

**National Institute of Metrology (Thailand)**

3/4-5 Moo 3, Klong 5, Klong Luang, Pathumthani, 12120, Thailand

Tel. +66 2577 5100 (Please contact : Customer Service Section Ext. 3101, 3102) Fax. +66 2577 3659 E-mail : cs@nimt.or.th Website : http://www.nimt.or.th

Price List

Item No.	Description	Range	Accuracy / Uncertainty	Price (THB)	Remark	Code
Calibration Fee						
Acoustics and Vibration Metrology						
1	Measurement Microphone type LS1P by the reciprocity technique (sensitivity level and phase level) at low frequency	20 Hz to 10 kHz	0.040 dB to 0.070 dB	10,630/piece		14010 - 11101
2	Measurement Microphone type LS1P by the reciprocity technique (sensitivity level and phase level) at low frequency	2 Hz to 20 Hz	- Sensitivity level : (0.04 - 0.20) dB - Phase level : (2.0 to 0.4) Degree	22,500/piece		14010 - 11104
3	Measurement Microphone type LS2P by the reciprocity technique (Pressure sensitivity level)	20 Hz to 20 kHz	0.040 dB to 0.10 dB	10,630/piece		14010 - 11102
4	Measurement Microphone by the insert voltage technique (pressure sensitivity level)	250 Hz and 1 kHz	0.10 dB	5,130/piece		14010 - 11103
5	Measurement Microphone by the comparison method (free-field sensitivity level)	31.5 Hz to 16 kHz 84 dB	0.30 dB to 0.40 dB	7,880/piece		14010 - 11201
6	Measurement Microphone type WS2 by the insert voltage technique (microphone sensitivity) and by The electrostatic actuator (frequency response)	20 Hz to 20 kHz	Sensitivity : 0.10 dB Frequency Response : 0.10 to 0.30 dB	7,500/piece		14010 - 11202
7	Measurement Microphone type WS3 by the insert voltage technique (microphone sensitivity) by The electrostatic actuator or coupler comparison (frequency response)	20 Hz to 20 kHz	Sensitivity : 0.10 dB Frequency Response : 0.10 to 0.30 dB	7,500/piece		14010 - 11203
8	Pistonphone or Sound Calibrator	74 dB to 124 dB 250 Hz, 1kHz	0.060 dB	4,880 first level 1,000 /next level		14010 - 12101
9	Multifunction Acoustic Calibrator or Multi-frequency Sound Calibrator	74 dB to 124 dB 31.5 Hz to 16 kHz	0.080 dB to 0.140 dB	16,880/piece		14010 - 12201
10	Sound Level Meter	Based on IEC 61672 Part 3	Class 1, 2	10,880/piece		14010 - 13101
11	Sound Level Meter (Free-field sound pressure response level and absolute sensitivity)	31.5 Hz to 16 kHz 84 dB	0.020 dB to 0.40 dB	7,880/piece		14010 - 13201
12	Acoustic Analyzer (based on IEC 61672 : 3)	31.5 Hz to 20 kHz	as specification	22,500/piece		14010-13401
	Additional Function of Band Pass Filter			plus 10,000/piece		

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13	Sound Analyzer (LAN-XI)	Self-generate Noise Measurement : DC - 51.2 kHz Inherent Noise : 384 Hz - 51.2 kHz Frequency Response : 992 Hz, 12.8 kHz, 25.6 kHz, 51.2 kHz Amplitude Linearity : 17 dBV to -83 dBV	Self-generate Noise Measurement : 50 dBV Inherent Noise : 5 dBV Frequency Response : at 992 Hz ; 0.03 dBV at 12.8 kHz ; 0.03 dBV at 25.6 kHz ; 0.04 dBV at 51.2 kHz ; 0.17 dBV Amplitude Linearity : at 17,-43,-63 dBV ; 0.06 mV at -83 dBV ; 0.17 dBV	7,500/piece/channel		14010-13402
14	Sound exposure meter or Noise Dose Meter	63 Hz to 8 kHz	Class 1, 2	17,500/piece		14010-13301
15	Pure-tone audiometer with supra-aural earphone	125 Hz - 8 kHz	Type 1, 2, 3 and 4	7,500/piece		14010 - 14101
16	Pure-tone audiometer with circumaural earphone	125 Hz - 8 kHz	Type 1, 2, 3 and 4	7,500/piece		14010 - 14201
17	Air-conduction audiometer coupler with insert earphone	125 Hz - 8 kHz	Type 1, 2, 3 and 4	7,500/piece		14010-14301
18	Ear Simulator	100 Hz - 16 kHz	100 Hz to 12.5kHz : 0.4 dB >12.5 kHz to 16 kHz : 0.5 dB	8,750/piece		14010-14401
19	Artificial Mastoid or Mechanical coupler for the measurement of bone vibrator	125 Hz - 8 kHz	Mechanical Impedance level : 0.5 dB Force sensitivity : 0.4 dB	17,500/piece		14010-14402
20	Bone-conduction pure-tone audiometer	250 Hz - 4 kHz	Type 1, 2, 3 and 4	7,500/piece		14010 - 14501
21	Octave Band Pass Filter	20 Hz - 20 kHz	Class 1, 2	7,500/piece		14010 - 17101
22	Preamplifier	20 Hz - 100 kHz	Input and insert parameter : 0.14 dB Frequency Response : 0.14 dB Inherent noise : 0.1 mV	5,000/piece		14010 - 17201
23	Sound Absorption Coefficients of Materials for low frequency	50 Hz - 1.6 kHz	3.8 %	5,000/piece		14010 - 67001
24	Sound Absorption Coefficients of Materials for high frequency	500 Hz - 6.4 kHz	3.8 %	5,000/piece		14010 - 67002
25	Sound Transmission Loss of Materials	50 Hz - 6.4 kHz	3.8%	8,750/piece		14010-67003
26	Tuning Fork	500 Hz - 5 kHz	0.8 Hz	3,125/piece		14010-67101
27	Qualification sound booth testing	125 Hz - 8 kHz	1 dB	15,000/piece		14010-67201
28	Dental Scaler (Noise measurement) Based on ISO 2234	20 Hz - 40 kHz	as specification	3,750/piece		14010-67301

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29	Vibration Meter	1 m/s ² to 100 m/s ² 40 Hz to 5 kHz	1.0 %	10,000/piece		14020 - 11101
30	Vibration Meter	1 Hz to 160 Hz	2 % for velocity in vertical and horizontal vibration directions	10,000/piece		14020 - 11102
31	Vibration Meter for Low frequency by comparison with standard accelerometer.	1 m/s ² to 100 m/s ² 10 Hz to 5kHz	1.0%	15,000/piece		14020-11103
32	Low-frequency vibration sensor	Vertical direction:0.1 Hz to 100 Hz Horizontal direction: 0.1 to 80 Hz	1.0%	20,000 /piece		14020-11104
33	Vibration Calibrator	1 m/s ² to 100 m/s ² 40 Hz to 5 kHz	1 %	5,000 / first point 1,250 / next point		14020 - 12101
34	Mobile vibration calibrator based on ISO16063-44	1 m/s ² to 100 m/s ² 40 Hz to 5 kHz	1.2 % for Acceleration 1 % for Frequency 1 % for Distortion	35,000 /first 8 points 5,000/next point		14020 - 12102
35	Accelerometer using Laser Interferometry by fringe counting method and minimum point method according to ISO 16063-11. (charge sensitivity)	10 m/s ² to 200 m/s ² 40 Hz to 800 Hz	0.50 %	13,750/piece		14020 - 13101
		10 m/s ² to 370 m/s ² > 800 Hz to 5 kHz	0.80 %			
36	Accelerometer using Laser vibrometer by sine approximation method according to ISO 16063-11. (charge sensitivity and phase)	10 m/s ² to 100 m/s ² 10 Hz to 5 kHz	0.4 % and 0.5 degree	30,000/piece		14020-13103
		10 m/s ² to 100 m/s ² >5 kHz to 10kHz	0.4 % and 1 degree			
		10 m/s ² to 100 m/s ² >10 kHz to 20 kHz	1% and 1 degree			
37	Accelerometer by comparison to reference transducer (Charge sensitivity)	1 m/s ² to 100 m/s ² 40 Hz to 5 kHz	1.0%	8,750 first point 1,250/next point		14020 - 13102
38	Shock Acceleration for Shock Table	50 m/s ² to 2000 m/s ²	5.5%	35,000/piece		14020-13121
39	3-axis Vibration Testing (on-site)	10 m/s ² to 100 m/s ² 10 Hz to 5 kHz	1.5 %	37,500/piece		14020-13111
40	Shock Transducer by Laser interferometry	20 g to 500 g	1.0%	11,250 /piece		14020 - 13201
41	Shock accelerometer by comparison to a reference accelerometer based on ISO 16063-22 (Charge sensitivity in modulus)	2000 m/s ² to 100000 m/s ² Duration Time 0.08 ms to 1.6 ms	3.0%	15,000 / first 3 points 3,000/ next point		14020-13202

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42	Shock Accelerometer by laser interferometry (Charge sensitivity in modulus)	50 m/s ² to 2000 m/s ² Duration Time 1.6 ms to 6.0 ms	1.0%	20,000 / first 3 points 4,000/ next point		14020-13203
43	Acceleration of Two Axis and Triaxial for Vibration Table	5 m/s ² to 100 m/s ² 40 Hz to 5 kHz	Horizontal Axis ±3.0% Vertical Axis ±3.0%	30,000 first Axis 7,500/ Next Axis		14020-13211
44	Low shock by comparison to a reference accelerometer based on ISO 16063-22 (Voltage and Charge sensitivity in modulus)	50 m/s ² to 2000 m/s ² Duration Time 1.6 ms to 6.0 ms	2.0%	15,000 / first 3 points 3,000/ next point		14020-13300
45	Accelerometer by Laser Interferometry (voltage sensitivity)	10 m/s ² to 200 m/s ² 40 Hz to 800 Hz	0.50 %	13,750/piece		14020-13301
		10 m/s ² to 370 m/s ² > 800 Hz to 5 kHz	0.80 %			
46	Accelerometer by Laser Interferometry (Voltage sensitivity in modulus)	0.3 m/s ² to 10 m/s ² 1 Hz to 160 Hz	1.0%	13,000/piece		14020-13302
47	Accelerometer by Laser Interferometry (Phase shift of Voltage transducer type)	0.3 m/s ² to 10 m/s ² 1 Hz to 160 Hz	1.0 degree	13,000/piece		14020-13303
48	Accelerometer by Laser Interferometry (Voltage sensitivity in modulus with Phase shift)	0.3 m/s ² to 10 m/s ² 1 Hz to 160 Hz	1.0% and 1.0 degree	15,000/piece		14020-13304
49	Accelerometer by comparison to reference transducer (voltage sensitivity)	0.3 m/s ² to 10 m/s ² 1 Hz to 80Hz	1.0%	8,750/piece		14020-13305
50	Accelerometer by comparison to reference transducer (voltage sensitivity) Modulus	1 m/s ² to 100 m/s ² 40 Hz to 5 kHz	1.0%	10,000/piece		14020-13306
51	Angular accelerometer by comparison to reference transducer (voltage sensitivity) Modulus and Phase	1 °/s – 5,300 °/s 1 Hz to 200 Hz	1.0% 1.5 degree	10,000/piece		14020-13603
52	Laser Vibrometer by comparison to reference vibrometer (modulus)	10 m/s ² to 50 m/s ² 40 Hz to 5 kHz	0.50%	50,000/piece		14020-13401
53	Laser Vibrometer base on ISO 16063-41 for low frequency	0.1 Hz to less than 0.4 Hz 0.4 Hz to 40 Hz more than 40 Hz to 160 Hz	1.0 % 0.5% 2.0%	50,000/piece		14020-13402
54	Laser Vibrometer base on ISO 16063-41 for medium frequency	50 Hz to 15 kHz more than 15 kHz to 20 kHz	0.5% 1.0%	50,000/piece		14020-13403
55	Shock accelerometer by comparison to a reference accelerometer based on ISO 16063-22 (Voltage sensitivity in modulus)	2000 m/s ² to 100000 m/s ² Duration Time 0.08 ms to 1.6 ms	3.0%	15,000 / first 3 points 3,000/ next point		14020-13404
56	Shock accelerometer by laser interferometry (Voltage sensitivity in modulus)	50 m/s ² to 2000 m/s ² Duration Time 1.6 ms to 6.0 ms	1.0%	20,000 / first 3 points 4,000/ next point		14020-13405

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57	Pendulum Shock (on-site)	500 m/s ² to 5000 m/s ²	5 %	31,250/piece		14020-13601
58	Tachometer (Beam of infrared LED technique)	900 RPM to 99,000 RPM	1.0%	5,000/piece		14020 - 18102
59	Stroboscope	210 RPM to 7500 RPM	1.0%	5,000/piece		14020 - 18103
60	Displacement (Unloaded scaler), Frequency (Dental scaler)	0.1 µm to 220.0 µm.	5.0%	11,250/piece		14020-18104
		18 kHz to 20 kHz	2.0%			
61	Tachometer (Engine Ignition Signal with Sparking Plug (Simulation Set))	120 RPM to 36,000 RPM	1.0%	5,000 /piece		14020-18105
62	Tachometer and RPM Meter (Vibration Technique)	120 RPM to 21,000 RPM	1.0%	5,000/piece		14020-18106
63	GPS/GNSS Speed Calibration Dynamics Test (Field Test) onsite	10 km/h to 160 km/h	± 0.2 km/h for speed 10 km/h to 100 km/h ± 0.25 km/h for speed >100 km/h to 160 km/h	55,000/piece		14020-18107
64	Conditioning Amplifier (Charge Amplifier)	10 Hz to 10 kHz	0.03 %	5,380/piece		14020 - 19101
65	Conditioning Amplifier (Voltage Amplifier)	40 Hz to 5 kHz	0.03 %	6,250/piece		14020 - 19102
66	Conditioning Amplifier (IEPE Amplifier)	10 Hz to 10 kHz	0.03%	6,250/piece		14020 - 19103
67	Electrical Controller	Analog Input Voltage: 23 mV to 6 V analog input charge 15 to 7000 pC Frequency: 10 Hz to 100 kHz	±0.5 mV/V for Frequency 10 – 40 Hz ±0.4 mV/V for Frequency 40 Hz – 1 kHz ±0.5 mV/V for Frequency 1 – 20 kHz ±0.8 mV/V for Frequency 20 – 50 kHz ±1.6 mV/V for Frequency 50 – 100 kHz ±0.7 fC/pC for Frequency 10 – 40 Hz ±0.6 fC/pC for Frequency 40 Hz – 1 kHz ±0.7 fC/pC for Frequency 1 – 20 kHz ±1.0 fC/pC for Frequency 20 – 50 kHz ±1.8 fC/pC for Frequency 50 – 100 kHz	60,000 /piece		14020 - 19104
68	Electrical Generator	10 mV, 100 mV, 1 V, and 10V	0.05% for Range 10 V 0.10% for Range 1 V 0.15% for Range 100 mV 1.0% for Range 10 mV	12,500 / piece		14020 - 19105

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69	Ultrasound Power Meter (ultrasound power-ultrasound power meter)	0.5 W to 10 W 1 MHz	6.0%	10,000/piece		14030 - 11101
		0.5 W to 4 W 3 MHz	7.0%			
		0.5 W to 2 W 5 MHz	8.0%			
70	Ultrasonic Transducer (ultrasonic transducer and generator)	0.5 W to 10 W 1 MHz	6.0 %	12,500/piece		14030 - 11102
		0.5 W to 4 W 3 MHz	7.0%			
		0.5 W to 2 W 5 MHz	7.0%			

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71	Immersion Ultrasonic Transducer (Planar Scanning Method)	1 MHz to 15 MHz 50 kPa to <20 Mpa	14.40 % to 15.30 %	7,500/piece		14030-13101
72	Ultrasonic Sonic Monitor	0.5 W to 10 W 1 MHz	14%	5,625/piece		14030-14101
		0.5 W to 4 W 3 MHz				
		0.5 W to 2 W 5 MHz				
73	Ultrasonic Power (Therapeutic Ultrasound) - Onsite Service	0.5 W to 10 W 1 MHz to 3 MHz	5.0%	3,000/piece		14030-15101
74	Ultrasonic Processor	40 Hz to 300 kHz Amplitude Displacement [μmp-p]	1.5% for Frequency 4.5% for Displacement	15,000/piece		14030-19101
75	Ultrasound Check Source	10 mW, 100 mW and 1 W 3.5 MHz	6.0 %	10,000/piece		14033-13111
76	Needle hydrophone (free-field sensitivity - hydrophone)	1 MHz to 15 MHz 50 kPa to <20 Mpa	14.0 % to 15.0 %	24,375/piece		14033-11101
77	Ultrasound transducer for physiotherapy (Planar Scanning Method)	1 MHz , 3 MHz 50 kPa to <20 MPa	17.0 %	7,500/point		14033-63301
78	Electrical Safety Test - Based On IEC 60601-1	Acceptance Test for Medical Electrical Equipment and Systems	Mains Voltage: 6 V Equipment Current: 2.5 A Protective Earth Resistance: 0.02 Ohm Insulation Resistance: 11 MOhm Earth Leakage Current: 1.5 uAAC+DC Enclosure Leakage Current: 1.5 uAAC+DC	5,625/piece		14030-67001
79	Ultrasound Power and Time Accuracy (Therapeutic Ultrasound) - Onsite Service	1 MHz to 3 MHz 0.5 W to 10.0 W	8.0%	5,000/piece		14030-11103
		1 MHz to 3 MHz 60 s and 240 s	1.0%			
80	Adjustment Charge		25 % of the calibration cost of each range			14000 - 10001