



**TRACEABILITY CHART OF STANDARD ELECTRICAL INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

AC CURRENT

AC Current Calibrator Fluke/5790A+A40
Freq. 10Hz to 10kHz Range 30 μ A to 20A
Accuracy \pm (30ppm to 65ppm)

Digital Multimeter Fluke/8508A
Freq. 50Hz to 5kHz Range 10 μ A to 20A
Accuracy \pm (250ppm to 0.25%)

AC VOLTAGE LF

AC voltage Calibrator Fluke/5790A
Freq. 10Hz to 1MHz Range 6 mV to 1000V
Accuracy \pm (80ppm to 500ppm)

AC VOLTAGE SOURCE
Digital Multimeter Fluke/8508A
Freq. 50Hz to 20kHz Range 10
Agilent / 34970A / PRT Probe

Range : above @ 5 °C a
Hart / 1502A / PRT Probe

Range : -25 °C to 400 °C

AC CURRENT

AC Current Calibrator Fluke/5500A+50 Turn
Coil, Fluke/5100B+5220A Freq. 50Hz to 5kHz
Range 10 μ A to 20A
Accuracy \pm (0.06% +0.005%)+0.02 μ A

AC CURRENT SOURCE

Digital Multimeter HP/3458A, Keithley 2000
Freq. 50Hz to 5kHz Range 10 μ A to 3 A
Accuracy \pm (0.03% to 0.3%)

AC VOLTAGE LF

AC voltage Calibrator Fluke/5500A, Fluke/5100B
Freq. 50Hz to 500kHz Range 1 mV to 1000V
Accuracy \pm (0.035% + 0.005%)+50 μ V

AC VOLTAGE SOURCE

Digital Multimeter HP/3458A, Keithley 2000
Freq. 50Hz to 20kHz Range 10mV to 1000 V
Accuracy \pm (0.02% to 0.08%)

**AC Current Measuring
Instrument**

Freq. 50 Hz to 5 kHz
Range 10 μ A to 20 A
Accuracy Error!
Bookmark not defined. (0.05%)

**AC Current Measuring
Instrument**

Freq. 10 Hz to 10 kHz
Range 10 μ A to 20 A
Accuracy \pm (0.6 %)

**AC Voltage Measuring
Instrument**

Freq. 50 Hz to 500 kHz
Range 1 mV to 1000 V
Accuracy \pm (0.20 %)

**AC Voltage Measuring
Instrument**

Freq. 20 Hz to 1 MHz
Range 6 mV to 1000 V
Accuracy \pm (0.20%)



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

**RESISTANCE
MEASURING
INSTRUMENT**

Fluke8508A
Range : 0Ω to 20 GΩ

Accuracy
± (7ppm to 500ppm)

**DC RESISTANCE
Air type**

DC Standard Resistor
1Ω, 10Ω,100Ω,10kΩ□
and 10MΩ

Accuracy
± (2ppm to 50ppm)

**DC RESISTANCE
Oil type**

DC Standard
Resistor 0.1Ω,
1Ω,10Ω,25Ω, 100Ω,
200Ω, 400Ω and
1 kΩ

Accuracy
±(2ppm to 50ppm)

**STANDARD HIGH
RESISTANCE**

Caddock/MX1M-2G
Range: 1 MΩ to 2 GΩ
Accuracy ± (0.2%)

**DC RESISTANCE
Fluke/5500AFluke/5100B.**

Yokogawa 2793/2786
Range: 0.01Ω to 300□MΩ
Accuracy
± (0.01% to 0.5%)

DC Standard Resistor
100MΩ □to 100GΩ□
Accuracy
± 12ppm to 0 .2%

**RESISTANCE
MEASURING
INSTRUMENT**

HP/3458A,Keithley/2000
Range : 0 Ω to 1 GΩ
Accuracy
± (13ppm to 0.5%)

**Resistance
Measuring
Instrument**

Range
1 MΩ to 2 GΩ

Accuracy
± (0.5%)

**Resistance
Measuring
Instrument**

Range
0.01 Ω to 100 GΩ

Accuracy
± (0.05% + 50 mΩ)

Resistance Source

Range
0 Ω to 1 GΩ

Accuracy
± (0.05% + 50 mΩ)

Resistance Source

Range
0 Ω to 20 GΩ

Accuracy
± (0.012% + 0.008 Ω)

**Resistance
Measuring
Instrument**

Range
0.1 Ω to 1 kΩ

Accuracy
± (0.012% + 0.008 Ω)



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

DC CURRENT

DC Current Calibrator Fluke/8508A +R-Shunt,
Range : 0 mA to 20A
Accuracy \pm (6.5 ppm to 380 ppm)

Digital Multimeter Fluke/8508A
Range 1mA to 20A
Accuracy \pm (6.5ppm to 380 ppm)

DC VOLTAGE

DC Standard Fluke/732B
Range 1.018V ,10V
Accuracy \pm (2 ppm)

Digital Multimeter Fluke/8508A
Range 10 μ V to 1000V
Accuracy \pm (2.7ppm to 4.0ppm)

DC CURRENT

Digital Multimeter
HP/3458A,Keithley 2000
Range : 1mA to 20A
Accuracy
 \pm (25ppm to 115 ppm)

**DC CURRENT
MEASUREMENT**

DC Current Calibrator
Fluke/5500A+50 Turn Coil,
Fluke/5100B+5220A
Range 10 μ A to 550A
Accuracy
 \pm (0.015%+0.002%)+0.02 μ A

DC VOLTAGE

DC Voltage Calibrator
Fluke/5500A,Fluke/5100B
Range 0 V to 1000V
Accuracy \pm (0.04%+0.001%)+5 μ V

Digital Multimeter
HP/3458A,Keithley 2000
Range: 10 μ V to 1000V
Accuracy \pm (6.0ppm to 8.0ppm)

**DC Current
Source**

Range :
1 mA to 20 A
Accuracy
 \pm (0.01% + 0.015%)

**DC Current
Measuring
Instrument**

Range :
10 mA to 550A
Accuracy
 \pm (0.01% + 0.015 %)

**DC Current
Source**

Range :
0 mA to 20 A
Accuracy
 \pm (0.01% + 0.25 %)

**DC Voltage
Measuring
Instrument**

Range :
0 V to 1000 V
Accuracy
(0.025% + 0.015 %)

**DC Voltage
Source
Instrument**

Range :
10 mV to 1000 V
Accuracy
 \pm (0.005% + 5 μ V)



**TRACEABILITY CHART OF STANDARD TIME AND FREQUENCY INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

**CO-Ordinateted
Universal Time
US Naval Observatory
UTC-USNO**

National Institute of Metrology(NIMT)Thailand



GPS Receiver

FREQUENCY

Reference Standard
GPS Receiver/Rubidium Frequency Standard 10 MHz
Rapco 1804L26A
Uncertainty : $\pm (1 \times 10^{-11})$

Working Frequency Standard

Quartz Oscillator
- Frequency Counter Fluke/PM6685
- Counter Timer Fluke/1953A
- Digital multimeter Keithley 2000
- Timer/Timometer 4500/Analyzer Pendulum CNT-90
Range 10 Hz to 300 MHz
Accuracy : $\pm (1.5 \times 10^{-8})$

Working Frequency Standard

Quartz Oscillator
- Function Generator Yokogawa FG110
- Signal Generator Marconi 2030
Range 3 Hz to 1.3 GHz
Accuracy : $\pm (2 \times 10^{-7})$

Frequency Generator

- Function Generator
- Quartz Stop Watch
- Digital Stoboscope
Frequency 10 Hz to 300 MHz
Accuracy : $\pm (1 \times 10^{-6})$

Frequency Measuring Instrument

- Frequency Counter Time Base Cal.
- Digital Tachometer
Frequency: 3 Hz to 1.3 GHz
Accuracy : $\pm (1 \times 10^{-6})$



**TRACEABILITY CHART OF STANDARD ELECTRICAL INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

**National Institute of Metrology
(NIMT)
Thailand
(DC Voltage)**

**National Measurement Institute
(NMI)
Australia
(AC Voltage)**

**National Institute of Metrology (NIMT)
Thailand**

**Thai Airways International Public Company Limited
Laboratory Accreditation No. 0003**

AC&DC HIGH VOLTAGE

- AC/DC Kilovoltmeter and High Voltage Divider Hipotronics KVM100-D
- AC Dielectric Test Set Hipotronics 100HVT-B
Range: 1 kVdc to 10 kVdc Accuracy : $\pm 0.5\%$
Range: 1 kVac to 6.5 kVac Accuracy : $\pm 1\%$

OSCILLOSCOPE CALIBRATION SYSTEM

- Oscilloscope Calibrator Tektronix TG501, SC503, PG506 up to 250 MHz
- Multi-Product Calibrator Fluke 5500A
Bandwidth : 250 MHz
Accuracy: $\pm 25 \text{ ppm} + 15 \text{ mHz}$

DC/AC High Voltage Measuring Instrument

- Withstanding Voltage Tester
- AC/DC High Voltage Tester
- AC/DC Hi-pot Tester
Range : 1 kV to 10 kV
Accuracy : $\pm (3\%)$

Oscilloscope

- Oscilloscope
- Digital Oscilloscope
- Digital /Analog Oscilloscope
- Scope Meter
Range : 2 mV_{p-p} to 10 V_{p-p}
Bandwidth 250 MHz
Accuracy: $\pm (2\%)$



**TRACEABILITY CHART OF STANDARD ELECTRICAL INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (NIMT)Thailand

Capacitance

Reference Standard
Programmable Automatic
RCL Meter Fluke PM6304C

Range 0.01 pF to 10 mF
Accuracy \pm (0.05% to 0.1 %)

Power Meter

Reference Standard
Multi-Product Calibrator
Fluke 5500A

Range 0.1W to 10 kW
Accuracy \pm (0.09%to0.25 %)

Phase Meter

Reference Standard
Precision Phasemeter
Krohn-Hite 6620

Range 0 ° to 180 °
Accuracy \pm (0.05° to 0.2°)

Capacitance Source

Reference Standard
Multi-Product Calibrator
Fluke 5500A

Range 330 pF to 1.1 mF
Accuracy \pm (0.25 % + 0.1 nF)

**Capacitance
Measuring Instrument**

- Capacitor Meter
Range : 330 pF to 1.1 mF
Accuracy : \pm (0.8%)

Capacitor

- Capacitor
Range: 0.01 pF to 10 mF
Accuracy: \pm (0.25% +0.1 nF)

**Power Measuring
Instrument**

- Wattmeter
- Digital / Analog Wattmeter
- Power meter
Range : 0.1 W to 10 kW
Accuracy : \pm (0.8 %)

**Power Sourcing
Instrument**

- Multi-Product Calibrator
- Phase Meter
Range : 0° to 180°
Accuracy: \pm (0.15°)



**TRACEABILITY CHART OF STANDARD ELECTRICAL INSTRUMENTS (GAUSS METER)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (NIMT)Thailand

MAGNETIC FLUX DENSITY

- Standard Reference Magnets
Accuracy :

100 G : $\pm 0.5\%$
500 G : $\pm 0.5\%$
1000 G : $\pm 0.5\%$

MAGNETIC FLUX DENSITY

- Low Field Magnets Reference (Helmholtz coil)
Accuracy : 0 – 21.5 Gauss/Amp : $\pm (0.1\% \text{ to } 0.5\%)$

Gauss Meter / Tesla Meter

Magnetic Field density Measuring Instrument
Range : 0.1 G to 1000 G
Accuracy : $\pm 1\%$



**TRACEABILITY CHART OF STANDARD PHOTOMETRY INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NSC-TISI-TIS17025
CALIBRATION 0008

NATIONAL STANDARDS LABORATORIES

**National Institute of
Metrology(NIMT)Thailand**

**National Measurement Institute
(NMI) Australia**

**National Institute of
Metrology(NIMT)Thailand**

**Industrial Technology and
Testing Service Center
Thailand Institute of
Scientific and Technological
Research (TISTR)**

DC Voltage Current Source

Programmable
Voltage/Current Source

Range: 0 to 120 VDC
0 to 8.4 ADC

Accuracy: 0.01%

Photometry

Reference Standard Lamp

OL-FEL High-Accuracy Irradiance Standard
Optronc Laboratories
Uncertainty: $\pm 1.0 \%$

Linear Scale

Photometry Bench &
Encorder

Range : 9.6 m
Accuracy : $\pm 0.25 \text{ mm}$

Photometry Measuring Instrument

- Lux meter
Range: 15 lx to 5000 lx
Accuracy: $\pm 2 \%$



**TRACEABILITY CHART OF STANDARD RESISTANCE THERMOMETER INSTRUMENTS OF
TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

**Temperature Calibration
Laboratory
Technology Promotion
Association (Thailand Japan)**

High Precision Bath

Range: -10 °C to 110 °C
Accuracy: 1.0 °C

Standard Resistor

(oil type)

Resistance value : 0.1 Ω , 1 Ω , 10 Ω , 25 Ω ,
100 Ω , 200 Ω , 400 Ω , 1000 Ω
Uncertainty: (± 0.11 m Ω)

Standard Resistor

(Air type)

Resistance value : 1 Ω , 10 Ω , 100 Ω ,
10 k Ω ,
Uncertainty: (± 0.11 m Ω)

Black Stack Thermometer Readout

Test Point : 0.1 Ω , 1 Ω , 10 Ω , 25 Ω , 100 Ω ,
200 Ω , 400 Ω , 1000 Ω , 10 k Ω
Accuracy : ± 20 ppm

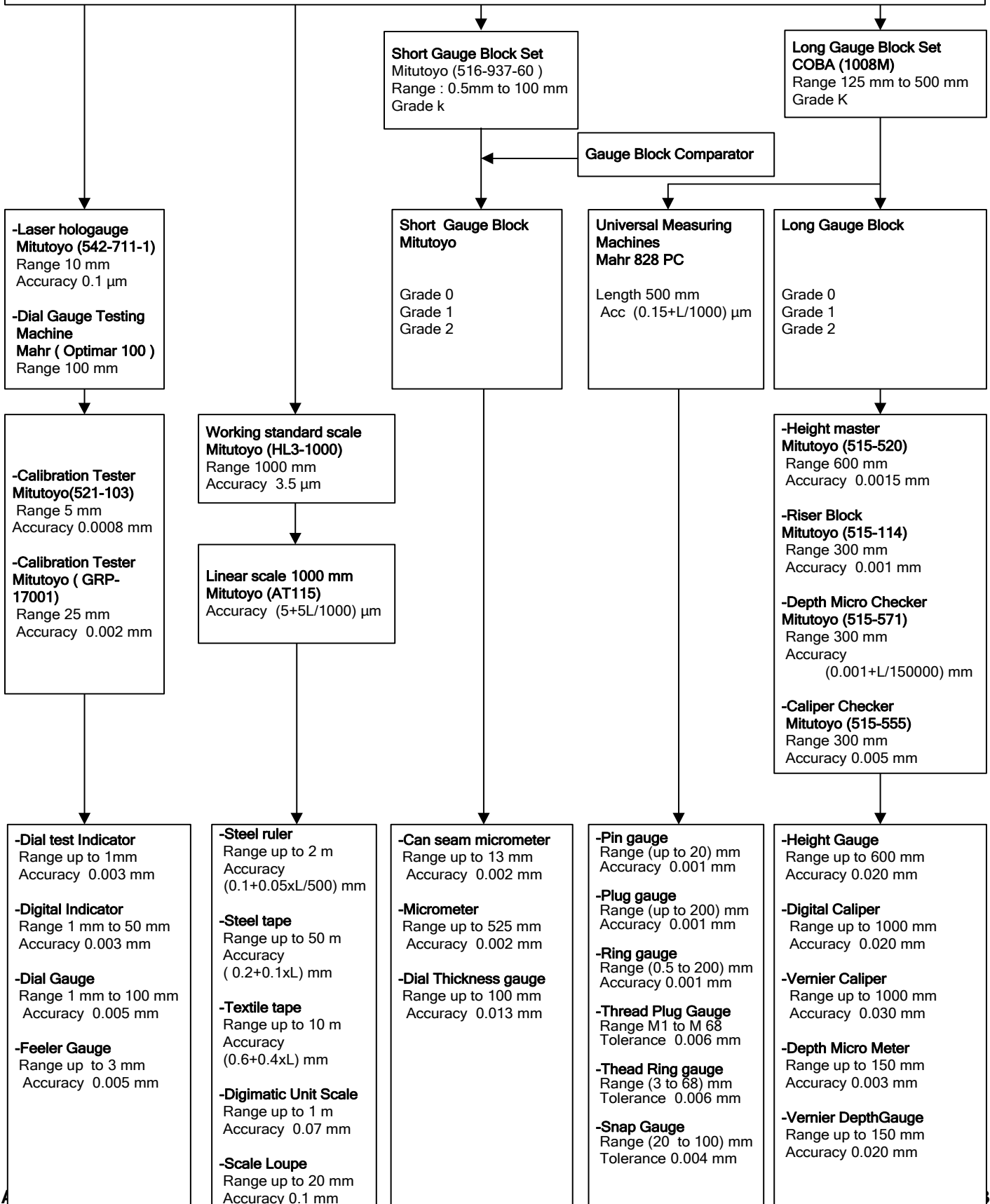


**TRACEABILITY CHART OF STANDARD DIMENSIONAL INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand



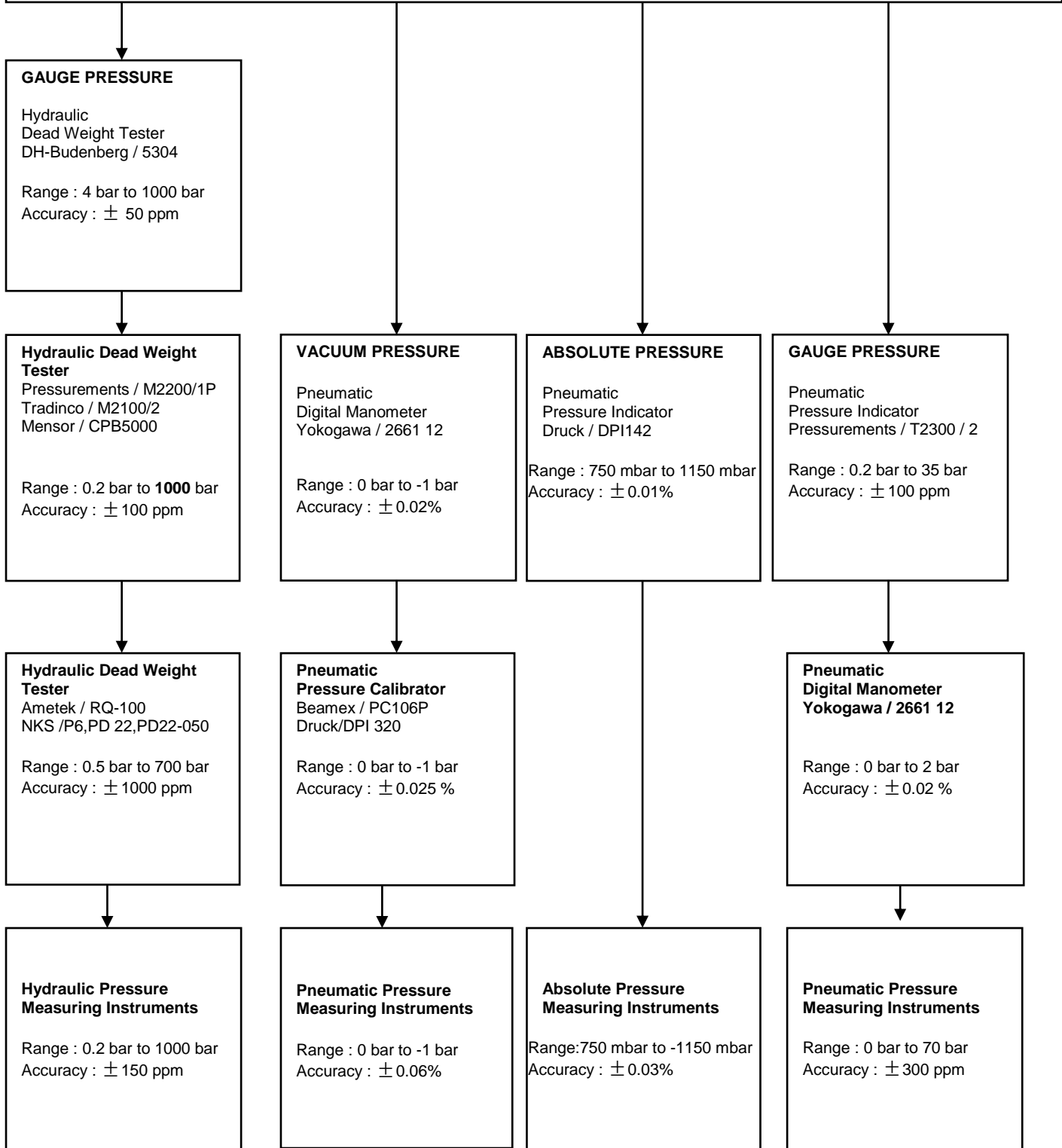


**TRACEABILITY CHART OF STANDARD PRESSURE INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

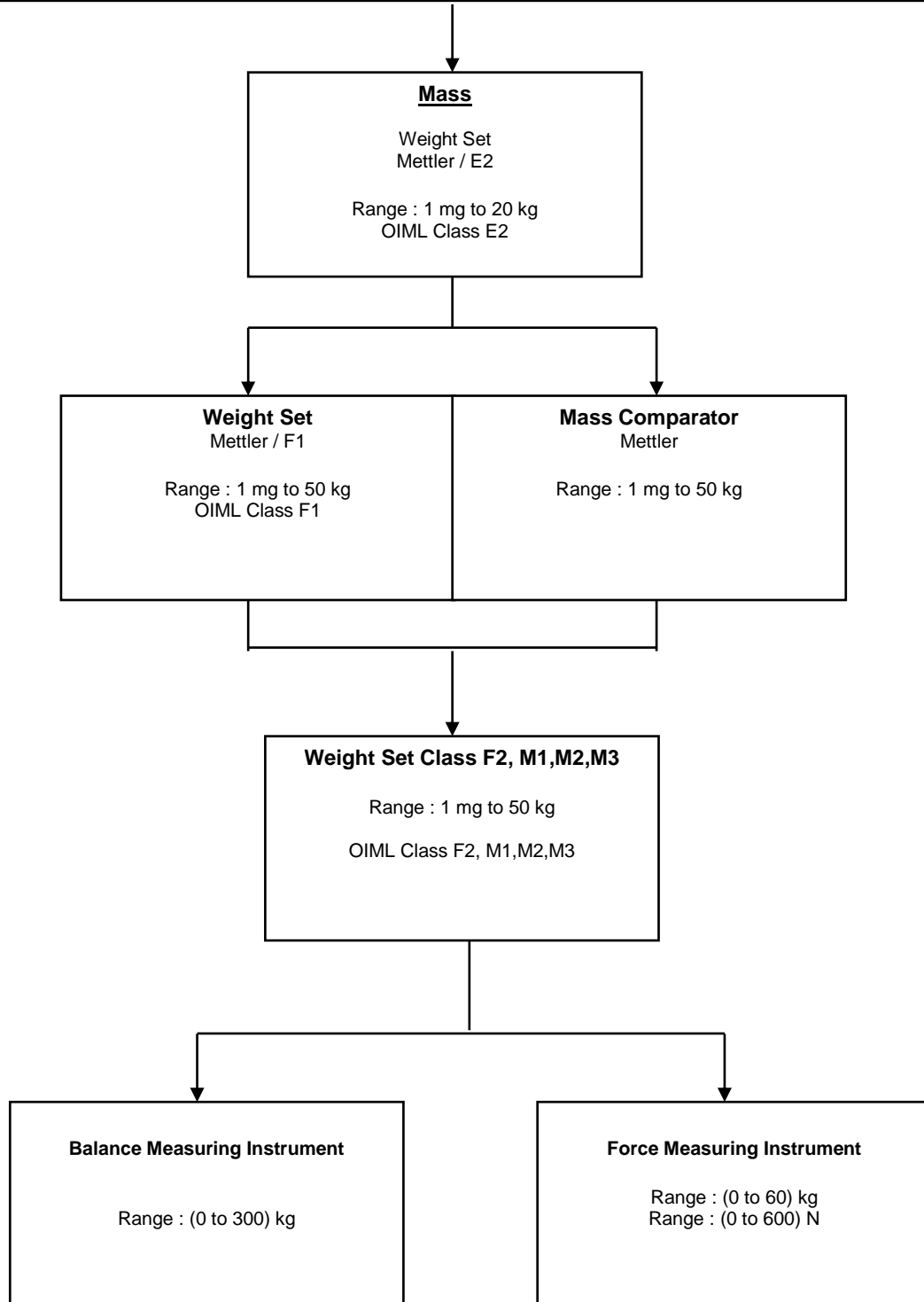
**National Institute of Metrology(NIMT)
Thailand**





NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand





**TRACEABILITY CHART OF STANDARD TORQUE INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

Weight Sets Range : 1 mg to 20 kg (OIML Class E2)

Weight Sets Range : 1 mg to 50 kg (OIML Class F1)

Weight Sets Range : 1/32 Oz to 50 lb(Class M)

Arm

Range up to 3 N·m , $U_{95\%} \pm 0.1\%$
Range : up to 25 N·m , $U_{95\%} \pm 0.1\%$
Range : up to 135 N·m , $U_{95\%} \pm 0.1\%$
Range : up to 407 N·m , $U_{95\%} \pm 0.1\%$
Range : up to 1355 N·m , $U_{95\%} \pm 0.1\%$

Transducer

Range : 0.2 N·m to 2 N·m , $U_{95\%} \pm 3.2 \text{ mN.m/N.m}$
Range : > 2 N·m < to 5 N·m , $U_{95\%} \pm 3.5 \text{ mN.m/N.m}$
Range : 5 N·m to 1355 N·m , $U_{95\%} \pm 2.0 \text{ mN.m/N.m}$

Torque Measurement Instrument

Range : 0.452 N·m to 1355 N·m
 $U_{95\%} : \pm 1\%$



**TRACEABILITY CHART OF STANDARD
HARDNESS (SHORE HARDNESS DUROMETER)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (NIMT) Thailand

**Hardness
DuroCalibrator**

REX

Shore : A , D

Scale A Accuracy : ± 0.025 N

Scale D Accuracy : ± 0.148 N

Durometer Hardness Gauge

Shore : A , D

Scale A Accuracy : ± 0.075 N

Scale D Accuracy : ± 0.4445 N



**TRACEABILITY CHART OF STANDARD TEMPERATURE INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Standards which realize the units of measurement according to the International System of Unit (SI)

The National Institute of Metrology (NIMT) Thailand

Thai Airways International Public Company Limited Reference Standard Laboratory
Laboratory Accreditation No. 0003

Standard Thermometer Type R

Range : 400 °C to 1100 °C
Calibration uncertainty :
 ± 0.7 °C to ± 0.8 °C

Standard Thermometer Type S

Range : 400 °C to 1100 °C
Calibration uncertainty :
 ± 0.5 °C to ± 0.8 °C

Digital Multimeter
Keithley 2700, Fluke 8846A,
Fluke 8842A
Accuracy : $< \pm 0.006$ mVDC

Platinum Resistance Thermometers

SPRT, Hart – 5699, Isotech-909H
Nominal R_{TPW} 25.5 Ohm
Range : -38 °C to 420 °C
Reproducibility : ± 0.001 °C
Long-term drift : < 0.008 °C / year

PRTs, Hart - 5628
Nominal R_{TPW} 25.5 Ohm
Range : -38 °C to 420 °C
Stability : ± 0.002 °C
Long-term drift :
 < 0.02 °C / year (Max.)

PRT, Hart – 5614
Range : -75 °C to 200 °C
PRT, Hart – 5614 & 5615, Burn - 12001
Range : -38 °C to 400 °C
Stability : ± 0.03 °C
Long-term drift :

Standard Indicators

Temperature range: (-38 to 420) °C

Standard Thermometer, Hart –1560/2560
Accuracy : ± 0.005 °C @ 0 °C
& ± 0.007 °C @ 100 °C

DC Volt / Ohm / DC Amp. Measurement Digital Multimeter Keithley 2700, Fluke 8846A,
Accuracy : $< \pm 0.006$ mV
Accuracy : $< \pm 0.035$ Ohm
Accuracy : $< \pm 0.015$ mA

Standard Indicator

DC Volt / Ohm / DC Amp. Measurement
Digital Multimeter
Fluke 8842A
Accuracy : $< \pm 0.006$ mV
Accuracy : $< \pm 0.035$ Ohm
Accuracy : $< \pm 0.015$ mA

Working Standards Thermometer

Range : -38 °C to 400 °C
Hart – 1529, Hart – 2562 ; with PRT, IPRT
System accuracy : ± 0.08 °C

High Temperature Measuring Instrument

Range : >400 °C to 900 °C
Accuracy : ± 3 °C

Low Accuracy $> \pm 0.2$ °C

High Accuracy $\geq \pm 0.1$ °C

- **LIG, DTM, TC, RTD, Transmitter, Logger, Recorder ;**
Range : -75 °C to 400 °C
- **Temperature block calibrator ;**
Range : -38 °C to 400 °C ;
Accuracy : $\geq \pm 1$ °C



**TRACEABILITY CHART OF STANDARD RADIATION TEMPERATURE INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

The National Institute of Metrology (Thailand) (NIMT)

Reference Standards of Laboratory of
Technology Promotion Association
(Thailand - Japan)
(TPA)

Laboratory Accreditation No. 0008

Precision Infrared Calibrator

Fluke ; 4180
Range : 15 °C to 120 °C @ Emissivity: 0.95
System accuracy * : ± 2.5 °C

Working Standard Thermometer

Hart Scientific model 1529 (Chub E4) with PRT
Range : 35 °C to 400 °C
System accuracy * : ± 0.1 °C

Standard Radiation Thermometer

Chino Corporation; IR-RST-90
Range : 500 °C to 1100 °C
System accuracy * : better than ± 2.0 °C

Radiation Thermometer

Range : 15 °C to 120 °C
Uncertainty : ≥ ± 4 °C

Radiation Thermometer

Range : 35 °C to 400 °C
Uncertainty : ≥ ± 2 °C

Radiation Thermometer

Range : 500 °C to 1100 °C
Uncertainty : ≥ ± 3 °C

$$\text{System accuracy}^* : \sqrt{\text{Calibration uncertainty}^2 + \text{Drift}^2 + \text{Uncorrected error}^2}$$



**TRACEABILITY CHART OF STANDARD TEMPERATURE INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

The National Institute of Metrology (Thailand) (NIMT)

ITS-90 Fixed Point Cells

Slim Mercury Triple Point Cell Isotech – ITL M 17724M
-38.8344 °C ± 1 mK

Water Triple point Cell Hart – 5901B
0.01 °C ± 0.6 mK

Gallium melting point Cell Pond Engineering – K28C
29.7646 °C ± 0.7 mK

Slim Tin Freeze Point Cell Isotech – ITL M 17669M
231.928 °C ± 2 mK

Slim Zinc Freeze Point Cell Isotech – ITL M 17671M
419.527 °C ± 2.5 mK

Standard Indicator

Super Thermometer , Hart-1590
Transfer Accuracy : ± 1.5 ppm
(using external Ref. resistor)

Platinum Resistance Thermometer :

Resistance Ratio : $W(29.7646\text{ °C}) \geq 1.11807$ or $W(-38.8344\text{ °C}) \leq 0.844235$

Temperature (t_{90}) : -38.8344 °C, 0.01 °C, 29.7646 °C , 231.928 °C and 419.527 °C



**TRACEABILITY CHART OF STANDAR RELATIVE HUMIDITY INSTRUMENTS
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

Physikalisch-Technischen Bundesanstalt (PTB), Germany	National Institute of Standard and Technology (NIST) U.S.A.	National Institute of Metrology (NIMT) (Thailand)
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**Humidity / Temperature Meter
Model Testo 400**

**Hygro-M2 Dew Monitor
Model : 5112
Dew Point Hygrometer
Model : Dew Prime II
Chilled – Mirror Hygrometer
Model : Dew Master**

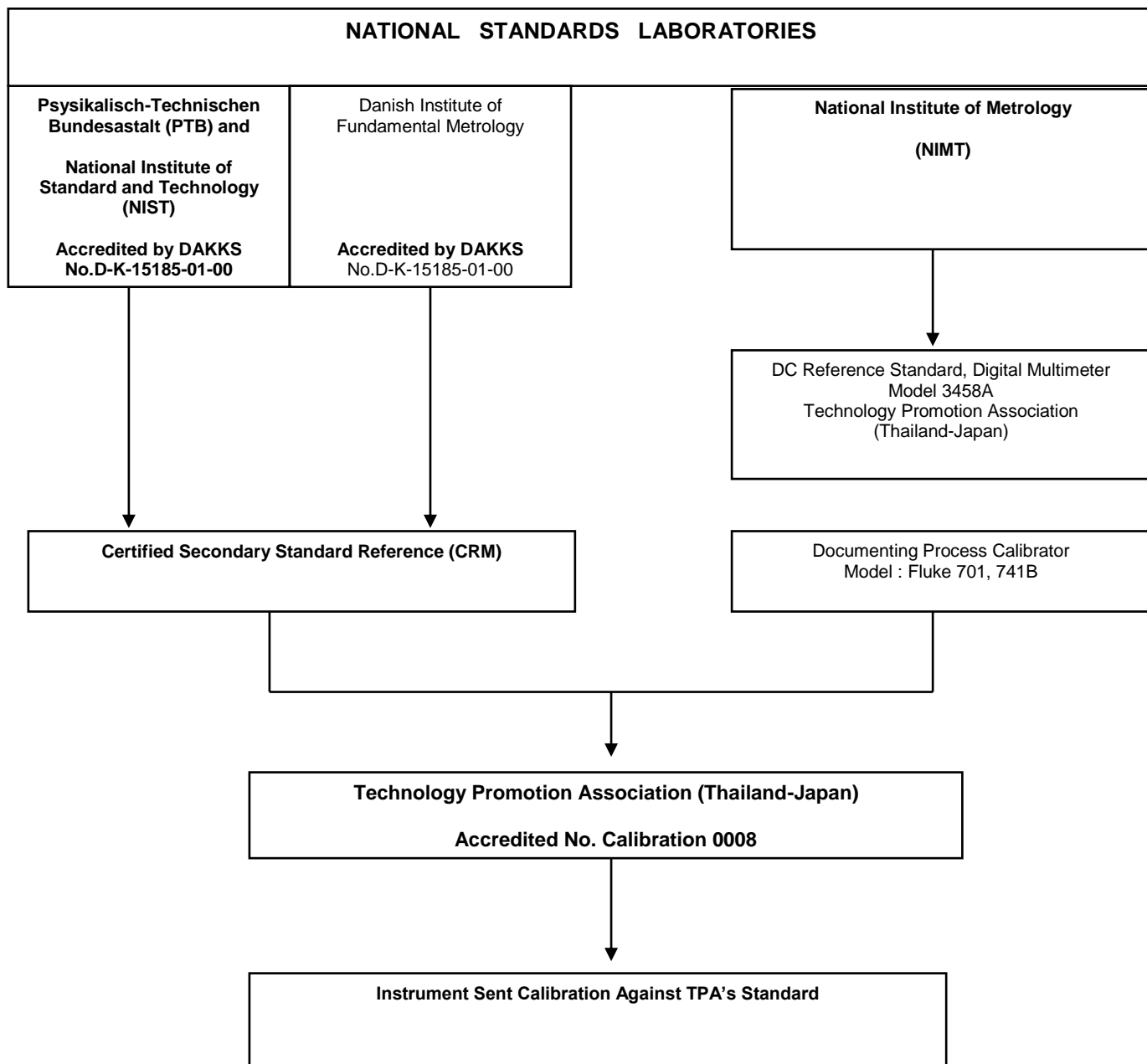
**Handheld Thermometer with Probe
Model : 1521**

**Technology Promotion Association (Thailand-Japan)
Accredited No. Calibration 0008**

Instrument Sent to Calibration Against TPA's Standard



**TRACEABILITY CHART OF STANDARD BUFFER & SIMULATOR
FOR pH-METER CALIBRATION
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**





**TRACEABILITY CHART OF STANDARD SOLUTION
FOR CONDUCTIVITY METER
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

Accredited by Physikalisch-Technischen Bundesanstalt (PTB)
and
National Institute of standards and Technology (NIST)
Accredited by DAKKS No.D-K-15185-01-00

Danish Institute of fundamental Metrology
Accredited by DAKKS No.D-K-15185-01-00

Certified Secondary Standard Reference (CRM)

Technology Promotion Association (Thailand-Japan)
Accredited No. Calibration 0008

Instrument Sent Calibration Against TPA's Standard



TRACEABILITY CHART OF STANDARD FILTER INSTRUMENTS
FOR SPECTROPHOTOMETER CALIBRATION
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

NATIONAL STANDARDS LABORATORIES

Certified Reference Standard Filter Accredited by
The United Kingdom Accreditation Service (UKAS)

Technology Promotion Association (Thailand-Japan)
Accredited No. Calibration 0008

Instrument Sent Calibration Against TPA's Standard



**TRACEABILITY CHART OF SUCROSE STANDARD SOLUTION
FOR REFRACTROMETER
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (Thailand)

(NIMT)

Certified Reference Material (CRM) :

Sucrose Standard Solution

Technology Promotion Association (Thailand-Japan)

Accredited No. Calibration 0008

Instrument Sent to Calibration Against TPA's Standard



**TRACEABILITY CHART OF STANDARD TEMPERATURE INSTRUMENTS
FOR pH AND CONDUCTIVITY METER
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (Thailand)

(NIMT)

Technology Promotion Association (Thailand-Japan)

Accredited No. Calibration 0008

Reference Standard Thermometer

Instrument Sent to Calibration Against TPA's Standard



**TRACEABILITY CHART OF STANDARD INSTRUMENT
FOR CENTRIFUGE CALIBRATION
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (Thailand)

(NIMT)

Technology Promotion Association (Thailand-Japan)

Accredited No. Calibration 0008

Tachometer

Range : 1,000 - 13,000 rpm

Accuracy : $\pm (0.02 \% + 1 \text{ digit})$

Instrument Sent to Calibration Against TPA's Standard



**TRACEABILITY CHART OF STANDAR D ACCREDITED
GLASSWARE CALIBRATION LABORATORY
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



National Standard Laboratories

National Institute of Metrology (NIMT) Thailand

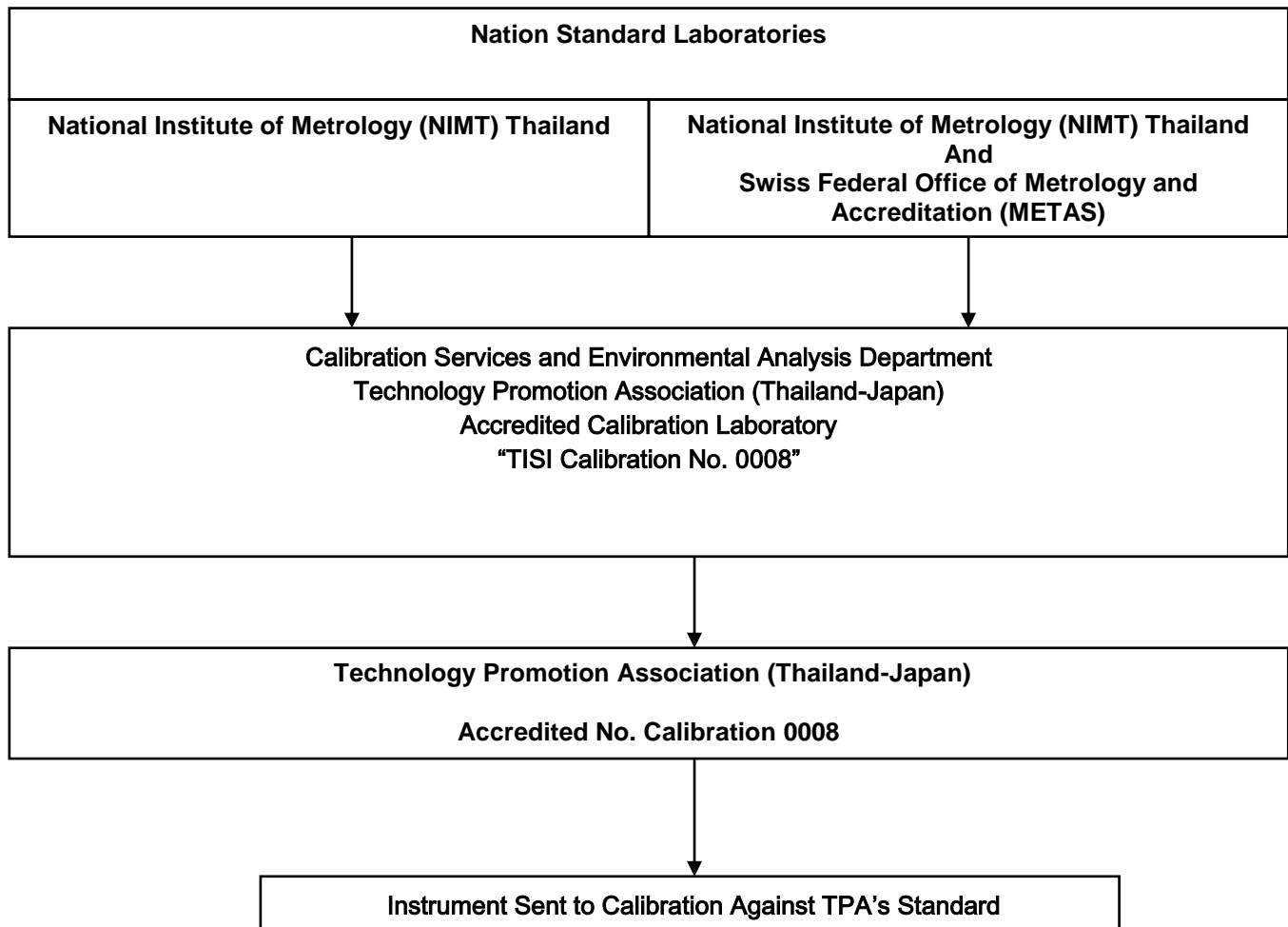
**Calibration Services and Environmental Analysis Department
Technology Promotion Association (Thailand-Japan)
Accredited Calibration Laboratory
"TISI Calibration No. 0008"**

**Technology Promotion Association (Thailand-Japan)
Accredited No. Calibration 0008**

Instrument Sent to Calibration Against TPA's Standard

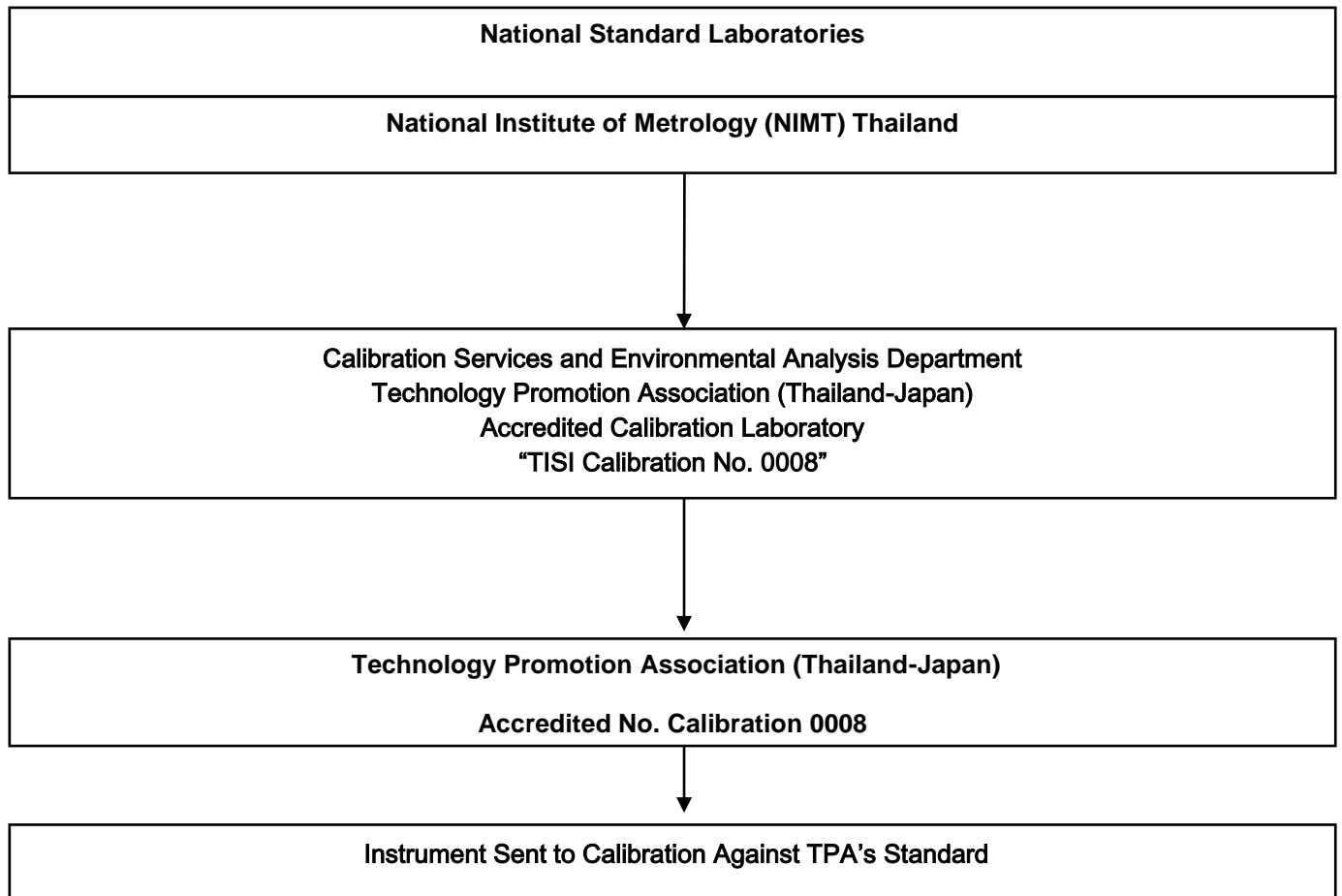


**TRACEABILITY CHART OF STANDARD ACCREDITED
MICRO PIPET CALIBRATION LABORATORY
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**





**TRACEABILITY CHART OF STANDAR D ACCREDITED
DISPENSOR PISTON BURETTE CALIBRATION LABORATORY
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



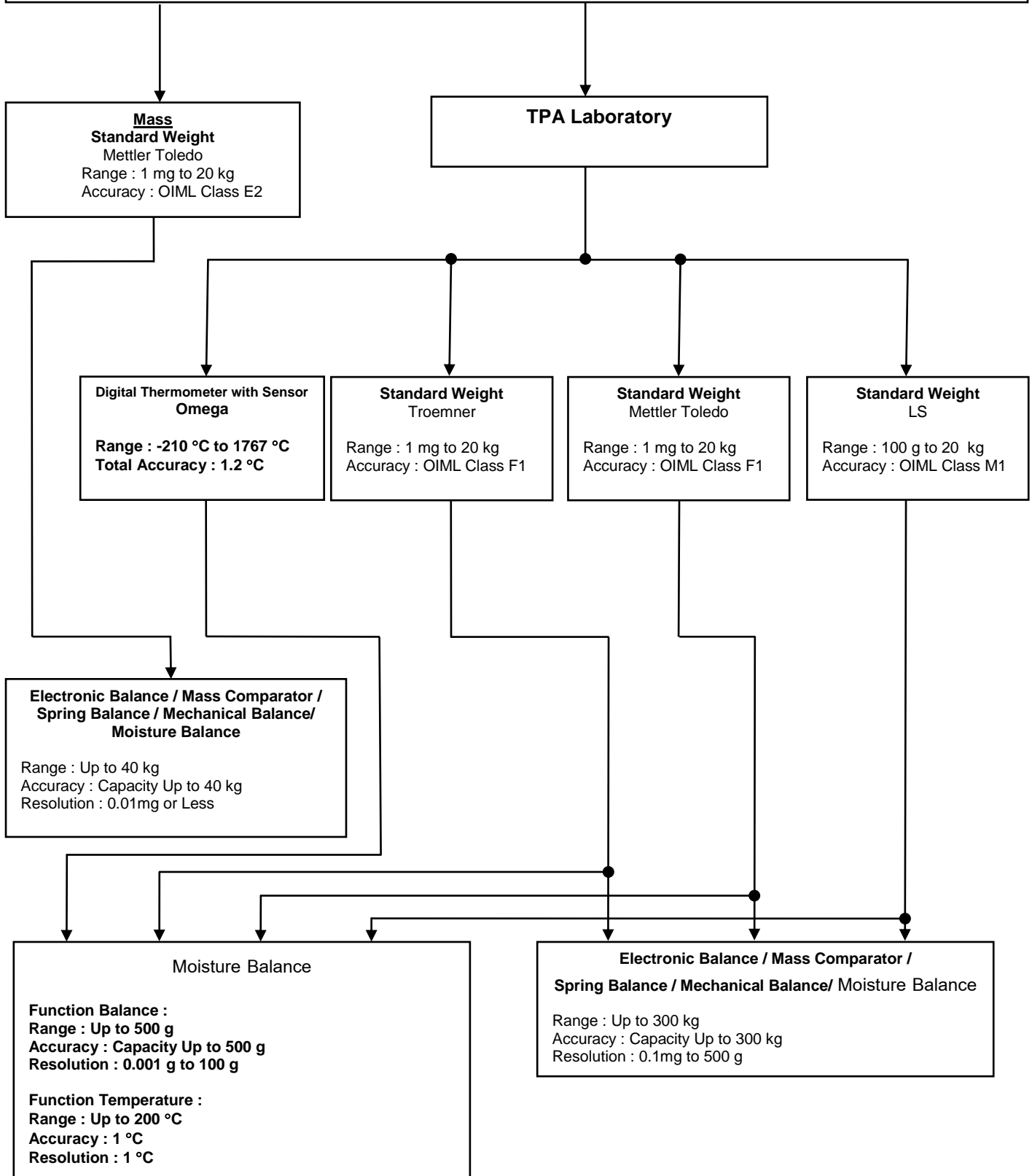


**TRACEABILITY CHART OF STANDARD WEIGHT INSTRUMENTS(On-Site)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology (NIMT) Thailand





**TRACEABILITY CHART OF STANDARD FOR DIMENSIONAL (On-Site)
, (SURFACE PLATE & PROFILE PROJECTOR),
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

**Dimension
Standard Inclinometer
Wyler**

Range : $\pm 1900 \mu\text{m/m}$
Accuracy : Limits of error < 0.5 % Full Scale
(DIN 2276)

**Dimension
Standard Glass Scale
Mitutoyo**

Range : 50, 100 , 200 mm
Accuracy : $1.6 \mu\text{m}$ to $1.9 \mu\text{m}$

**Precision Square
Tesa**

Range : 150 mm x 100 mm ,
200 mm x 130 mm

Accuracy : $8 \mu\text{m}$ to $9 \mu\text{m}$

TPA Laboratory

**Overlay Chart
Mitutoyo**

Range : Up to 140 mm
Up to 180°
Accuracy : $\pm 1^\circ$

**Dial Test Indicator
Mitutoyo**

Range : $\pm 0.14 \text{ mm}$
Accuracy : $3 \mu\text{m}$

Granite Surface Plate / Steel Surface Plate

Size : (300 mm x 300 mm)to(3000 mm x 3000 mm)
Accuracy : Grade 0 , 1 , 2 (JIS B 7513-1992)

*** Profile Projector**

Range (X-Y Axis): Up to 200 mm
Magnification Test
Resolution : 0.0005 mm
* Not Accreditation ISO/IEC 17025



**TRACEABILITY CHART OF STANDARD FOR DIMENSIONAL (On-Site)
, (DIMENSIONAL SMALL TOOLS),
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORY

National Institute of Metrology (NIMT) Thailand

Technology Promotion Association (Thailand-Japan)

Accredited No. Calibration 0008

Gauge Block Set
Mitutoyo

Range : 2.001 mm to 100 mm
: 2.5 mm to 25 mm
Accuracy : Grade 0

Caliper Checker
Mitutoyo

Range : 10 mm to 300 mm
Accuracy : $\pm 5 \mu\text{m}$

Calibration Tester
Mitutoyo

Range : Up to 25 mm
Accuracy : $\pm 2 \mu\text{m}$

Can Seam Micrometer

Range : Up to 13 mm
Accuracy : $\pm 2 \mu\text{m}$

Micrometer

Range : Up to 25 mm
: 25 to 50 mm
Accuracy : $\pm 2 \mu\text{m}$

Thickness Gauge

Range : Up to 50 mm
Accuracy : $\pm 13 \mu\text{m}$

Vernier Caliper

Range : Up to 300 mm
Accuracy : $\pm 30 \mu\text{m}$

Dial Gauge

Range : 1 mm to 25 mm
Accuracy : $\pm 5 \mu\text{m}$



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology(NIMT)Thailand

**Force
Standard Load Cell
Interface**

Range : 4.5 kN , 10 kN, 45 kN,110 kN , 225 kN
Accuracy : 0.02% of full scale to 0.03% of full scale

Compression & Tension Testing Machine

Range : 1 kN to 225 kN
Accuracy : Class 0.5 , 1 , 2 , 3 conforms to EN ISO 7500-1:2004



**TRACEABILITY CHART OF STANDAR D TEMPERATURE INSTRUMENTS (On-Site)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

**National Institute of
Metrology(NIMT)
Thailand**

**National Measurement Institute
(NMI)
Australia**

**National Measurement Institute
(NPL)
England**

**Thai Airways International Public Company Limited
Laboratory Accreditation No. 0003**

**Technology Promotion Association (Thailand-Japan)
Accredited No. Calibration 0008**

Data Acquisition

Agilent / 34970A / TC Type T
Range : -35 °C to 4 °C
Accuracy : ± 0.60 °C
Range : 104 °C to 200 °C
Accuracy : ± 1.1 °C

Agilent / 34970A / RTD PT100
Range : 4 °C to 104 °C
Accuracy : ± 0.16 °C

Digital Thermometer

Hart / 1502A / PRT Probe
Range : -25 °C to 400 °C
Accuracy : ± (0.053) °C

Data Acquisition

Agilent / 34970A / PRT Probe
Range : above @ 5 °C ambient to 100 °C
Accuracy : ± 0.080 °C

**Temperature Controller
Chamber**

Range : -35 °C to 200 °C
Accuracy : ± (0.5 to 10) °C

Autoclave

Range : 100 °C to 200 °C
Accuracy : ± 3.0 °C

Thermometer with Sensor

Range : -25 °C to 400 °C
Accuracy : ± (0.16 to 5.0) °C

Water Bath

Range :
above @ 5 °C ambient to 100 °C
Accuracy : ± (0.25 to 5.0) °C



**TRACEABILITY CHART OF STANDARD TEMPERATURE INSTRUMENTS (On-Site)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

**National Institute of
Metrology(NIMT)
Thailand**

**National Standards which realize the unit of measurement according to
the International System of Unit (SI)**

**Thai Airways International Public Company Limited
Laboratory Accreditation No. 0003**

**Technology Promotion Association (Thailand-Japan)
Accredited No. Calibration 0008**

Standard Thermometer

Range : 200 °C to 400 °C
Hart / 1502A / PRT Probe

Range : 400 °C to 900 °C
Fluke / 2190A / TC Type S
Fluke / 54II / TC Type S

Calibration Uncertainty : 0.066 °C

Calibration Uncertainty : 2.4 °C

Furnace

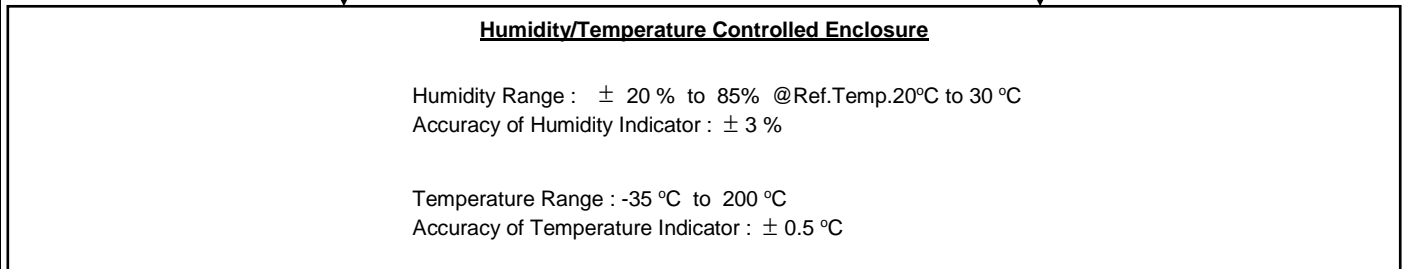
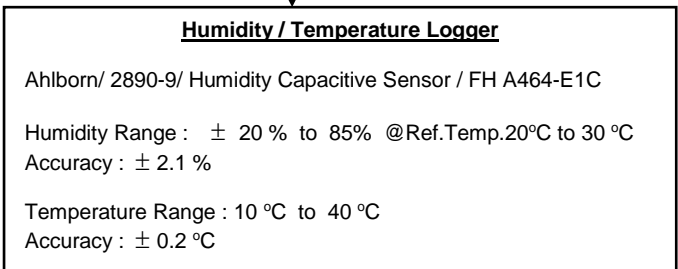
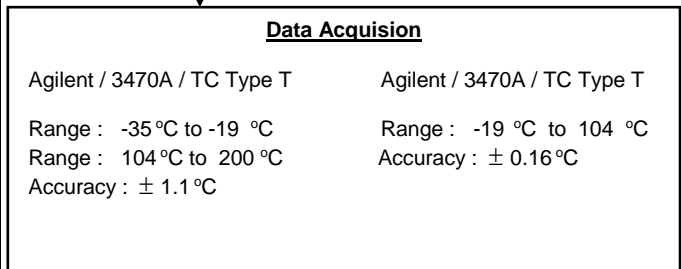
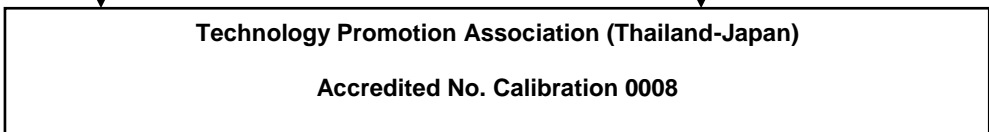
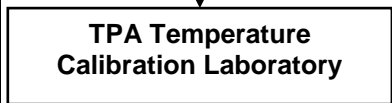
Range : 200 °C to 400 °C @ CMC: ± 0.70 °C
Range : >400 °C to 700 °C @ CMC: ± 4.5 °C
Range : >700 °C to 900 °C @ CMC: ± 5.0 °C



**CHART OF STANDARD HUMIDITY INSTRUMENTS (On-Site)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES





**CHART OF STANDARD HUMIDITY PRESSURE INSTRUMENTS (On-Site)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

National Institute of Metrology Thailand (NIMT) Thailand

Technology Promotion Association (Thailand-Japan)

Accredited No. Calibration 0008

Standard Pressure Calibrator

Multifunction Calibrator Beamex MC5

Range : - 90 kPa to 0 kPa, Acc: ± 0.04 of Rdg. + 0.01 % of Range
Range : 0 kPa to 200 kPa, Acc: ± 0.04 of Rdg. + 0.025 % of Range
Range : 0 kPa to 2000 kPa, Acc: ± 0.04 of Rdg. + 0.01 % of Range
Range : 0 kPa to 16000 kPa, Acc: ± 0.04 of Rdg. + 0.013 % of Range

Pressure Measuring Device

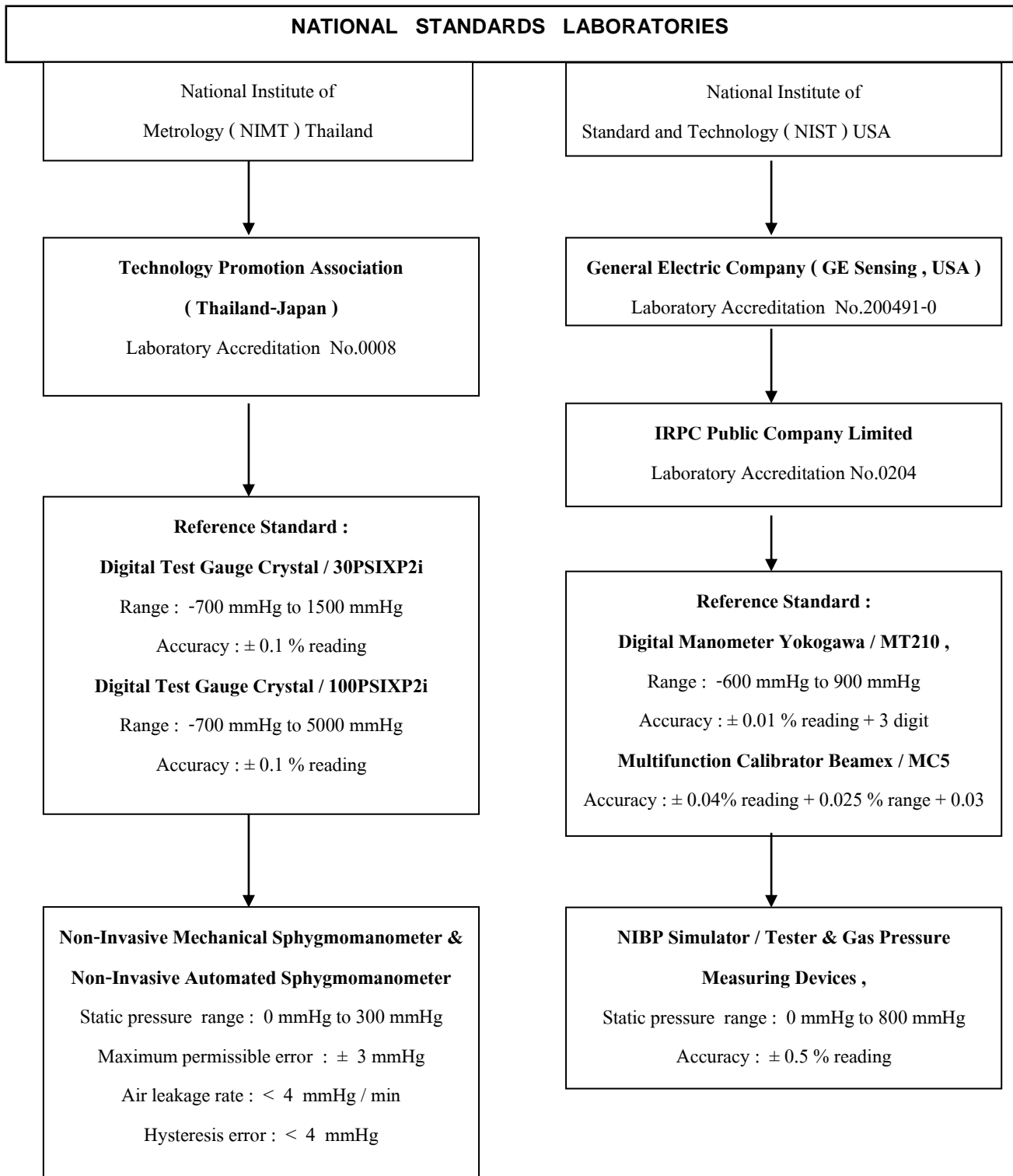
Range : 0 kPa to 200 kPa, Acc: ± 0.04 %
Range : 0 kPa to 2000 kPa, Acc: ± 0.04 %
Range : 0 kPa to 16000 kPa, Acc: ± 0.02 %

Vacuum Measuring Device

Range : -90 kPa to 0 kPa, Acc: ± 0.20 %



**TRACEABILITY CHART OF STANDARD PRESSURE INSTRUMENTS
(MEDICAL CALIBRATION LAB)
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND - JAPAN)**





NATIONAL STANDARDS LABORATORIES

National Institute of Metrology Thailand (NIMT) Thailand

Technology Promotion Association (Thailand-Japan)

Accredited No. Calibration 0008

Standard Pressure Calibrator

Multifunction Calibrator Beamex MC5

Range : 0 mmHg to 1500 mmHg

Accuracy : ± 0.04 % of reading + 0.025% of range + 0.30 mmHg

Gas Pressure Measuring Device

Range : 0 mmHg to 1500 mmHg

Accuracy : ± 0.4 % of reading + 1 mmHg



**TRACEABILITY CHART OF STANDARD ACCREDITED
BREATH ALCOHOL CALIBRATION LABORATORY
OF TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**



NATIONAL STANDARDS LABORATORIES

Certified Reference Material : Ethanol Gas Standard

***Accredited by The United Kingdom Accreditation Service (UKAS)
Calibration No.0468 and Reference Materials No.4183***

TPA Accredited Calibration No. 0008

Instruments Sent to Calibration Against TPA's Standard