

Schedule

Metrix Precision Pte Ltd
No. 23 Tagore Lane
#02-03/04 Tagore 23 Warehouse
Singapore 787601

Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 1 of 16

FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>A. Dimensional Metrology</p> <p>1. Geometrical Measurement (Lab & Site)</p> <p>i. Flatness measurement</p> <ul style="list-style-type: none"> • Optical Parallel (Dia 12 mm) • Dial Test Indicator (Up to 100 mm) (101 to 500 mm) (Up to 1000 mm) <p>ii. Parallelism & Straightness measurement</p> <ul style="list-style-type: none"> • Dial Test Indicator (Up to 100 mm) (101 to 1000mm) • Mu-Checker System (Up to 100 mm) (101 to 1000 mm) 	<p>In-house calibration procedure MP-DIM-01(T) V2R0</p> <p>In-house calibration procedure Section MP-DIM-01(T) V2R0</p>	<p>0.3 μm</p> <p>3.0 μm 3.0 μm 3.0 μm</p> <p>3.0 μm 3.0 μm</p> <p>0.4 μm 0.4 μm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 2 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
iii Angle measurement <ul style="list-style-type: none"> • Optical Comparator Protractor Up to 360 ° 	In-house calibration Procedure MP-DIM-01(T) V2R0	0.18 (Minute)
2. Limit Gauges		(Lab)
i. Plain Plug Gauges or Pin Gauges <ul style="list-style-type: none"> • Up to 25 mm 	In-house calibration procedure Section MP-DIM-10(T) V2R1	0.7 µm
ii. Plain Ring Gauges <ul style="list-style-type: none"> • Up to 50 mm • 50 to 225 mm 		2.4 µm 5.0 µm
3 Micrometer Gauges		
i. External Micrometer and Interchangeable micrometer (Analog & Digimatic) Resolution (0.001 mm) <ul style="list-style-type: none"> • 0 to 25 mm • 26 to 50 mm • 51 to 75 mm • 76 to 100 mm • 101 to 200mm • 201 to 400mm • 401 to 600mm • 601 to 800 mm • 801 to 1000mm 	In-house calibration procedure Section MP-DIM-02(T) V2R0	1.0 µm 1.0 µm 1.0 µm 1.0 µm 1.0 µm 1.0 µm 2.0 µm 3.0 µm 3.0 µm

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 3 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
ii. Internal Micrometer <ul style="list-style-type: none"> • 5 to 30 mm • 25 to 50 mm • 50 to 75 mm • 75 to 100 mm 	In-house calibration procedure Section MP-DIM-02(T) V2R0	1.0 μm 1.0 μm 1.0 μm 1.0 μm
iii. Stick Micrometer (Analog and Digimatic) <ul style="list-style-type: none"> • 50 to 63 mm • 13 to 100 mm • 100 to 200 mm • 200 to 300 mm 	In-house calibration procedure Section MP-DIM-02(T) V2R0	2.0 μm 2.0 μm 2.0 μm 2.0 μm
iv. Depth Micrometer <ul style="list-style-type: none"> • 0 to 25 mm • 25 to 300 mm 	In-house calibration procedure Section MP-DIM-02(T) V2R0	2.0 μm 2.0 μm
vi. Micrometer Head <ul style="list-style-type: none"> • 0 to 25 mm • 0 to 50 mm 	In-house calibration procedure Section MP-DIM-02(T) V2R0	2.0 μm 2.0 μm
Holtest Micrometer <ul style="list-style-type: none"> • up to 5" 		0.00012 inches

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 4 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>4 Caliper</p> <p>i. Slider Caliper</p> <ul style="list-style-type: none"> • 0 to 150 mm • 0 to 200 mm • 0 to 300 mm • 0 to 600 mm • 0 to 1000 mm <p>ii. Depth Caliper</p> <ul style="list-style-type: none"> • 0 to 150 mm • 0 to 200 mm • 0 to 300 mm <p>iii. Caliper Gauges Internal, External and Thickness Type (Dial and Digimatic)</p> <ul style="list-style-type: none"> • 0 to 60 mm • 60 to 70 mm • 70 to 135 mm 	<p>In-house calibration procedure. MP-DIM-03(T) V2R0</p> <p>In-house calibration procedure. MP-DIM-03(T) V2R0</p>	<p>10.0 µm</p> <p>10.0 µm</p> <p>10.0 µm</p> <p>10.0 µm</p> <p>10.0 µm</p> <p>10.0 µm</p> <p>10.0 µm</p> <p>10.0 µm</p>
<p>5 Height Gauge Instrument (Lab & Site)</p> <p>i. Height Gauge (Resolution 0.001 mm)</p> <ul style="list-style-type: none"> • 0 to 300 mm • 0 to 600mm 	<p>In-house calibration procedure. MP-DIM-04(T) V2R0</p>	<p>1.0 µm</p> <p>1.0 µm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 5 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>6 Dial and Level Type Instrument (Lab & Site)</p> <p>i. Dial Gauges/ Indicator Dial Test Indicator Lever Probe Indicator Micro Indicator</p> <ul style="list-style-type: none"> • 0 to 5 mm • 0 to 10 mm • 0 to 30 mm • 0 to 50 mm <p>(Resolution 0.001 mm) (Graduation 0.001 & 0.01 mm)</p> <p>7. Linear and Indicating Instrument (Lab & Site)</p> <p>Linear Gauges Linear Transducer Digimatic Indicator Indicating Gauge</p> <ul style="list-style-type: none"> • 0 to 12 mm (Resolution 0.001mm) • 0 to 30 mm (Resolution 0.0005mm) • 0 to 50 mm (Resolution 0.001mm) 	<p>In-house calibration procedure. MP-DIM-05(T) V2R0</p>	<p>0.5 μm 0.7 μm 0.8 μm 1.2 μm</p> <p>(Lab)</p> <p>0.6 μm 0.3 μm 0.6 μm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 6 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>8. End Standard</p> <p>i. End Standard length measurement</p> <p>(Extension Rods , Standard Rods) Using DTI System</p> <ul style="list-style-type: none"> • Up to 25 mm • 25 to 50 mm • 50 to 75 mm • 75 to 100 mm • 100 to 200mm • 200 to 400 mm • 400 to 600mm • 600 to 800 mm • 800 to 1000 mm <p>ii Using Mu-checker System</p> <ul style="list-style-type: none"> • Up to 25 mm • 25 to 50 mm • 51 to 75 mm • 76 to 100 mm • 101 to 200 mm • 201 to 400 mm • 401 to 600 mm • 601 to 800 mm • 801 to 1000 mm 	<p>In-house calibration procedure. MP-DIM-07(T) V2R0</p> <p>In-house calibration procedure. MP-DIM-07(T) V2R0</p>	<p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>3.0 μm</p> <p>4.0 μm</p> <p>5.0 μm</p> <p>(Lab)</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>2.0 μm</p> <p>3.0 μm</p> <p>4.0 μm</p> <p>5.0 μm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 7 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>9. Line Standard</p> <p>i Steel Rule Plastic Rule</p> <ul style="list-style-type: none"> • Length Accuracy <ul style="list-style-type: none"> - Up to 200 mm - Up to 400 mm - Up to 600 mm - Up to 800 mm - Up to 1000 mm <p>ii Measuring Tape</p> <ul style="list-style-type: none"> • Measuring Tape • Hermatic Ullage Tape • Tank Gauging Tape • Hook Tape • Surveyor Tape <ul style="list-style-type: none"> - Up to 10 m - Up to 30m - Up to 50 m - Up to 100m <p>iii Glass Scale (Including Stage Micrometer Scale, Microscope Glass Scale and other Related scale)</p> <p>Length Accuracy</p> <ul style="list-style-type: none"> - Up to 200 mm 	<p>In-house calibration Procedure. MP-DIM-08(T) V2R0</p> <p>In-house calibration procedure MP-DIM-08(T) V2R0</p> <p>In-house calibration procedure. MP-DIM-08(T) V2R0</p>	<p>0.058 mm 0.058 mm 0.058 mm 0.058 mm 0.058 mm 0.058 mm</p> <p>(Lab) 0.0004 m 0.0006 m 0.0008 m 0.0010 m</p> <p>0.005 mm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 8 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>10 Parallel Screw Gauges</p> <ul style="list-style-type: none"> • Thread Plug <ul style="list-style-type: none"> - External and Internal Thread Up to 80 mm - Pitch Diameter - Major Diameter - Pitch Distance - Angle • Thread Ring <ul style="list-style-type: none"> Up to 80 mm - Pitch Diameter - Minor Diameter 	<p>In-house calibration Procedure MP-DIM-15(T) V2R1</p>	<p>2 μm 2 μm 5 μm 0.15 minutes 4 μm 5 μm</p>
<p>11 Cylinder Gauges including Bore Gauges</p> <ul style="list-style-type: none"> - Length Accuracy • Up to 450 mm 	<p>In-house calibration procedure. MP-DIM-16(T) V2R0</p>	<p>(Lab) 1 μm</p>
<p>12. Measurement of Die Crimping Tool</p> <ul style="list-style-type: none"> • Hand Crimp Tools 	<p>In-house calibration procedure MP-DIM-20(T) V2R0</p>	<p>12 μm</p>
<p>13. Profile Projector & Toolmaker Microscope</p> <ul style="list-style-type: none"> • Up to 200 mm 	<p>In-house calibration procedure MP-DIM-14(T) V2R1</p>	<p>4 μm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 9 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>14. Gauge Block (Same Material)</p> <ul style="list-style-type: none"> • 0.1 to 10 mm • 10 to 25 mm • 25 to 50 mm • 50 to 75 mm • 75 to 100 mm 	<p>In-house calibration procedure MP-DIM-25(T) V2R0</p>	<p>1.0 µm 1.0 µm 1.0 µm 1.0 µm 1.0 µm</p>
<p>B. <u>Mechanical Metrology</u></p>		
<p>1. Torque Measuring Devices (Lab & Site)</p> <ul style="list-style-type: none"> • Setting Torque Tool • Dial Torque Tool • Torque Wrench • Torque Screw Driver • Torque Gauge • Digital Torque Gauge - 0.5 to 1.5 N.m - 1.5 to 6 N.m - 6 to 30 N.m - 30 to 60 N.m - 60 to 100 N.m - 100 to 300 N.m - 300 to 850 N.m - 850 to 1400 N.m - 1400 to 2000 N.m 	<p>In-house calibration procedure MP-MEC-01(T) V2R0</p>	<p>0.01 N.m 0.05 N.m 0.23 N.m 0.22 N.m 0.22 N.m 2.4 N.m 2.4 N.m 2.6 N.m 5.0 N.m</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 10 of 16

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>2. Balance and Weighing Scales (Lab & Site)</p> <ul style="list-style-type: none"> • Electronic Balance • Analytical Balance • Weighing Scales <p>- up to 0.500 g</p> <p>- up to 210 g</p> <p>- up to 1000 g</p> <p>- up to 5000 g</p> <p>- up to 15kg</p> <p>- up to 60kg</p> <p>- up to 300kg</p>	<p>In-house calibration procedure</p> <p>MP-MEC-02(T)</p> <p>V2R0</p> <p>- Off center error</p> <p>- Hysteresis</p> <p>- Repeatability</p> <p>- Linearity</p>	<p>0.000063 g</p> <p>0.00016 g</p> <p>0.0067 g</p> <p>0.071 g</p> <p>0.000058 kg</p> <p>0.0058 kg</p> <p>0.029 kg</p>
<p>3. Force Measuring Devices (Lab & Site)</p> <ul style="list-style-type: none"> • Push Pull Gauge • Force Gauge • Torque Meter • Cable Tension Meter • Load-cell / Load Indicator • Load Gauge • Spring Balance • Tension Meter • Pull Tester • Push Tester 	<p>In-house calibration procedure. Section 3.0</p> <p>MP-MEC-03(T)</p> <p>V2R0</p>	

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 11 of 16

MEASURED QUANTITIES/ RANGE/ INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<ul style="list-style-type: none"> • Tension Gauge • Tensile Tester • Shear Tester • Force Indicator/ Gauge • Dynamometer • Belt Tension Gauge • Strap Tension Gauge • Wire Tension Meter - Up to 5 kgf - Up to 10 kgf - Up to 20 kgf - Up to 50 kgf - Up to 120 kgf • Load Cell - Up to 100 kN (Ref UTM) • Dial Tension Gauge • Tension Gauge • Spring Balance • Load Cell • Cable Tension Meter • Strain Gauge • Pull Tester • Tubular Balance • Push Tester • Force Gauge • Load Gauge • Gram Gauge • Tensile Tester • Shear Tester • Force Indicator 	<p>In-house calibration procedure MP-MEC-03(T) V2R0</p>	<p>0.00058 kgf</p> <p>0.0058 kgf</p> <p>0.0058 kgf</p> <p>0.0058 kgf</p> <p>0.0058 kgf</p> <p>0.57 kN</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 12 of 16

MEASURED QUANTITIES/ RANGE/ INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<ul style="list-style-type: none"> - Up to 50 gf - Up to 100 gf - Up to 250 gf - Up to 1000 gf - Up to 2000 gf <p>4. Torque Meter Tester (Lab & Site)</p> <ul style="list-style-type: none"> • Torque Checker • Torque Analyser • Torque Tester • Digital Torque Meter • Torque Transducer • Torque Indicator 	<p>In-house calibration procedure MP-MEC-04(T) V2R0</p>	<p>0.23 gf 0.23 gf 1.2 gf 2.3 gf 12 gf</p>
<ul style="list-style-type: none"> - Up to 5 N.m - Up to 10 N.m <p>5. Torque Measuring Devices (Lab & Site)</p> <ul style="list-style-type: none"> • Torque Multiplier <ul style="list-style-type: none"> - Up to 1200 lbf ft - Up to 3200 lbf ft - Up to 5000 lbf ft 	<p>Torque Multiplier System MP-MEC-09(T) V2R0</p>	<p>0.0059 N.m 0.0058 N.m</p> <p>3.7 lbf ft 8.5 lbf ft 15 lbf ft</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 13 of 16

MEASURED QUANTITIES/ RANGE/ INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>6. Rubber Hardness Tester (Lab & Site)</p> <p>Shore A ,B, E & O</p> <ul style="list-style-type: none"> • Hand Durometer • Pencil Durometer • Digital Durometer • Tire Hardness Gauge • Pocket Durometer • Dial Durometer <p>Direct Force Verification - Up to 75 Div (855 gf)</p>	<p>In-house calibration procedure MP-MEC-05(T) V2R0</p>	<p>12 mN</p>
<p>7. Hardness Machine (Lab & Site)</p> <p>In-direct verification method of hardness machine (C & B)</p> <ul style="list-style-type: none"> • Hardness Tester • Impressor Tester • Digital Hardness Tester • Handheld Hardness Tester • Analogue Tester • Brinell Hardness Tester • Portable Hardness Machine <p>HRC BLOCK</p> <ul style="list-style-type: none"> - 20 to 30 - 40 to 45 - 60 to 65 	<p>In-house calibration procedure MP-MEC-06(T) V2R0</p>	<p>0.39 HRC 0.34 HRC 0.33 HRC</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 14 of 16

MEASURED QUANTITIES/ RANGE/ INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>HRB BLOCK</p> <ul style="list-style-type: none">- 50 to 60- 60 to 65- 80 to 90 <p>8. Tachometer Non-Contact (Lab & Site)</p> <ul style="list-style-type: none">• Optical Tachometer• Infrared Tachometer• Laser Tachometer• Mechanical Tachometer• RPM Indicator• Revolution Indicator• Digital Tachometer• Speed Indicator• Speed Meter <ul style="list-style-type: none">- 0 to 300 rpm- 300 to 600 rpm- 600 to 1200 rpm- 1200 to 2000 rpm- 2000 to 5000 rpm- 5000 to 10000 rpm- 10000 to 20000 rpm- 20000 to 50000 rpm- 50000 to 70000 rpm- 70000 to 90000 rpm	<p>In-house calibration procedure MP-MEC-07(T) V2R0</p>	<p>1.0 HRB 1.3 HRB 1.5 HRB</p> <p>0.28 rpm 0.28 rpm 0.29 rpm 0.28 rpm 0.28 rpm 1.9 rpm 1.9 rpm 1.9 rpm 16 rpm 16 rpm</p>

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 15 of 16

MEASURED QUANTITIES/ RANGE/ INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY *
<p>9 Contact Tachometer (Lab/Site)</p> <p>250 to 500 rpm 500 to 1000 rpm 1000 to 2000 rpm 2000 to 5000 rpm 5000 to 9600 rpm</p>	<p>In-house calibration procedure MP-MEC-07(T) V2R0</p>	<p>0.15 rpm 0.31 rpm 0.33 rpm 0.33 rpm 0.61 rpm</p>
<p>10 Pressure Measuring Devices, Hydraulic (Lab/Site)</p> <ul style="list-style-type: none"> • Pressure Gauge • Oil Pressure Gauge • Force Pressure Gauges • Pressure Transmitters • Pressure Recorders • Pressure Indicators • Vacuum Gauge • Air Gauge • Transducer • Transmitters • Recorders - -13.5 psi to 30 psi - Up to 300 psi - Up to 1000 psi - Up to 5000 psi - Up to 10000 psi - Up to 15000 psi 	<p>In-house calibration procedure MP-MEC-11(T) V2R1</p>	<p>0.015 psi 0.062 psi 0.21 psi 1.0 psi 2.1 psi 3.1 psi</p>

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

Schedule



Certificate No. : LA-2014-0581-C

Issue No. : 2

Date : 29 July 2016

Page : 16 of 16

Approved signatories

Mr M. Karunanithi - All items

Mr Surendren A/L R Palpanadan - All items

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 calibration results. 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.