

Schedule

ISOLAB (Singapore) Pte Ltd
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@ Level 2
Singapore 629031

Certificate No. : LA-2003-0278-C

Issue No. : 20

Date : 02 May 2019

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Field of Testing : Calibration and Measurement

MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
A Temperature Calibration		
A1. Resistance Temperature Devices Indicators -200 °C to 200°C 200°C to 850 °C	STCP-001 (Rev. 4)	0.01 °C 0.01 °C
A2. Resistance Temperature Devices Simulators -200 °C to 850 °C	STCP-001 (Rev. 4)	0.01 °C
A3. Thermocouple Simulators	STCP-002 (Rev. 4)	
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		0.38 °C 0.29 °C 0.25 °C 0.20 °C 0.16 °C
Type J -210 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 1200 °C		0.40 °C 0.31 °C 0.26 °C 0.20 °C

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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		0.51 °C 0.37°C 0.29 °C 0.25 °C 0.28 °C
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		0.60 °C 0.42 °C 0.33 °C 0.24 °C 0.22 °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		0.78 °C 0.49 °C 0.40 °C 0.33 °C 0.31 °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 1768 °C		0.78 °C 0.56 °C 0.44 °C 0.40 °C 0.36 °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		0.43 °C 0.36 °C 0.28 °C 0.22 °C 0.17 °C

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<p>Type S</p> <p>-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</p> <p>-200 °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>A5. Resistance Temperature Detectors Without Display</p> <p>-80 °C to 0 °C 0 °C to 30 °C 30 °C to 250 °C 250 °C to 500 °C</p> <p>A6. Thermocouple Sensor without Display</p> <p>Type E</p> <p>-80 °C to 250 °C</p> <p>Type J</p> <p>-80°C to 0 °C 0 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C</p>	<p>STCP-003 (Rev. 4)</p> <p>STCP-004 (Rev. 6)</p>	<p>0.63 °C 0.53 °C 0.47 °C 0.37 °C 0.34 °C 0.31 °C</p> <p>0.47 °C 0.35 °C 0.27 °C 0.20 °C 0.15 °C</p> <p>17 mK 11 mK 17 mK 0.41 °C</p> <p>0.7 °C</p> <p>0.7 °C 0.7 °C 0.9 °C 1.5 °C</p>

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MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
<p>Type K -80 °C to 0 °C 0 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1290 °C</p> <p>Type N -80 °C to 0 °C 0 °C to 200 °C 200 °C to 400 °C 400 °C to 1000 °C 1000 °C to 1290 °C</p> <p>Type R 0 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1290 °C</p> <p>Type S 0 °C to 350 °C 350 °C to 1100 °C 1100 °C to 1290 °C</p> <p>Type T -80 °C to 0 °C 0 °C to 250 °C</p>		<p>0.5 °C 0.3 °C 0.5 °C 1.4 °C 2.7 °C</p> <p>0.7 °C 0.4 °C 0.5 °C 1.4 °C 2.8 °C</p> <p>0.5 °C 1.4 °C 2.7 °C</p> <p>0.9 °C 1.4 °C 2.2 °C</p> <p>0.4 °C 0.3 °C</p>
<p>A7. Digital Indicator With RTD Sensor</p> <p>-80 °C to -40 °C -40 °C to 0 °C 0 °C to 250 °C 250 °C to 550 °C</p>	STCP-005 (Rev. 5)	<p>15 mK 15 mK 15 mK 0.41 °C</p>

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A8. Digital Indicator with Base Metal Thermocouple -80 °C to 20 °C 20 °C to 250 °C 250 °C to 500 °C 500 °C to 700 °C 700 °C to 900 °C 900 °C to 1290 °C	STCP-005 (Rev. 5)	0.5 °C 0.6 °C 1.8 °C 2.1 °C 2.3 °C 2.9 °C
A9. Digital Indicator with Noble Metal Thermocouple 0 °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. 5)	0.4 °C 0.6 °C 1.5 °C 2.2 °C 2.8 °C
A10. Humidity Instruments -20 °C to 60 °C (25 to 95) % relative humidity at 23 °C -20 °C to 60 °C (i) (25 to 95) % relative humidity (ii) (95 and above) % relative humidity	STCP-006 (Rev. 5)	0.30 °C (2.0 to 2.2) % relative humidity 0.12 °C (2.0 to 2.2) % relative humidity (2.7 to 2.8) % relative humidity
A11. Temperature Enclosure -80 °C to -40 °C -40 °C to 100 °C 100 °C to 350 °C 350 °C to 1290 °C 121 °C (Autoclaves & Pressurized Enclosures)	STCP-007 (Rev. 5)	0.9 °C 1.3 °C 2.7 °C 3.9 °C 0.3 °C
A12. Digital Indicator with RTD Sensor on Site -40 °C to 0 °C 0 °C to 100 °C 100 °C to 200 °C 200 °C to 300 °C 300 °C to 500 °C	STCP-008 (Rev. 4)	0.5 °C 0.2 °C 0.7 °C 1.9 °C 3.0 °C

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<p>A13. Digital Indication with Base Metal Thermocouple Sensor on Site Digital Display On Site</p> <p>-40 °C to 0 °C 0 °C to 100 °C 100 °C to 200 °C 200 °C to 300 °C 300 °C to 500 °C</p>	STCP-008 (Rev. 4)	<p>2.0 °C 1.9 °C 2.0 °C 2.6 °C 3.5 °C</p>
<p>A14. Digital RTD Indicators (On-Site)</p> <p>-200 °C to 500 °C</p>	STCP-009 (Rev. 4)	0.2 °C
<p>A15. Thermocouple Display Device(On-Site)</p> <p>Type E -200 °C to 0 °C -0 °C to 1000 °C</p> <p>Type J -200 °C to 800 °C</p> <p>Type K -200 °C to 1200 °C</p> <p>Type N -200 °C to 1200 °C</p> <p>Type T -200 °C to 0 °C 0 °C to 400 °C</p>	STCP-010 (Rev. 4)	<p>0.8 °C 0.7 °C 0.9 °C 0.8 °C 0.8 °C 0.8 °C 0.7 °C</p>
<p>A16. Temperature Transmitter with RTD Sensor</p> <p>-80 °C to 200 °C 200 °C to 500 °C</p>	STCP-011 (Rev. 5)	<p>0.2 °C 0.5 °C</p>

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A17. Temperature Transmitter with Base Thermocouple Sensor 0 °C to 200 °C 200 °C to 1 000 °C 1 000 °C to 1 200 °C				STCP-011 (Rev. 5)	2.2 °C 2.5 °C 3.4 °C
A18. Radiation Thermometers -10 °C to 50 °C 50 °C to 700 °C -10 °C to 50 °C 50 °C to 700 °C				STCP-012 (Rev. 4) $\epsilon = 1.00$ $\epsilon = 1.00$ $\epsilon = 0.90$ to 0.99 $\epsilon = 0.90$ to 0.99	0.4 °C 5.8 °C to 6.5 °C 1.8 °C 6.0 °C to 6.8 °C
A19. Liquid-In-Glass (LIG) Thermometer				STCP-013 (Rev. 4)	
	Type of Immersion	Min. LIG Graduation (°C)	Max. LIG Graduation (°C)	Temperature Range (°C)	
(i)	Total Immersion	0.1	1.0	-80 to -40	0.2 °C
(ii)	Total Immersion	0.05	1.0	-40 to 0	0.1 °C
(iii)	Total Immersion	0.05	1.0	0 to 200	0.1 °C
(iv)	Total Immersion	0.1	1.0	200 to 250	0.3 °C
(v)	Partial Immersion	0.1	1.0	-80 to -40	0.4 °C
(vi)	Partial Immersion	0.05	1.0	-40 to 0	0.3 °C
(vii)	Partial Immersion	0.05	1.0	0 to 150	0.5 °C
(viii)	Partial Immersion	0.1	1.0	150 to 200	0.6 °C
(ix)	Partial Immersion	0.1	1.0	200 to 250	0.8 °C

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A20. Temperature and Humidity Chamber -20 °C to 60 °C (20 to 90) % relative humidity	STCP-014 (Rev. 2)	0.6 °C to 0.8 °C (2.3 to 7.8) % relative humidity
A21. Sensor Calibration Using Fixed Point (a) Triple Point of Water (0.01 °C)	STCP-015 (Rev. 3)	3 mK
(b) Gallium Melting Point (29.7646 °C)	STCP-016 (Rev. 3)	3 mK
A22. Multi-Holed Temperature Block Bath Calibration Radial and Axial Test -40 °C to 250 °C 250 °C to 1100 °C 1100 °C to 1295 °C Loading, Stability and Deviation Test -40 °C to 250 °C 250 °C to 1 100 °C 1100 °C to 1295 °C	STCP-017 (Rev. 2)	0.1 °C to 0.4 °C 2.6 °C to 3.8 °C 4.7 °C 0.1 °C 1.8 °C to 3.4 °C 4.0 °C

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B. Mechanical Calibration (Pressure)		
B1. Analogue Pressure Gauges	SPCP-001 (Rev. 6)	
-0.9 bar to 0 bar		3.0 mbar
0 mbar to 1000 mbar		3.0 mbar
1000 mbar to 35 bar		0.06 bar
35 bar to 1100 bar		1.2 bar
B2. Digital Pressure Indicators	SPCP-002 (Rev. 6)	
-0.9 bar to 0 bar		0.18 mbar
0 mbar to 1000 mbar		0.015 mbar to 0.17 mbar
1000 mbar to 35 bar		0.34 mbar to 4.0 mbar
35 bar to 350 bar		0.06 bar
350 bar to 1100 bar		0.13 bar
B3. Pressure Transmitters	SPCP-003 (Rev. 6)	
-0.9 bar to 0 bar		1 mbar
0 mbar to 1000 mbar		0.08 mbar
1 bar to 1100 bar		0.018 % of Applied Reading
B4. Analogue Pressure Gauge (On-Site)	SPCP-004 (Rev. 6)	
-0.9 bar to 0 bar		0.0095 bar
0 to 20 bar		0.1 bar
20 bar to 350 bar		2.1 bar
350 bar to 700 bar		2.4 bar
B5. Absolute Pressure Instruments	SPCP-005 (Rev. 6)	
a. Liquid Media (1.0 to 1100) bar absolute		0.018 % of Applied Reading + 0.1 mbar
b. Gas Media		
i. (0.1 to 1.2) bar absolute		0.0011 bar absolute
ii. (1.2 to 35) bar absolute		0.018% of Applied Reading + 0.1 mbar
iii. (35 to 70) bar absolute		0.0071 bar

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C. Electrical Calibration (Stopwatches and Timers)	LDPCP-005 (Rev. 2)	
C1. Stopwatches (In-house)		
a. Analogue Stopwatches 5 s to 3600 s		1.2 s
b. Digital Stopwatches 5 s to 3600 s		0.03 s
C2. Stopwatches (On-site)		
a. Analogue Stopwatches 5 s to 3600 s		2.4 s
b. Digital Stopwatches 5 s to 3600 s		0.05 s to 0.06 s
C3. Timers (In-house)		
a. Analogue Timers 5 s to 3600 s		2.4 s
b. Digital Timers 5 s to 3600 s		0.7 s
C4. Timers (On-site)		
a. Analogue Timers 5 s to 3600 s	2.7 s	
b. Digital Timers 5 s to 3600 s	0.9 s to 1.4 s	

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

Approved Signatories :

Mr Simon Montero Jr - For all items

Mr Gerald Quek Teck Thye - For A5 – A9 and A16 – A17 only.

Mr Shetty A. Jagadeesh - For A1, A2, B and C only.

Mr Thanish Nagappan - For A1, A2, A11, A14 and A20 only

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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 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.