SINGAPORE LABORATORY ACCREDITATION SCHEME

Accredited Laboratory SAC-SINGLAS

Schedule

VK Calibration Services Pte Ltd
No. 3, Soon Lee Street, #03-33
Pioneer Junction
Singapore 637606

Certificate No. : LA-2020-0765-C

Issue No. : 1

Date : 09 November 2020

FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A Electrical		
A.1 DC Voltage Source (Lab)	In-house procedure: VKC/WI/E-02 Rev 0, 6½ DMM	
0 mV to 10 mV		7.1 µV
10 mV to 100 mV		18 µV
100 mV to 1 V		0.12 mV
1 V to 2 V		0.26 mV
2 V to 5 V		0.56 mV
5 V to 10 V		1.1 mV
10 V to 20 V		3.1 mV
20 V to 50 V		6.8 mV
50 V to 100 V		13 mV
100 V to 200 V		0.04 V
200 V to 500 V		0.08 V
500 V to 1000 V		0.14 V
A.2 DC Current Source (Lab/Site)	In-house procedure: VKC/WI/E-02 Rev 0, 6½ DMM	
0 µA to 10 µA		0.05 µA
10 µA to 100 µA		0.15 µA
100 µA to 1000 µA		1.3 µA
1mA to 20 mA		0.03 mA
20 mA to 100 mA		0.13 mA
100 mA to 400 mA		1.1 mA
400 mA to 1 A		2.6 mA
1 A to 3 A		14.6 mA
3 A to 5 A		0.02 A
5 A to 10 A		0.04 A
by Clamp Meter	In-house procedure: VKC/WI/E-10 Rev 0, Clamp Meter	
50 A to 99 A		3.4 % reading
100 to 500 A		2.7 % reading

Schedule

Accredited Laboratory SAC-SINGLAS

Certificate No. : LA-2020-0765-C Issue No. : 1

Date : 09 November 2020 Page : 2 of 9

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A.3 AC Voltage Source (50Hz) (Lab)	In-house procedure: VKC/WI/E-02 Rev 0, 6½ DMM	
1 mV		61 µV
>1 mV to 10 mV		84 µV
>10 mV to 100 mV		0.32 mV
>100 mV to 1 V		3.2 mV
>1 V to 10 V		32 mV
>10 V to 100 V		0.32 V
>100 V to 500 V		1.8 V
> 500 V to 750 V		2.5 V
A.4 AC Current Source (50Hz) (Lab)	In-house procedure: VKC/WI/E-02 Rev 0, 6½ DMM	
1µA to 10 µA		0.07 µA
10 µA to 100 µA		0.26 µA
100 µA to 900 µA		2.4 µA
900 µA to 1 mA		2.6 µA
1 mA to 10 mA		0.03 mA
10 mA to 100 mA		0.26 mA
100 mA to 400 mA		1.3 mA
400 mA to 1A		2.6 mA
1 A to 3 A		16 mA
3 A to 5A		21 mA
5 A to 10 A		37 mA
A.5 Resistance 2 Wire & 4 wire (Lab)	In-house procedure: VKC/WI/E-02 Rev 0, 6½ DMM	
0.1 Ω to 1 Ω		4.8 mΩ
>1 Ω to 30 Ω		0.01Ω
>30 Ω to 60 Ω		0.02Ω
>60 Ω to 1100 Ω		0.02 %
>1100 Ω to 50 kΩ		0.01 kΩ
>50 kΩ to 900 kΩ		0.02 %
>900 kΩ to 10 MΩ		0.08 %
>10 MΩ to 100 MΩ		1 %

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A.6 Sourcing Instruments Frequency (Lab)	In-house procedure: VKC/WI/E-02 Rev 0, 6½ DMM	
10 Hz to 100 Hz		0.04 Hz
100 Hz to 500 Hz		0.07 Hz
500 to 1000 Hz		0.14 Hz
1000 Hz to 2000 Hz		0.27 Hz
2000 Hz to 5000 Hz		0.66 Hz
5000 Hz to 10000 Hz		1.3 Hz
A.7 DC Voltage Measuring Instruments (Lab)	In-house procedure: VKC//WI/E-03 Rev 0, Transmille 3041A	
0 mV - 10 mV		5.5 µV
10 mV - 200 mV		15 µV
0.2 V - 1 V		77 µV
1 V - 2 V		0.12 mV
2V to 5 V		0.3 mV
5 V -10 V		0.8 mV
10 V - 20 V		1.5 mV
20 V - 100 V		7.7 mV
100 V - 200 V		10 mV
200 V - 500 V		36 mV
500 V - 1000 V		80 mV
A.8 AC Voltage Measuring Instrument - 50 Hz (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
20 mV - 100 mV		0.10 mV
100 mV - 200 mV		0.2 mV
0.2 V - 1 V		0.8 mV
1 V - 2 V		1.3 mV
2 V - 10 V		8.6 mV
10 V - 20 V		12.2 mV
20 V - 100 V		0.14 V
100 V - 200 V		0.2 V
200 V - 600 V		0.6 V
600 V - 1000 V		0.8 V

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A.9 DC Current Measuring Instruments (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
0.5 µA - 100 µA		63 nA
100 µA - 200 µA		75 nA
0.2 mA – 2 mA		0.65 µA
2 mA - 10 mA		1.3 µA
10 mA - 20 mA		1.9 µA
20 mA - 50 mA		11 µA
50 mA - 100 mA		15 µA
100 mA - 200 mA		22 µA
0.2 A - 1 A		0.20 mA
1 A - 2 A		0.34 mA
2 A - 5 A		3.1 mA
5 A – 7.5 A		4.3 mA
7.5 A - 10 A		5.5 mA
A.10 Current Clamp Meter - DC current (Lab)	In-house procedure: VKC/WI/E-07 Rev 0, Transmille 3041A Current Clamp EA002	
0 A to 50 A		0.3 A
50 A - 200 A		0.8 A
200 A - 500 A		1.8 A
500 A - 750 A		2.6 A
750 A to 1000 A		3.6 A
A.11 AC Current Measuring Instruments - 50 Hz (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
20 µA - 50 µA		0.45 µA
50 µA - 200 µA		0.57 µA
0.2 mA - 1 mA		1.8 µA
1 mA - 2 mA		2.5 µA
2mA - 10 mA		14 µA
10 mA - 20 mA		20 µA
20 mA - 50 mA		0.07 mA
50 mA – 200 mA		0.15 mA
0.2 A - 1 A		2 mA
1 A - 2 A		3 mA
2 A - 5 A		12 mA
5 A - 10 A		15 mA

Certificate No. : LA-2020-0765-C Issue No. : 1

Date : 09 November 2020 Page : 5 of 9

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A.12 Current Clamp Meter - AC Current (Lab)	In-house procedure: VKC/WI/E-07 Rev 0, Transmille 3041A	
0 A - 100 A	Current Clamp EA002 @50 Hz	0.5 A
100 A – 200 A		0.9 A
200 A - 350 A		1.3 A
350 A - 500 A		1.9 A
500 A – 750 A		2.7 A
750 A – 1000 A		3.4 A
A.13 Measuring Instrument Resistance 2 Wire (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
1 Ω		47 mΩ
10 Ω		49 mΩ
100 Ω		54 mΩ
1 kΩ		0.2 Ω
10 kΩ		1.3 Ω
100 kΩ		12 Ω
1 MΩ		0.3 kΩ
10 MΩ		5.4 kΩ
100 MΩ		0.7 MΩ
A.14 Measuring Instrument Resistance 4 Wire (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
1 Ω		8.3 mΩ
10 Ω		9.3 mΩ
100 Ω		15 mΩ
1 kΩ		0.2 Ω
10 kΩ		1.2 Ω
100 kΩ		12 Ω
A.15 Frequency Measuring Instruments (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
100 Hz - 500 Hz		18 mHz
0.5 kHz - 2 kHz		0.1 Hz
2 kHz - 5 kHz		0.2 Hz
5 kHz - 20 kHz		0.9 Hz
20 kHz - 75 kHz		2.5 Hz
75 kHz - 100 kHz		6.7 Hz
100 kHz - 500 kHz		17 Hz

Certificate No. : LA-2020-0765-C Issue No. : 1

Date : 09 November 2020 Page : 6 of 9

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A.16 Capacitance Measuring Instruments (Lab)	In-house procedure: VKC/WI/E-03 Rev 0, Transmille 3041A	
1 nF		10 pF
10 nF		74 pF
20 nF		0.16 nF
50 nF		0.38 nF
100 nF		0.71 nF
1 µF		11.3 nF
10 µF		0.18 µF
A.17 Insulation Tester / Earth Tester Megger / Megaohm Hi-Tester (Lab)	In-house procedure: VKC/WI/E-08 Rev 0, Direct Method	
1 MΩ		0.7 % reading
>1MΩ to 50 MΩ		0.4 % reading
>50 MΩ to 100 MΩ		1 % reading
200MΩ		12.3 %reading
500MΩ		5.4 %reading
1000MΩ		3.4 %reading
B Mechanical		
B.1 Vacuum Instruments (Lab/Site) Manometer, Differential pressure gauge / Transducer/ Transmitter Recorder	In-house procedure: VKC//WI/M-05, Rev 0 VKC/WI/M-07, Rev 0 VKC/WI/M-08, Rev 0	
(-0.8 to 0) bar		1.5 mbar
B.2 Low pressure Instruments Manometer, DP Gauge / pressure Switch / Megnehelic Gauge / Recorder	VKC//WI/M-05, Rev 0 VKC/WI/M-07, Rev 0 VKC/WI/M-08, Rev 0	
(-400 to -280) mbar		1.37 mbar
(>-280 to -160) mbar		1.75 mbar
(>-160 to 0) mbar		0.66 mbar
(> 0 to 200) mbar		1.23 mbar
(>200 to 400) mbar		2.50 mbar

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
B.3 Pressure Instruments using Indicator (Lab/Site) Analog gauge, Digital gauge/ Calibrator, Manometer, Transmitter, Switch, Recorder.	VKC//WI/M-05, Rev 0 VKC/WI/M-07, Rev 0 VKC/WI/M-08, Rev 0	
(0 to 20) bar		13 mbar
(>20 to 70) bar		0.05 bar
(>70 to 200) bar		0.13 bar
(>200 to 700) bar		0.47 bar
(> 10,000 to 30000) psi		59 psi
(> 30,000 to 36000) psi		0.41 % FS
B.4 Pressure Instruments using Dead Weight Tester (Lab) Analog gauge, Digital gauge/ Calibrators, Manometer, Transmitter, Switch, Recorder	VKC/WI/M-05 Rev 0 VKC/WI/M-07, Rev 0 VKC/WI/M-08, Rev 0	
(> 7 to 35) bar		0.01 bar
(> 35 to 70) bar		0.02 bar
(> 70 to 700) bar		0.03 % reading
B.5 Tachometer (Non-contact) (Lab)	In-house procedure: VKC/WI/M-04, Rev 0, Multifunction Calibrator and Optical tachometer adaptor	
60 rpm – 3000 rpm		0.2 rpm
3000 rpm – 20000 rpm		1.4 rpm
20000 rpm – 40000 rpm		1.9 rpm
40000 rpm – 60000 rpm		2.4 rpm
C Temperature		
C.1 Temperature Gauge, Temperature Recorder, Temperature Switch, Temperature Transmitter, Temperature Controller, Indicator with Sensor (Lab/Site)	VKC/WI/T-02, Rev 0 VKC/WI/T-03, Rev 0	
-45°C to 200°C		0.15°C
>200°C to 250°C		0.50 °C
>250°C to 450°C		0.68 °C
>450 to 550°C		0.77 °C

Certificate No. : LA-2020-0765-C Issue No. : 1

Date : 09 November 2020 Page : 8 of 9

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
C.2 Temperature Calibrator (Dry Block & Liquid Bath) (Lab/Site)	VKC/WI/T-04, Rev 0	
-45°C to 200°C		0.16°C
>200°C to 250°C		0.50°C
>250°C to 450°C		0.68°C
>450°C to 550°C		0.77°C
C.3 RTD Indicator & Simulator (Lab/Site)	VKC/WI/T-05, Rev 0	
Type: Pt-100		
-220° C to 0 ° C		0.20°C
>0° C to 850 ° C		0.36°C
C.4 Thermocouple Simulator (Lab/Site)	VKC/WI/T-05, Rev 0	
Type J		
200°C to 1200°C		1.5 °C
Type K		
-200°C to 0°C		1.8°C
>0°C to 1372°C		1.6°C
Type T		
-250°C to -200°C		1.6°C
>-200°C to 400°C		1.4°C
Type S		
-50°C to 1768°C		1.8°C
Type R		
-50°C to 200°C		2.0 °C
>200°C to 1768°C		1.9 °C

Schedule

Accredited Laboratory SAC-SINGLAS

Certificate No. : LA-2020-0765-C Issue No. : 1

Date : 09 November 2020 Page : 9 of 9

MEASURED QUANTITIES/ INSTRUMENT/RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
C.5 Thermocouple Indictor (Lab/Site)	VKC/WI/T-05, Rev 0	
Type J		
-160°C to 1200°C		1.4 °C
Type K		
-240°C to -90°C		1.7 °C
>-90°C to 1372°C		1.5 °C
Type T		
-250°C to 400°C		1.4 °C
Type S		
-50°C to 1768 °C		1.8 °C
Type R		
-50°C to 200°C		1.7 °C
>200°C to 1768°C		1.5 °C

* CMC is expressed as an expanded uncertainty estimated at a level of confidence of approximately 95 %.

Approved Signatory

V Mohan - For all items in categories A, B & C

Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment 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. 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.