



VTT MIKES calibration and expert services

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Request a quote for calibration.

For information about addresses, delivery conditions and other conditions see the end of the list.

1 Weights

- 1 mg - 500 mg
 - OIML class E2
 - OIML class E1
 - Other weight classes
- 1 g - 5 kg
 - OIML class E2
 - OIML class E1
 - Other weight classes
- 10 kg - 20 kg
 - OIML class E2
 - OIML class E1
 - Other weight classes
- Weight used in pressure balances (ring weights)
 - Accuracy class 10 ppm
 - Accuracy class 5 ppm
- Weights, basic charge

2 Density of weights

- Density of weights, 1 g - 2 kg
- Density standards, basic charge
- Hydrometers, 4 meas. points

3 Gas flow

- Calibration using nitrogen, 5 ml/min ... 100 l/min
 - Using primary method: 5 meas. points
 - Using an LFE-system: 5 meas. points

4 Pressure

- Calibration of oil-filled pressure balance, 0.5 MPa ... 500 MPa (5 measurement points)
- Calibration of gas-filled pressure balance, 1 MPa ... 16 MPa (5 measurement points)
- Calibration of a barometer by comparing it to a measurement standard at the prevailing air pressure (6 measurement points)
- Pressure gauge and barometer calibration (price per measuring range includes 6 measurement points)
- Negative gauge pressure calibration (price per measuring range includes 6 measurement points)
- Vacuum gauge calibrations (price per measuring range includes 6 measurement points)
- Spinning rotor gauge calibrations
- Leak testing using helium
- Dynamic pressure measurements, 20 MPa ... 500 MPa
- Pressure calibrations with instrument adjustment: 1.5 x normal price (adjustment needs always to be agreed for each case)
- Expert services (mass, temperature, pressure, humidity, flow,

5 Thermometers

- Fixed point calibrations
- Resistance thermometers ITS-90, -189 ... +660 °C
 - Ar (-189 °C)
 - Hg (-38 °C)
 - Ga (29 °C)
 - Sn (232 °C)
 - Zn (419 °C)
 - Al (660 °C)
- Triple point of water
- Calibration by comparison
 - Resistance thermometers in a liquid bath, -80 °C ... 280 °C
 - Liquid-in-glass thermometers in a liquid bath, -80 °C ... 280 °C
 - Digital thermometers, -80 °C ... 280 °C
 - Thermometers in oven, < 660 °C
 - Furnaces
- Calibration at the boiling point of nitrogen
- Calibration by electrical simulation

6 Hygrometers

- Dew point calibrations
 - Dew-point temperature, -80 °C ... -61 °C
 - Dew-point temperature, -60 °C ... +84 °C
- Humidity and temperature calibrations
 - 10 %rh ... 95 %rh, +10 °C ... +85 °C
 - 10 %rh ... 95 %rh, -20 °C ... +10 °C

7 Length

7.1 Laser Radiations

- Stabilized laser of the mise en pratique
 - 532 nm
 - 543,5 nm
 - 633 nm
- Other wavelength standards
- Fibre optic source
- Optical spectrum analyzer

7.2 Linear dimensions

- Length instruments
 - Laser interferometer
 - Basic system
 - Angle measurement option
 - Straightness measurement option
 - Air sensor
 - Adjustment of air sensor
 - Wave length calibration
 - EDM instrument
 - 0 - 30 m
 - 1-D measuring machine
 - 0 - 1000 mm
 - 1001 - 3000 mm
 - Additional scale of same machine
 - Scale compensation
 - Height measuring instrument
 - 1-D displacement
 - Piezo etc.
 - 1-D sensor
 - Measuring range < 50 mm, max. 100 points
 - Measuring range 51 mm - 200 mm, max. 100 points
 - Additional range
 - Reduced uncertainty ($u < 0.2 \mu\text{m}$)
 - Gauge block comparator
 - Dial-indicator tester
- End standards
 - Gauge blocks
 - 0,5 - 100 mm
 - > 100 ... 1000 mm
 - Special gauge block
 - Gauge block, interferometrical calibration
 - 0 - 100 mm
 - 101 - 200 mm
 - 201 - 400 mm
 - 401 - 1000 mm
 - Gauge block set M88
 - Gauge block set M112
 - Gauge block set M122
 - Air gap standard
 - Sheet gauge, thickness
 - Sheet gauge, diameter
 - Length bar (long gauge block)
 - Micrometer setting rod
 - 0 - 100 mm
 - 101 - 500 mm
 - > 500 mm
 - Step gauge, normal accuracy (0.3 $\mu\text{m/m}$)
 - 0 - 250 mm
 - 251 - 350 mm
 - 351 - 500 mm
 - 501 - 700 mm
 - 701 - 1100 mm
 - 1101 - 1600 mm
 - 1601 - 2020 mm
 - Step gauge, better accuracy (0.15 $\mu\text{m/m}$)
 - 0 - 250 mm
 - 251 - 350 mm
 - 351 - 500 mm
 - 501 - 700 mm
 - 701 - 1100 mm
 - 1101 - 1600 mm
 - 1601 - 2020 mm
 - Gap gauge
 - Feeler (thickness) gauge

7.3 Line standards

Precision line scale, stage micrometer
Max 50 lines
0 - 100 mm
101-500 mm
501 - 1000 mm
Additional scale at same substrate
0 - 100 mm
101-500 mm
501 - 1000 mm
Reduced uncertainty, $u < 200$ nm
2D scale
1-D and 2-D gratings and other microscope
calibration standards, see Microscope calibration standards
Tape, wire
0 - 30 (60, 90, ...) m
Tape measure
Plumb tape
0 - 30 (60, 90, ...) m
Electronic plumb tape
Circometer
Machinist scale
0 - 1 m
>1 - 2 m
>2 - 3 m
>3 - 5 m
Additional scale
Diameter standards
External cylinder (plug, piston)
Reduced uncertainty, $u < 500$ nm
on diameter
External cylinder (tapered)
Internal cylinder (ring)
Reduced uncertainty $u < 500$ nm
on diameter
Internal cylinder (tapered)
Sphere (ball); diameter
Roundness
Reduced uncertainty $u < 300$ nm
on diameter

7.4 Angle

Angle by Circle Dividers
Optical polygons (12 faces)
Index table
Rotary table, rotary encoder scale
Reduced uncertainty, $u < 0,2^\circ$
Small-angle Generators
Sine (bar, table)
Angle instruments
Autocollimator
Reduced uncertainty $u < 0,02^\circ$
Electronic level (frame type)
Electronic level
Clinometers
Sprit (bubble) level
Sprit (bubble) level (frame type)
Theodolite (see Form/ Tachymeter/ Angular scales)
Optical level
(bevel) protractor
Squareness tester
Angle artifacts
Angle block
90° square
Knife edge square
Steel square
Granite square
Frame square
Cylinder square
Cone (taper) gauge
Angle Prisms
Optical square (pent prism)
Retro reflector

7.5 Form

Shaft alignment instrument

Flatness standards

Optical flat < 150 mm
Optical flat (parallel, wedge)
Surface plate (granite)
Surface plate < 1000 mm
Surface plate > 1000 mm

Flatness standard for SPMs

Roundness standards

External cylinder
External cylinder (arbor)
Internal cylinder
Sphere (hemisphere)
Magnification standard

Straightness Standards

Straight edge
Cylindrical straightness standards
(granite)
0 - 1000 mm
> 1000 mm
(steel)
0 - 1000 mm
> 1000 mm

Cylindricity Standards

External cylinder
Internal cylinder

7.6 Complex Geometry

Surface Texture Standards

(Groove) depth (step height) standard, e.g. ISO 5436-1 Type A
Tip-condition standard
Spacing standard
Roughness standard
Profile coordinate standard

Screw Standards

Setting standard for thread micrometer
Thread plug, plain
Thread plug, tapered
Thread ring, plain
Thread ring, tapered

2-D, 3-D Instruments

Surface roughness measuring machine
Additional tip
Measuring projector
Measuring microscope
Coordinate measuring machine
length scale
Straightness < 1000 mm
Coordinate measuring machine, inspection 10360-2
Tachymeter
Length scale
Angular scales; (also theodolite)
Laser scanner
Motion (translation, angle) stage
Roundness measuring machine
Cylindricity measuring machine
Form-measuring machine

Hardness

Hardness indenter

7.6 Microscope calibration standards

1-D grating, SPM calibration standard
(diffraction measurement) Pitch
2-D grating, SPM calibration standard
(diffraction measurement) Pitch, x&y
Orthogonality (to the same grating)
1-D grating, SPM calibration standard
(AFM measurement) Pitch
Step height by AFM
2-D grating, SPM calibration standard
Pitch, x&y
Orthogonality (to the same grating)
Step height by AFM
Flatness (to the same grating)
Step height standard for SPMs
Step height
Flatness standard for SPMs
Other microscope standards, see line scales above

7.7 Various dimensional

Hand instruments

External micrometer

0 - 50 mm

51 - 500 mm

501 - 3000 mm

Micrometer head

Depth micrometer

Depth micrometer setting device

Caliper

0 - 150 mm

151 - 500 mm

> 500 mm

Depth gauge

Internal two-point (bore) micrometer

Basic equipment

Extra part(s)

Internal three-point micrometer

Dial gauge, dial test indicator

0 - 10 mm

10 - 25 mm

> 25 mm

Diameter gauge

Thickness gauge

Tachometer, contact type

Melt viscosity instrument nozzle

7.8 Measuring services

Surface roughness measurements

Flatness measurements

interferometric

mechanical

Machine tool measurements

- Position accuracy measurements

According to VDI/GDO-3441 or to ISO 230/2

- Positioning during adjustment

- Geometrical measurements

- Test piece measurements

- Angular deviations of movement

Roundness measurements

Cylindricity measurements

Form measurements

Atomic force microscopic measurements

Electronic force microscopy measurements

3-D measurements with CMM

contact probe (Legex)

optical probe (Quick Vision)

XCT measurements for industrial artefacts

Orifice plate

Other measuring services

7.9 Other service

Identification marks

Ultrasound cleaning

Burr removing

Evaluation of measuring results

Expert service

8 Time and Frequency

df/f , dT/T , uncertainty < 0.001 ppm

Rubium and cesium oscillators,

GPS timing receivers, etc.

df/f , dT/T , uncertainty 0.001-1 ppm

TCXO etc.

df/f , dT/T , uncertainty over 1 ppm

Tachometers, stroboscopes,

electronic watches, etc.

Point frequency adjustment

NTP service

Expert services

9 Electricity

9.1 DC voltage

DC voltage standards, single voltage level

9.2 DV current

Basic fee includes one measuring range

10 fA – 100 nA

100 μ A – 1 A

see also multimeters and calibrators

1 A – 20 A

20 A – 600 A

9.3 Resistance

DC calibrations

10 mohm - 1 Mohm (< 150 mA, < 100 mW, < 100 V)

0,1 mohm - 1 ohm (150 mA - 100 A, < 100 W)

1 Mohm - 100 Mohm (< 100 V)

1 Mohm - 100 Tohm (< 1 kV, < 10 mW)

Power dependence of resistance standards

Temperature dependence of resistance standards 20...25 °C

9.4 AC voltage

Thermal converters, 45-60 Hz

Uncertainty < 400 ppm

Current transformers 0,1 A - 2500 A

Current transformers over 2500 A

Current transformers, uncertainty under 400 ppm

9.5 High voltage

DC voltage

DC voltage measuring system

1 kV - 50 kV

50 kV - 200 kV

200 kV - 1000 kV

1000 kV - 1200 kV

DC linearity test

AC voltage

AC voltage measuring system

1 kV - 40 kV

40 kV - 100 kV

100 kV - 200 kV

200 kV - 500 kV

AC linearity test

High voltage probe (ac or dc / ac and dc)

ac or dc

ac and dc

Voltage transformer

1 kV - 40 kV

40 kV - 100 kV

100 kV - 200 kV

Capacitance and inductance

Capacitance

High voltage capacitance and tand

Inductance

Inductance and losses

Calibration of capacitance bridge

High voltage on-site calibrations

9.6 Pulse calibrations

LI measuring system

1 kV - 10 kV

10 kV - 200 kV

200 kV - 400 kV

Step response measurement

Linearity test

SI measuring system

1 kV - 200 kV

Step response measurement

Linearity test

Impulse calibration

Digital recorder

Impulse calibrator

Step response measurement

PD-calibrator, 5 measurement points

PD measuring system (detector), 1-phase / 1-channel

Surge-tester calibration

Impulse current

ESD-tester calibration

On-site pulse calibrations

- 9.7 Calibrators**
Examples of calibrated devices: Fluke 5700 A, Fluke 5500 A
Basic calibration at about 80 measurement points
Calibration at specific points
Calibrator, basic calibration
- 9.8 Tester calibrators**
Examples of calibrated devices: Fluke 5320A, 5322A
- 9.9 Multimeters**
Fees include basic functions (DCV, ACV, DCI, ACI, R)
Additional functions (temperature, capacitance, etc.)
according to a separate offer
Reference multimeters, e.g. Keysight 3458 A, Fluke 8508A
basic calibration at about 80 measurement points
Mid-level devices, e.g. Keysight 34450A
Basic devices, e.g. Fluke 79
- 9.10 Insulation resistance meters**
up to 100 GOhm
up to 100 TOhm
- 9.11 Oscilloscopes**
Single channel
- 9.12 Laboratory power sources**
Single output
- 9.13 Electronic loads**
Single channel
- 9.14 Amplifiers**
Transconductance amplifiers
Examples of calibrated devices: Datron 4600, Fluke 5220 A
Basic calibration at about 30 measurement points
Calibration at specific points
Voltage amplifiers
Examples of calibrated devices: Fluke 5205 A
Basic calibration at about 20 measurement points
Calibration at specific points
- 9.15 Electric power**
Basic fees include ca. 20 measurement points
Electric power, 1-phase unc. 0,005%-0,05%
Electric power, 1-phase unc. 0,05%-0,5%
Electric power, 1-phase unc. over 0,5%
Electric power, 3-phase unc. 0,01%-0,05%
Electric power, 3-phase unc. 0,05%-0,5%
Electric power, 3-phase unc. over 0,5%
Electric power, additional measuring points
- 9.16 Capacitance standards**
Basic calibration
- 9.17 Inductance standards**
Basic calibration
- 9.18 High frequencies**
Cal. factor of RF & MW power sensor
10 MHz - 18 GHz,
1 mW, 25 points, reflection coefficients
Reference supply of a power sensor
Attenuation
10 MHz - 6 GHz, 0 - 80 dB,
6 GHz - 18 GHz, 0 - 60 dB,
40 points, reflection coefficients
- 9.19 Other services in electricity**
Adjustment of measuring devices
Expert services
Measurement services, working time (h)
- 10 Acoustics**
Sound calibrators: single frequency calibrators
Sound calibrators, e.g. B&K 4226
Microphones LS1P or LS2P
Reciprocity calibration, 31,5 Hz - 10 (20) kHz,
including 26 frequencies or more
Comparison method, 31,5 Hz - 16 kHz,
including 11 frequencies, for LS2P only
Accelerometers, 10 Hz - 10 kHz
Sensitivity and phase, including 31 frequencies
Accelerometers, 0,4 Hz -160 Hz
Sensitivity and phase, including 27 frequencies
Portable vibration loggers
Portable vibration calibrators, e.g. PCB 394C06
Other vibration measurement devices
Vibration measurement of constructions
Expert services

11 High Capacity Weight *

High capacity weight M1-M2, 20 kg - 2000 kg

12 Force *

12.1 Calibrations according to standard

EN ISO 376 calibration one direction

0,1 - 1,1 MN

10 - 100 kN

1 - 10 kN

0,1 - 1 kN

< 0,1 kN

EN ISO 376 calibration two directions

0,1 - 1,1 MN

10 - 100 kN

1 - 10 kN

0,1 - 1 kN

< 0,1 kN

Applied calibration EN ISO 376,

2 posit. 1-direction

0,1 - 1,1 MN

10 - 100 kN

1 - 10 kN

0,1 - 1 kN

< 0,1 kN

Applied calibration EN ISO 376,

2 posit. 2-direction

0,1 - 1,1 MN

10 - 100 kN

1 - 10 kN

0,1 - 1 kN

< 0,1 kN

12.2 Charge of standards/hour

0,1-1,1 MN, FSTM no 4

10-100 kN, FSTM no 3

1-10 kN, FSTM no 2

0,1-1kN, FSTM no 1

< 0,1 kN, FSTM no 5

12.3 Scale calibration in the force standard

(crane scales, aircraft scales and all types of scales
which are similar to these, single point load)

Calibr. of weighing instrument in FSM m > 11 t

Calibr. of weighing instrument in FSM m = 1,2 t - 11 t

Calibr. of weighing instrument in FSM m = ≤ 1,1 t

Axle load weighing instrument 6 t or 10 t

12.4 Special devices

Calibration of adhesiotester

13 Torque *

13.1 Torque wrenches

Calibration of wrench, 1-dir, M ≤ 2 kNm/piece

Add charge for second direction, M ≤ 2 kNm/piece

Additional charge for electrical tools/piece

Charge for measurement points more than 3

13.2 Tools with actuator

One measuring point

M ≤ 2 kNm

Additional points

M ≤ 2 kNm

13.3 Torque wrench calibration devices

Devices with torque transducers

M ≤ 2 kNm

one direction

two directions

Cal. of tool torque tester with rider beam

13.4 Torque transducer calibration

According to EURAMET cg-14 (EA-10/14)

M ≤ 50 Nm 1-direction

M ≤ 50 Nm 2-directions

50 Nm ≤ M ≤ 2 kNm 1-direction

50 Nm ≤ M ≤ 2 kNm 2-directions

2 kNm < M ≤ 20 kNm 1-direction

2 kNm < M ≤ 20 kNm 2-directions

If two measuring bridges are calibrated from the same transducer
at the same time the price is multiplied by 1.25

<p>14 Liquid Flow* Liquid flow meter calibration, reference standard D100, 15 < DN ≤ 50 Liquid flow meter calibration, reference standard D500, 150 < DN ≤ 500 Liquid flow meter calibration, national standard D200, 10 < DN ≤ 200</p> <p>14.1 Charge of liquid flow standards/hour Reference standard D100, 15 < DN ≤ 50 Reference standard D500, 150 < DN ≤ 500 Reference standard D200, 10 < DN ≤ 200</p> <p>15 VTT MIKES Kajaani, other services* Expert service Comparison</p> <p>16 Other basis of charge (shipment) Shipment costs within Finland (not insured) m < 7,5 kg 7,5 kg < m < 15 kg 15 kg < m < 30 kg 30 kg < m < 70 kg Large package surcharge (in addition to shipment costs) - package's length plus girth [(2 x width) + (2 x height)] combined exceeds 330 cm, but does not exceed 419 cm Special shipment (package over maximum limits) - actual weight > 70 kg, or length exceeds 270 cm, or length plus girth [(2 x width) + (2 x height)] combined exceeds 419 cm Shipment cost according to an agreement</p>	<p>17 Expert services, guides Expert service for measurement problems RR-test for measurement process Expert service for setting up calibration system Calibration instruction CD for dimensional measuring instruments Calibration instructions, no. pc. S. Saxholm, M. Rantanen, Measurement of pressure, 38 pp. (in Finnish)</p> <p>18 Other services Certificates and document copies Publications Travel costs Kilometer allowance Daily allowance Travelling time Expert services Other services, metrology MIKES-AALTO, Metrology Research Institute, calibrations Meeting fee Other products (metrology) Rent of premises</p> <p style="text-align: right;">* performed in VTT MIKES Kajaani</p>
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ADDRESSES

VTT MIKES (Espoo, Otanlempi)

Post address:	Street and cargo address:
PL 1000	Tekniikantie 1
FI-02044 VTT	FI-02150 ESPOO
Finland	Finland

VTT MIKES Kajaani

Post address:	Street address:
Tehdaskatu 15	Tehdaskatu 15
Puristamo 9P19	Puristamo 9D17
FI-87100 KAJAANI	FI-87100 KAJAANI
Finland	Finland

Cargo address:
Sokajärventie 9
Puristamo 9D3
FI-87100 KAJAANI
Finland

Other contact information

Email: kalibroinnit@vtt.fi
Tel. Exchange: +358 20 722 111

TERMS OF CONTRACT AND DELIVERY

The calibration will be performed in accordance with the valid scope of competence.
However, the total measurement uncertainty of the calibration may be larger than indicated in our valid scope of competence due to the device being calibrated.

Terms of payment

The calibration shall be invoiced after the work has been completed unless otherwise agreed. Invoices shall be paid within 21 days of the date of the invoice.
Interest on overdue payments shall be charged in accordance with the Finnish Interest Act (633/1982).

Other terms

VTT has a right to mention the Commission and the name of the Client as a reference.

The VTT General Terms of Contract* will apply to the Commission with the following exceptions:

- Section 7 does not apply to calibration commissions.
- Failure of the measurement standard shall be considered as Force Majeure and VTT shall be released from its obligations under the Contract.

* the general terms of contract of the VTT Technical Research Centre of Finland: https://www.vttresearch.com/sites/default/files/files/vtt_general_terms.pdf

Unless otherwise agreed upon, an electronically signed calibration certificate or measurement report is delivered to the client as an unencrypted e-mail.

Field calibration costs are always case-specific.

The adjustment of the measurement instrument is not included in calibration; the adjustment of the instrument must be separately agreed.

The statement of conformity to a specification or standard for the calibration (e.g. pass/fail, in-tolerance/out-of-tolerance) is usually not part of the calibration; the reporting of the statement of conformity must be separately agreed.

Sales tax, VAT

Value added tax (VAT) and any other taxes and fees imposed by foreign authorities shall be added to the price, when applicable.

Urgency fee

If a calibration is performed urgently as per the client's request thereby bypassing other jobs in queue, the calibration fee may be charged in double.

Delivery

Before delivering the measurement instruments to VTT MIKES the client has to agree with VTT MIKES about the calibration and its delivery time.

An accompanying letter must be sent with the device/devices detailing:

- instrument to be calibrated, the scales to be measured, measuring points etc.
- contact information including invoicing and delivery addresses.

The client must also include the preferred return method for the device. VTT MIKES will return the devices sent for calibration in the client's packaging and will insure the shipment if specifically requested by the client.

VTT MIKES is not responsible for any instrument damage during transportation or shipment.

Possible transportation and shipment costs will be charged from the customer.