



National Institute of Metrology (Thailand)

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

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Price List

Item No.	Description	Range	Accuracy / Uncertainty	Price (THB)	Remark	Code
Calibration Fee						
Branch: Photometry						
1	Luminous intensity of a tungsten lamp	10 cd $\leq I_v \leq 3\,000$ cd 2 000 K $\leq CCT \leq 3\,400$ K	0.98%	15,000	Detector-based method against a set of reference photometer	13011-11011
2	Luminous intensity of an incandescent lamp	10 cd $\leq I_v \leq 3\,000$ cd 2 000 K $\leq CCT \leq 3\,400$ K	0.66%	18,750 for the first lamp + 8,500 for any additional lamp of the same type	Substitution method against two national reference standard lamps	13015-11011
			0.83%	12,500 for the first lamp + 6,250 for any additional lamp of the same type	Substitution method against two working standard lamps	13016-11011
3	Illuminance responsivity of a photo-detector head	12 lx $\leq E_v \leq 300$ lx 2 000 K $\leq CCT \leq 3\,400$ K	0.70%	6,250	Source-based measurements using national reference standard lamps applying the inverse-square law.	13015-11021
			0.80%	3,130	Source-based measurements using working standard lamps applying the inverse-square law.	13016-11021
4	Illuminance responsivity of an illuminance meter or a lux meter	2 lx $\leq E_v \leq 70$ lx (range 1) 70 lx $\leq E_v \leq 1\,400$ lx (range 2) 1 200 lx $\leq E_v \leq 10\,000$ lx (range 3) 10 000 lx $< E_v \leq 30\,000$ lx (range 4)	0.91% (range 1, 2, 3) 1.3% (range 4, 5) varied with illuminance level	5,000 for the first range + 2,500 for any additional range 2, 3, 4 (5 calibration points per range)	Detector-based comparison against reference photometers (Tungsten source)	13011-11021
		500 lx $< E_v \leq 30\,000$ lx (range 5) 2 000 K $\leq CCT \leq 3\,400$ K		10,000 for range 5 (15 calibration points)		
5	Illuminance responsivity of an illuminance meter or a lux meter (LED source)	1 000 lx $< E_v \leq 120\,000$ lx 5 780 K $\leq CCT \leq 5\,930$ K	1.2% (1 000 lx $\leq E_v \leq 10\,000$ lx) 1.6% (10 000 lx $< E_v \leq 120\,000$ lx) varied with illuminance level	15,000 (15 calibration points)	Detector-based comparison against reference photometers using LED source	13011-11022
6	Luminous flux of a tungsten lamp	5 lm to 9 000 lm	0.89%	18,000	Gonio-photometer (CCT: 2 000 K to 3 400 K)	13010-11031
7	Luminous flux of an LED	5 lm to 9 000 lm	1.2%	18,000	Gonio-photometer (Geometric measurement conditions: full, peak wavelength: white)	13010-11032



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8	Luminous flux of a tungsten lamp	5 lm to 9 000 lm	1.1%	13,000 for the first lamp + 7,000 for any additional lamp of the same type	Integrating sphere (CCT: 2 000 K to 3 400 K)	13015-11031
9	Luminous flux of an LED	5 lm to 9 000 lm	1.3%	13,000 for the first lamp + 7,000 for any additional lamp of the same type	Integrating sphere (Geometric measurement conditions: full, peak wavelength: white)	13015-11032
10	Luminous flux of a single-packaged LED	0.1 lm to 100 lm	2.1% to 2.6% varied with LED color	12,500 for the first LED + 6,250 for any additional LED of the same type	Integrating sphere (Geometric measurement conditions: full)	13045-11032
11	Luminous flux of a linear fluorescent lamp	800 lm to 4 000 lm	1.2%	13,000 for the first lamp + 7,000 for any additional lamp of the same type	Integrating sphere (CCT: 2 600 K to 6 200 K)	13015-11033
12	Luminance of a luminance source	$0.100\ 0\ \text{cd/m}^2 \leq L_v \leq 199\ 900\ \text{cd/m}^2$ $2\ 000\ \text{K} \leq \text{CCT} \leq 6\ 500\ \text{K}$	1.1%	10,000 for the first calibration point + 8,000 for any additional point	Direct measurement by NIMT's reference luminance meter	13012-11051
13	Luminance responsivity of a luminance meter	$0.100\ 0\ \text{cd/m}^2 \leq L_v \leq 43\ 000\ \text{cd/m}^2$ $2\ 000\ \text{K} \leq \text{CCT} \leq 3\ 400\ \text{K}$	0.91%	30,000 for a set of 30 calibration points covering 5 decades	Detector-based comparison against a set of two reference photometers with precision aperture	13011-11060
		$1\ \text{cd/m}^2 \leq L_v \leq 49\ 000\ \text{cd/m}^2$ $3\ 000\ \text{K} \leq \text{CCT} \leq 6\ 000\ \text{K}$	1.7%	4,000 for the first calibration point + 1,500 for any additional point within the same range and approximately same CCT ($\pm 50\ \text{K}$)	Comparison method against the reference luminance meter under the solar spectrum uniform source system	13012-11060
14	Averaged luminous intensity of a single-packaged LED	0.1 cd to 50 cd	2.4% to 3.3% varied with LED color	15,000 for the first LED (CIE condition A and B) + 7,500 for any additional LED of the same type	Photometric bench, spectroradiometer and reference lamps	13045-11012
15	Correlated color temperature of a general source	2 600 K to 3 200 K (tungsten lamp) 2 600 K to 7 500 K (discharge lamp, LED)	19 K (tungsten lamp) 23 K to 79 K (discharge lamp, LED)	6,500	Spectroradiometer and integrating sphere	13015-15021



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Item No.	Description	Range	Accuracy / Uncertainty	Price (THB)	Remark	Code
Branch: Properties of materials						
1	Regular spectral transmittance of a transmitting filter or film. <i>Measured transmittance values will be reported at 10 nm interval from 200 nm to 900 nm and 50 nm interval from 900 nm to 2 500 nm.</i>	31.6% < %T ≤ 97.7% (0.01 ≤ OD < 0.5)	200 nm to 2000 nm: Greater than or equal to 0.48%	6,250/sample for full range (UV-VIS-NIR) 3,750/sample for half range (UV-VIS or VIS-NIR)	By comparison against a reference ND filters using the reference spectrophotometer. <i>Measurement uncertainties shown are percent relative of transmittance values and they are varied by wavelengths and dependent of UCC.</i>	13025-14011
		10.0% < %T ≤ 31.6% (0.5 ≤ OD < 1.0)	200 nm to 2000: Greater than or equal to 0.57%			
		1.00% < %T ≤ 10.00% (1.0 ≤ OD < 2.0)	200 nm to 2000: Greater than or equal to 0.61%			
		0.01% < %T ≤ 1.00% (2.0 ≤ OD < 4.0)	200 nm to 1800: Greater than or equal to 0.81%			
	Luminous transmittance of a transmitting filter or film.	0% < %Tv ≤ 100% (2.0 ≤ OD < 4.0)	0.68%	3,750/sample		
2	Diffuse spectral transmittance of a diffusely transmitting material	380 nm to 780 nm	For 20% haze plate, typical uncertainties in diffuse spectral transmittance are 0.13% to 0.18% throughout the spectrum	4,000/sample	Direct measurement by single-beam reference spectrophotometer	13025-14021
3	Specular excluded spectral diffuse reflectance of a glossy color sample (8°:de) <i>Measured diffused reflectance values will be reported at 5 nm interval from 380 nm to 780 nm.</i>	0% < %R ≤ 10%	0.0003	6,250 for the first piece + 3,750 for any additional piece Fee will be scaled down for selected partial wavelength range.	By comparison against a reference glossy ceramic color standard using the reference spectrophotometer with integrating sphere accessory. <i>Measurement uncertainties shown are percent relative of reflectance values and they are varied by wavelengths and dependent of UCC.</i>	13025-14051
		10% < %R ≤ 30%	2.4% to 1.2%			
		30% < %R ≤ 100%	1.8% to 0.66%			
4	Specular excluded spectral diffuse reflectance of a matte color sample (8°:de) <i>Measured diffused reflectance values will be reported at 5 nm interval from 380 nm to 780 nm.</i>	0% < %R ≤ 10%	0.0003	6,250 for the first piece + 3,750 for any additional piece Fee will be scaled down for selected partial wavelength range.	By comparison against a reference matte ceramic color standard using the reference spectrophotometer with integrating sphere accessory. <i>Measurement uncertainties shown are percent relative of reflectance values and they are varied by wavelengths and dependent of UCC.</i>	13026-14051
		10% < %R ≤ 30%	2.4% to 1.2%			
		30% < %R ≤ 100%	1.8% to 0.66%			



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5	Specular included spectral diffuse reflectance of a glossy color sample (8°:di) <i>Measured diffused reflectance values will be reported at 5 nm interval from 380 nm to 780 nm.</i>	0% < %R ≤ 10%	0.0030 to 0.0022	6,250 for the first piece + 3,750 for any additional piece Fee will be scaled down for selected partial wavelength range.	By comparison against a reference glossy ceramic color standard using the reference spectrophotometer with integrating sphere accessory. <i>Measurement uncertainties shown are percent relative of reflectance values and they are varied by wavelengths and dependent of UCC.</i>	13025-14071
		10% < %R ≤ 20%	3.6% to 1.6%			
		20% < %R ≤ 30%	2.0% to 1.2%			
		30% < %R ≤ 100%	1.7% to 0.68%			
6	Specular included spectral diffuse reflectance of a matte color sample (8°:di) <i>Measured diffused reflectance values will be reported at 5 nm interval from 380 nm to 780 nm.</i>	0% < %R ≤ 10%	0.0030 to 0.0022	6,250 for the first piece + 3,750 for any additional piece Fee will be scaled down for selected partial wavelength range.	By comparison against a reference matte ceramic color standard using the reference spectrophotometer with integrating sphere accessory. <i>Measurement uncertainties shown are percent relative of reflectance values and they are varied by wavelengths and dependent of UCC.</i>	13026-14071
		10% < %R ≤ 20%	3.6% to 1.6%			
		20% < %R ≤ 30%	2.0% to 1.2%			
		30% < %R ≤ 100%	1.7% to 0.68%			
7	Regular spectral reflectance	5 ≤ %R ≤ 100% 200 nm ≤ λ ≤ 2 500 nm at 5 nm interval	0.32% to 0.42% for the wavelength range from 200 nm to 885 nm 1.0% to 1.4% for the wavelength range from 890 nm to 2 500 nm *Typical values for a high	11,250 for full-range. Price for partial-range will be scaled down accordingly.	Absolute method by a double-subtractive double-beam spectrophotometer (Perkin-Elmer Lambda 1050) equipped with a variable-angle reflectance accessory (URA)	13025-14061
8	Wavelength calibration of a transmitted wavelength standard (holmium oxide solution, holmium oxide filter, dysprosium oxide filter etc.)	200 nm to 2 500 nm	200 nm to 700 nm: 0.19 nm	2,500 for first peak identification + 1,250 for any additional peak	Measurement by reference spectrometer	13025-14150
			700 nm to 2 500 nm: 0.57 nm			
9	Wavelength calibration of a reflectance wavelength standard (holmium oxide doped ceramic tile etc.)	200 nm to 2 500 nm	200 nm to 700 nm: 0.19 nm	3,750 for first peak identification + 1,250 for any additional peak	Measurement by reference spectrometer with integrating sphere accessory	13025-14151
			700 nm to 2 500 nm: 0.57 nm			
10	Regular transmittance responsivity of transmission meter and tint meter	0% < %T ≤ 100%	2%	6,250	By comparison against working standard ND filters at the nominal optical density values of 0.1, 0.3, 0.5 and 1.0.	13026-14011



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Branch: Properties of detectors						
1	Spectral irradiance responsivity of a spectroradiometer with irradiance probe	200 nm to 1 700 nm	Greater than or equal to 2.6%	7,000 + 3,000 with three filters + 3,000 with additional filters (Diode array)	Direct measurement against a set of two FEL working standard lamps	13038-12023
				12,000 + 3,000 with wavelength verification (Scanning type)		
2	Relative spectral radiance responsivity of a spectroradiometer with radiance probe	250 nm to 2 500 nm	Greater than or equal to 2.5%	11,250 for scanning type and 6,250 for diode-array type	Direct measurement against a set of two FEL working standard lamps	13039-12030
3	Absolute spectral radiance responsivity	Radiance: 0.000 5 W.sr ⁻¹ . m ⁻² .nm ⁻¹ Type of source: Tungsten-based integrating sphere source	2.8% to 7.6%	7,500 for diode array type spectrometer 10,000 for scanning type spectrometer	Direct measurement on reference radiance gauge	13038-12030
4	Power responsivity of a trap detector	Power level: < 1 mW	0.026% (power responsivity) 0.087% (spectral responsivity)	35,000 per wavelength point + 10,000 for spectral responsivity	- The power responsivity is calibrated against a cryogenic radiometer at laser wavelengths (406.7 nm, 413.1 nm, 476.2 nm, 530.9 nm, 568.2 nm, 632.8 nm, 647.1 nm, 799.3 nm) - Spectral responsivity scale is interpolated between the laser wavelengths based on a physical model of trap detectors	13030-12040
5	Solar irradiance responsivity of a Si-pyranometer	Wavelength: 400 nm to 1 100 nm Power Level: 50 W.m ⁻² to 380 W.m ⁻²	2.0%	6,250	Comparison against a working standard spectroradiometer applying 300 W Xe arc lamp with 1.5 global airmassfilter	13034-12716
6	Solar irradiance responsivity of a thermopile-detector pyranometer	280 nm to 2 500 nm (160 W.m ⁻² to 520 W.m ⁻²)	2.1% to 3.4%	9,000	Source based calibration against a working standard spectroradiometer applying a solar simulator system	13034-12717
7	Intregated irradiance responsivity of broadband radiometer	315 nm to 400 nm (UVA)	4.4%	6,250 per probe for the first irradiance level point + 3,130 for any additional irradiance level point	Source based calibration against a reference spectroradiometer using filtered 500 W Hg(Xe) as light source	13034-12090
		280 nm to 315 nm (UVB)	6.3%			13034-12091
		280 nm to 400 nm (UVA+UVB)	6.0%			13034-12092
		Arbitrary range within 280 nm to 1 020 nm	Varied by selected range			13034-12099
8	Intregated irradiance responsivity of narrowband radiometer	365 nm ± 10 nm	4.4%	6,250 per probe for the first irradiance level point + 3,130 for any additional irradiance level point	Source based calibration against a reference spectroradiometer using filtered 500 W Hg(Xe) as light source	13034-12110
		254 nm ± 10 nm	10%			13034-12113
		Arbitrary range within 280 nm to 1 020 nm	Varied by selected range			13034-12119
9	UVC irradiance responsivity of an UVC radiometers	Wavelength: 240 nm to 270 nm Irradiance level: 2 μW.cm ⁻² to 20 W.m ⁻² (Standard points: 2, 40, 160, 225, 350, 450, and 500 μW.cm ⁻²)	3.1%, varied by DUT and irradiance level	8,750 THB / fisrt point + 2,500 THB / for additional standard point(s) + 4,375 THB / for additional point(s)	Source based calibration against a reference spectroradiometer using low pressure Hg lamps as calibration source with ND filters	13034-12093



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10	Erythemally Weighted Effective Global Solar UV Irradiance Responsivity of a UVE Radiometer/UV Index Meter	$0.012 \text{ W}\cdot\text{m}^{-2} \leq E_{\text{er}} \leq 0.500 \text{ W}\cdot\text{m}^{-2}$ $250 \text{ nm} \leq \lambda \leq 400 \text{ nm}$	8.8 % to 9.3 % varied with effective irradiance level and DUT	6,250 for the first point + 3,750 for any additional point	Source based comparison against working standard spectroradiometer by using a properly filtered Xe discharge lamp as the calibration light source	13034-12095
		$0.5 \leq I_{\text{er}} \leq 20.0$ $250 \text{ nm} \leq \lambda \leq 400 \text{ nm}$				
11	Integrated Irradiance Responsivity of a Bilirubin Phototherapy Radiometer	$50.0 \mu\text{W}\cdot\text{cm}^{-2} \leq E_b \leq 1\,000.0 \mu\text{W}\cdot\text{cm}^{-2}$ $400 \text{ nm} \leq \lambda \leq 550 \text{ nm}$ (Based on IEC 60601-2-50)	2.2 % varied with irradiance level and DUT	6,250 for the first level point + 3,750 for any additional level point	Source based calibration against a working standard spectroradiometer by using a 445 nm blue LED panel light source as the calibration light source	13034-12096
		$1.0 \mu\text{W}\cdot\text{cm}^{-2}\cdot\text{nm}^{-2} \leq E_b(\lambda) \leq 20.0$ $\mu\text{W}\cdot\text{cm}^{-2}\cdot\text{nm}^{-2}$ $425 \text{ nm} \leq \lambda \leq 475 \text{ nm}$ (Based on AAP CPG)				
		$50.0 \mu\text{W}\cdot\text{cm}^{-2} \leq E_b \leq 750.0 \mu\text{W}\cdot\text{cm}^{-2}$ $400 \text{ nm} \leq \lambda \leq 500 \text{ nm}$ (Other CPGs)	2.1 % varied with irradiance level and DUT			
12	Integrated Radiant Exposure Responsivity of a UV Radiometer	$315 \text{ nm} \leq \lambda \leq 400 \text{ nm}$ $2 \text{ W}\cdot\text{m}^{-2} \leq E_p \leq 40 \text{ W}\cdot\text{m}^{-2}$ $30 \text{ s} \leq t \leq 120 \text{ s}$	5.0 % to 6.3 % varied with exposure time, irradiance level and DUT	8,500 for the first point + 4,200 for any additional point	Comparison against a working standard spectroradiometer with a calibrated stopwatch applying the filtered 500W Mercury lamp	13034-12100
		$280 \text{ nm} \leq \lambda \leq 400 \text{ nm}$ $5 \text{ W}\cdot\text{m}^{-2} \leq E_p \leq 40 \text{ W}\cdot\text{m}^{-2}$ $30 \text{ s} \leq t \leq 180 \text{ s}$	5.5 % to 6.8 % varied with exposure time, irradiance level and DUT	8,125 for the first point + 3,750 for any additional point	Comparison against a working standard spectroradiometer with a calibrated stopwatch applying the 300W Ultra-Vitalux® UV lamp	13034-12101
13	Responsivity of PAR radiometer	400 nm to 700 nm	2.0%	6,250	Direct measurement against a set of two FEL working standard lamps	13038-12120
14	Measurement of linearity response of a photo-detector	At discrete wavelengths from 200 nm to 2 500 nm Beam size ranges from 25 micron to 5 mm	200 nm to 400 nm: $\pm 0.1\%$ 400 nm to 2 500 nm: $\pm 0.05\%$	4,375 for one combination of wavelength and beam size of one photo-detector	Flux superposition method	13032-12900
15	Measurement of uniformity of response of a photo-detector	At discrete wavelengths from 200 nm to 2 500 nm Beam size ranges from 25 micron to 5 mm	200 nm to 400 nm: $\pm 0.2\%$ 400 nm to 2 500 nm: $\pm 0.1\%$	6,250 for one combination of wavelength and beam size of one photo-detector	x-y linear scan	13032-12910
16	Spectral irradiance responsivity of low-sense UV and blue-wavelength spectroradiometer	Wavelength: $200 \text{ nm} \leq \lambda \leq 500 \text{ nm}$ Power level: $0.002 \text{ W}\cdot\text{m}^{-2}\cdot\text{nm}^{-1}$ to $1 \text{ W}\cdot\text{m}^{-2}\cdot\text{nm}^{-1}$	$\geq 4.7\%$, varied by DUT, wavelength, bandwidth and power level	10,000 / Irradiance level	Comparison against reference spectroradiometer using 300 W Xe lamp	13038-12024
17	Spectral responsivity of a broadband detector	Wavelength: $400 \text{ nm} \leq \lambda \leq 800 \text{ nm}$ Power level: 4.8 nW to 2.6 μW	0.22% to 0.25%	20,000 for 10 nm step, 30,000 for 5 nm step	Comparison against two reference trap-detectors under monochromatic radiation	13031-12011



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Branch: Properties of sources						
1	Spectral irradiance of a tungsten-halogen lamp (FEL and Ushio type)	250 nm $\leq \lambda \leq$ 430 nm	3.6% to 2.2%	11,250 for the first range of the first lamp + 5,630 for the first range of any additional lamp of the same type + 3,750 for any additional range	By scanning measurements against a set of two spectral irradiance standard lamps using a double subtractive monochromator	13037-13011
		430 nm $< \lambda \leq$ 1 100 nm	2.2% to 1.7%			
		1 100 nm $< \lambda \leq$ 1 800 nm	2.1% to 3.2%			
		1 800 nm $< \lambda \leq$ 2 400 nm	3.2% to 6.8%			
2	Spectral irradiance of a deuterium lamp	200 nm to 400 nm	5.3% to 12%	13,750 for the first lamp + 5,630 for any additional lamp	By scanning measurements against a spectral irradiance reference national standard lamp using a double subtractive monochromator	13037-13012
3	Measurement of absolute / relative spectral irradiance of a light source	250 nm to 1 020 nm	Greater than or equal to 2.4%	6,250 for the first lamp + 3,130 for any additional lamp of the same type	Measurement by a working standard diode array spectroradiometer	13034-13013
4	Measurement of integrated absolute irradiance of a light source	320 nm to 400 nm (UVA)	4.2%	6,250 for the first lamp (per range) + 3,130 for any additional lamp of the same type (per range)	Measurement by a working standard radiometer	13035-15090
		260 nm to 320 nm (UVB)	6.4%			13035-15091
		400 nm to 500 nm	3.6%			13035-15098
5	Spectral radiance of radiance source	Wavelength range: 320 nm to 1 100 nm Bandwidth: 4.0 nm Correlated color temperature (CCT) 2 000 K \leq CCT \leq 6 500 K	2.6% to 7.0%	20,000 for the first calibration point + 5,000 for any additional point	Comparison method for relative spectral measurement and direct measurement for absolute luminance by a reference luminance meter.	13037-13021
6	Spectral radiant flux of a tungsten lamp	0.001 W/nm to 0.07 W/nm	3.4% to 2.8% (360 nm to 395 nm) 2.8% to 3.6% (395 nm to 830 nm)	20,000 (+ 500 for total radiant flux)	Gonio-spectroradiometer and integrating sphere (Geometric measurement conditions: full)	13010-13051
7	Total radiant flux of a tungsten lamp	5 W to 20 W	1.6%	20,000	Gonio-spectroradiometer and integrating sphere (Geometric measurement conditions: full, wavelength range: 360 nm to 830 nm)	13010-15080



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Branch: Colour of materials and sources						
1	Surface color of general reflecting material, x, y, Y, u', v', L*, a*, b*	-	Varied by parameter of interest and color of UUC, please contact a laboratory staff for full details.	For general material: 7,500 THB for the first piece and 4,000 THB for an additional piece. For a set of color standards: 7,500 THB for the first piece and 2,000 THB for an additional piece.	Spectral diffuse reflectance measurement by single-beam substitution method against a reference color standard	13025-16010
2	Surface Color Responsivity of Colorimeter, x, y, Y, u', v', L*, a*, b*	380 nm to 780 nm	Varied by parameter of interest and color of standard.	6,250	Direct measurement by using the basic color checked standard	13026-16010
3	Transmitted color of a transmitting material	360 nm to 860 nm	Values and uncertainties vary depending on sample's color.	3,500/sample	Direct measurement by single-beam reference spectrophotometer	13025-16030
4	Haze and luminous transmittance of a diffusely transmitting material	380 nm to 780 nm	For 20% haze plate, typical uncertainty in transmission haze is 0.16%.	5,000/sample	Based on ASTM D1003 standard method	13025-16070
5	Whiteness and Tint	380 nm to 780 nm W greater than 40 and less than 5Y-280	1.5	6,500/sample	Spectral diffuse reflectance measurement by single-beam substitution method against a reference white diffuse reflectance standard	13025-16120
6	Correlated color temperature of a general source	2 600 K to 3 200 K (tungsten lamp) 2 600 K to 7 500 K (discharge lamp, LED)	13 K (tungsten lamp) 14 K to 33 K (discharge lamp, LED)	6,500 (+ 500 for chromaticity coordinate)	Spectroradiometer and photometric bench	13041-15021
7	Emitted color of a general source	-	0.001 (tungsten lamp) 0.002 (discharge lamp, LED)	6,500 (+ 500 for correlated color temperature)	Spectroradiometer and photometric bench	13041-15040
8	Correlated color temperature response of a color temperature meter	2 600 K to 3 200 K (tungsten source) 2 600 K to 10 000 K (spectrally tunable LED source)	13 K (tungsten source) 25 K to 133 K (spectrally tunable LED source)	6,500 for the first calibration point + 1,000 for any additional point	Spectroradiometer	13041-15030
9	Chromaticity response of a colorimeter	-	0.001 (tungsten source) 0.002 (spectrally tunable LED source)	6,500 for the first calibration point + 1,000 for any additional point	Spectroradiometer	13041-15050

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Branch: Photovoltaic devices						
1	Spectral responsivity of a PV device	Wavelength: $300 \text{ nm} \leq \lambda \leq 1200 \text{ nm}$ Power level: 0.2 mW to 4 mW	2.0%, varied by DUT, wavelength and power level	10,000 for the first bias light level + 5,000 for additional bias light level	IEC 60904-8 Clause 7	13050-12001
2	I-V characteristics of a PV device	Wavelength: $300 \text{ nm} \leq \lambda \leq 1200 \text{ nm}$ Power level: 1,000 W/m ²	1.5% for short-circuit current, 0.7% for open-circuit current	10,000 for the first light level + 5,000 for additional light level	IEC 60904-1 Clause 7 current-voltage characteristic of a single junction photovoltaic device in simulated sunlight	13050-12002
3	Indoor calibration of pyranometers	Solar irradiance: 500 W/m ² to 1000 W/m ² Type of source: Class AAA Solar simulator	3.0% for pyranometer class A, B, C 2.0% for Si photodiode pyranometer	10,000 for 5 calibration points	ISO 9847: 2023 type A1 by comparison with a reference pyranometer or a reference solar cell	13050-11001



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Price List

Item No.	Description	Range	Accuracy / Uncertainty	Price (THB)	Remark	Code
On-site Calibration						
1	Spectral diffuse/hemispherical reflectance of a spectrally-neutral material	30 % to 100 %	2.2 % to 1.4 % (diffuse: 400 nm to 470 nm hemispherical: 400 nm to 430 nm) 1.4 % to 1.3 % (diffuse: 470 nm to 700 nm hemispherical: 430 nm to 700 nm)	10,000	Spectrophotometer	13015-34051
2	Measurement of absolute / relative spectral irradiance of a light source	250 nm to 1020 nm	3.4% to 9.8%	6,250	Measurement by a working standard diode array spectroradiometer	13034-33013
3	Measurement of integrated absolute irradiance of a light source	320 nm to 400 nm (UVA)	4.2%	6,130 (per range)	Measurement by a working standard radiometer	13035-35090
		260 nm to 320 nm (UVB)	6.4%			13035-35091
		400 nm to 500 nm	3.6%			13035-35098
4	Solar simulator performance testing according to IEC 60904-9	400 nm to 1,100 nm (300 nm to 1 200 nm) for spectral match evaluation	0.015 to 0.030	For 400 nm to 1 100 nm, 7,500/irradiance level For 300 nm to 1 200 nm, 9,000/irradiance level	Measurements based on IEC 60904-9 Edition 3.0 2020-09	13034-33014
		80% of active area for non-uniformity evaluation	0.01%	12,000 for 98 test positions + 500/additional test position		
		Data sampling time of DUT ≥ 100 ms for instability evaluation	0.05%	7,500 for LTI and STI 3,500 for LTI only		
5	UVC Integrated irradiance of customer's source	220 nm to 280 nm	5.4%	6,400 per probe for the first irradiance level point + 2,900 for any additional irradiance level point	Measurement by reference UVC meter	13035-32093
6	Sensitivity of a pyranometer	(600 to 1000) W/m ²	3.0%	10,000	Comparison to a reference pyranometer in accordance with ISO 9847:2023 Type B1	13050-31001

- Note:
1. If the lamp aging is required, the fee is 500 Baht per hour per lamp.
 2. If the customer requests an adjustment for the unit under calibration, there will be an additional charge to cover for the adjustment fee.
 3. The uncertainties in the above table are expanded relative measurement uncertainties unless marked with *.
 4. For any measurand related to the spectral property or spectrally integrated property, the measurement uncertainty varies by wavelength range of interest and depends on the UUC.

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Item No.	Description	Range	Accuracy / Uncertainty	Price (THB)	Remark	Code
CRM for Sale						
1	ND Filter (OD0.1, OD0.4, OD1.0)	380 nm to 780 nm	Spectral regular transmittance 0.74% to 0.86% for OD0.1 0.86% to 1.2% for OD0.4 $T < 10\%$, $U_{abs} = 0.29\%$ and $T \geq 10\%$, $U_{rel} = 3.1\%$ for OD1.0 Luminous transmittance 0.7% for OD0.1 1.0% for OD0.4 3.1% for OD1.0	10,000/sample	By comparison with air and reference ND filters using the reference spectrophotometer.	13025-34011
2	Holmium oxide glass filter	240 nm to 640 nm	$U_{abs} = 0.20$ nm	17,500 for 4 peaks identification + 1,250 for any additional peak	Measurement by reference spectrophotometer	13025-34150