

Schedule

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Singapore 797565

Certificate No. : LA-2013-0551-C

Issue No. : 5

Date : 5 October 2017

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FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES/INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY (CMC*)
A Dimensional		
1. Plain Plug Gauges (Parallel) (1 to 50) mm (50 to 100) mm (100 to 150) mm	CCP 2.4.24 Issue 10	0.001 mm on Diameter 0.001 mm on Diameter 0.001 mm on Diameter
2. Length Gauges Flat and Spherical Ended 0 to 775 mm	CCP 2.3.1 Issue 8	0.001 mm + (0.005 mm x Length in m)
3. Parallels 5-50 x 100 x 400 mm	CCP 2.4.38 Issue 8	0.005 mm
4. Micrometer (External) 0 to 775 mm	CCP 2.4.1 Issue 12 CCP 2.3.1 Issue 8 (rods)	Heads: 0.002 mm Rods: 0.001 mm + (0.005 mm x Length in m)
5. Micrometer (Depth) (0 to 300) mm	CCP 2.4.4 Issue 9	Heads: 0.002 mm heads Rods: 0.001 mm + (0.005 mm x Length in m)
6. Micrometer (Internal and rod type) (0 to 300) mm	CCP 2.4.2 Issue 12	Heads: 0.002 mm Rods: 0.001 mm + (0.005 mm x Length in m)
7. Caliper (0 to 600) mm	CCP 2.4.6 Issue 12	0.01 mm + (0.03 mm x Length in m)

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8. Height Gauge (0 to 1 000) mm	CCP 2.4.5 Issue 9	0.01 mm + (0.03 mm x Length in m)
9. Depth Gauge (0 to 600) mm	CCP 2.4.8 Issue 11	0.01 mm + (0.03 mm x Length in m)
10. Dial Indicators (0 to 50) mm	CCP 2.4.11 Issue 10	0.0014 mm (Analogue) 0.002 mm (Digital)
11. Engineers Squares (50 to 300) mm	CCP 2.4.17 Issue 10	0.003 mm
12. Ring Gauges Plain (6 to 50) mm (50 to 100) mm (100 to 200) mm	CCP 2.3.2 Issue 11 (Section 9.1.6)	0.0010 mm 0.0016 mm 0.0025 mm
13. General Dimensional Measurements, made using CMM including non-contact method : Measuring range: <= 1570 mm	CCP 2.4.36 Issue 15	0.0035 mm + (0.0065 x L) mm (L in m)
B. TEMPERATURE		
1. Resistance Thermometer PT-100 20 °C to 100 °C >100 °C to 130 °C	QCR/LCP/0600 Issue 2	0.10 °C 0.12 °C
2. Electrical simulation of Temperature - Calibration of measuring and simulation instruments		
<u>Measure and Source</u>		<u>Lab / On-site</u>
a. RTD PT100 -200 °C to 200 °C 200 °C to 600 °C 600 °C to 850 °C	CCP 4.4 Issue 5	0.06 °C 0.08 °C 0.11 °C

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b. J-Type 0 °C to 1200 °C	CCP 4.9 Issue 6	0.24 °C
c. K-Type 0 °C to 1000 °C 1000 °C to 1372 °C		0.25 °C 0.34 °C
d. N-Type 0 °C to 800 °C 800 °C to 1300 °C		0.27 °C 0.26 °C
e. R-Type 0 °C to 400 °C 400 °C to 1768 °C		0.51 °C 0.45 °C
C. MECHANICAL		
1. a. Torque Hand Tools (0.5 to 1500) N·m	CCP 3.6.6 Issue 6	1 % of reading
b. Torque Ratio Multiplier: Multiplier Ratio (100 to 5000) lbf.ft (135 to 6780) N·m	CCP 3.6.6 Issue 6	1 %
2. Pressure Measuring Devices (Lab/Site)		
Direct indicating instruments Pressure Gauges Pressure Transducers with indicators	CCP 3.7.2 Issue 5	
(0 to 100) psi gauge		0.16 psi gauge
(0 to 900) psi gauge		0.36 psi gauge
(0 to 3700) psi gauge		3.0 psi gauge
(0 to 5000) psi gauge		4.0 psi gauge
(0 to 9000) psi gauge		4.5 psi gauge

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3. Digital Weighing Scales (Lab/Site) (5 to 210) g (5 to 410) g (5 to 6100) g (5 to 60) kg	CCP 3.6.5 Issue 3	1.3 mg 3 mg 40 mg 4 g
4. Hardness Testing machine (Indirect Verification) (Lab/Site) a. Vickers Scale (Indirect Verification) 162.1 HV0.1 428.0 HV0.1 870.6 HV0.1 162.5 HV0.2 424.5 HV0.2 835.3 HV0.2 167.6 HV0.5 418.5 HV0.5 817.7 HV0.5 161.6 HV1 415.5 HV1 809.5 HV1 160.3 HV5 417.7 HV5 805.8 HV5 161.3 HV10 413.8 HV10 796.4 HV10	QCD 9.5 Issue 1 BS EN ISO 6507-2 : 2005	11.0 HV (1 µm) 39.0 HV (1 µm) 77.0 HV (1 µm) 9.0 HV 31.0 HV 73.0 HV 6.0 HV 20.0 HV 47.0 HV 4.0 HV 19.0 HV 34.0 HV 3.0 HV 10.0 HV 21.0 HV 3.0 HV 7.0 HV 13.0 HV

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b. Rockwell Scale (Indirect Verification) (10 to 45) HRBW (> 45 to 80) HRBW (> 80 to 100) HRBW (10 to 70) HRC	QCD 9.5 Issue 1 BS EN ISO 6508-2 : 2015	1.3 HRBW 0.9 HRBW 0.5 HRBW 0.4 HRC

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

Approved signatories :

Mr George Bastings For all items.
Dr Chao Zhixia For all items.
Mr Gnanasekaran Velusamy For category A, C1 and C3 only.
Mr Dennis Balano For category B (Temperature) and C2 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 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.