

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



NO: SAMM 049

Page: 1 of 32

LABORATORY LOCATION:
(PERMANENT LABORATORY)



NORTHLAB SEAMS (M) SDN. BHD.
NO. 47-G & 47-1, JALAN PJU 1A/41B
PUSAT DAGANGAN NZX, ARA JAYA
47301 PETALING JAYA
SELANGOR
MALAYSIA

FIELDS OF CALIBRATION:

DIMENSIONAL, MASS, FORCE, PRESSURE,
TEMPERATURE, ELECTRICAL

FIELD OF TESTING:

MECHANICAL (VALVE TESTING)

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2005 (ISO/IEC 17025:2005).

This laboratory's fulfillment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

* The expanded uncertainties are based on an estimated confidence probability of approximately 95% and have a coverage factor of $k=2$ unless stated otherwise.

SCOPE OF CALIBRATION: DIMENSIONAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
1) Plain Plug Gauge/Pin Gauge (diameter only)	0.2 mm to 10 mm 10 mm to 50 mm 50 mm to 100 mm 100 mm to 150 mm	0.7 μ m 1.1 μ m 1.5 μ m 1.9 μ m	Contact method using Universal Horizontal Metroscope with Gauge Block
2) Plain Ring Gauge (diameter only)	2 mm to 50 mm 50 mm to 100 mm 100 mm to 150 mm	1.4 μ m 1.5 μ m 1.6 μ m	Contact method using Universal Horizontal Metroscope with Master Ring Gauge
3) Plain Gap Gauge	0.5 mm to 10 mm 10 mm to 150 mm 150 mm to 300 mm	2.5 μ m 3 μ m 5 μ m	Calibrated using Height Setting Micrometer according to ASME B 47.1 – 1:2007
4) Thread Plug & Thread Ring Gauge (Pitch Diameter & Major Diameter)	M2 to M38 M38 to M100	1.2 μ m 3.0 μ m	Calibrated using Universal Horizontal Metroscope according to ANSI/ASME B1.2- 1983 or ISO 1502-1996

SCOPE OF CALIBRATION: DIMENSIONAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
5) Feeler Gauge	0.05 mm to 1 mm	0.5 μ m	Calibrated using Universal Horizontal Metroscope according to BS 957:2008
6) Thickness Gauge	0 mm to 20 mm	2.5 μ m	Calibrated using Height Setting Micrometer according to ASME B 47.1 – 1:2007
7) Other Limit Gauge – Height, Depth & Length	0 mm to 300 mm	(2 + 10 * Length in m) μ m	Calibrated using Height Setting Micrometer according to ASME B 47.1 – 1:2007
8) Dial Gauge	0 mm to 10 mm 10 mm to 30 mm 30 mm to 50 mm 50 mm to 80 mm 80 mm to 100 mm	0.0005 mm 0.0009 mm 0.001 mm 0.0012 mm 0.0015 mm	Calibrated using indicator tester according to JIS B 7503:1997 or DIN 879:1999 or ASME B89.1.10M-2001
9) Dial Test Indicator	0 mm to 5 mm	0.0005 mm	Calibrated using indicator tester according to ASME B89.1.10M-2001
10) Digital Indicator	0 mm to 100 mm	1 μ m	Calibrated using Gauge Block according to in house calibration procedure SEAMS - 0017
11) Linear Gauges	0 mm to 100 mm	1 μ m	Calibrated using Gauge Block according to in house calibration procedure SEAMS - 0017
12) Dial Thickness Gauge	0 mm to 20 mm (0.001 mm resolution)	3 μ m	Calibrated using Gauge Block according to in house calibration procedure SEAMS - 0005
13) External Micrometer	25 mm traverse for frame up to 600 mm	2 μ m	Calibrated Using Gauge Block according to ISO 3611:2010
14) Thread Micrometer	25 mm traverse for frame up to 100 mm	1 μ m	Calibrated using Gauge Block according to in house calibration procedure SEAMS - 0010

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



MS ISO/IEC 17025

NO: SAMM 049

Page: 3 of 32

SCOPE OF CALIBRATION: DIMENSIONAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(±)*	Remarks
15) Internal Micrometer including Stick Micrometer	25 mm traverse for stick length up to 900 mm	4 µm	Calibrated using Height Setting Micrometer and Gauge Block according to BS 959:2008
16) Depth Micrometer	0 mm to 300 mm	3 µm	Calibrated using Gauge Block according to BS 6468 : 2008
17) Dial / Digital & Vernier Caliper (External accuracy)	0 mm to 1000 mm	16 µm	Calibrated using Caliper Checker and Gauge Block according to BS EN ISO 13385-1:2011 or JIS B 7507:2016
18) Dial / Digital & Vernier Height Gauge	0 mm to 1000 mm	16 µm	Calibrated using Gauge Block according to BS EN ISO 13225:2012
19) Precision Vernier Depth Gauge	0 mm to 300 mm	13 µm	Calibrated using Gauge Block according to BS EN ISO 13385-2:2011
20) Caliper Gauge	0 mm to 50 mm	5 µm	Calibrated using Gauge Block according to in house calibration procedure SEAMS - 0004
21) Height Setting Micrometer & Riser Block	0 mm to 300 mm 300 mm to 600 mm	1 µm 2 µm	Calibrated using Gauge Block according to ISO 7863:1984
22) Caliper Checker	0 mm to 360 mm 0 mm to 670 mm	2.1 µm 4 µm	Calibrated using Gauge Block according to in house calibration procedure SEAMS – 0001
23) Calibration Tester	0 mm to 25 mm, (0.001 mm resolution) 0 mm to 30 mm, (0.0001 mm resolution)	1.0 µm 0.4 µm	Calibrated using Gauge Block according to in house calibration procedure SEAMS – 0009
24) Three-Point Internal Micrometer (Holtest)	6 mm to 100mm	3 µm	Calibrated using Ring Gauge according to in house calibration procedure SEAMS - 0007

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 4 of 32

SCOPE OF CALIBRATION: DIMENSIONAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
25) Taper Thread Plug Gauge (Pitch diameter at basic length, step length)	1/16 inch to 2 inch	0.0002 inch	Calibration using Universal Horizontal Microscope and Gauge Block according to ASME B1.20.5 - 1991

Signatories:

1. **Azhar Bin Salman**
2. **Mohanakrishnan Sreesankar**
3. ****Sreejith Radhakrishnan**
4. ****Vishnu Pakkanar**

**Note: Non-resident signatory

NO: SMM 049

Page: 5 of 32

SCOPE OF CALIBRATION: DIMENSIONAL

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Projector (Individual Linear Axis Only)	Linear Scale 0 to 300 mm Magnification error	7 μ m	Calibrated using Glass Scale and Precision Ball according to JIS B 7184:1994
Measuring Microscopes (Individual Linear Axis Only)	Linear Scale 0 to 200 mm	7 μ m	Calibrated using Glass Scale according to JIS B 7153:1995
Surface Plate (flatness)	length up to 600 mm over 600 mm to 1000mm over 1000 mm to 1500 mm over 1500 mm to 2000 mm	1.6 μ m 1.9 μ m 2.0 μ m 2.2 μ m	Calibrated using Planekator according to BS 817:2008

Signatories:

1. **Azhar Bin Salman**
2. **Mohanakrishnan Sreesankar**
3. ****Sreejith Radhakrishnan**

**Note: Non-resident signatory

NO: SAMM 049

Page: 6 of 32

SCOPE OF CALIBRATION: MASS

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Standard Weights	1 mg to 200 g Above 200 g to 1000 g Above 1 kg to 20 kg	0.3 mg 3 mg 0.3 g	Calibrated using standard weights and electronic weighing scale

Signatories:

1. Mohanakrishnan Sreesankar
2. Biji Nalinakshan Nair
3. **Sreejith Radhakrishnan
4. **A.Murugappan

**Note: Non-resident signatory

SCOPE OF CALIBRATION: MASS**SITE: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Weighing Balances / Scales	up to 350 g up to 1500 g up to 6000 g 6 kg to 30 kg up to 150 kg up to 300 kg up to 500 kg up to 1000 kg	0.0004 g 0.003 g 0.13 g 0.0014 kg 0.006 kg 0.02 kg 0.06 kg 0.14 kg	Calibrated using Standard Weights The calibration procedure covers the instrumental accuracy and linearity error, repeatability and off- center error

Signatories:

1. Mohanakrishnan Sreesankar
2. Biji Nalinakshan Nair
3. **Sreejith Radhakrishnan
4. **A.Murugappan

**Note: Non-resident signatory

NO: SAMM 049

Page: 7 of 32

SCOPE OF CALIBRATION: FORCE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Push - Pull and Tension Gauge	0 kgf to 5 kgf 5 kgf to 10 kgf 10 kgf to 30 kgf 30 kgf to 50 kgf	0.002 kgf 0.003 kgf 0.03 kgf 0.05 kgf	Calibrated using Standard Weights
Hand Torque Tools	0.1 N.m to 0.7 N.m 0.7 N.m to 1 N.m 1 N.m to 5 N.m 5 N.m to 12.5 N.m 12.5 N.m to 150 N.m 150 N.m to 300 N.m 300 N.m to 900 N.m 900 N.m to 1360 N.m	0.003 N.m 0.005 N.m 0.018 N.m 0.04 N.m 0.20 N.m 1.1 N.m 2.7 N.m 3.3 N.m	Calibrated according to ISO 6789:2003

Signatories:

1. Mohanakrishnan Sreesankar
2. Biji Nalinakshan Nair
3. Azhar Bin Salman
4. **Sreejith Radhakrishnan
5. **A.Murugappan

**Note: Non-resident signatory

NO: SAMM 049

Page: 8 of 32

SCOPE OF CALIBRATION: PRESSURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Pneumatic Pressure Instruments	0 bar to 8 bar	0.05% of Reading + 0.001 bar	Calibrated using Pneumatic Dead Weight Tester
	8 bar to 10 bar 10 bar to 20 bar	0.0068 bar 0.022 bar	Calibrated using Digital Pressure Indicator
Hydraulic Pressure Instruments	1 bar to 1200 bar	0.011% of Reading + 0.0070 bar	Calibrated using Hydraulic Dead Weight Tester
Hydraulic Pressure Instruments	1200 psi to 60,000 psi	160 psi	Calibrated using High Pressure Transducer
Vacuum Instruments	-0.97 bar to 0 bar	0.0015 bar	Calibrated using Digital Pressure Indicator
Pneumatic Pressure Instruments	0 inH ₂ O to 2 inH ₂ O	0.0044 inH ₂ O	Calibrated using Water Manometer
	2 inH ₂ O to 10 inH ₂ O	0.035 inH ₂ O	Calibrated using Pressure Module
Pneumatic Pressure Instruments Absolute	0 to 20 bar abs	0.03 bar abs	Calibrated using Digital Pressure Indicator

Signatories:

1. **Tamilselvam A/L Chinayah**
2. **Biji Nalinakshan Nair**
3. ****Sreejith Radhakrishnan**
4. ****A.Murugappan**

**Note: Non-resident signatory

NO: SAMM 049

Page: 9 of 32

SCOPE OF CALIBRATION: PRESSURE

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Pneumatic Pressure Instruments	0 inH ₂ O to 2 inH ₂ O	0.0044 inH ₂ O	Calibrated using Water Manometer
	2 inH ₂ O to 10 inH ₂ O	0.035 inH ₂ O	Calibrated using Pressure Module
	0 bar to 2 bar 2 bar to 10 bar 10 bar to 20 bar	0.0056 bar 0.016 bar 0.037 bar	Calibrated using Digital Pressure Indicator
Hydraulic Pressure Instruments	20 bar to 400 bar 400 bar to 700 bar	0.68 bar 1.6 bar	Calibrated using Digital Pressure Indicator
Vacuum	-0.97 bar to 0 bar	0.0027 bar	Calibrated using Digital Pressure Indicator
Pneumatic Pressure Instruments Absolute	0 to 20 bar abs	0.10 bar abs	Calibrated using Digital Pressure Indicator

Signatories:

1. **Tamilselvam A/L Chinayah**
2. **Biji Nalinakshan Nair**
3. ****Sreejith Radhakrishnan**
4. ****A.Murugappan**

**Note: Non-resident signatory

NO: SAMM 049

Page: 10 of 32

SCOPE OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Temperature Sensors with Indicators	-40 °C to 5 °C 5 °C to 150 °C 150 °C to 200 °C 200 °C to 420 °C 420 °C to 600 °C 600 °C to 1000 °C 1000 °C to 1200 °C	0.081 °C 0.13 °C 0.21 °C 0.24 °C 1.7 °C 3.1 °C 3.2 °C	By Comparison Method using PRT / Type S Thermocouple and Temperature Bath / Dry Block
PT100 & Thermocouple Sensors without Indicators	-40 °C to 5 °C 5 °C to 150 °C 150 °C to 200 °C 200 °C to 420 °C 420 °C to 600 °C 600 °C to 1000 °C 1000 °C to 1200 °C	0.93 °C 0.93 °C 0.95 °C 0.95 °C 2.0 °C 3.2 °C 3.3 °C	By Comparison Method using PRT / Type S Thermocouple and Temperature Bath / Dry Block / Temperature Indicator
Temperature Indicators			
PT 100 (3926)	-200 °C to 0 °C 0 °C to 630 °C	0.059 °C 0.14 °C	
PT 100 (385)	-200 °C to 0 °C 0 °C to 630 °C 630 °C to 800 °C	0.059 °C 0.14 °C 0.27 °C	
PT 100 (3916)	-200 °C to 630 °C	0.27 °C	
Thermocouple			By Electrical Simulation Using Temperature Calibrator and ITS 90 Tables
Type E	-200 °C to -100 °C -100 °C to 1000 °C	0.58 °C 0.25 °C	
Type J	-210 °C to 1200 °C	0.31 °C	
Type K	-200 °C to 1372 °C	0.46 °C	
Type N	-200 °C to 1300 °C	0.46 °C	
Type R	0 °C to 1767 °C	0.67 °C	
Type S	0 °C to 1767 °C	0.55 °C	
Type T	-200 °C to -150 °C -150 °C to 400 °C	0.73 °C 0.28 °C	

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 11 of 32

SCOPE OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Temperature Calibrators			
PT 100 (3926)	-200 °C to 0 °C 0 °C to 630 °C	0.1 °C 0.1 °C	By Electrical Measurement Using DMM and ITS 90 Tables
PT 100 (385)	-200 °C to 0 °C 0 °C to 800 °C	0.1 °C 0.1 °C	
PT 100 (3916)	-200 °C to 0 °C 0 °C to 630 °C	0.1 °C 0.1 °C	
Thermocouple			
Type E	-200 °C to -100 °C -100 °C to 1000 °C	0.58 °C 0.25 °C	By Electrical Measurement Using Temperature Calibrator and ITS 90 Tables
Type J	-210 °C to 1200 °C	0.32 °C	
Type K	-200 °C to 1372 °C	0.47 °C	
Type N	-200 °C to 1300 °C	0.47 °C	
Type R	0 °C to 1767 °C	0.67 °C	
Type S	0 °C to 1767 °C	0.56 °C	
Type T	-200 °C to -150 °C -150 °C to 400 °C	0.73 °C 0.28 °C	
Dry Block Calibrators	-40 °C to 420 °C 420 °C to 600 °C 600 °C to 1200 °C	0.21 °C 1.7 °C 2.6 °C	Calibrated using PRT and Type S Thermocouple
Liquid-in-Glass Thermometer (partial immersion)	-40 °C to 5 °C 5 °C to 150 °C 150 °C to 200 °C	0.10 °C 0.14 °C 0.21 °C	By Comparison Method Using PRT and Temperature Bath
Temperature and Humidity Indicator	15 °C to 35 °C 35 °C to 40 °C 25 %R.H to 65 %R.H 65 %R.H to 90 %R.H	0.54 °C 0.74 °C 4.2 %R.H 5.0 %R.H	By Comparison with Reference Thermohygrometer in Environmental Chamber

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 12 of 32

SCOPE OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Infrared Thermometer	50 °C to 300 °C 300 °C to 400 °C	4.9 °C 5.1 °C	By Comparison with Reference Infrared Thermometer in Blackbody Source

Signatories:

1. **Tamilselvam A/L Chinayah**
2. **Biji Nalinakshan Nair**
3. **Mohanakrishnan Sreesankar**
4. ****Neela Lohit Pavani**
5. ****A.Murugappan**

**Note: Non-resident signatory

NO: SAMM 049

Page: 13 of 32

SCOPE OF CALIBRATION: TEMPERATURE

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Temperature Sensors with Indicators	-15 °C to 50 °C 50 °C to 420 °C 420 °C to 600 °C 600 °C to 1000 °C 1000 °C to 1200 °C	0.25 °C 0.29 °C 1.7 °C 3.1 °C 3.2 °C	By Comparison Method Using PRT/ Type S Thermocouple and Temperature Bath / Dry Block
PT100 & Thermocouple Sensors without Indicators	-15 °C to 50 °C 50 °C to 420 °C 420 °C to 600 °C 600 °C to 1000 °C 1000 °C to 1200 °C	0.94 °C 0.95 °C 2.0 °C 3.2 °C 3.3 °C	By Comparison Method Using PRT/ Type S Thermocouple and Temperature Bath / Dry Block / Temperature Indicator
Temperature Indicators			
PT 100 (3926)	-200 °C to 100 °C 100 °C to 630 °C	0.25 °C 0.5 °C	
PT 100 (385)	-200 °C to 100 °C 100 °C to 800 °C	0.25 °C 0.61 °C	
PT 100 (3916)	-200 °C to 100 °C 100 °C to 630 °C	0.25 °C 0.5 °C	
Thermocouple			
Type E	-200 °C to -100 °C -100 °C to 1000 °C	0.92 °C 0.37 °C	By Electrical Simulation Using Temperature Calibrator and ITS 90 Tables
Type J	-210 °C to 1200 °C	0.58 °C	
Type K	-200 °C to 1372 °C	0.89 °C	
Type N	-200 °C to 0 °C 0 °C to 1300 °C	1.1 °C 0.71 °C	
Type R	0 °C to 1767 °C	1.9 °C	
Type S	0 °C to 1767 °C	1.8 °C	
Type T	-200 °C to 0 °C 0 °C to 400 °C	1.3 °C 0.37 °C	

NO: SAMM 049

Page: 14 of 32

SCOPE OF CALIBRATION: TEMPERATURE

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Dry Block Calibrators	-40 °C to 420 °C 420 °C to 600 °C 600 °C to 1200 °C	0.21 °C 1.8 °C 2.7 °C	Calibrated using PRT and Thermocouple Type S
Temperature Controlled Enclosures	-40 °C to 200 °C 200 °C to 400 °C 400 °C to 1200 °C	1.1 °C 2.2 °C 5.9 °C	Using Thermocouple and Temperature Indicator Based on AS2853-1986
Humidity Controlled Enclosure	5 °C to 60 °C	1.1 °C	Using Thermocouple and Temperature Indicator Based on AS2853-1986
	<u>5 °C to 20 °C</u> 20 %R.H to 50 %R.H 50 %R.H to 80 %R.H 80 %R.H to 95 %R.H	6.3 % R.H 8.3 % R.H 9.2 %R.H	
	<u>20 °C to 40 °C</u> 20 %R.H to 50 %R.H 50 %R.H to 80 %R.H 80 %R.H to 95 %R.H	3.8 %R.H 5.5 %R.H 6.4 %R.H	
	<u>40 °C to 60 °C</u> 20 %R.H to 50 %R.H 50 %R.H to 80 %R.H 80 %R.H to 95 %R.H	2.8 %R.H 4.3 %R.H 5.1 %R.H	

Signatories:

1. **Tamilselvam A/L Chinayah**
2. **Biji Nalinakshan Nair**
3. **Mohanakrishnan Sreesankar**
4. ****Neela Lohit Pavani**
5. ****A.Murugappan**

**Note: Non-resident signatory

NO: SAMM 049

Page: 15 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Instruments			
DC Voltage	0 mV to 329 mV 0.33 V to 3.29 V 3.29 V to 32.9 V 30 to 329 V 329 to 1020 V	0.027 mV / V 0.014 mV / V 0.016 mV / V 0.022 mV / V 0.023 mV / V	Calibrated according to procedure E18, Rev 01 using Direct Method
AC Voltage	1 mV to 33 V	See Matrix A	Calibrated according to procedure E18, Rev 01 using Direct Method
	33 V to 330 V 45 Hz to 1 kHz 1 kHz to 10 kHz 10 kHz to 20 kHz 20 kHz to 50 kHz 50 kHz to 100 kHz	0.23 mV / V 0.25 mV / V 0.31 mV / V 0.39 mV / V 2.5 mV / V	
	330 V to 1020 V 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	0.68 mV / V 0.65 mV / V 0.68 mV / V	

MATRIX A
AC VOLTAGE MEASUREMENT

Range	Frequency					
	Hz	kHz	kHz	kHz	kHz	KHz
	10 to 45	0.045 to 10	10 to 20	20 to 50	50 to 100	100 to 500
1 mV to 32.9 mV	1.1	0.4	0.45	1.4	4.5	11
33 mV to 330 mV	0.38	0.20	0.22	0.44	1	4.4
0.33 V to 3.3 V	0.36	0.20	6.0	0.37	5.9	3.8
3.3 V to 33 V	0.37	10	9.8	9.8	9.9	-

The uncertainties given in this table are expressed in mV/V.

NO: SAMM 049

Page: 16 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Instruments (Continued)		-	
DC Current	0 mA to 0.33 mA 0.33 mA to 3.3 mA 3.3 mA to 33 mA 33 mA to 0.33 A 0.33 A to 1.1 A 1.1 A to 3.0 A 3 A to 11 A 11 A to 20.5 A	0.24 mA / A 0.13 mA / A 0.12 mA / A 0.12 mA / A 0.27 mA / A 0.45 mA / A 0.63 mA / A 2.3 mA / A	Calibrated according to procedure E18, Rev 01 using Direct Method
	20.5 A to 1025 A (current coil)	3.0 mA / A	Calibrated using Multifunction Calibrator 5520A and 50 turn coil
AC Current	0.029 mA to 330 mA	See Matrix B	Calibrated according to procedure E18, Rev 01 using Direct Method
	<u>0.33 A to 1.1 A</u> 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	2.2 mA / A 0.80 mA / A 8.0 mA / A 34 mA/A	
	<u>1.1 A to 3.0 A</u> 10 Hz to 45 Hz 45 Hz to 1 kHz 1 kHz to 5 kHz 5 kHz to 10 kHz	9.0 mA / A 8.9 mA / A 12 mA / A 33 mA/A	
	<u>3 A to 11 A</u> 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz	0.98 mA / A 1.4 mA / A 35 mA / A	Calibrated according to procedure E11, Rev 01 using Direct Method
	<u>11 A to 20.5 A</u> 45 Hz to 100 Hz 100 Hz to 1 kHz 1 kHz to 5 kHz	3.4 mA / A 3.5 mA / A 3.5 mA / A	
	<u>20.5 A to 1025 A</u> 45 Hz to 65 Hz 65 Hz to 440 Hz	3.7 mA / A 9.5 mA / A	Calibrated using Multifunction Calibrator 5520A and 50 turn coil

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SMM 049

Page: 17 of 32

SCOPE OF CALIBRATION: ELECTRICALMATRIX B
AC CURRENT MEASUREMENT

Range	Frequency					
	Hz	Hz	kHz	kHz	kHz	kHz
	10 to 20	20 to 45	0.045 to 1	1 to 5	5 to 10	10 to 30
0.029 mA to 0.33 mA	2.7	2.1	1.8	4.0	9.9	20
0.33 mA to 3.3 mA	2.4	1.5	1.2	2.4	5.9	12
3.3 mA to 33 mA	2.2	1.1	0.60	1.0	2.4	4.8
33 mA to 330 mA	2.2	1.1	0.60	1.4	2.7	5.4

The uncertainties given in this table are expressed in mA/A.

NO: SAMM 049

Page: 18 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Instruments (Continued)			
Resistance (DMM)	0 Ω to 11 Ω	0.17 m Ω / Ω	Calibrated according to procedure E18, Rev 01 using Direct Method
	11 Ω to 33 Ω	0.099 m Ω / Ω	
	33 Ω to 110 Ω	0.052 m Ω / Ω	
	110 Ω to 330 Ω	0.043 m Ω / Ω	
	330 Ω to 1.1 k Ω	0.037 m Ω / Ω	
	1.1 k Ω to 3.3 k Ω	0.043 m Ω / Ω	
	3.3 k Ω to 11 k Ω	0.039 m Ω / Ω	
	11 k Ω to 33 k Ω	0.043 m Ω / Ω	
	33 k Ω to 110 k Ω	0.037 m Ω / Ω	
	110 k Ω to 330 k Ω	0.047 m Ω / Ω	
	330 k Ω to 1.1 M Ω	0.040 m Ω / Ω	
	1.1 M Ω to 3.3 M Ω	0.091 m Ω / Ω	
	3.3 M Ω to 11 M Ω	0.16 m Ω / Ω	
	11 M Ω to 33 M Ω	0.40 m Ω / Ω	
	33 M Ω to 110 M Ω	0.63 m Ω / Ω	
110 M Ω to 330 M Ω	4.8 m Ω / Ω		
330 M Ω to 1100 M Ω	18 m Ω / Ω		
Capacitance	0.19 nF to 0.4 nF	35 mF / F	Calibrated according to procedure E18, Rev 01 using Direct Method
	0.4 nF to 1.1 nF	16 mF / F	
	1.1 nF to 3.3 nF	9.4 mF / F	
	3.3 nF to 11 nF	4.0 mF / F	
	11 nF to 33 nF	6.4 mF / F	
	33 nF to 110 nF	4.0 mF / F	
	110 nF to 0.330 μ F	4.1 mF / F	
	0.330 μ F to 1.1 μ F	4.1 mF / F	
	1.1 μ F to 3.3 μ F	4.1 mF / F	
	3.3 μ F to 11 μ F	4.1 mF / F	
	11 μ F to 33 μ F	5.8 mF / F	
	33 μ F to 110 μ F	6.4 mF / F	
	110 μ F to 330 μ F	6.2 mF / F	
	330 μ F to 1.1 mF	6.3 mF / F	
	1.1 mF to 3.3 mF	6.2 mF / F	
3.3 mF to 11 mF	6.2 mF / F		
11 mF to 33 mF	9.7 mF / F		
33 mF to 110 mF	15 mF / F		

Scan QR Code or visit www.ism.gov.my/cab-directories for the current scope of accreditation

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



MS ISO/IEC 17025

NO: SAMM 049

Page: 19 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Instruments (Continued)			
Frequency	0.01 Hz to 12 kHz 12 kHz to 100 kHz 100 kHz to 2 MHz	0.0057 mHz / Hz 0.0057 mHz / Hz 0.0050 mHz / Hz	Calibrated according to procedure E18, Rev 01 using Direct Method
Single Phase Power Meter			
a) DC Power	40 mW to 200 mW 0.22 W to 720 W 720 W to 11000 W	0.71 mW / W 0.47 mW / W 1 mW / W	Calibrated according to procedure E18, Rev 01 using Direct Method
b) i. AC Power @ 45Hz to 65Hz	0.04 W to 3.3 W 3.3 W to 11000 W	3.1 mW / W 1.9 mW / W	Calibrated according to procedure E18, Rev 01 using Direct Method
b) ii. Power Factor	0 to 1	0.003	Calibrated according to procedure E18, Rev 01 using Direct Method
Oscilloscope Calibrations			
Amplitude	1 mV to 130 Vp-p 10 Hz to 10 kHz	2.9 mV / V	Calibrated according to procedure E02, Rev 02 using Direct Method
Rise Time	Rise time \leq 1 ns 4.5 mVp-p to 2.75 Vp-p	1.2 ns	Calibrated according to procedure E02, Rev 02 using Direct Method
	Rise time \leq 0.3 ns 400 mVp-p	0.35 ns	
Bandwidth	5 mV to 5.5 V 50 kHz to 100 MHz 100 MHz to 300 MHz	17 mV/V 23 mV/V	Calibrated according to procedure E02, Rev 02 using Direct Method
	424 mVp-p to 1131 mVp- p 10 MHz to 200 MHz 200 MHz to 500 MHz 500 MHz to 1 GHz 1 GHz to 2 GHz	12 mV/V 46 mV/V 120 mV/V 230mV/V	
Frequency	0.1 Hz to 10 MHz 10 MHz to 2 GHz	0.00012 mHz / Hz 0.00012 mHz / Hz	Calibrated according to procedure E02, Rev 02 using Direct Method
Time Period	2 ns to 10 ns 20 ns to 100 ns 100 ns to 15 s	0.029 ms / s 0.029 ms / s 0.00012 ms / s	Calibrated according to procedure E02, Rev 02 using Direct Method

Scan QR Code or visit www.ism.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 20 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Instruments			
Resistance (Insulation Resistance)	0.01 Ω to 0.1 Ω	23 m Ω / Ω	Calibrated according to procedure E12, Rev 01 using Direct Method
	0.1 Ω to 1 Ω	5.8 m Ω / Ω	
	1 Ω to 10 Ω	0.58 m Ω / Ω	
	10 Ω to 100 Ω	0.58 m Ω / Ω	
	100 Ω to 1000 Ω	0.58 m Ω / Ω	
	1 k Ω to 10 k Ω	0.58 m Ω / Ω	
	10 k Ω to 100 k Ω	0.58 m Ω / Ω	
	0.1 M Ω to 1 M Ω	0.58 m Ω / Ω	
	1 M Ω to 10 M Ω	2.3 m Ω / Ω	
	10 M Ω to 100 M Ω	2.3 m Ω / Ω	
	100 M Ω to 1000 M Ω	23 m Ω / Ω	
	1 G Ω to 10 G Ω	58 m Ω / Ω	
	10 G Ω to 100 G Ω	58 m Ω / Ω	
100 G Ω to 1000 G Ω	58 m Ω / Ω		
Capacitance	10 pF to 110 pF	12 mF / F	Calibrated according to procedure E15, Rev 01 using Direct Method
	110 pF to 1000 pF	12 mF / F	
	1 nF to 10 nF	12 mF / F	
	10 nF to 100 nF	12 mF / F	
	100 nF to 1000 nF	12 mF / F	
	1 μ F to 10 μ F	12 mF / F	
Inductance	10 μ H to 100 μ H	23 mH / H	Calibrated according to procedure E14, Rev 01 using Direct Method
	100 μ H to 1000 μ H	23 mH / H	
	1 mH to 10 mH	23 mH / H	
	10 mH to 100 mH	23 mH / H	
	100 mH to 1000 mH	23 mH / H	
	1 H to 10 H	23 mH / H	

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 21 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Sourcing Instruments			
DC Voltage	1 mV to 100 mV 100 mV to 1V 1 V to 10 V 10 V to 100 V 100 V to 1000 V	0.020 mV / V 0.012 mV / V 0.0093 mV / V 0.014 mV / V 0.014 mV / V	Calibrated according to procedure E17, Rev 01 using Direct Method
	1 kV to 6 kV 6 kV to 40 kV	12 mV / V 23 mV / V	Calibrated according to procedure E03, Rev 01 using Direct Method
AC Voltage	<u>1 mV to 700 V</u>	See Matrix C	Calibrated according to procedure E17, Rev 01 using Direct Method
	<u>700 V to 1000 V</u> 45 Hz to 1 kHz 1 kHz to 10 kHz	14 mV / V 14 mV / V	
	<u>1 kV to 6 kV</u> 45 Hz to 65 Hz	17 mV / V	Calibrated according to procedure E03, Rev 01 using Direct Method
	<u>6 kV to 40 kV</u> 45 Hz to 65 Hz	62 mV / V	

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 22 of 32

SCOPE OF CALIBRATION: ELECTRICALMATRIX C
AC VOLTAGE SOURCING

Range	Frequency					
	Hz	kHz	kHz	kHz	kHz	KHz
	1 to 40	0.040 to 1	1 to 20	20 to 50	50 to 100	100 to 300
1 mV to 10 mV	1.9	1.8	1.9	2.2	6.2	46
10 mV to 100 mV	0.22	0.21	0.26	0.41	1.0	3.6
0.1 V to 1 V	0.2	0.12	0.2	0.37	0.95	3.6
1 V to 10 V	0.2	0.12	0.2	0.4	1.0	3.9
10 V to 100 V	0.29	0.23	0.26	0.43	1.4	4.7
100 V to 700 V	0.52	0.5	0.72	1.4	3.5	-
	300 kHz to 1 MHz			1 MHz to 2MHz		
10 mV to 100 mV	12			17		
0.1 V to 1 V	12			17		
1 V to 10 V	12			18		
10 V to 100 V	17			-		

The uncertainties given in this table are expressed in mV/V.

NO: SAMM 049

Page: 23 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Sourcing Instruments (Continued)			
DC Current	10 nA to 100 nA 100 nA to 1 μ A 1 μ A to 10 μ A 10 μ A to 100 μ A 100 μ A to 1 mA 1 mA to 10 mA 10 mA to 100 mA 100 mA to 1 A 1 A to 3 A	1.0 mA / A 0.59 mA / A 0.068 mA / A 0.033 mA / A 0.031 mA / A 0.029 mA / A 0.047 mA / A 0.14 mA / A 1.6 mA / A	Calibrated according to procedure E17, Rev 01 using Direct Method
	3 A to 200 A	2.6 mA / A	Calibrated according to procedure E04, Rev 02 using V/I Method
AC Current	<u>10 μA to 1 A</u>	See Matrix D	Calibrated according to procedure E17, Rev 01 using Direct Method
	<u>1 A to 3 A</u> 3 Hz to 5 Hz 5 Hz to 10 Hz 10 Hz to 5 kHz	13 mA / A 5.0 mA / A 2.6 mA / A	
	<u>3 A to 200 A</u> 45 Hz to 65 Hz	2.5 mA / A	Calibrated according to procedure E04, Rev 02 using V/I Method

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



MS ISO/IEC 17025

NO: SAMM 049

Page: 24 of 32

SCOPE OF CALIBRATION: ELECTRICAL

MATRIX D
AC CURRENT SOURCING

Range	Frequency						
	Hz	Hz	Hz	KHz	kHz	kHz	kHz
	10 to 20	20 to 45	45 to 100	0.1 to 5	5 to 20	20 to 50	50 to 100
10 μ A to 100 μ A	5.0	2.1	1.1	1.1	-	-	-
100 μ A to 1 mA	4.9	2.0	0.95	0.75	2.9	5.1	8.1
1 mA to 100 mA	4.9	2.0	0.94	0.6	0.94	5.1	8.1
100 mA to 1 A	4.9	2.1	1.2	1.4	3.7	12	-

The uncertainties given in this table are expressed in mA/A.

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 25 of 32

SCOPE OF CALIBRATION: ELECTRICAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Sourcing Instruments (Continued)			
Resistance	1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 1 G Ω	0.036 m Ω / Ω 0.023 m Ω / Ω 0.016 m Ω / Ω 0.016 m Ω / Ω 0.018 m Ω / Ω 0.030 m Ω / Ω 0.084 m Ω / Ω 0.6 m Ω / Ω 5.9 m Ω / Ω	Calibrated according to procedure E17, Rev 01 using Direct Method
Frequency (100mV to 750V)	1 Hz to 40 Hz 40 Hz to 10 MHz	0.60 mHz / Hz 0.12 mHz / Hz	Calibrated according to procedure E17, Rev 01 using Direct Method
Capacitance	1 nF to 10 nF 10 nF to 100 nF 100 nF to 1 μ F 1 μ F to 10 μ F 10 μ F to 100 μ F 100 μ F to 1000 μ F 1 mF to 10 mF 10 mF to 50 mF	24 mF / F 12 mF / F 12 mF / F 12 mF / F 12 mF / F 17 mF / F 17 mF / F 37 mF / F	Calibrated according to procedure E17, Rev 01 using Direct Method
Timer & Stop Watch	1 s to 99999 s	4 μ s / s	Calibrated using Universal Counter Agilent 53131A
Tachometer (Non-Contact / Stroboscope)	30 rpm to 99 rpm 100 rpm to 999 rpm 1000 rpm to 4999 rpm 5000 rpm to 9999 rpm 10000 rpm to 49999 rpm 50000 rpm to 99999 rpm	0.0073 rpm 0.010 rpm 0.062 rpm 0.072 rpm 0.62 rpm 0.72 rpm	Calibrated using Universal Counter
Tachometer (Non-Contact / Stroboscope)	100 rpm to 99 rpm 100 rpm to 999 rpm 1000 rpm to 4999 rpm 5000 rpm to 9999 rpm	0.2 rpm 1.1 rpm 4.3 rpm 8.3 rpm	Calibrated using Non-Contact Tachometer

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

Signatories:

1. **Biji Nalinakshan Nair**
2. **Mohanakrishnan Sreesankar**
3. ****Neela Lohit Pavani**
4. ****Vishnu Pakkanar**
5. ****A.Murugappan**

**Note: Non-resident signatory

NO: SAMM 049

Page: 26 of 32

SCOPE OF CALIBRATION: ELECTRICAL

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Measuring Instruments			
DC Voltage	0 V to 20 V	0.29 mV / V	Calibrated according to procedure SE01, Rev 01 using Direct Method
DC Current	0 mA to 24 mA	0.27 mA / A	Calibrated according to procedure SE01, Rev 01 using Direct Method
Resistance (Insulation Resistance)	0.01 Ω to 0.1 Ω 0.1 Ω to 1 Ω 1 Ω to 10 Ω 10 Ω to 100 Ω 100 Ω to 1000 Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 0.1 M Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω 100 M Ω to 25 G Ω	23 m Ω / Ω 5.8 m Ω / Ω 0.58 m Ω / Ω 0.58 m Ω / Ω 0.58 m Ω / Ω 0.58 m Ω / Ω 0.58 m Ω / Ω 0.58 m Ω / Ω 2.3 m Ω / Ω 2.3 m Ω / Ω 58 m Ω / Ω	Calibrated according to procedure SE01, Rev 01 using Direct Method
Frequency	1 Hz to 1000 Hz 1 kHz to 10 kHz	0.58 mHz / Hz 1.4 mHz / Hz	Calibrated according to procedure SE01, Rev 01 using Direct Method
Capacitance	10 pF to 110 pF 110 pF to 1000 pF 1 nF to 10 nF 10 nF to 100 nF 100 nF to 1000 nF 1 μ F to 10 μ F	12 mF / F 12 mF / F 12 mF / F 12 mF / F 12 mF / F 12 mF / F	Calibrated according to procedure SE01, Rev 01 using Direct Method
Inductance	10 μ H to 100 μ H 100 μ H to 1000 μ H 1 mH to 10 mH 10 mH to 100 mH 100 mH to 1000 mH 1 H to 10 H	23 mH / H 23 mH / H 23 mH / H 23 mH / H 23 mH / H 23 mH / H	Calibrated according to procedure SE01, Rev 01 using Direct Method

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 27 of 32

SCOPE OF CALIBRATION: ELECTRICAL

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks	
Sourcing Instruments				
DC Voltage	1 mV to 100 mV	0.098 mV / V	Calibrated according to procedure SE02, Rev 01 using Direct Method	
	100 mV to 1 V	0.054 mV / V		
	1 V to 10 V	0.046 mV / V		
	10 V to 100 V	0.059 mV / V		
	100 V to 1000 V	0.064 mV / V		
	1 kV to 6 kV	12 mV / V		
	6 kV to 40 kV	23mV / V		
AC Voltage	10 mV to 750 V	See Matrix E	Calibrated according to procedure SE02, Rev 01 using Direct Method	
	<u>750 V to 1000 V</u> 0.045 kHz to 1 kHz 1 kHz to 10 kHz	9.2 mV / V 9.2 mV / V		
	<u>1 kV to 6 kV</u> 45 Hz to 65 Hz	16 mV / V		Calibrated according to procedure SE03, Rev 01 using Direct Method
	<u>6 kV to 40 kV</u> 45 Hz to 65 Hz	62 mV / V		
DC Current	50 μ A to 500 μ A	3.3 mA / A	Calibrated according to procedure SE02, Rev 01 using Direct Method	
	500 μ A to 1000 μ A	3.1 mA / A		
	1 mA to 10 mA	0.81 mA / A		
	10 mA to 100 mA	0.64 mA / A		
	100 mA to 1 A	1.3 mA / A		
	1 A to 3 A	1.6 mA / A		
	3 A to 200 A	7.3 mA / A	Calibrated according to procedure SE04, Rev 04 using Direct Method	

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



MS ISO/IEC 17025

NO: SMM 049

Page: 28 of 32

SCOPE OF CALIBRATION: ELECTRICAL

SITE: CATEGORY I

MATRIX E
AC VOLTAGE SOURCING

Range	Frequency					
	Hz	Hz	kHz	kHz	kHz	KHz
	3 to 5	5 to 10	0.01 to 20	20 to 50	50 to 100	100 to 300
10 mV to 100 mV	12	4.5	1.2	2.0	7.9	52
0.1 V to 1 V	12	4.4	1.0	2.0	7.9	52
1 V to 10 V	12	4.4	1.0	2.0	7.9	52
10 V to 100 V	12	4.4	1.0	2.0	7.9	52
100 V to 750 V	12	4.4	1.0	2.0	7.9	52

The uncertainties given in this table are expressed in mV/V.

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

NO: SAMM 049

Page: 29 of 32

SCOPE OF CALIBRATION: ELECTRICAL

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Sourcing Instruments (Continued)			
AC Current	50 μ A to 3 A	See Matrix F	Calibrated according to procedure SE02, Rev 01 using Direct Method
	<u>3 A to 200 A</u> 45 Hz to 65 Hz	18 mA / A	Calibrated according to procedure SE04, Rev 04 using Direct Method
Resistance	10 Ω to 100 Ω 100 Ω to 1 k Ω 1 k Ω to 10 k Ω 10 k Ω to 100 k Ω 100 k Ω to 1 M Ω 1 M Ω to 10 M Ω 10 M Ω to 100 M Ω	0.16 m Ω / Ω 0.1 m Ω / Ω 0.13 m Ω / Ω 0.13 m Ω / Ω 0.13 m Ω / Ω 0.47 m Ω / Ω 9.4 m Ω / Ω	Calibrated according to procedure SE02, Rev 01 using Direct Method

MATRIX F
AC CURRENT MEASUREMENT

Range	Frequency				
	Hz	Hz	kHz	kHz	kHz
	3 to 5	5 to 10	0.01 to 5	0.045 to 1	1 to 20
50 μ A to 500 μ A	-		-	9.1	9.1
500 μ A to 1000 μ A	-	-	-	9.2	9.8
1 mA to 100 mA	-	-	12	3.9	1.6
100 mA to 1 A	-	-	12	4.7	2.4
1 A to 3 A	-	-	13	4.7	2.4

The uncertainties given in this table are expressed in mA/A.

NO: SAMM 049

Page: 30 of 32

SCOPE OF CALIBRATION: ELECTRICAL

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty(\pm)*	Remarks
Sourcing Instruments (Continued)			
Frequency (100 mv to 750 v)	3 Hz to 5 Hz 5 Hz to 10Hz 10 Hz to 40 Hz 40 Hz to 300 kHz	1.2 mHz / Hz 0.58 mHz / Hz 0.35 mHz / Hz 0.12 mHz / Hz	Calibrated according to procedure SE02, Rev 01 using Direct Method
Capacitance	100 nF to 1 μ F 1 μ F to 10 μ F 10 μ F to 100 μ F 100 μ F to 1000 μ F 1000 μ F to 9999 μ F	18 mF / F 18 mF / F 18 mF / F 18 mF / F 35 mF / F	Calibrated according to procedure SE02, Rev 01 using Direct Method
Timer & Stop Watch	1 s to 99999 s	4 μ s / s	Calibrated using Universal Counter Agilent 53131A
Tachometer (Non- Contact / Stroboscope)	30 rpm to 99 rpm 100 rpm to 999 rpm 1000 rpm to 4999 rpm 5000 rpm to 9999 rpm 10000 rpm to 49999 rpm 50000 rpm to 99999 rpm	0.002 rpm 0.007 rpm 0.06 rpm 0.07 rpm 0.60 rpm 0.66 rpm	Calibrated using Universal Counter
Tachometer (Non- Contact / Stroboscope)	1 rpm to 99 rpm 100 rpm to 999 rpm 1000 rpm to 4999 rpm 5000 rpm to 9999 rpm	0.2 rpm 0.4 rpm 1.3 rpm 2.3 rpm	Calibrated using Non- Contact Tachometer

Scan QR Code or visit www.ism.gov.my/cab-directories for the current scope of accreditation

Signatories:

1. Biji Nalinakshan Nair
2. Mohanakrishnan Sreesankar
3. **Neela Lohit Pavani
4. **Vishnu Pakkanar
5. **A.Murugappan

**Note: Non-resident signatory

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



MS ISO/IEC 17025

NO: SAMM 049

Page: 31 of 32

SCOPE OF TESTING: MECHANICAL (VALVE TESTING)

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
A. Pressure Relief Valves	<ol style="list-style-type: none"> 1. "As Received" Pop Pressure Test 2. Seat Leakage Test 	<ol style="list-style-type: none"> 1. API 576 Clause 6.2.9: 2009 2. API 527 Section 2,4 & 5: 2014
B. Control Valves	<ol style="list-style-type: none"> 1. Shell Test 2. Pressure Closure Test (Seat Leakage Test) 3. Packing Test 4. Rated Valve Travel Test 5. Dead Band Test 	<ol style="list-style-type: none"> 1. API 598 : 2016 Clause 6.3, ASME B 16.34 Section 7.1 & IEC 60534-4: 2006 Section 5.4 2. API 598 : 2016 Clause 6.4, 6.5 ASME B 16.34 Section 7.2 & IEC 60534-4: 2006 Section 5.5 3. IEC 60534-4: 2006 Section 5.6 4. IEC 60534-4: 2006 Section 5.7 5. IEC 60534-4: 2006 Section 5.8
C. Isolation Valves <ol style="list-style-type: none"> 1. Parallel Slide Valve 2. Gate Valve 3. Globe Valve 4. Check Valve 5. Plug Valve 6. Butterfly Valve 7. Ball Valve 	<ol style="list-style-type: none"> 1. Shell Test 2. Pressure Closure Test (Seat Leakage Test) 3. Back Seat Test 	<ol style="list-style-type: none"> 1. API 598: 2016 Clause 6.3 & ASME B 16.34 Section 7.1 2. API 598: 2016 Clause 6.4, 6.5 & ASME B 16.34 Section 7.2 3. API 598: 2016 Clause 6.2

Scan QR Code or visit www.jsm.gov.my/cab-directories for the current scope of accreditation

Signatories:

1. **Tamilselvam A/L Chinayah**
2. **Mohanakrishnan Sreesankar**
3. ****Abdul Hafeez**

**Note: Non-resident signatory

Schedule

Issue date: 12 July 2017
Valid until: 10 August 2020



MS ISO/IEC 17025

NO: SAMM 049

Page: 32 of 32

SCOPE OF TESTING: MECHANICAL (VALVE TESTING)

SITE: CATEGORY I

Materials/ Products Tested	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
A. Pressure Relief Valves	<ol style="list-style-type: none"> 1. "As Received" Pop Pressure Test 2. Seat Leakage Test 	<ol style="list-style-type: none"> 1. API 576 Clause 6.2.9: 2009 2. API 527 Section 2,4 & 5: 2014
B. Control Valves	<ol style="list-style-type: none"> 1. Shell Test 2. Pressure Closure Test (Seat Leakage Test) 3. Packing Test 4. Rated Valve Travel Test 5. Dead Band Test 	<ol style="list-style-type: none"> 1. API 598 : 2016 Clause 6.3, ASME B 16.34 Section 7.1 & IEC 60534-4: 2006 Section 5.4 2. API 598 : 2016 Clause 6.4, 6.5 ASME B 16.34 Section 7.2 & IEC 60534-4: 2006 Section 5.5 3. IEC 60534-4: 2006 Section 5.6 4. IEC 60534-4: 2006 Section 5.7 5. IEC 60534-4: 2006 Section 5.8
C. Isolation Valves <ol style="list-style-type: none"> 1. Parallel Slide Valve 2. Gate Valve 3. Globe Valve 4. Check Valve 5. Plug Valve 6. Butterfly Valve 7. Ball Valve 	<ol style="list-style-type: none"> 1. Shell Test 2. Pressure Closure Test (Seat Leakage Test) 3. Back Seat Test 	<ol style="list-style-type: none"> 1. API 598: 2016 Clause 6.3 & ASME B 16.34 Section 7.1 2. API 598: 2016 Clause 6.4 & 6.5 ASME B 16.34 Section 7.2 3. API 598: 2016 Clause 6.2

Scan QR Code or visit www.ism.gov.my/cab-directories for the current scope of accreditation

Signatories:

1. **Tamilselvam A/L Chinayah**
2. **Mohanakrishnan Sreesankar**
3. ****Abdul Hafeez**

**Note: Non-resident signatory