

# 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. : 1  
Date : 24 September 2007  
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## SCOPE OF ACCREDITATION

FIELD OF TESTING : Calibration & Measurement

MEASURED QUANTITIES/ INSTRUMENTS/ RANGE TO BE CALIBRATED	METHOD	BEST MEASUREMENT CAPABILITIES EXPRESSED AS AN UNCERTAINTY ( $\pm$ )	
<b>A DIMENSIONAL METROLOGY</b>			
<b>1 Gauge Blocks and Accessories (Tungsten &amp; Steel only)</b>		<u>Tungsten Carbide</u>	<u>Steel</u>
1.1 Metric unit	) BS 4311 : Part 3 : 1993 ) Work procedure 019, ) 23 February 2007 ) ISO 3650, JIS B 7506 and ) DIN 861		
0 mm to 10 mm		0.05 $\mu$ m	0.05 $\mu$ m
10 mm to 25 mm		0.06 $\mu$ m	0.06 $\mu$ m
25 mm to 50 mm		0.09 $\mu$ m	0.09 $\mu$ m
50 mm to 75 mm		0.10 $\mu$ m	0.11 $\mu$ m
75 mm to 100 mm		0.13 $\mu$ m	0.15 $\mu$ m
1.2 Imperial Unit			
0 inch – 0.4 inch		1.7 $\mu$ inch	1.7 $\mu$ inch
0.4 inch – 1 inch		2.2 $\mu$ inch	2.3 $\mu$ inch
1 inch – 2 inch		3.4 $\mu$ inch	3.7 $\mu$ inch
2 inch – 3 inch		4.0 $\mu$ inch	4.5 $\mu$ inch
3 inch – 4 inch		5.2 $\mu$ inch	5.9 $\mu$ inch
Flatness : Up to 2.5 mm		0.11 $\mu$ m	4.3 $\mu$ inch
Over 2.5 mm		0.10 $\mu$ m	3.9 $\mu$ inch
<b>2 Gauge Block Comparators (Lab / On-Site)</b>	In-house Calibration Procedure SEAMS -0008 : 1997, 31 May 2005		
a. Up to 10 mm		0.031 $\mu$ m	
b. Up to 50 mm		0.061 $\mu$ m	
c. Up to 100 mm		0.091 $\mu$ m	

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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 : 1982 Work procedure 001, 05 August 2005	0.2 $\mu$ m to 0.5 $\mu$ m 0.3 $\mu$ m to 0.8 $\mu$ m 0.6 $\mu$ m to 1.0 $\mu$ m 1.1 $\mu$ m to 1.5 $\mu$ m
3.1 Plug/Pin gauges of lower accuracy Up to 25mm (On-Site)		2 $\mu$ m
3.2 Precision Balls up to 10mm		0.2 $\mu$ m
4 Thread Wires (Measuring Cylinders) 0 mm to 10 mm	BS 5590: 1978 Work Procedure 025, 17 December 2003	0.2 $\mu$ m
5 Plain Ring Gauges a. 1 mm to 50 mm b. 50 mm to 100 mm c. 100 mm to 150 mm	BS 969 : 1982 Work procedure 002, 08 August 2005	0.2 $\mu$ m to 0.9 $\mu$ m 0.4 $\mu$ m to 1.4 $\mu$ m 0.5 $\mu$ m to 1.5 $\mu$ m
6 Parallel Screw Thread Plug Gauges a. M2 to M38 b. M38 to M100	) ) BS 1580 : 1962(1985) Part 1 ) or Part 2 ) Work procedure 014, ) 17 January 2004	1.2 $\mu$ m 3 $\mu$ m
6.1 Parallel Screw Thread Ring Gauges a. M3.5 to M38 b. M38 to M100	) ) )	1.2 $\mu$ m 3 $\mu$ m
7 Plain Gap Gauges a. 0.5 mm to 50 mm b. 50 mm to 150 mm c. 150 mm to 300 mm	ANSI B 47-1 : 1981 as a guide Work procedure 003, 30 June 2000	2 $\mu$ m 3 $\mu$ m 5 $\mu$ m
8 Feeler Gauges As covered in BS 957 or JIS B 7524	BS 957 : 1969 JIS B 7524 : 1992 Work procedure 010, 17 December 2003	0.6 $\mu$ m to 1.0 $\mu$ m

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8.1 Feeler gauges of lower accuracy (Lab/On-Site)		1 $\mu$ m
9 Surface Plate (On-site/Lab) 2000 mm X 1500 mm	BS 817 : 1988 Work procedure 023, 17 Dec 2003	1.4 $\mu$ m / 55 $\mu$ inch
10 Universal Measuring Machine, 0 mm to 100 mm (Lab / On-Site) Flatness	In-house Calibration Procedure SEAMS-0012 : 1996, 30 June 2000	0.20 $\mu$ m 0.18 $\mu$ m
11 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, 08 Aug 05 SEAMS-0009:1996, 29 Aug 00	0.6 $\mu$ m 0.2 $\mu$ m
12 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, 30 June 2000	0.8 $\mu$ m 1.5 $\mu$ m  0.6 $\mu$ m 0.18 $\mu$ m 1.5 $\mu$ m
13 Caliper Checker a. Up to 360 mm b. Up to 670 mm  Flatness Parallelism	In-house Calibration Procedure SEAMS-0001 : 1993, 30 June 2000	0.9 $\mu$ m 1.6 $\mu$ m  0.18 $\mu$ m 1.5 $\mu$ m

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14 Measuring Microscopes (Toolmaker's) (Lab / On-Site) Up to 200 mm	JIS B 7153 : 1995 Work procedure 022, 24 January 2002	1.8 $\mu$ m
15 Measuring Projectors (Lab / On-Site) a. Up to 240 mm b. Up to 300 mm	JIS B 7184 : 1972 as a guide Work procedure 016, 24 January 2002	2 minutes angular 2.2 $\mu$ m linear 3.3 $\mu$ m linear
16 Engineering Squares - (Including Cylindrical & Block Type)	BS 939 : 1977 Work procedure 017, 18 Sep 2000	3 $\mu$ m
17 External Micrometers Functional requirements as covered in BS 870 : 150	BS 870 : 1950 (1959) Work procedure 005, 23 February 2007	
17.1 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 $\mu$ m 5 $\mu$ m 7 $\mu$ m 10 $\mu$ m
17.2 Up to 100 mm (On-Site)		1 $\mu$ m
17.3 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 $\mu$ m 5 $\mu$ m 7 $\mu$ m 10 $\mu$ m
17.4 Micrometer Head Accuracy		0.6 $\mu$ m
18 Thread Micrometer 0 - 100 mm	In-house Calibration Procedure SEAMS-0010 : 1996, 18 Sep 2000	1 $\mu$ m

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19 Internal Micrometer (incl. Stick Micrometer) Functional requirements as covered in BS 959:1950 up to 900 mm	BS 959 : 1950 (1959) Work procedure 006, 29 Aug 2000	3 $\mu$ m
20 Internal Micrometer 5 - 300 mm	In-house Calibration Procedure SEAMS-0011 : 1996, 30 June 2000	3 $\mu$ m
21 Depth Micrometer Functional requirements as covered in BS 6468 : 1984 Up to 300 mm	BS 6468 : 1984 Work procedure 007, 30 June 2000	2 $\mu$ m
22 Holtest a. 0.001 mm resolution b. 0.01 mm resolution	In-house Calibration Procedure SEAMS-0007 : 1996, 23 Oct 2000	3 $\mu$ m 5 $\mu$ m
23 Dial Gauges  Functional requirements as covered in BS 907 : 1965	BS 907 : 1965, JIS B 7503:1997, DIN 879 : 1999 Work procedure 011, 23 February 2007	0.45 $\mu$ m to 1 $\mu$ m
23.1 Dial Gauges (On-Site) a. Up to 12.7 mm b. 0.01 mm resolution		2 $\mu$ m
23.2 Microindicators / Inductive Probe		0.10 $\mu$ m
24 Dial Test Indicators Functional requirements as covered in BS 2795 : 1981	BS 2795 : 1981 Work procedure 012, 30 June 2000	0.10 $\mu$ m to 0.45 $\mu$ m

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25 Linear Gauges (Lab/ On-Site) a. Up to 100 mm b. Up to 150 mm	In-house Calibration Procedure SEAMS-0017 : 1997, 08 February 2006	1 $\mu$ m 3 $\mu$ m to 10 $\mu$ m
26 Digital Indicator (Lab/ On-Site) a. Up to 100 mm b. Up to 150 mm	In-house Calibration Procedure SEAMS-0017 : 1997, 08 February 2006	1 $\mu$ m 3 $\mu$ m to 10 $\mu$ m
27 Dial Thickness Gauge a. 0.001 mm resolution b. 0.01 mm resolution	In-house Calibration Procedure SEAMS-0005 : 1996, 30 June 2000	3 $\mu$ m 5 $\mu$ m
28 Electronic & Mechanical Slide Caliper  Functional requirements as covered in BS 887 : 1982 a. Up to 1000 mm b. Up to 2000 mm c. Up to 300 mm (On-Site)	BS 887 : 1982, JIS B 7507 : 1993 Work procedure 008, 05 August 2005	2 $\mu$ m Flatness / Parallelism  10 $\mu$ m 10 $\mu$ m 20 $\mu$ m
29 Caliper Gauge 0 – 50 mm	In-house Calibration Procedure, SEAMS-0004 : 1996 30 June 2000	5 $\mu$ m
30 Electronic & Mechanical Height Gauges As covered in BS 1643 : 1983 up to 1000 mm	BS 1643 : 1983 Work procedure 009, 10 Dec 2001	10 $\mu$ m
31 Other Limit Gauges incl. Height, Depth, Length Up to 300 mm	ANSI B 47-1 : 1981 as a guide Work procedure 004, 30 June 2000	10 $\mu$ m

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32 Precision Vernier Depth Gauge 0 – 300 mm	BS 6365 : 1983 Work procedure 021, 29 Aug 2000	10 $\mu$ m
33 Depth Gauge Electronic & Mechanical 0 - 1000 mm	In-house Calibration Procedure SEAMS-0014 : 1996, 30 June 2000	0.01 mm
34 Bevel Protractor Functional requirements as covered in BS 1685 : 1951	BS 1685 : 1951(1959) Work procedure 015, 28 Sep 2001	3 $\mu$ m linear 5 minutes angular
35 Cylinder (bore) Gauges As covered in JIS B 7515:1982	JIS B 7515 : 1982 Work procedure 013, 18 Sep 2000	3 $\mu$ m
36 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, 27 April 2007  using optical parallel  Using electronic probe  Using electronic probe	0.21 $\mu$ m  0.85 $\mu$ m 1.02 $\mu$ m  0.85 $\mu$ m 1.02 $\mu$ m
37 Gauge block Accessories (Dimensions)	Work Procedure – 019, 23 Feb 2007 Using electronic probe Using ULM	1.08 $\mu$ m 0.23 $\mu$ m

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<p><b>B MECHANICAL</b></p> <p>1 Torque Gauges</p> <p>a. Up to 10 lbf.in</p> <p>b. 10 lbf.in to 100 lbf.in</p> <p>c. 8 lbf.ft to 100 lbf.ft</p> <p>d. 100 lbf.ft to 400 lbf.ft</p> <p>e. 400 lbf.ft to 600 lbf.ft</p> <p>f. 600 lbf.ft to 1000 lbf.ft</p> <p>2 Weighing Scales/Balances (Lab /On-site)</p> <p>a. Up to 62 g</p> <p>b. 62 g to 180 g</p> <p>c. 180 g to 1200 g</p> <p>d. 1200 g to 6200 g</p> <p>e. 6.2 kg to 32 kg</p> <p>f. 32 kg to 60 kg</p> <p>g. 60 kg to 130 kg</p> <p>h. 130 kg to 180 kg</p> <p>3 Push/Pull Gauge (Lab/On-Site)</p> <p>a. Up to 5 kgf</p> <p>b. Up to 50 kgf</p> <p>c. Up to 110 kgf</p> <p>4 Tension Gauges (Lab/On-Site)</p> <p>a. Up to 500 gf</p> <p>b. Up to 50 kgf</p> <p>5 Torque Wrench (Dial/digital) Up to 3000 lbf.ft</p> <p>6 Torque Multiplier Up to 5000 lbf.ft</p>	<p>ISO 6789 : 2003 Work procedure 020, 27 April 2007</p> <p>In-house Calibration Procedure SEAMS-0006 : 1996, 23 February 2007</p> <p>In-house Calibration Procedure SEAMS-002 : 1993, 23 February 2007</p> <p>In-house Calibration Procedure SEAMS-0003 : 1993, 23 February 2007</p> <p>Work procedure 020, 27 April 2007</p> <p>Work procedure 020, 27 April 2007</p>	<p>0.037 lbf.in</p> <p>0.241 lbf.in</p> <p>0.12 lbf.ft</p> <p>0.96 lbf.ft</p> <p>1.75 lbf.ft</p> <p>2.11 lbf.ft</p> <p>0.00008 g</p> <p>0.0002 g</p> <p>0.003 g</p> <p>0.03 g</p> <p>0.001 kg</p> <p>0.01 kg</p> <p>0.09 kg</p> <p>0.14 kg</p> <p>0.001 kgf</p> <p>0.01 kgf</p> <p>0.7 kgf</p> <p>0.8 gf</p> <p>0.54 kgf</p> <p>3.2 lbf.ft</p> <p>3.6 lbf.ft</p>



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- \* 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 - Item A1, A3 – A9, A11– A35, A36-A37, B1– B6.

Mr Sreejith Radhakrishnan - Item A1, A3– A5, A6-A6.1, A7– A9, A11a, A12 - A15, A17– A37 and B1– B6.