, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Total Dissolved Solids (TDS)	2540-C, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Total Suspended Solids (TSS)	2540-D, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Total Hardness	2340-C, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Alkalinity	2320-B, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Chloride	4500-Cl <sup>-</sup> B, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Calcium	3500-Ca B, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Magnesium	3500-Mg(B), Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		Chemical Oxygen Demand (COD)	5220-B, Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA
		pH	4500-H <sup>+</sup> , Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, AWWA/APHA

14-03-2024  
Date

\_\_\_\_\_  
Sd  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

Water/ Wastewater/ Industrial Effluents/ Solutions/ Liquids	Chemical and Environmental testing	Copper (Cu)	Standard Methods for the Examination of Water and Waste water, 24th edition, 2022, APHA, AWWA, WEF / Atomic Absorption Spectrometer, AAAnalyst -100, Perkin Elmer-USA / Direct method (Flame - AAS)
		Iron (Fe)	
		Lead (Pb)	
		Zinc (Zn)	
		Chromium (Cr)	
		Sodium (Na)	
		Potassium (K)	
		Calcium (Ca)	
		Magnesium (Mg)	
		Cadmium (Cd)	
		Nickel (Ni)	
		Manganese (Mn)	
		Cobalt (Co)	

### Calibration Laboratory.

Accreditation Scope of **NATIONAL METROLOGY INSTITUTE OF PAKISTAN**  
PLOT NO.16, SECTOR H-9/1, ISLAMABAD, PAKISTAN.

Permanent laboratory premises

#### Field of measurement: VOLUME METROLOGY

Measured quantity	Range	*Expanded Uncertainty ( ± )	Technique, Reference Standard, Equipment
Micropipette	10 µL - 5000 µL	0.20 µL – 5.0 µL	<b>Equipment Used:</b> M-39 ME414S, Sartorius, Germany M-58 CP8200, Sartorius, Germany M-28 CC64K, Sartorius, Germany  <b>Method Used:</b> ASTM E542-01 MMD/Vol-28/TPP-28
Glassware	1 mL - 1000 mL	0.010 mL – 2.9 mL	
Glassware	1 L - 5 L	0.0040 L - 0.030 L	
Metallic	20 mL - 2000 mL	0.12 mL - 5.8 mL	
Metallic	2 L - 5 L	0.0060 L - 0.017 L	
Metallic	5 L - 10 L	0.017 L - 0.029 L	
Metallic	10 L - 20 L	0.029 L - 0.050 L	

#### Field of measurement: DIMENSION METROLOGY

Measured quantity	Range	*Expanded Uncertainty ( ± )	Technique, Reference Standard, Equipment
Length	(0-300) mm / (0-30) cm	0.041 - 0.071 mm	<b>Unit Under Test:</b> Foot Scales using Length Comparator <b>Method Used:</b> DMD/TP-1

14-03-2024  
Date

\_\_\_\_\_  
Sd  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

	0-1000 mm (1Meter)	0.041 - 0.062 mm	<b>Unit Under Test:</b> Meter Scales using Length Comparator <b>Method Used:</b> DMD/TP-1
	0.005 - 50 m	0.053 - 0.19 mm	<b>Unit Under Test:</b> Measuring Tapes using Length Comparator <b>Method Used:</b> DMD/TP-1
	1000 mm	0.0015 - 0.0050 mm	<b>Unit Under Test:</b> End Standard Meter Gauge Block using End to End Comparator <b>Method Used:</b> DMD/TP-2
	0.03 - 0.1 mm	0.20 - 3.0 $\mu$ m	<b>Unit Under Test:</b> Feeler Gauge using UMM <sub>2</sub> <b>Method Used:</b> DMD/TP-3
	0.5 - 100 mm	0.11 – 15 $\mu$ m	<b>Unit Under Test:</b> Gauge Blocks using UMM <sub>2</sub> <b>Method Used:</b> DMD/TP-3
	101 - 300 mm	0.13 – 4.8 $\mu$ m	<b>Unit Under Test:</b> Gauge Blocks using UMM <sub>2</sub> <b>Method Used:</b> DMD/TP-3
	0 - 300 mm	0.10 – 25 $\mu$ m	<b>Unit Under Test:</b> Precision Glass / Scale / Slide using UMM <sub>1</sub> <b>Technique Used:</b> Direct Measurement
	0 - 80 mm	0.72 – 14 $\mu$ m	<b>Unit Under Test:</b> Dial Indicator / Gauge using UMM <sub>1</sub> <b>Method Used:</b> DMD/TP-7
	0 - 300 mm	0.0058 - 0.088 mm	<b>Unit Under Test:</b> Digital Vernier /Dial Caliper using Gauge Blocks <b>Method Used:</b> DMD/TP-4
	0 - 25.4 mm	0.00060 - 0.0090 mm	<b>Unit Under Test:</b> Micrometer using Gauge Blocks <b>Method Used:</b> DMD/TP-5
	0 - 25 mm	0.00060 - 0.0067 mm	<b>Unit Under Test:</b> Dial Gauge Calibrator/ Dial Testing Machine using Gauge Blocks <b>Method Used:</b> Direct Measurement
<b>Diameter External</b>	0.5 mm - 100 mm	0.18 $\mu$ m - 10 $\mu$ m	<b>Unit Under Test:</b> Cylinders using UMM <sub>2</sub> <b>Method Used:</b> Direct Measurement
<b>Diameter Internal</b>	5.0 mm - 100 mm	0.74 $\mu$ m - 16 $\mu$ m	<b>Unit Under Test:</b> Ring Gauges using UMM <sub>1</sub>

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



**ACCREDITATION  
DOCUMENT**

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

			<b>Method Used:</b> DMD/TP-8
--	--	--	---------------------------------

**Field of measurement: PRESSURE METROLOGY**

Measured quantity	Range	*Expanded Uncertainty ( ± )	Technique, Reference Standard, Equipment
Hydraulic Pressure	10 – 500 psi	0.033 psi	<b>Reference Standards:</b> Hydraulic Dead Weight Tester (P– 10/R) <b>Unit Under Test:</b> Dead Weight Testers, Hydraulic Gauges and transducers Pressure Indicator <b>Method Used:</b> PMD/TPP-29
	501 – 1000 psi	0.034 psi	
	1001 – 5000 psi	0.052 psi	
	5001 – 10000 psi	0.35 psi	
Hydraulic Pressure	200 psi	0.0060 %FS	<b>Reference Standards:</b> Electronic Dead Weight Tester (P-19) <b>Unit Under Test:</b> Dead Weight Testers, Hydraulic Gauges and transducers Pressure Indicator <b>Method Used:</b> PMD/TPP-38
	500 psi		
	1500 psi		
	2000 psi		
Pneumatic Pressure	(-1 – 0) bar	0.00030 bar	<b>Reference Standards:</b> Digital Pneumatic Pressure Calibrator (P – 10, P-13) <b>Unit Under Test:</b> Pneumatic/ vacuum gauges, pressure calibrator, manometers and transducers <b>Method Used:</b> PMD/TPP-24
	(1– 20) bar	0.0035 bar	
Pneumatic Pressure Indicator	(0 – 500) psi	0.34 psi	<b>Reference Standards:</b> Digital Pneumatic Pressure Calibrator (P – 10, P-16) <b>Unit Under Test:</b> Pneumatic/ vacuum gauges, pressure calibrator, manometers and transducers <b>Method Used:</b> PMD/TPP-24
	501 – 10000 psi	0.84 psi	
	-1 – 0 bar	0.00030 bar	
	0 – 2 bar	0.0035 bar	
Atmospheric Pressure	(0.70 – 1.10) bar	0.00016 bar	<b>Reference Standards:</b> Reference Barometer (P-12) <b>Unit Under Test:</b> Barometers and Manometers <b>Method Used:</b> PMD/TPP-30

**Field of measurement: THERMAL METROLOGY**

Measured quantity	Range	*Expanded Uncertainty ( ± )	Technique, Reference Standard, Equipment
-------------------	-------	-----------------------------	--

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

<b>Heat Sources</b>  <b>Temperature (Sources)</b>	-80.00 °C	0.090 °C	<b>Reference Standards:</b> (Black Stack Thermometer FLUKE), (Working Standard PRT FLUKE), (R-Type Thermocouple 5649 FLUKE) (Zero Point Dry Well FLUKE) (Dry Block Calibrator (Model: Gemini700LRI) <b>Unit Under Test:</b> All types of Heat Sources <b>Method Used:</b> TMD/TPP-33
	0.00 °C	0.090 °C	
	100 °C	0.60 °C	
	200 °C	0.60 °C	
	299.3 °C	0.60 °C	
	400.0 °C	0.60 °C	
	500.0 °C	0.60 °C	
	600.0 °C	0.60 °C	
	700.0 °C	0.61 °C	
1150 °C	0.61 °C		
<b>Liquid-in-glass Thermometer</b>  <b>Temperature (Measure)</b>	-40 °C	0.10 °C	<b>Reference Standards:</b> Ultra Low Temperature Bath (Heart Scientific 7380) Liquid In Glass Thermometer (ASTM) High Precision Thermostatic Bath (Model: PROLABO) Oil Bath (HO-21S) Working Standard PRT (5628) Black Stack Digital Readout (1560) <b>Unit Under Test:</b> Liquid –In- Glass Thermometers <b>Method Used:</b> TMD/TPP-25
	0 °C	0.10 °C	
	10 °C	0.10 °C	
	30 °C	0.10 °C	
	50 °C	0.10 °C	
	80 °C	0.10 °C	
	100 °C	0.10 °C	
	150 °C	0.12 °C	
	200 °C	0.10 °C	
<b>Thermo-Hygrometer</b>  <b>Temperature / Humidity (Sources)</b>	20 %RH	2.20 %RH	<b>Reference Used:</b> RH Generator (HumiLab) NESLAB RTE Bath/Circulator (USA) Humidity and Temperature Probe OMEGAETTE (USA) Model: HH311 Fluke 971 <b>Unit Under Test:</b> All types of Thermo hygrometers <b>Method Used:</b> TMD/TPP-32
	30 %RH	2.20 %RH	
	40 %RH	2.70 %RH	
	50 %RH	2.80 %RH	
	60 %RH	2.80 %RH	
	70 %RH	2.80 %RH	
	80 %RH	2.80 %RH	
	18 °C	0.40 °C	
	20 °C	0.40 °C	
	22 °C	0.40 °C	
	24 °C	0.40 °C	
	26 °C	0.40 °C	
	28 °C	0.40 °C	
<b>Platinum Resistance Thermometer (PRT)</b>  <b>Temperature (Measure)</b>	-80 °C	0.0060 °C	<b>Reference Used:</b> Working Standard PRT (5628) Black Stack Digital Readout (1560) Dry Block Calibrator ISOTECH GIMNI 700LRI Ultra-Low Temperature Bath (7380) <b>Unit Under Test:</b> All types of PRT/RTD <b>Method Used:</b> MD/TPP-31
	0 °C	0.0040 °C	
	100 °C	0.0060 °C	
	200 °C	0.0070 °C	
	300 °C	0.0090 °C	
	400 °C	0.0090 °C	
	500 °C	0.014 °C	
	600 °C	0.014 °C	
<b>Thermocouple</b>  <b>Temperature (Sources)</b>	-40 °C	0.60 °C	<b>Reference Used:</b> Dry Block Calibrator (Model: Gemini700LRI) Ultra-Low Temperature Bath (Model:7380 USA), E-Type Thermocouple (Serial#:2H19 Japan)
	0 °C	0.60 °C	

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

	200 °C	0.60 °C	Black Stack Digital Readout (Serial#: A8B906, Fluke USA) R-Type Thermocouple (Serial #: 2J13 Japan) Furnace (9112B, Fluke USA) Temperature/Pressure Calibrator (Model#: 525BFluke USA), Working Standard PRT (Model #: 5628) Digital Thermometer (YEW 2575) Digital Thermometer (YEW 2572), R-Type Thermocouple Serial#:4996), Muffle Furnace (Model#:KE-6HK1200-3) Zero Point Dry Well (Model#:9101) S-Type Thermocouple (Model#:5650) <b>Unit Under Test:</b> S-Type Thermocouple R-Type Thermocouple K-Type Thermocouple <b>Method Used:</b> TMD/TPP-26
	400 °C	0.60 °C	
	600 °C	0.60 °C	
	800 °C	0.60 °C	
	1000 °C	0.61 °C	
	1100 °C	0.61 °C	

### Field of measurement: TIME AND FREQUENCY METROLOGY

Measured quantity	Range	*Expanded Uncertainty ( ± )	Technique, Reference Standard, Equipment
Frequency (Source)	10 Hz - 500 Hz @ 0 dBm	2.9E-03	<b>Reference Standards:</b> Cesium Frequency Standard 571A Precision Test System RFS10Rb Frequency Standard Marconi Instrument, AM/FM signal Generator 2024 (Source) SMF100 Signal Generator  <b>Unit Under Test:</b> Agilent Universal Frequency Counter/Timer 53230A(Measure) Microwave Frequency Counter 53152A  <b>Method Used:</b> Direct Frequency Comparison (T&FMD/TPP-01)
	501 Hz - 10 kHz @ 0 dBm	2.9E-03 to 1.2E-05	
	11 KHz - 500 kHz @ 0 dBm	1.2E-05	
	501 kHz - 1 MHz @ 0 dBm	1. 2E-05 to 1.3E-08	
	2 MHz - 100 MHz @ 0dBm	1.3E-08 to 1.0E-07	
	101 MHz - 500 MHz @ 0 dBm	1.0E-07 to 4.3E-07	
	501 MHz - 1 GHz@ 0 dBm	4.3E-07 to 1.7E-10	
	1.1 GHz - 10 GHz @ 0 dBm	1.7E-10 to 1.4E-09	
	11 GHz - 20 GHz @ 0 dBm	1.4E-09 to 2.0E-09	
	21 GHz - 30 GHz @ 0 dBm	2.0E-09 to 3.0E-09	
	31 GHz - 40 GHz @ 0 dBm	3.0E-09 to 1.4E-07	
Time base 10 MHz	4.9E-07		
Frequency (Measure)	10 Hz to 500 Hz @ 0 dBm	1.2E-02	<b>Reference Standards:</b> Cesium Frequency Standard 5071A Agilent Universal Frequency Counter/Timer 53230A(Measure) Microwave Frequency Counter 53152A
	501 Hz to 10kHz @ 0 dBm	1.2E-02 to 1.2E-05	
	11 KHz to 500 kHz	1.2E-05 to 8.0E-05	

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

	@ 0 dBm		<b>Unit Under Test:</b> Marconi Instrument, AM/FM signal Generator 2024 (Source) SMF100 Signal Generator <b>Method Used:</b> Direct Frequency Comparison with Frequency Counter (T&FMD/TPP-04)
	501 kHz to 1 MHz @ 0 dBm	8.0E-05 to 1.2E-08	
	2 MHz to 100 MHz @ 0 dBm	1.2E-08 to 4.1E-07	
	101 MHz to 500 MHz @ 0 dBm	4.1E-07 to 1.7E-08	
	501 MHz to 1 GHz @ 0 dBm	1.7E-08 to 2.9E-10	
	1.1 GHz to 10 GHz @ 0 dBm	2.9E-10 to 1.4E-09	
	11 GHz to 20 GHz @ 0 dBm	1.4E-09 to 2.6E-09	
	21 GHz to 30 GHz @ 0 dBm	2.6E-09 to 2.4E-09	
	31 GHz to 40 GHz @ 0 dBm	2.4E-09 to 2.4E-07	
	Time base 10 MHz	1.7E-08	
<b>Time Interval Measure</b>	1s to 60s (1min)	4.80E-01	<b>Reference Standards:</b> Cesium Frequency Standard 5071A Precision Test Systems GPS10RBN <b>Unit Under Test:</b> Casio, HS-60W-IDF, Q&Q Digital Stopwatch <b>Method Used:</b> Direct Frequency Comparison Method (T&FMD/TPP-02)
	1s to 1800s (1/2 hr)		
	1s to 3600s (1hrs)		
	1s to 7200s (2 hrs)		

**Field of measurement: ELECTRICAL METROLOGY**  
**A. (Measure Mode Scope)**

Measured quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
<b>DC Voltage</b>	0 - 100 mV	0.00085 mV	<b>Reference Standards:</b> 3458-Agilent, 34401 – Agilent, 8508 - A, Fluke, Digital multi-meters High voltage divider DVR 150 <b>Unit Under Test:</b> Fluke-5720-a, 9100-Wavetek, Multifunction Calibrator, High voltage source) <b>Method Used:</b> EMD/TPP-09
	100.00001 mV - 1 V	0.0000042 V	
	1.000001 - 10 V	0.000037 V	
	10.00001 - 100 V	0.00056 V	
	100.0001 - 1000 V	0.0056 V	
	1000.001 V - 150 kV	0.50 %	
<b>DC Current</b>	0 - 100 μA	0.0019 μA	<b>Reference Standard:</b> 3458-Agilent, 34401 – Agilent, 8508 - A, Fluke, Digital Multi-meters, Clamp meter Radian TX-21 <b>Unit Under Test:</b> Fluke-5720-A, 9100-Wavetek Multifunction Calibrator (Source) <b>Method Used:</b> EMD/TPP-09
	100.0001 μA - 1 mA	0.000015 mA	
	1.000001 - 10 mA	0.00015 mA	
	10.00001 - 100 mA	0.0019 mA	
	100.01 mA - 3 A	0.000020 A	
	3.00001 - 20 A	0.00024 A	
	20.00001 - 2000 A	1.50 %	

14-03-2024  
Date

Sd  
Director





## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

<b>AC Voltage</b>	0 - 10 mV, at 50Hz to 300 Hz	0.0039 mV	<b>Reference Standard:</b> 3458-Agilent, 34401 – Agilent, 8508 - A, Fluke, Digital Multi-meters (Measure) High Voltage Divider <b>Unit Under Test:</b> Fluke-5720-A, 9100-Wavetek Multifunction Calibrator (Source), High Voltage Source <b>Method Used:</b> EMD/TPP-09
	10.0001 - 100 mV, at 50Hz to 300 Hz	0.00039 mV	
	100.00001 mV - 1 V, at 50 to 500 Hz	0.00021 V	
	1.00001 - 10 V, at 50 Hz to 10 kHz	0.0038 V	
	10.00001 - 100 V, at 50 Hz to 10 kHz	0.018 V	
	100.0001 - 1000 V, at 50 Hz to 10 kHz	0.028 V	
	1kV to 150kV, at 50Hz to 1kHz	0.50 %	
<b>AC Current</b>	0 - 100 $\mu$ A, at 10 Hz to 1 kHz	0.012 $\mu$ A	<b>Reference Standard:</b> 3458-Agilent, 34401 – Agilent, 8508 - A, Fluke, Digital Multi-meters (Measure), Clamp meter <b>Unit Under Test:</b> Fluke-5720-a, 9100-Wavetwk Multifunction Calibrator (Source) <b>Method Used:</b> EMD/TPP-09
	100.001 $\mu$ A - 10 mA, at 10 Hz to 1 kHz	0.0013 mA	
	10.0001 - 100 mA, at 10 Hz to 1 kHz	0.013 mA	
	100.001 mA - 3 A, at 10 Hz to 1 kHz	0.00013 A	
	3.00001 - 20 A, at 10 Hz to 1 kHz	0.0063 A	
	20.00001 - 2000 A, at 50 Hz to 1 kHz	1.50 %	
<b>Resistance</b>	0 - 10 $\Omega$	0.00017 $\Omega$	<b>Reference Standard:</b> 3458-Agilent, 34401 – Agilent, 8508 - A, Fluke, Digital Multi-meters (Measure) <b>Unit Under Test:</b> Fluke-5720-A, 9100-Wavetek Multifunction Calibrator (Source) <b>Method Used:</b> EMD/TPP-09 EMD/TPP-11 EMD/TPP-12
	10.00001 - 100 $\Omega$	0.0014 $\Omega$	
	100.0001 $\Omega$ - 1 k $\Omega$	0.0000077 k $\Omega$	
	1.0000001 - 100 k $\Omega$	0.00069 k $\Omega$	
	100.00001 K $\Omega$ - 1 M $\Omega$	0.000010 M $\Omega$	
	1.00001 - 100 M $\Omega$	0.014 M $\Omega$	
	100.001 M $\Omega$ - 2 G $\Omega$	0.00026 G $\Omega$	
	2.00001 - 20 G $\Omega$	0.0024 G $\Omega$	
<b>Capacitance</b>	0.00 - 10 pF	0.0030 pF	<b>Reference Standard:</b> PM-6306 Fluke, Reference Digital Capacitance Meter (Measure) <b>Unit Under Test:</b> 9100-Wavetek, Universal Calibration System (Sources) <b>Method Used:</b> EMD/TPP-14
	10.001 - 1000 pF	3.16 pF	
	1 nF	0.0010 nF	
	1.001 nF - 1000 nF	2.89 nF	
	1 $\mu$ F	0.00010 $\mu$ F	
	1.0001 - 1000 $\mu$ F	0.058 $\mu$ F	
<b>Inductance</b>	100 $\mu$ H	0.05 $\mu$ H	<b>Reference Standard:</b> Fixed value working standard Inductors (source) <b>Unit Under Test:</b> Digital inductance/ LCR meter pm-6304 fluke, (measure) <b>Method Used:</b> EMD/TPP-14
	1 mH	0.0058 mH	
	10 mH	0.0058 mH	
	100 mH	0.0080 mH	
	1 H	0.00010 H	

14-03-2024  
Date

Sd  
Director



**ACCREDITATION  
DOCUMENT**

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

<b>AC Power</b>	50 mW – 2.7 kW (Direct) Up to 96 MW (with Sensors)	0.13 mW to 0.0067 kW 9.0 mW (with Sensors)	<p><b>Reference Standard:</b>  Three Phase Power Network Tester/ Analyzer (TE30)  Portable Transformer Analyzer (TX-21)  Three Phase 4 Channel Power Analyzer (PA2203A)  Three Phase Reference Standard (MT3000)</p> <p><b>Unit Under Test:</b>  Electrical Power Standard (6105A),  Three Phase Current &amp; Voltage Source (MT551)  Reference Standard Universal Calibration System (Source)</p> <p><b>Method Used:</b>  EMD/TPP-16</p>
-----------------	---	---	--

**Field of measurement: ELECTRICAL METROLOGY**  
**B. (Source Generation Scope)**

Measured quantity	Range	*Expanded Uncertainty (±)	Technique, Reference Standard, Equipment
<b>DC Voltage</b>	1.018 V	0.20 μV	<p><b>Reference Standard:</b>  Fluke – 732-B, Reference DC Voltage Standard (Source)</p> <p><b>Unit Under Test:</b>  3458-Agilent Reference, 8508 - A, Fluke, Digital Multi-meter (Measure)</p> <p><b>Method Used:</b>  EMD/TPP-10</p>
	10 V	0.40 μV	<p><b>Reference Standard:</b>  Fluke – 5720-A Multifunction Calibrator (Source)</p> <p><b>Unit Under Test:</b>  All Types OF Digital / Analog Multi-meter  3458-AGILENT, 8508-A, Fluke, 45-Fluke, ETC (Measure)</p> <p><b>Method Used:</b>  EMD/TPP-10</p>
	220 mV	0.0021 mV	
	2.2 V	0.000012 V	
	11 V	0.000041 V	
	22 V	0.000081 V	
	220 V	0.0011 V	
	1100 V	0.0076 V	
<b>DC Current</b>	220 μA	0.15 μA	<p><b>Reference Standard:</b>  Fluke – 5720-A Multifunction Calibrator-9100 Source)</p> <p><b>Unit Under Test:</b>  All Types OF Digital / Analog Multi-meters  3458-Agilent, 8508- A, Fluke, 45-Fluke, Clamp meter, etc. (Measure)</p> <p><b>Method Used:</b>  EMD/TPP-10</p>
	1.2 mA	0.000084 mA	
	22 mA	0.00081 mA	
	220 mA	0.011 mA	
	2.2 A	0.00019 A	
<b>AC Voltage</b>	20 A, 1000 A (via current coil)	0.0041 A 0.0044 A	<p><b>Reference Standard:</b>  Fluke – 5720- A Multifunction Calibrator</p>
	2.2 mV, at 10 Hz to 100	0.026 mV	

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

	kHz		(Source)
	22 mV, at 10 Hz to 100 kHz	0.079 mV	<b>Unit Under Test:</b> All Types OF Digital / Analog Multi- meters 3458 -Agilent, 8508- A, Fluke, 45-Fluke, etc. (Measure)  <b>Method Used:</b> EMD/TPP-10 EMD/TPP-08
	220 mV, at 10 Hz to 100 kHz	0.64 mV	
	2.2 V, at 10 Hz to 100 kHz	0.0040 V	
	22 V, at 10 Hz to 100 kHz	0.036 V	
	220 V, at 10 Hz to 100 kHz	0.057 V	
	750 V, at 40 Hz to 10 kHz	0.46 V	
	1100 V, at 40 Hz to 10 kHz	0.67 V	
AC Current	220 $\mu$ A, at 10 Hz to 10 kHz	0.31 $\mu$ A	
	2.2 mA, at 10 Hz to 10 kHz	0.0031 mA	
	22 mA, at 10 Hz to 10 kHz	0.029 mA	
	220 mA, at 10 Hz to 10 kHz	0.25 mA	
	2.2 A, at 20 Hz to 10 kHz	0.016 A	
	20 A, at 40 Hz to 10 kHz 1000 A, at 40 Hz to 1 kHz (via current coil)	0.040 A	
Resistance	1 $\Omega$	0.000095 $\Omega$	<b>Reference Standard:</b> Fluke – 5720-A Multifunction Calibrator (Source)  <b>Unit Under Test:</b> All Types OF Digital / Analog Multi-meter i. e. 3458-Agilent, 8508-A, Fluke, 45-Fluke, etc. (Measure)  <b>Method Used:</b> EMD/TPP-10 EMD/TPP-11 EMD/TPP-12
	10 $\Omega$	0.000023 $\Omega$	
	100 $\Omega$	0.000010 $\Omega$	
	1 k $\Omega$	0.0000090 k $\Omega$	
	10 k $\Omega$	0.0000090 k $\Omega$	
	100 k $\Omega$	0.000010 $\Omega$	
	1 M $\Omega$	0.000020 M $\Omega$	
	10 M $\Omega$	0.00005 M $\Omega$	
	100 M $\Omega$	0.00010 M $\Omega$	
1 T $\Omega$	0.000030 M $\Omega$		
Resistance	0.0001 $\Omega$	60 $\mu\Omega$	<b>Reference Standard:</b> Hi-Accuracy Working Standard 4-Terminal Standard Resistors 20-E/D to 28-E/D, H&B Germany (Source)  <b>Unit Under Test:</b> 34420-Agilent Digital $\mu\Omega$ Meter (Measure)  <b>Method Used:</b> EMD/TPP-11 EMD/TPP-12
	10 k $\Omega$	0.0080 $\Omega$	
Capacitance	0.1 $\mu$ F	0.00050 $\mu$ F	<b>Reference Standard:</b> Fixed Value Working Standard Capacitors (Source)  <b>Unit Under Test:</b> Digital Capacitance/ LCR Meter PM-6304 Fluke, (Measure)
	1 $\mu$ F	0.00050 $\mu$ F	

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

			<b>Method Used:</b> EMD/TPP-13
	4 $\mu$ F	0.050 % + 3.0 pF	<b>Reference Standard:</b> 9100-Wavetek, Universal Calibration system (Source) <b>Unit Under Test:</b> Digital Capacitance Meter LCR Meter, (Measure) <b>Method Used:</b> EMD/TPP-13
	40 $\mu$ F	0.050 %	
	400 $\mu$ F	0.050 %	
	4 mF	0.050 %	
<b>DC Power</b>	1 W – 500 kW	0.10 W to 0.16 kW	<b>Reference Standard:</b> 9100-Wavetek, Universal Calibration system (Source) <b>Unit Under Test:</b> Power Analyzer / Wattmeter (Measure) <b>Method Used:</b> EMD/TPP-17
<b>AC Power</b>	1 W – 500 kW, at 50 Hz – 1 kHz	0.10 W to 0.16 kW	<b>Reference Standard:</b> Universal Calibration System 9100-Wavetek (Source) <b>Unit Under Test:</b> Power Analyzer (Measure) <b>Method Used:</b> EMD/TPP-17
<b>Inductance</b>	100 $\mu$ H	0.0080 $\mu$ H	<b>Reference Standard:</b> Fixed Value Working Standard Inductors (Source) <b>Unit Under Test:</b> Digital Inductance/ LCR Meter PM-6304 Fluke, (Measure) <b>Method Used:</b> EMD/TPP-14
	1 mH	0.0060 mH	
	10 mH	0.0060 mH	
	100 mH	0.0060 mH	
	1 H	0.0060 H	
<b>Field of measurement: CHEMICAL METROLOGY</b>			
<b>Measured quantity</b>	<b>Range</b>	<b>*Expanded Uncertainty (<math>\pm</math>)</b>	<b>Technique, Reference Standard, Equipment</b>
<b>Calibration of Conductivity meter</b>	1413 $\mu$ mhos /cm	5.2 $\mu$ mhos /cm	<b>Reference Standard:</b> NIST Traceable Conductivity standard solution <b>Method Used:</b> APHA, AWWA, WEF, USA, 2510B
<b>Calibration of pH meter</b>	0 -14	0.020	<b>Reference Standard:</b> NIST Traceable pH buffers <b>Method Used:</b> APHA, AWWA, WEF, USA, 2510B Standard Buffer solutions / Two - point calibration method

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director



**ACCREDITATION  
DOCUMENT**

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

**Calibration Laboratory.**

Onsite Accreditation Scope of  
**NATIONAL PHYSICAL & STANDARDS LABORATORY**  
 PLOT NO.16, SECTOR H-9/1, ISLAMABAD, PAKISTAN.

Mobile laboratory (Onsite Calibration)

<b>Field of measurement: MASS METROLOGY</b>			
<b>Measured quantity</b>	<b>Range</b>	<b>*Expanded Uncertainty (±)</b>	<b>Technique, Reference Standard, Equipment</b>
<b>Balance/ Weighing machine</b>	Up to 500 g	0.010 to 0.10 mg (depends upon readability/resolution of unit under-test)	E2 class standard masses (1 mg to 5000 g) <b>Method Used:</b> MMD/TPP-21/04
	500 g to 5000 g	0.10 to 1.0 mg (depends upon readability/resolution of unit under-test)	
<b>Field of measurement: THERMAL METROLOGY</b>			
<b>Measured quantity</b>	<b>Range</b>	<b>*Expanded Uncertainty (±)</b>	<b>Technique, Reference Standard, Equipment</b>
<b>Calibration of Thermocouples</b>	Ambient to 650 °C	1.0 °C to 1.5 °C	Dry block Temperature Calibrator, Digital Readout, Reference Thermometers, Zero-point Dry Well <b>Method Used:</b> TMD/TPP-26
<b>Calibration of PRT/SPRT</b>	Ambient to 650 °C	0.15 °C to 0.50 °C	Reference Thermometers, Digital Readout, zero point Dry Well, Dry block Temperature Calibrator <b>Method Used:</b> TMD/TPP-31
<b>Calibration of Low Temperature Bath/ Heat Sources (Oven, Incubator, Dry Block, Furnace)</b>	-80 °C to 1400 °C	0.10 °C to 0.50 °C	PRT, S & R Type Thermometer <b>Method Used:</b> TMD/TPP-34
<b>Calibration of Thermo Hygrometers</b>	20 %RH to 80 %RH	1.4 % RH to 1.9 %RH	RH Generator Humi-Lab. Humidity and Temperature Probe (OMEGAETTE, USA; Model: HH311) <b>Method Used:</b> TMD/TPP-32
<b>Field of measurement: ELECTRICAL METROLOGY</b>			
<b>Measured quantity</b>	<b>Range</b>	<b>*Expanded Uncertainty (±)</b>	<b>Technique, Reference Standard, Equipment</b>

14-03-2024  
Date

\_\_\_\_\_  
Sd  
Director



## ACCREDITATION DOCUMENT

**F-06/02**  
**Issue Date: 18/08/2020**  
**Rev. No: 09**  
**LAB 001**

<b>DC Voltage</b>	100 mV	0.00085 mV	<b>Reference Standard:</b> Digital multi-meters High voltage divider DVR 150 <b>Unit under test:</b> Multifunction Calibrator, High voltage source
	100.00001 mV - 1 V	0.0000042 V	
	1.000001 - 10 V	0.000037 V	
	10.00001 - 100 V	0.00056 V	
	100.0001 - 1000 V	0.0056 V	
	1 kV – 150 kV	0.50 %	
<b>AC Voltage</b>	100 mV – 1000 V at 50 Hz to 10 kHz	0.0039 mV - 0.028 V	
	1kV - 150kV at 50Hz to 1kHz	0.50 %	
<b>DC Current</b>	1 mA – 20 A	0.00015 mA – 0.00025A	<b>Reference Standard:</b> 3458-Agilent, 34401- Agilent, 8508- A, Fluke, Digital Multi-meters, Clamp meter Radian TX-21 <b>Unit under test:</b> Multifunction Calibrator High Current Source
	20 A – 2000 A	1.50 %	
<b>AC Current</b>	1 mA to 20 A, at 10 Hz to 1 kHz	0.0013 mA	
	20 A – 2000 A, at 50 Hz to 10 kHz	1.50 %	
<b>Resistance</b>	1 Ω - 2 GΩ	0.00017 Ω - 0.00026 GΩ	<b>Reference Standard:</b> Digital multi-meters <b>Unit Under Test:</b> Resistance Calibrator Fixed / Decade Resistance Box
	2 GΩ - 20 GΩ	0.0026 GΩ	
<b>Capacitance</b>	1 nF – 1000 μF	0.0010 nF – 0.058 μF	<b>Reference Standard:</b> PM-6306 Fluke <b>Unit Under Test:</b> Decade / Fixed Capacitance Standards
<b>Inductance</b>	100 μH – 1 H	0.050 μH – 0.0061 H	<b>Reference Standard:</b> PM-6306 Fluke, <b>Unit under test:</b> Digital / Fixed / Decade Inductance

\* **Expanded Uncertainty:**

- Expanded Uncertainty is the measurement uncertainty at a coverage probability of 95 %, which usually requires the use of a coverage factor of  $k = 2$ . This measurement uncertainty is a value for which the laboratory has been accredited using the procedure that was the subject of assessment. In certificates issued under its accreditation scope an accredited laboratory is not permitted to quote an uncertainty that is smaller than the published uncertainty for respective ranges as given above.

14-03-2024  
Date

Sd  
\_\_\_\_\_  
Director