

NO: SAMM 325

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LABORATORY LOCATION:
(PERMANENT LABORATORY)

TRESCAL (MALAYSIA) SDN. BHD.
PMT 2927, JALAN MEGAT HARUN
PUSAT PERNIAGAAN MAJU
14000 BUKIT MERTAJAM
PULAU PINANG
MALAYSIA

FIELDS OF CALIBRATION:

TEMPERATURE, DIMENSIONAL, MASS, PRESSURE,
FORCE, TORQUE, TIME & FREQUENCY

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment 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 and 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 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

*** The uncertainty covered by the CMC is expressed as the expanded uncertainty corresponding to a coverage probability of approximately 95 % and have a coverage factor of k=2 unless stated otherwise.**

SCOPE OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Liquid-in-glass thermometer (total & partial immersion)	-30 °C to 0 °C 0 °C to 200 °C 200 °C to 400 °C	0.08 °C 0.07 °C 0.35 °C	Comparison with Pt 100 reference in: liquid bath and temperature block calibrator
Temperature sensor (Platinum resistance thermometer, thermocouple, thermistor)	-30 °C to 0 °C 0 °C to 250 °C 250 °C to 400 °C 400 °C to 600 °C 600 °C to 1000 °C 1000 °C to 1200 °C	0.08 °C 0.08 °C 0.36 °C 1.0 °C 2.1 °C 2.7 °C	Comparison with Pt 100 / Type R thermocouple reference in: liquid bath and temperature block calibrator
Temperature sensor with indicator (Platinum resistance thermometer, thermocouple, thermistor, temperature gauge)	-30 °C to 0 °C 0 °C to 250 °C 250 °C to 400 °C 400 °C to 600 °C 600 °C to 1000 °C 1000 °C to 1200 °C	0.08 °C 0.07 °C 0.36 °C 1.0 °C 2.2 °C 2.7 °C	

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SCOPE FIELD OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Temperature & Humidity Indicator or Recorder	10 °C to 50 °C 20 %rh to 50 %rh 50 %rh to 70 %rh 70 %rh to 90 %rh (at 25 °C)	0.09 °C 1.6 %rh 1.8 %rh 1.9 %rh	Comparison with Thermohygrometer / Pt 100
Temperature calibrator I) Source a) Type K b) Type N c) Type J d) Type T e) Type E f) Type R g) Type S h) Type B i) Pt 100	-270 °C to -100 °C -100 °C to 1370 °C -260 °C to -100 °C -100 °C to 1300 °C -210 °C to 1200 °C -270 °C to -100 °C -100 °C to 400 °C -270 °C to -100 °C -100 °C to 1000 °C -50 °C to 500 °C 500 °C to 1760 °C -50 °C to 500 °C 500 °C to 1760 °C 100 °C to 500 °C 500 °C to 1800 °C -200 °C to 850 °C	1.0 °C 0.1 °C 1.1 °C 0.1 °C 0.1 °C 0.6 °C 0.1 °C 0.6 °C 0.1 °C 0.3 °C 0.2 °C 0.3 °C 0.2 °C 1.1 °C 0.3 °C 0.1 °C	By electrical measurement using multimeter & reference table ITS 90

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SCOPE OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
II) Measurement			
a) Type K	-200 °C to -100 °C -100 °C to 1370 °C	1.1 °C 0.2 °C	By electrical simulation using calibrator & reference table ITS 90
b) Type N	-200 °C to -100 °C -100 °C to 1300 °C	1.1 °C 0.2 °C	
c) Type J	-200 °C to 1200 °C	0.2 °C	
d) Type T	-200 °C to -100 °C -100 °C to 400 °C	0.6 °C 0.2 °C	
e) Type E	-200 °C to -100 °C -100 °C to 1000 °C	0.6 °C 0.2 °C	
f) Type R	0 °C to 1760 °C	2 °C	
g) Type S	0 °C to 1760 °C	2 °C	
h) Type B	600 °C to 1800 °C	2 °C	
i) Pt 100	-200 °C to 850 °C	0.2 °C	

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SCOPE OF CALIBRATION: TEMPERATURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Temperature indicating device (by electrical simulation) a) Type K -200 °C to -100 °C -100 °C to 1370 °C b) Type N -200 °C to -100 °C -100 °C to 1300 °C c) Type J -200 °C to 1200 °C d) Type T -200 °C to -100 °C -100 °C to 400 °C e) Type E -200 °C to -100 °C -100 °C to 1000 °C f) Type R 0 °C to 1760 °C g) Type S 0 °C to 1760 °C h) Type B 600 °C to 1800 °C i) Pt 100 -200 °C to 850 °C			By electrical simulation using calibrator & reference table ITS 90

Signatories:

1. Oh Joo Kiat

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SCOPE OF CALIBRATION: TEMPERATURE**SITE: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Temperature sensor (Platinum resistance thermometer, thermocouple, thermistor)	0 °C to 200 °C 200 °C to 400 °C	0.2 °C 0.4 °C	Comparison with Pt 100 reference in: liquid bath and temperature block calibrator
Temperature sensor with indicator (Platinum resistance thermometer, thermocouple, thermistor, temperature gauge)	0 °C to 200 °C 200 °C to 400 °C	0.08 °C 0.33 °C	
Temperature indicating device (by electrical simulation) a) Type K b) Type N c) Type J d) Type T e) Type E f) Type R g) Type S h) Type B i) Pt 100	-200 °C to -100 °C -100 °C to 1370 °C -200 °C to -100 °C -100 °C to 1300 °C -200 °C to 1200 °C -200 °C to -100 °C -100 °C to 400 °C -200 °C to -100 °C -100 °C to 1000 °C 0 °C to 1760 °C 0 °C to 1760 °C 600 °C to 1800 °C -200 °C to 850 °C	1.1 °C 0.2 °C 1.1 °C 0.2 °C 0.2 °C 0.6 °C 0.2 °C 0.6 °C 0.2 °C 2 °C 2 °C 2 °C 0.2 °C	By electrical simulation using calibrator & reference table ITS 90
Temperature controlled enclosure	-80 °C to -30 °C -30 °C to 100 °C 100 °C to 250 °C 250 °C to 600 °C 600 °C to 1300 °C	0.7 °C 0.2 °C 0.6 °C 1.7 °C 2.7 °C	

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SCOPE OF CALIBRATION: TEMPERATURE

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Humidity enclosure	5 °C to 60 °C 20 %rh to 95 %rh	0.2 °C 2.4 %rh	Calibrated by using thermohygrometer based on IEC 60068-3-6:2018

Signatories:

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2. **Shukri Bin Mohamad Ariffin

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SCOPE OF CALIBRATION: DIMENSIONAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Precision caliper (internal & external)	Up to 200 mm 200 mm to 600 mm	0.006 mm 0.012 mm	Calibrated by using caliper checker / gauge block with reference to JIS B7507:2022
Micrometer (external)	Up to 25 mm 25 mm to 150 mm	0.002 mm 0.003 mm	Calibrated by using gauge block and optical parallel with reference to JIS B7502:2016
Height gauge	Up to 300 mm 300 mm to 600 mm	0.007 mm 0.008 mm	Calibrated by using caliper checker & dial test indicator and standard square with reference to JIS B 7517:2018
Dial thickness gauge	Up to 20 mm	1 μ m	Calibrated by using gauge block with reference to JIS B 7503:2017
Dial gauge	Up to 25 mm 25 mm to 50 mm	1.0 μ m 1.7 μ m	Calibrated by using dial gauge tester and micrometer head with reference to JIS B 7503:2017
Dial test indicator	Up to 0.28 mm 0.28 mm to 0.6 mm 0.6 mm to 1.5 mm	1.5 μ m 1.8 μ m 5.0 μ m	Calibrated by using gauge block and dial gauge tester with reference to JIS B 7533:2015
Digital indicator	Up to 50 mm	2.0 μ m	Calibrated by using gauge block with reference to JIS B 7503:2017
Feeler Gauge	0.01 mm to 1 mm	2.2 μ m	Calibrated by using Digital Micrometer with reference to BS 957:2008

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SCOPE OF CALIBRATION: DIMENSIONAL

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
External Parallel Screw Thread Plug Gauge (Simple Pitch Diameter and Major Diameter)	2 mm to 22 mm	Major Diameter: 2.0 μ m Simple Pitch Diameter: 3.0 μ m	Calibrated by using 3 wire pin set scale and Micrometer with reference to JIS B 0261:2020

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SCOPE OF CALIBRATION: DIMENSIONAL

SITE: CATEGORY I

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Surface Plate	300 mm x 300 mm 600 mm x 600 mm 1000 mm x 1000 mm 1600 mm x 2500 mm	1.0 μ m 1.9 μ m 2.1 μ m 3.4 μ m	Calibrated by using precision inclinometer with reference to BS 817:2008
Toolmaker's Microscope (Independent Linear Scale Only)	Up to 140 mm	1.5 μ m	Calibrated by using glass scale with reference to JIS B 7184:2021
Profile projector (Independent linear scale only)	Up to 140 mm	1.5 μ m	Calibrated by using glass scale with reference to JIS B7184:2021

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SCOPE OF CALIBRATION: MASS

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Standard Weight	2 kg to 25 kg	0.2 g	Calibrated using standard weight and comparator as standard according to OIML R111-1:2004 (E)

SCOPE OF CALIBRATION: MASS**SITE: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Analytical Balance and Weighing Scale	Up to 5 g	0.06 mg	Calibrated using standard weights with general reference to ASTM E898-20 and LAB 14 Ed. 2018. The uncertainty quoted is based on no adjustment made to the sensitivity of the weighing instrument immediately before calibration.
	Up to 20 g	0.11 mg	
	Up to 50 g	0.3 mg	
	Up to 200 g	1.0 mg	
	Up to 1 kg	10 mg	
	Up to 5 kg	50 mg	
	Up to 10 kg	0.11 g	
	Up to 20 kg	0.15 g	
	Up to 30 kg	0.3 g	
	Up to 50 kg	10 g	
	Up to 100 kg	20 g	
	Up to 500 kg	0.11 kg	
	Up to 1,000 kg	0.21 kg	

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SCOPE OF CALIBRATION: PRESSURE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Pressure Measuring Device			
Vacuum	Up to -0.95 bar	0.002 bar	Calibrated using test gauge as standard according to AS 1349 (1986) and DKD-R-6-1 (edition 03/2014)
Absolute Pressure	0 bar abs to 2 bar abs 2 bar abs to 7 bar abs	0.0010 bar abs 0.0015 bar abs	
Pneumatic	0 mbar to 10 mbar 5 mbar to 10 mbar 10 mbar to 30 mbar 30 mbar to 50 mbar 50 mbar to 70 mbar 70 mbar to 1000 mbar 1 bar to 6 bar 6 bar to 30 bar	0.005 mbar 0.01 mbar 0.02 mbar 0.03 mbar 0.05 mbar 0.14 mbar 0.004 bar 0.008 bar	
Hydraulic	0 bar to 350 bar 350 bar to 700 bar	0.09 bar 0.16 bar	

Signatories:

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SCOPE OF CALIBRATION: PRESSURE**SITE: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Pressure Measuring Device			
Vacuum	Up to -0.95 bar	0.002 bar	Calibrated using test gauge as standard according to AS 1349 (1986) and DKD-R-6-1 (edition 03/2014)
Absolute Pressure	0 bar abs to 2 bar abs 2 bar abs to 7 bar abs	0.0010 bar abs 0.0015 bar abs	
Pneumatic	0 mbar to 10 mbar 5 mbar to 10 mbar 10 mbar to 30 mbar 30 mbar to 50 mbar 50 mbar to 70 mbar 70 mbar to 1000 mbar 1 bar to 6 bar 6 bar to 30 bar	0.005 mbar 0.01 mbar 0.02 mbar 0.03 mbar 0.05 mbar 0.14 mbar 0.004 bar 0.008 bar	
Hydraulic	0 bar to 350 bar 350 bar to 700 bar	0.09 bar 0.16 bar	

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SCOPE OF CALIBRATION: FORCE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Force measuring device	0 N to 4.9 N 4.9 N to 980 N	0.001 N 0.03 N	Calibrated by using dead weight with reference to ISO 376:2011

SCOPE OF CALIBRATION: FORCE**SITE: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Compression / tensile testing machine	Up to 100 kgf 100 kgf to 1000 kgf 1000 kgf to 5000 kgf 5000 kgf to 10000 kgf	0.006 kgf 1.5 kgf 3.5 kgf 11 kgf	Calibrated by using load cell based on ISO 7500-1:2018

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SCOPE OF CALIBRATION: TORQUE

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Hand Torque Tools	0.1 N.m to < 2 N.m 2 N.m to < 10 N.m 10 N.m to < 150 N.m 150 N.m to < 400 N.m 400 N.m to 1000 N.m	1.9 % of rdg. 1.1 % of rdg. 0.8 % of rdg. 0.4 % of rdg. 0.3 % of rdg.	Calibrated by using torque calibrator based on ISO 6789-2:2017

Signatories:

1. Oh Joo Kiat

SCOPE OF CALIBRATION: TIME & FREQUENCY**SITE: CATEGORY I**

Instrument Calibrated/ Measurement Parameter	Range	Calibration and Measurement Capability Expressed as an Uncertainty ($\pm$)*	Remarks
Stop watch / Timer	0 s to 300 s 300 s to 3600 s 3600 s to 10800 s	0.19 s 0.60 s 1.8 s	Calibrate by using comparison method according to NIST stop watch and timer calibration
Rotational Speed (r.p.m) Non-contact	60 rpm to 20000 rpm	1.0 rpm	Calibrated using tachometer

Signatories:

1. Oh Joo Kiat
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