

Schedule

NORTHLAB SEAMS Pte Ltd
No. 27 Woodlands Industrial Park E1
02-08 Hiangkie Industrial Building
Singapore 757718

Certificate No. : LA-2007-0369-C
Issue No. : 3
Date : 21 December 2009
Page : 1 of 10

SCOPE OF ACCREDITATION

FIELD OF TESTING : Calibration & Measurement

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)	
<p>A DIMENSIONAL METROLOGY</p> <p>1. Gauge Blocks and Accessories (Tungsten & Steel only)</p> <p>1.1 Metric unit 0 mm to 10 mm 10 mm to 25 mm 25 mm to 50 mm 50 mm to 75 mm 75 mm to 100 mm</p> <p>1.2 Imperial Unit 0 inch – 0.4 inch 0.4 inch – 1 inch 1 inch – 2 inch 2 inch – 3 inch 3 inch – 4 inch</p> <p>Flatness : Up to 2.5 mm Over 2.5 mm</p> <p>2. Gauge Block Comparators (Lab / On-Site)</p> <p>a. Up to 10 mm b. Up to 50 mm c. Up to 100 mm</p>	<p>) BS 4311 : Part 1 : 2007) Work procedure 019,) 15 March 2008) ISO 3650 : 1998,) JIS B 7506 : 2004</p> <p>In-house Calibration Procedure SEAMS -0008 : 1997, 15 March 2008</p>	<p><u>Tungsten Carbide</u></p> <p>0.05 μm 0.06 μm 0.09 μm 0.10 μm 0.13 μm</p> <p>1.7 μinch 2.2 μinch 3.4 μinch 4.0 μinch 5.2 μinch</p> <p>0.11 μm 0.10 μm</p> <p>0.031 μm 0.061 μm 0.091 μm</p>	<p><u>Steel</u></p> <p>0.05 μm 0.06 μm 0.09 μm 0.11 μm 0.15 μm</p> <p>1.7 μinch 2.3 μinch 3.7 μinch 4.5 μinch 5.9 μinch</p> <p>4.3 μinch 3.9 μinch</p>

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 2 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
3. Plain Plug Gauges or Pin Gauges a. 0 mm to 10 mm b. 10 mm to 50 mm c. 50 mm to 100 mm d. 100 mm to 200 mm	BS 969 : 2008 Work procedure 001, 15 March 2008	0.2 μm to 0.5 μm 0.3 μm to 0.8 μm 0.6 μm to 1.0 μm 1.1 μm to 1.5 μm
3.1 Plug/Pin gauges of lower accuracy Up to 25mm (Lab/On-Site)		2 μm
3.2 Precision Balls up to 10mm		0.2 μm
4. Thread Wires (Measuring Cylinders) 0 mm to 10 mm	BS 5590: 1978 Work Procedure 025, 15 March 2008	0.2 μm
5. Plain Ring Gauges a. 1 mm to 50 mm b. 50 mm to 100 mm c. 100 mm to 150 mm d. 150 mm to 200 mm	BS 969 : 2008 Work procedure 002, 15 March 2008	0.2 μm to 0.9 μm 0.4 μm to 1.4 μm 0.5 μm to 1.5 μm 0.9 μm to 1.7 μm
6. Parallel Screw Thread Plug Gauges a. M2 to M38 b. M38 to M100)) BS 1580 : 2007 Part 1) or Part 3) Work procedure 014,) 15 March 2008	1.2 μm 3 μm
6.1 Parallel Screw Thread Ring Gauges a. M3.5 to M38 b. M38 to M100)))	1.2 μm 3 μm
7. Tapered Thread Plug Gauges	ASME B1.20.5-1991 Work procedure 030, 15 March 2008	5 μm
8. Plain Gap Gauges a. 0.5 mm to 50 mm b. 50 mm to 150 mm c. 150 mm to 300 mm	ASME B 47.1-1 : 2007 as a guide Work procedure 003, 15 March 2008	2 μm 3 μm 5 μm

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 3 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
9. Feeler Gauges As covered in BS 957 or JIS B 7524	BS 957 : 2008 JIS B 7524 : 2008 Work procedure 010, 15 March 2008	0.6 μm to 1.0 μm
9.1 Feeler gauges of lower accuracy (Lab/On-Site)		1 μm
10. Surface Plate (On-site/Lab) 2000 mm X 1500 mm	BS 817 : 2008 Work procedure 023, 15 March 2008	1.4 μm / 55 μinch
11. Universal Measuring Machine, 0 mm to 100 mm (Lab / On-Site) 100 mm to 500 mm (Lab / On-Site) 500 mm to 1000 mm (Lab / On-Site) Flatness	In-house Calibration Procedure SEAMS-0012 : 1996, 15 March 2008	0.20 μm 1.8 μm 2.8 μm 0.18 μm
12. Dial Gauge Calibration Tester a. 0.001 mm resolution (range 25mm) b. 0.0001 mm resolution (range 30mm)	In-house Calibration Procedure SEAMS-0013:1996, 15 Mar 08 SEAMS-0009:1996, 15 Mar 08	0.6 μm 0.2 μm
13. Height Setting Micrometer/Riser Block a. up to 300 mm b. up to 600 mm Accuracy of lead screw Flatness Parallelism	ISO 7863 : 1984 Work procedure 018, 15 March 2008	0.9 μm 1.8 μm 0.6 μm 0.18 μm 1.5 μm
14. Caliper Checker a. Up to 360 mm b. Up to 670 mm Flatness Parallelism	In-house Calibration Procedure SEAMS-0001 : 1993, 15 March 2008	0.9 μm 1.8 μm 0.18 μm 1.5 μm

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 4 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
15. Measuring Microscopes (Toolmaker's) (Lab / On-Site) Up to 200 mm	JIS B 7153 : 1995 Work procedure 022, 15 March 2008	1.8 μ m
16. Measuring Projectors (Lab / On-Site) a. Up to 240 mm b. Up to 300 mm	JIS B 7184 : 1994 as a guide Work procedure 016, 15 March 2008	2 minutes angular 2.2 μ m linear 3.3 μ m linear
17. Engineering Squares - (Including Cylindrical & Block Type)	BS 939 : 2007 Work procedure 017, 15 March 2008	1.9 μ m
18. External Micrometers Functional requirements as covered in BS 870 : 2008	BS 870 : 2008 Work procedure 005, 15 March 2008	
18.1 Up to 600 mm a. Over 600 mm up to 1000 mm b. Over 1000 mm up to 1500 mm c. Over 1500 mm up to 2000 mm	BS 870 as guide and with reference to manufacturers' requirements	1 μ m 5 μ m 7 μ m 10 μ m
18.2 Up to 100 mm (On-Site)		1 μ m
18.3 Setting Rods a. Up to 600 mm b. Over 600 mm up to 1000 mm c. Over 1000 mm up to 1500 mm d. Over 1500 mm up to 1950 mm		1 μ m 5 μ m 7 μ m 10 μ m
18.4 Micrometer Head Accuracy		0.6 μ m
19. Thread Micrometer 0 - 100 mm	In-house Calibration Procedure SEAMS-0010 : 1996, 15 March 2008	1 μ m

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 5 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
20. Internal Micrometer (incl. Stick Micrometer) Functional requirements as covered in BS 959:2008 up to 900 mm	BS 959 : 2008 Work procedure 006, 15 March 2008	3 μ m
21. Internal Micrometer 5 - 300 mm	In-house Calibration Procedure SEAMS-0011 : 1996, 15 March 2008	3 μ m
22. Depth Micrometer Functional requirements as covered in BS 6468 : 2008 Up to 300 mm	BS 6468 : 2008 Work procedure 007, 15 March 2008	2 μ m
23. Holtest a. 0.001 mm resolution b. 0.01 mm resolution	In-house Calibration Procedure SEAMS-0007 : 1996, 15 March 2008	3 μ m 5 μ m
24. Dial Gauges Functional requirements as covered in BS 907 : 2008	BS 907 : 2008, JIS B 7503:1997, DIN 879 : 1999 Work procedure 011, 15 March 2008	0.45 μ m to 1 μ m
24.1 Dial Gauges (On-Site) a. Up to 12.7 mm b. 0.01 mm resolution		2 μ m
24.2 Microindicators / Inductive Probe		0.10 μ m
25. Dial Test Indicators Functional requirements as covered in BS 2795 : 1981	BS 2795 : 1981 Work procedure 012, 15 March 2008	0.10 μ m to 0.45 μ m

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 6 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
26. Linear Gauges (Lab/ On-Site) a. Up to 100 mm b. Up to 150 mm	In-house Calibration Procedure SEAMS-0017 : 1997, 15 March 2008	1 μ m 3 μ m to 10 μ m
27. Digital Indicator (Lab/ On-Site) a. Up to 100 mm b. Up to 150 mm	In-house Calibration Procedure SEAMS-0017 : 1997, 15 March 2008	1 μ m 3 μ m to 10 μ m
28. Dial Thickness Gauge a. 0.001 mm resolution b. 0.01 mm resolution	In-house Calibration Procedure SEAMS-0005 : 1996, 15 March 2008	3 μ m 5 μ m
29. Electronic & Mechanical Slide Caliper Functional requirements as covered in BS 887 : 2008 a. Up to 1000 mm b. Up to 2000 mm c. Up to 300 mm (On-Site)	BS 887 : 2008, JIS B 7507 : 1993 Work procedure 008, 15 March 2008	2 μ m Flatness / Parallelism 10 μ m 10 μ m 20 μ m
30. Caliper Gauge 0 – 50 mm	In-house Calibration Procedure, SEAMS-0004 : 1996 15 March 2008	5 μ m
31. Electronic & Mechanical Height Gauges As covered in BS 1643 : 2008 up to 1000 mm	BS 1643 : 2008 Work procedure 009, 15 March 2008	10 μ m
32. Other Limit Gauges incl. Height, Depth, Length Up to 300 mm	ASME B 47.1 - 2007 as a guide Work procedure 004, 15 March 2008	10 μ m

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 7 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
33. Precision Vernier Depth Gauge 0 – 1000 mm	BS 6365 : 2008 Work procedure 021, 15 March 2008	10 μ m
34. Depth Gauge Electronic & Mechanical 0 - 1000 mm	In-house Calibration Procedure SEAMS-0014 : 1996, 15 March 2008	0.01 mm
35. Bevel Protractor Functional requirements as covered in BS 1685 : 2008	BS 1685 : 2008 Work procedure 015, 15 March 2008	3 μ m linear 5 minutes angular
36. Cylinder (bore) Gauges As covered in JIS B 7515:1982	JIS B 7515 : 1982 Work procedure 013, 15 March 2008	3 μ m
37. Form Measurement a. Parallelism Up to 100 mm Up to 100 mm Up to 500 mm a. Flatness Up to 100 mm Up to 500 mm	In-house Calibration Procedure SEAMS-0015 : 2006, 15 March 2008 using optical parallel Using electronic probe Using electronic probe	0.21 μ m 0.85 μ m 1.02 μ m 0.85 μ m 1.02 μ m
38. Gauge block Accessories (Dimensions)	Work Procedure – 019, 15 March 2008 Using electronic probe Using ULM	1.08 μ m 0.23 μ m

Schedule



Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 8 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
39 Check- master Up to 300 mm Up to 600 mm Up to 1000 mm	In-house Calibration Procedure SEAMS-0016:2007, 15 Mar 2008	0.9 μ m 1.6 μ m 2.6 μ m
40 Coating Thickness Gauge Up to 3 mm	In-house Calibration Procedure SEAMS-0023 : 2008, 15 March 2008	2.3 μ m
41 Metal Rule a Up to 300 mm b Over 300 mm up to 500 mm c Over 500 mm up to 1000 mm d Over 1000 mm up to 2000 mm	JIS B 7516 : 1987 Work procedure 027, 15 March 2008	4 μ m 6 μ m 8 μ m 11 μ m
42 Measuring Tape a Up to 1 m b Over 1 m up to 5 m c Over 5 m up to 10 m d Over 10 m up to 20 m e Over 20 m up to 30 m f Over 30 m up to 50 m g Over 50 m up to 100 m	JIS B 7512 : 2005 Work procedure 029, 15 March 2008	0.14 mm 0.32 mm 0.45 mm 0.63 mm 0.77 mm 0.99 mm 1.40 mm

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 9 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
<p>B MECHANICAL</p> <p>1 Torque Gauges</p> <p>a. Up to 5 lbf.in b. 5 lbf.in to 10 lbf.in c. 10 lbf.in to 100 lbf.in d. 8 lbf.ft to 100 lbf.ft e. 100 lbf.ft to 400 lbf.ft f. 400 lbf.ft to 600 lbf.ft g. 600 lbf.ft to 1000 lbf.ft</p> <p>2 Weighing Scales/Balances (Lab /On-site)</p> <p>a. Up to 62 g b. 62 g to 180 g c. 180 g to 1500 g d. 1500 g to 5000 g e. 5 kg to 10 kg f. 10 kg to 60 kg g. 60 kg to 130 kg h. 130 kg to 180 kg</p> <p>3 Push/Pull Gauge (Lab/On-Site)</p> <p>a. Up to 5 kgf b. Up to 50 kgf c. Up to 110 kgf</p> <p>4 Tension Gauges (Lab/On-Site)</p> <p>a. Up to 500 gf b. Up to 50 kgf</p> <p>5 Torque Wrench (Dial/digital) Up to 3000 lbf.ft</p>	<p>ISO 6789 : 2003 Work procedure 020, 15 March 2008</p> <p>In-house Calibration Procedure SEAMS-0006 : 1996, 15 March 2008</p> <p>In-house Calibration Procedure SEAMS-002 : 1993, 15 March 2008</p> <p>In-house Calibration Procedure SEAMS-0003 : 1993, 15 March 2008</p> <p>Work procedure 020, 15 March 2008</p>	<p>0.017 lbf.in 0.037 lbf.in 0.241 lbf.in 0.12 lbf.ft 0.96 lbf.ft 1.75 lbf.ft 2.11 lbf.ft</p> <p>0.00008 g 0.0002 g 0.001 g 0.02 g 0.045 g 0.30 g 0.002 kg 0.003 kg</p> <p>0.001 kgf 0.01 kgf 0.7 kgf</p> <p>0.8 gf 0.54 kgf</p> <p>3.2 lbf.ft</p>

Schedule

Certificate No. : LA-2007-0369-C

Issue No. : 3

Date : 21 December 2009

Page : 10 of 10

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY (\pm)
6 Torque Multiplier Up to 5000 lbf.ft	Work procedure 020, 15 March 2008	3.6 lbf.ft
7 Torque Meter Up to 5 lbf.in 5 lbf.in to 10 lbf.in 10 lbf.in to 40 lbf.in 40 lbf.in to 100 lbf.in	Work procedure 024, 15 March 2008	0.023 lbf.in 0.038 lbf.in 0.13 lbf.in 0.29 lbf.in

- * 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.

Approved signatories

Mr Jeffrey T. Pereira - For all calibration

Ms Karl Lim - All except A2.

Mr Sreejith Radhakrishnan - All except A2.

Mr Noorazmi Bin Mohamed - Items A1, A3-A9.1, A12- A42 and B1 – B7 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.