

# Schedule

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Certificate No. : LA-2003-0278-C

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Date : 3 May 2018

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Field of Testing : Calibration and Measurement

MEASURED QUANTITIES/ INSTRUMENTS/RANGE TO BE CALIBRATED		METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
<b>A</b>	<b>Temperature Calibration</b>		
A1.	<b>Resistance Temperature Devices Indicators</b> -200 °C to 200°C 200°C to 850 °C	STCP-001 (Rev. 4)	0.01 °C 0.01 °C
A2.	<b>Resistance Temperature Devices Simulators</b> -200 °C to 850 °C	STCP-001 (Rev. 4)	0.01 °C
A3.	<b>Thermocouple Simulators</b>	STCP-002 (Rev. 4)	
	<b>Type E</b> -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
	<b>Type J</b> -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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<p><b>Type K</b> -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</p> <p><b>Type N</b> -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</p> <p><b>Type R</b> -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><b>Type S</b> -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</p> <p><b>Type T</b> -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>0.51 °C 0.37 °C 0.29 °C 0.25 °C 0.28 °C</p> <p>0.60 °C 0.42 °C 0.33 °C 0.24 °C 0.22 °C</p> <p>0.78 °C 0.49 °C 0.40 °C 0.33 °C 0.31 °C</p> <p>0.78 °C 0.56 °C 0.44 °C 0.40 °C 0.36 °C</p> <p>0.43 °C 0.36 °C 0.28 °C 0.22 °C 0.17 °C</p>

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<p>A4. <b>Thermocouple Indicators</b></p> <p><b>Type E</b> -200 °C to -150 °C -150 °C to -100 °C -100 °C to 0 °C 0 °C to 200 °C 200 °C to 1000 °C</p> <p><b>Type J</b> -210 °C to -150 °C -150 °C to -100 °C -100 °C to 100 °C 100 °C to 1200 °C</p> <p><b>Type K</b> -200 °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><b>Type N</b> -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><b>Type R</b> -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>	STCP-002 (Rev. 4)	<p>0.42 °C 0.29 °C 0.24 °C 0.18 °C 0.15 °C</p> <p>0.39 °C 0.30 °C 0.25 °C 0.19 °C</p> <p>0.53 °C 0.36 °C 0.29 °C 0.25 °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>

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<p><b>Type S</b> -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><b>Type T</b> -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. <b>Resistance Temperature Detectors Without Display</b>  -80 °C to 0 °C 0 °C to 30 °C 30 °C to 250 °C 250 °C to 500 °C</p>	<p>STCP-003 (Rev. 4)</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>A6. <b>Thermocouple Sensor without Display</b></p> <p><b>Type E</b> -80 °C to 250 °C</p> <p><b>Type J</b> -80 °C to 0 °C 0 °C to 250 °C 250 °C to 500 °C 500 °C to 1000 °C</p>	<p>STCP-004 (Rev. 6)</p>	<p>0.7 °C</p> <p>0.7 °C 0.7 °C 0.9 °C 1.5 °C</p>

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<p><b>Type K</b> -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><b>Type N</b> -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><b>Type R</b> 0 °C to 500 °C 500 °C to 1000 °C 1000 °C to 1290 °C</p> <p><b>Type S</b> 0 °C to 350 °C 350 °C to 1100 °C 1100 °C to 1290 °C</p> <p><b>Type T</b> -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. <b>Digital Indicator With RTD Sensor</b></p> <p>-80 °C to -40 °C -40 °C to 0 °C 0 °C to 250 °C 250 °C to 550 °C</p>	<p>STCP-005 (Rev. 5)</p>	<p>15 mK 15 mK 15 mK 0.41 °C</p>

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A8.	<b>Digital Indicator with Base Metal Thermocouple</b> -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.	<b>Digital Indicator with Noble Metal Thermocouple</b> 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.	<b>Humidity Instruments</b> -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.	<b>Temperature Enclosure</b> -80 °C to -40 °C -40 °C to 100 °C 100 °C to 350 °C 350 °C to 1290 °C 121 °C (Autoclaves and Pressurized Enclosures)	STCP-007 (Rev. 5)	0.9 °C 1.3 °C 2.7 °C 3.9 °C 0.3 °C
A12.	<b>Digital Indicator with RTD Sensor on Site</b> -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. <b>Digital Indication with Base Metal Thermocouple Sensor on Site Digital Display On Site</b></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>	<p>STCP-008 (Rev. 4)</p>	<p>2.0 °C 1.9 °C 2.0 °C 2.6 °C 3.5 °C</p>
<p>A14. <b>Digital RTD Indicators (On-Site)</b></p> <p>-200 °C to 500 °C</p>	<p>STCP-009 (Rev. 4)</p>	<p>0.2 °C</p>
<p>A15. <b>Thermocouple Display Device(On-Site)</b></p> <p><b>Type E</b> -200 °C to 0 °C -0 °C to 1000 °C</p> <p><b>Type J</b> -200 °C to 800 °C</p> <p><b>Type K</b> -200 °C to 1200 °C</p> <p><b>Type N</b> -200 °C to 1200 °C</p> <p><b>Type T</b> -200 °C to 0 °C 0 °C to 400 °C</p>	<p>STCP-010 (Rev. 4)</p>	<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. <b>Temperature Transmitter with RTD Sensor</b></p> <p>-80 °C to 200 °C 200 °C to 500 °C</p>	<p>STCP-011 (Rev. 5)</p>	<p>0.2 °C 0.5 °C</p>

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A17. <b>Temperature Transmitter with Base Thermocouple Sensor</b> 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. <b>Radiation Thermometers</b> 0 °C 50 °C to 700 °C  0 °C 50 °C to 700 °C	STCP-012 (Rev. 4) $\varepsilon = 1.00$ $\varepsilon = 1.00$  $\varepsilon = 0.90$ to 0.99 $\varepsilon = 0.90$ to 0.99	0.4 °C 5.8 °C to 6.5 °C  1.8 °C 6.0 °C to 6.8 °C
A19. <b>Liquid-In-Glass Thermometer</b> -80 °C to 250 °C	STCP-013 (Rev. 4)	29 mK
A20. <b>Temperature and Humidity Chamber</b> -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. <b>Sensor Calibration Using Fixed Point</b> (a) Triple Point of Water (0.01 °C)  (b) Gallium Melting Point (29.7646 °C)	STCP-015 (Rev. 3)  STCP-016 (Rev. 3)	3 mK  3 mK
A22. <b>Multi-Holed Temperature Block Bath Calibration</b>  Radial and Axial Test -40 °C to 250 °C 250 °C to 1 100 °C 1 100 °C to 1 295 °C  Loading, Stability and Deviation Test -40 °C to 250 °C 250 °C to 1 100 °C 1 100 °C to 1 295 °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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<p><b>B. Mechanical Calibration (Pressure)</b></p> <p><b>B1. Analogue Pressure Gauges</b> -0.9 bar to 0 bar 0 mbar to 1000 mbar 1000 mbar to 35 bar 35 bar to 1100 bar</p> <p><b>B2. Digital Pressure Indicators</b> -0.9 bar to 0 bar 0 mbar to 1000 mbar 1000 mbar to 35 bar 35 bar to 350 bar 350 bar to 1100 bar</p> <p><b>B3. Pressure Transmitters</b> -0.9 bar to 0 bar 0 mbar to 1000 mbar 1 bar to 1100 bar</p> <p><b>B4. Analogue Pressure Gauge (On-Site)</b> -0.9 bar to 0 bar 0 to 20 bar 20 bar to 350 bar 350 bar to 700 bar</p> <p><b>B5. Absolute Pressure Instruments</b></p> <p>a. Liquid Media (1.0 to 1100) bar absolute</p> <p>b. Gas Media</p> <p>i. (0.1 to 1.2) bar absolute</p> <p>ii. (1.2 to 35) bar absolute</p> <p>iii. (35 to 70) bar absolute</p>	<p>SPCP-001 (Rev. 5)</p> <p>SPCP-002 (Rev. 5)</p> <p>SPCP-003 (Rev. 5)</p> <p>SPCP-004 (Rev. 5)</p> <p>SPCP-005 (Rev. 5)</p>	<p>3.0 mbar 3.0 mbar 0.06 bar 1.2 bar</p> <p>0.18 mbar 0.015 mbar to 0.17 mbar 0.34 mbar to 4.0 mbar 0.06 bar 0.13 bar</p> <p>1 mbar 0.08 mbar 0.018 % of Applied Reading</p> <p>0.0095 bar 0.1 bar 2.1 bar 2.4 bar</p> <p>0.018 % of Applied Reading + 0.1 mbar</p> <p>0.0011 bar absolute</p> <p>0.018% of Applied Reading + 0.1 mbar</p> <p>0.0071 bar</p>

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<b>C.</b>	<b>Electrical Calibration (Stopwatches and Timers)</b>	LDPC-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 %.

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Approved Signatories :

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

Mr Shetty A. Jagadeesh - For category C 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.