

Schedule

ISOLAB (Singapore) Pte Ltd
Blk 28D Penjuru Close
#01-07 Jurong Industrial Estate
Singapore 609132

Certificate No. : LA-2003-0278-C

Issue No. : 9

Date : 17 March 2010

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SCOPE OF ACCREDITATION

Field of Testing : Calibration and Measurement

MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (*)
A Temperature Calibration		
1. Resistance Temperature Devices Indicators -200 °C to 850 °C	STCP-001 (Rev.1)	0.01 °C
2. Resistance Temperature Devices Simulators -200 °C to 850 °C	STCP-001 (Rev.1)	0.01 °C
3. Temperature Display Devices and Calibrators (Thermocouple Simulators)	STCP-002 (Rev. 1)	
Type E -270 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 200 °C 200 °C to 1000 °C		0.37 °C 0.29 °C 0.23 °C 0.18 °C 0.15 °C
Type J -210 °C to -150 °C -150 °C to -100 °C -100 °C to 100 °C 100 °C to 1200 °C		0.38 °C 0.30 °C 0.24 °C 0.19 °C
Type K -270 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 900 °C 900 °C to 1372 °C		0.49 °C 0.35 °C 0.28 °C 0.23 °C 0.26 °C

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Type N -270 °C to -150 °C -150 °C to -100 °C -100 °C to 100 °C 100 °C to 200 °C 200 °C to 1300 °C Type R -50 °C to 100 °C 100 °C to 400 °C 400 °C to 600 °C 600 °C to 900 °C 900 °C to 1768 °C Type S -50 °C to 100 °C 100 °C to 200 °C 200 °C to 400 °C 400 °C to 700 °C 700 °C to 1200 °C 1200 °C to 1768 °C Type T -270 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 200 °C 200 °C to 400 °C		0.56 °C 0.39 °C 0.30 °C 0.22 °C 0.20 °C 0.62 °C 0.40 °C 0.32 °C 0.27 °C 0.25 °C 0.62 °C 0.45 °C 0.40 °C 0.32 °C 0.29 °C 0.27 °C
4. Temperature Display Devices and Calibrators (Thermocouple Indicators) Type E -270 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 200 °C 200 °C to 1000 °C	STCP-002 (Rev. 1)	0.41 °C 0.34 °C 0.26 °C 0.20 °C 0.15 °C 0.37 °C 0.29 °C 0.24 °C 0.18 °C 0.15 °C

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<p>Type J -210 °C to -150 °C -150 °C to -100 °C -100 °C to 100 °C 100 °C to 1200 °C</p> <p>Type K -270 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 1000 °C 1000 °C to 1372 °C</p> <p>Type N -270 °C to -150 °C -150 °C to -100 °C -100 °C to -50 °C -50 °C to 300 °C 300 °C to 1300 °C</p> <p>Type R -50 °C to 100 °C 100 °C to 400 °C 400 °C to 600 °C 600 °C to 900 °C 900 °C to 1768 °C</p> <p>Type S -50 °C to 100 °C 100 °C to 200 °C 200 °C to 400 °C 400 °C to 700 °C 700 °C to 1100 °C 1100 °C to 1768 °C</p> <p>Type T -270 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 200 °C 200 °C to 400 °C</p>		<p>0.39 °C 0.30 °C 0.25 °C 0.19 °C</p> <p>0.50 °C 0.36 °C 0.29 °C 0.24 °C 0.27 °C</p> <p>0.59 °C 0.41 °C 0.31 °C 0.26 °C 0.20 °C</p> <p>0.63 °C 0.46 °C 0.37 °C 0.31 °C 0.29 °C</p> <p>0.63 °C 0.53 °C 0.47 °C 0.37 °C 0.34 °C 0.31 °C</p> <p>0.42 °C 0.35 °C 0.27 °C 0.20 °C 0.15 °C</p>

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MEASURED QUANTITIES/ INSTRUMENTS/ RANGE BE CALIBRATED	TO	METHOD	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (*)
5. Platinum Resistance Thermometers Without Display (Using liquid baths, Range: -40°C to 250 °C) (Using block baths, Range: 250°C to 500°C)		STCP-003 (Rev.1)	35 mK 0.41 °C
6. Thermocouple Sensor without Display Type E -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C Type J -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C Type K -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1100 °C 1100 °C to 1290 °C Type N -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1100 °C 1100 °C to 1290 °C Type R -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1100 °C 1100 °C to 1290 °C		STCP-004 (Rev.3)	0.1 °C 0.5 °C 1.3 °C 0.1 °C 0.5 °C 1.4 °C 0.2 °C 0.5 °C 1.4 °C 2.1 °C 2.7 °C 0.1 °C 0.5 °C 1.4 °C 2.1 °C 2.7 °C 0.1 °C 0.5 °C 1.3 °C 2.1 °C 2.7 °C

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Type S -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1100 °C 1100 °C to 1290 °C Type T -40 °C to 250 °C 250 °C to 400 °C		0.1 °C 0.5 °C 1.3 °C 2.1 °C 2.7 °C 0.1 °C 0.5 °C
7. Digital Indicator With Sensing Probe -40 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1100 °C 1100 °C to 1290 °C	STCP-005 (Rev.2)	35 mK 0.5 °C 1.3 °C 2.1 °C 2.7 °C
8. Humidity Instruments 5 °C to 60 °C 25 % rh to 95 % rh at 23 °C 5 °C to 60 °C 25 % rh to 95 % rh	STCP-006 (Rev. 3)	0.3 °C 3.6 % rh 0.12 °C 2.0 % rh to 9.0 % rh
9. Temperature Enclosure -70 °C to -40 °C -40 °C to 100 °C 100 °C to 350 °C 350 °C to 1000 °C	STCP-007 (Rev. 2)	0.9 °C 0.5 °C 1.6 °C 2.3 °C
10. Temperature Sensor with digital Display (On-Site) -20 °C to 200 °C 200 °C to 600 °C	STCP-008 (Rev.1)	0.2 °C 0.7 °C
11. Digital RTD Indicators (On-Site) -200 °C to 800 °C	STCP-009 (Rev.1)	0.2 °C

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<p>12. Thermocouple Display Device (On-Site)</p> <p>Type E -200 °C to 1000 °C</p> <p>Type J -200 °C to 1200 °C</p> <p>Type K -200 °C to 1372 °C</p> <p>Type N -200 °C to 1300 °C</p> <p>Type T -200 °C to 400 °C</p>	<p>STCP-010 (Rev.1)</p>	<p>0.4 °C</p> <p>0.7 °C</p> <p>0.5 °C</p> <p>0.5 °C</p> <p>0.6 °C</p>
<p>13. Sensors with Transmitters</p> <p>-40 °C to 250 °C</p> <p>250 °C to 500 °C</p> <p>500 °C to 1000 °C</p> <p>1000 °C to 1100 °C</p> <p>1100 °C to 1290 °C</p>	<p>STCP-011 (Rev.2)</p>	<p>35 mK</p> <p>0.5 °C</p> <p>1.3 °C</p> <p>2.2 °C</p> <p>2.7 °C</p>
<p>14. Radiation Thermometers</p> <p>0°C</p> <p>50°C to 700°C</p> <p>0°C</p> <p>50°C to 700°C</p>	<p>STCP-012 (Rev 2)</p> <p>$\epsilon = 1.00$</p> <p>$\epsilon = 1.00$</p> <p>$\epsilon = 0.90$ to 0.99</p> <p>$\epsilon = 0.90$ to 0.99</p>	<p>0.4 °C</p> <p>5.8 °C</p> <p>1.8 °C</p> <p>6.1 °C</p>
<p>15. Liquid-In-Glass Thermometer</p> <p>-40 °C to 250 °C</p>	<p>STCP-013 (Rev. 1)</p>	<p>35 mK</p>

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16. Temperature and Humidity Chamber 0 °C to 60 °C 11 % rh to 95 % rh	STCP-014 (Rev. 0)	0.5 °C 0.9 % rh to 10.0 % rh
17. Sensor Calibration Using Fixed Point a. Triple Point of Water (0.01 °C)	STCP-015 (Rev 0)	7 mK
b. Gallium Melting Point (29.7646 °C)	STCP-016 (Rev 0)	4 mK
18. Multi-Holed Temperature Block Bath Calibration Radial and Axial Test -40 °C to 250 °C 250 °C to 1100 °C 1100 °C to 1290 °C Loading, Stability and Deviation Test -40 °C to 250 °C 250 °C to 1100 °C 1100 °C to 1290 °C	STCP-017 (Rev 0)	0.05 °C 2.3 °C 3.3 °C 0.04 °C 1.6 °C 2.4 °C

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B. Mechanical Calibration Pressure		
1. Analogue Pressure Gauge -0.9 bar to 0 bar 100 mbar to 200 mbar 200 mbar to 300 mbar 300 mbar to 500 mbar 500 mbar to 40 bar 40 bar to 1100 bar	SPCP-001 (Rev.4)	0.00024 bar 0.070 % of applied reading 0.040 % of applied reading 0.022 % of applied reading 0.016 % of applied reading 0.016 % of applied reading
2 Digital Pressure Indicators -0.9 bar to 0 bar 100 mbar to 200 mbar 200 mbar to 300 mbar 300 mbar to 500 mbar 500 mbar to 40 bar 40 bar to 1100 bar	SPCP-002 (Rev.4)	0.00024 bar 0.070 % of applied reading 0.040 % of applied reading 0.022 % of applied reading 0.016 % of applied reading 0.016 % of applied reading
3 Pressure Transmitters -0.9 bar to 0 bar 100 mbar to 200 mbar 200 mbar to 300 mbar 300 mbar to 500 mbar 500 mbar to 40 bar 40 bar to 1100 bar	SPCP-003 (Rev.4)	0.00024 bar 0.070 % of applied reading 0.040 % of applied reading 0.022 % of applied reading 0.016 % of applied reading 0.016 % of applied reading
4 Analogue Pressure Gauge (On-Site) -0.9 bar to 0 bar 0 to 20 bar 20 bar to 350 bar 350 bar to 700 bar	SPCP-004 (Rev.4)	0.022 bar 0.022 bar 0.16 bar 0.45 bar

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C ELECTRICAL		
1. DC Voltage Measuring Instruments	SECP-001 (Revision 0) SECP-002 (Revision 0)	
0 to 330 mV		0.018 mV
0 to 3.3 V		0.14 mV
0 to 33 V		1.4 mV
30 V to 330 V		15 mV
100 V to 1020.000 V		46 mV
2. DC Current Measuring Instruments	SECP-001 (Revision 0) SECP-003 (Revision 0)	
0 to 3.3 mA		0.38 μ A
0 to 33 mA		2.8 μ A
0 to 330 mA		29 μ A
0 A to 2.2 A		0.55 mA
2.2 A to 11 A		5.5 mA
3. AC Voltage Measuring Instruments	SECP-001 (Revision 0) SECP-004 (Revision 0)	
1 mV to 33 mV	10 Hz to 45 Hz	0.11 mV
	45 Hz to 10 kHz	0.054 mV
	10 kHz to 20 kHz	0.067 mV
	20 kHz to 50 kHz	0.080 mV
	50 kHz to 100 kHz	0.12 mV
	100 kHz to 500 kHz	0.31 mV
33 mV to 330 mV	10 Hz to 45 Hz	0.69 mV
	45 Hz to 10 kHz	0.14 mV
	10 kHz to 20 kHz	0.27 mV
	20 kHz to 50 kHz	0.45 mV
	50 kHz to 100 kHz	0.75 mV
	100 kHz to 500 kHz	2.1 mV

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0.33 V to 3.3 V	10 Hz to 45 Hz	4.1 mV
	45 Hz to 10 kHz	0.82 mV
	10 kHz to 20 kHz	2.2 mV
	20 kHz to 50 kHz	3.9 mV
	50 kHz to 100 kHz	7.6 mV
	100 kHz to 500 kHz	16 mV
3.3 V to 33 V	10 Hz to 45 Hz	41 mV
	45 Hz to 10 kHz	11 mV
	10 kHz to 20 kHz	23 mV
	20 kHz to 50 kHz	53 mV
	50 kHz to 100 kHz	76 mV
33 V to 330 V	45 Hz to 1 kHz	0.14 V
	1 kHz to 10 kHz	0.22 V
	10 kHz to 20 kHz	0.26 V
330 V to 1020 V	45 Hz to 1 kHz	0.46 V
	1 kHz to 10 kHz	1.7 V
	10 kHz to 20 kHz	2.0 V
4. AC Current Measuring Instruments	SECP-001 (Revision 0) SECP-005 (Revision 0)	
0.029 mA to 0.33 mA	10 Hz to 20 Hz	0.77 μ A
	20 Hz to 45 Hz	0.44 μ A
	45 Hz to 1 kHz	0.52 μ A
	1 kHz to 5 kHz	1.6 μ A
	5 kHz to 10 kHz	3.4 μ A

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0.33 mA to 3.3 mA	10 Hz to 20 Hz	5.4 μ A
	20 Hz to 45 Hz	2.9 μ A
	45 Hz to 1 kHz	2.9 μ A
	1 k Hz to 5 kHz	5.4 μ A
	5 k Hz to 10 kHz	16 μ A
3.3 mA to 33 mA	10 Hz to 20 Hz	54 μ A
	20 Hz to 45 Hz	28 μ A
	45 Hz to 1 kHz	26 μ A
	1 kHz to 5 kHz	54 μ A
	5 kHz to 10 kHz	0.16 mA
33 mA to 330 mA	10 Hz to 20 Hz	0.54 mA
	20 Hz to 45 Hz	0.28 mA
	45 Hz to 1 kHz	0.26 mA
	1 kHz to 5 kHz	0.54 mA
	5 kHz to 10 kHz	1.6 mA
0.33 A to 2.2 A	10 Hz to 45 Hz	3.7 mA
	45 Hz to 1 kHz	2.0 mA
	1 kHz to 5 kHz	13 mA
2.2 A to 11 A	45 Hz to 65 Hz	6.8 mA
	65 Hz to 500 Hz	10 mA
	500 Hz to 1 kHz	30 mA

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5. Resistance Measuring Instruments 0 Ω to 11 Ω 11 Ω to 33 Ω 33 Ω to 110 Ω 110 Ω to 330 Ω 330 Ω to 1.1 k Ω 1.1 k Ω to 3.3 k Ω 3.3 k Ω to 11 k Ω 11 k Ω to 33 k Ω 33 k Ω to 110 k Ω 110 k Ω to 330 k Ω 330 k Ω to 1.1 M Ω 1.1 M Ω to 3.3 M Ω 3.3 M Ω to 11 M Ω 11 M Ω to 33 M Ω 33 M Ω to 110 M Ω 110 M Ω to 330 M Ω	SECP-001 (Revision 0) SECP-006 (Revision 0)	7.4 m Ω 15 m Ω 20 m Ω 35 m Ω 0.13 Ω 0.28 Ω 1.3 Ω 2.8 Ω 15 Ω 36 Ω 0.17 k Ω 0.43 k Ω 5.6 k Ω 27 k Ω 0.44 M Ω 1.3 M Ω
6. Frequency Measuring Instruments 0.01 Hz to 119.99 Hz 120.0 Hz to 1199.9 Hz 1.200 kHz to 11.999 kHz 12.00 kHz to 119.99 kHz 120.0 kHz to 1199.9 kHz 1.200 MHz to 2.000 MHz	SECP-001 (Revision 0) SECP-007 (Revision 0)	6.6 mHz 0.025 Hz 0.63 Hz 6.2 Hz 0.063 kHz 0.58 kHz

* A reported uncertainty will be that for the instrument itself during calibration plus the appropriate measurement capability of the laboratory.

The uncertainties are based on an estimated confidence probability of approximately 95% unless otherwise stated.

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Approved signatories

Mr Tjhang Hendri - For all calibration.

Mr Abd Rashid Bin Othman - For A1-A4, A8-A9, A11-A12, A15-A16, A18 and B only.

Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005. A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 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 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 **Quality Management Systems — Requirements** and are aligned with its pertinent requirements.