SINGAPORE LABORATORY
ACCREDITATION SCHEME

ACCREDITED LABORATORY
SAC-SINGLAS

Schedule

ISOLAB (Singapore) Pte Ltd
2, Joo Koon Circle
@ Level -2
Singapore 629031

Certificate No. : LA-2003-0278-C

Issue No. : 17

Date : 18 September 2017

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**	STCP-001 (Rev. 4)	
	-200 °C to 200°C		0.01 °C
	200°C to 850 °C		0.02 °C
A2.	**Resistance Temperature Devices Simulators**	STCP-001 (Rev. 4)	
	-200 °C to 850 °C		0.01 °C
A3.	**Thermocouple Simulators**	STCP-002 (Rev. 4)	
	Type E		
	-270 °C to -150 °C		0.38 °C
	-150 °C to -100°C		0.29 °C
	-100 °C to 0 °C		0.25 °C
	0 °C to 200 °C		0.20 °C
	200 °C to 1000 °C		0.16 °C
	Type J		
	-210 °C to -150 °C		0.40 °C
	-150 °C to -100 °C		0.31 °C
	-100 °C to 0 °C		0.26 °C
	0 °C to 1200 °C		0.20 °C

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MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
Type K		
-270 °C to -150 °C		0.51 °C
-150 °C to -100 °C		0.37°C
-100 °C to 0 °C		0.29 °C
0 °C to 900 °C		0.25 °C
900 °C to 1372 °C		0.28 °C
Type N		
-270 °C to -150 °C		0.60 °C
-150 °C to -100 °C		0.42 °C
-100 °C to 100 °C		0.33 °C
100 °C to 200 °C		0.24 °C
200 °C to 1300 °C		0.22 °C
Type R		
-50 °C to 100 °C		0.78 °C
100 °C to 400 °C		0.49 °C
400 °C to 600 °C		0.40 °C
600 °C to 900 °C		0.33 °C
900 °C to 1768 °C		0.31 °C
Type S		
-50 °C to 100 °C		0.78 °C
100 °C to 200 °C		0.56 °C
200 °C to 400 °C		0.44 °C
400 °C to 700 °C		0.40 °C
700 °C to 1768 °C		0.36 °C
Type T		
-270 °C to -150 °C		0.43 °C
-150 °C to -100 °C		0.36 °C
-100 °C to 0 °C		0.28 °C
0 °C to 200 °C		0.22 °C
200 °C to 400 °C		0.17 °C

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	MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
A4.	**Thermocouple Indicators**	STCP-002 (Rev. 4)	
	Type E		
	-200 °C to -150 °C		0.42 °C
	-150 °C to -100 °C		0.29 °C
	-100 °C to 0 °C		0.24 °C
	0 °C to 200 °C		0.18 °C
	200 °C to 1000 °C		0.15 °C
	Type J		
	-210 °C to -150 °C		0.39 °C
	-150 °C to -100 °C		0.30 °C
	-100 °C to 100 °C		0.25 °C
	100 °C to 1200 °C		0.19 °C
	Type K		
	-200 °C to -150 °C		0.53 °C
	-150 °C to -100 °C		0.36 °C
	-100 °C to 0 °C		0.29 °C
	0 °C to 1000 °C		0.25 °C
	1000 °C to 1372 °C		0.27 °C
	Type N		
	-270 °C to -150 °C		0.59 °C
	-150 °C to -100 °C		0.41 °C
	-100 °C to -50 °C		0.31 °C
	-50 °C to 300 °C		0.26 °C
	300 °C to 1300 °C		0.20 °C
	Type R		
	-50 °C to 100 °C		0.63 °C
	100 °C to 400 °C		0.46 °C
	400 °C to 600 °C		0.37 °C
	600 °C to 900 °C		0.31 °C
	900 °C to 1768 °C		0.29 °C

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	MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
	Type S		
	-50 °C to 100 °C		0.63 °C
	100 °C to 200 °C		0.53 °C
	200 °C to 400 °C		0.47 °C
	400 °C to 700 °C		0.37 °C
	700 °C to 1100 °C		0.34 °C
	1100 °C to 1768 °C		0.31 °C
	Type T		
	-200 °C to -150 °C		0.47 °C
	-150 °C to -100 °C		0.35 °C
	-100 °C to 0 °C		0.27 °C
	0 °C to 200 °C		0.20 °C
	200 °C to 400 °C		0.15 °C
A5.	**Resistance Temperature Detectors Without Display**	STCP-003 (Rev. 4)	
	-80 °C to 0 °C		17 mK
	0 °C to 30 °C		11 mK
	30 °C to 250 °C		17 mK
	250 °C to 500 °C		0.41 °C
A6.	**Thermocouple Sensor without Display**	STCP-004 (Rev. 6)	
	Type E		
	-80 °C to 250 °C		0.7 °C
	Type J		
	-80°C to 0 °C		0.7 °C
	0 °C to 250 °C		0.7 °C
	250 °C to 500 °C		0.9 °C
	500 °C to 1000 °C		1.5 °C
	Type K		
	-80 °C to 0 °C		0.5 °C
	0 °C to 250 °C		0.3 °C
	250 °C to 500 °C		0.5 °C

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	MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
	500 °C to 1000 °C		1.4 °C
	1000 °C to 1290 °C		2.7 °C
	Type N		
	-80 °C to 0 °C		0.7 °C
	0 °C to 200 °C		0.4 °C
	200 °C to 400 °C		0.5 °C
	400 °C to 1000 °C		1.4 °C
	1000 °C to 1290 °C		2.8 °C
	Type R		
	0 °C to 500 °C		0.5 °C
	500 °C to 1000 °C		1.4 °C
	1000 °C to 1290 °C		2.7 °C
	Type S		
	0 °C to 350 °C		0.9 °C
	350 °C to 1100 °C		1.4 °C
	1100 °C to 1290 °C		2.2 °C
	Type T		
	-80 °C to 0 °C		0.4 °C
	0 °C to 250 °C		0.3 °C
A7.	**Digital Indicator With RTD Sensor**	STCP-005 (Rev. 5)	
	-80 ºC to -40 ºC		15 mK
	-40 °C to 0 °C		15 mK
	0 °C to 250 °C		15 mK
	250 °C to 550 °C		0.41 °C
A8.	**Digital Indicator with Base Metal Thermocouple**	STCP-005 (Rev. 5)	
	-80 °C to 20 °C		0.5 °C
	20 °C to 250 °C		0.6 °C
	250 °C to 500 °C		1.8 °C
	500 °C to 700 °C		2.1 °C
	700 °C to 900 °C		2.3 °C
	900 °C to 1290 °C		2.9 °C

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	MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
A9.	**Digital Indicator with Noble Metal Thermocouple**	STCP-005 (Rev. 5)	
	0 °C to 250 °C		0.4 °C
	250 °C to 500 °C		0.6 °C
	500 °C to 1000 °C		1.5 °C
	1000 °C to 1100 °C		2.2 °C
	1100 °C to 1290 °C		2.8 °C
A10.	**Humidity Instruments**	STCP-006 (Rev. 5)	
	-20 °C to 60 °C (25 to 95) % relative humidity at 23 °C		0.30 °C (2.0 to 2.2) % relative humidity
	-20 °C to 60 °C (i) (25 to 95) % relative humidity (ii) (95 and above) % relative humidity		0.12 °C (2.0 to 2.2) % relative humidity (2.7 to 2.8) % relative humidity
A11.	**Temperature Enclosure**	STCP-007 (Rev. 5)	
	-80 °C to -40 °C		0.9 °C
	-40 °C to 100 °C		1.3 °C
	100 °C to 350 °C		2.7 °C
	350 °C to 1290 °C		3.9 °C
	121 °C (Autoclaves and Pressurized Enclosures)		0.3 °C
A12.	**Digital Indicator with RTD Sensor on Site**	STCP-008 (Rev. 4)	
	-40 °C to 0 °C		0.5 °C
	0 °C to 100 °C		0.2 °C
	100 °C to 200 °C		0.7 °C
	200 °C to 300 °C		1.9 °C
	300 °C to 500 °C		3.0 °C

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

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A17.	**Temperature Transmitter with Base Thermocouple Sensor**	STCP–011 (Rev. 5)	
	0 °C to 200 °C		2.2 °C
	200 °C to 1 000 °C		2.5 °C
	1 000 °C to 1 200 °C		3.4 °C
A18.	**Radiation Thermometers**	STCP–012 (Rev. 4)	
	0 °C	ε = 1.00	0.4 °C
	50 °C to 700 °C	ε = 1.00	5.8 °C to 6.5 °C
	0 °C	ε = 0.90 to 0.99	1.8 °C
	50 °C to 700 °C	ε = 0.90 to 0.99	6.0 °C to 6.8 °C
A19.	**Liquid-In-Glass Thermometer**	STCP-013 (Rev. 4)	
	-80 °C to 250 °C		29 mK
A20.	**Temperature and Humidity Chamber**	STCP-014 (Rev. 2)	
	-20 °C to 60 °C		0.6 °C to 0.8 °C
	(20 to 90) % relative humidity		(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**	STCP-017 (Rev. 2)	
	Radial and Axial Test		
	–40 °C to 250 °C		0.1 °C to 0.4 °C
	250 °C to 1 100 °C		2.6 °C to 3.8 °C
	1 100 °C to 1 295 °C		4.7 °C

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	MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
	Loading, Stability and Deviation Test		
	–40 °C to 250 °C		0.1 °C
	250 °C to 1 100 °C		1.8 °C to 3.4 °C
	1 100 °C to 1 295 °C		4.0 °C
B.	**Mechanical Calibration (Pressure)**		
B1.	**Analogue Pressure Gauges**	SPCP-001 (Rev. 5)	
	-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. 5)	
	-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. 5)	
	-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. 5)	
	-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

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B5.	**Absolute Pressure Instruments** a. Liquid Media 1.0 bar to 1100 bar absolute	SPCP-005 (Rev. 5)	0.018 % of Applied Reading + 0.1 mbar
	b. Gas Media 0.1 bar to 1.2 bar absolute		0.0011 bar absolute
	1.2 bar to 35 bar absolute		0.018% of Applied Reading + 0.1 mbar
	35 bar to 70 bar absolute		0.0071 bar

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

Approved Signatories :

Mr Abd Rashid Bin Othman - For A1- A5, A10 - A11, A14 - A15, A18 – A20, A21(a), A22 and B only.

Mr Simon Montero Jr - For items A1-A9, A11- A17, and A21 only.

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.