



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 | | | | | | |
| Photometry Metrology | | | | | | |
| 1 | Luminous intensity of a tungsten lamp | $10 \text{ cd} \leq I_v \leq 3\,000 \text{ cd}$ $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 0.98% | 15,000 | Detector-based method against a set of reference photometer | 13011-11011 |
| 2 | Luminous intensity of an incandescent lamp | $10 \text{ cd} \leq I_v \leq 3\,000 \text{ cd}$ $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 0.79% | 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 |
| | | | 0.93% | 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 | $12 \text{ lx} \leq E_v \leq 300 \text{ lx}$ $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 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 | $2 \text{ lx} \leq E_v \leq 70 \text{ lx}$ (range 1) $70 \text{ lx} \leq E_v \leq 1\,400 \text{ lx}$ (range 2) $1\,200 \text{ lx} \leq E_v \leq 10\,000 \text{ lx}$ (range 3) $10\,000 \text{ lx} < E_v \leq 30\,000 \text{ lx}$ (range 4) $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 0.91% (range 1, 2, 3) 1.3% (range 4) varied with illuminance level | 2,500 for the first range + 1,250 for any additional range (5 calibration points per range) | Detector-based comparison against reference photometers | 13011-11021 |
| 5 | 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 |



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| 6 | 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 |
| 7 | 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 |
| 8 | Luminous flux of an LED | 20 lm to 4 000 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 |
| 9 | 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 |
| 10 | Luminance of a tungsten-based source | $1 \text{ cd/m}^2 \leq L_v \leq 10\,000 \text{ cd/m}^2$ $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 1.4% | 10,000 for the first calibration point + 5,000 for any additional point | Detector-based method against a reference luminance meter | 13012-11051 |
| 11 | Luminance responsivity of a luminance meter | $10 \text{ cd/m}^2 \leq L_v \leq 10\,000 \text{ cd/m}^2$ $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 0.85% | 10,000 for the first point + 5,000 for any additional point | Detector-based comparison against reference photometers | 13011-11060 |
| | | $1 \text{ cd/m}^2 \leq L_v < 10 \text{ cd/m}^2$ $2\,000 \text{ K} \leq \text{CCT} \leq 3\,400 \text{ K}$ | 1.2% | | Detector-based comparison against reference photometers and a monitor detector | |



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| 12 | 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 |
| 13 | 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 |
| 14 | 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 |
| 15 | Emitted color of a general source | Color space: (x,y), (u,v), (u',v') | 0.001 (tungsten lamp) 0.002 (discharge lamp, LED) | 6,500 | Spectroradiometer and integrating sphere | 13015-15040 |
| 16 | Regular spectral transmittance of a transmitting filter or film. <i>Measured transmittance values will be reported at 5 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) 10.0% < %T ≤ 31.6% (0.5 ≤ OD < 1.0) 1.00% < %T ≤ 10.00% (1.0 ≤ OD < 2.0) 0.01% < %T ≤ 1.00% (2.0 ≤ OD < 4.0) | 200 nm to 2000 nm: Greater than or equal to 0.48% 200 nm to 2000: Greater than or equal to 0.57% 200 nm to 2000: Greater than or equal to 0.61% 200 nm to 1800: Greater than or equal to 0.81% | 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 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 |
| 17 | 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 primary reference spectrophotometer | 13025-14021 |



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| 18 | 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> | 75% < %R ≤ 100% | 380 nm to 400 nm: 1.7% | 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 |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.86% | | | |
| | | 40% < %R ≤ 75% | 380 nm to 400 nm: 1.7% | | | |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.84% | | | |
| | | 20% < %R ≤ 40% | 380 nm to 400 nm: 1.8% | | | |
| | | | 405 nm to 460 nm: 1.3% | | | |
| | | | 465 nm to 780 nm: 0.90% | | | |
| | | 10% < %R ≤ 20% | 380 nm to 400 nm: 1.9% | | | |
| | | | 405 nm to 460 nm: 1.5% | | | |
| | | | 465 nm to 780 nm: 1.1% | | | |
| | | 5% ≤ %R ≤ 10% | 380 nm to 400 nm: 2.1% | | | |
| | | | 405 nm to 460 nm: 1.6% | | | |
| | | | 465 nm to 780 nm: 1.5% | | | |
| 19 | 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> | 75% < %R ≤ 100% | 380 nm to 400 nm: 1.7% | 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 |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.86% | | | |
| | | 40% < %R ≤ 75% | 380 nm to 400 nm: 1.7% | | | |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.84% | | | |
| | | 20% < %R ≤ 40% | 380 nm to 400 nm: 1.8% | | | |
| | | | 405 nm to 460 nm: 1.3% | | | |
| | | | 465 nm to 780 nm: 0.90% | | | |
| | | 10% < %R ≤ 20% | 380 nm to 400 nm: 1.9% | | | |
| | | | 405 nm to 460 nm: 1.5% | | | |
| | | | 465 nm to 780 nm: 1.1% | | | |
| | | 5% ≤ %R ≤ 10% | 380 nm to 400 nm: 2.1% | | | |
| | | | 405 nm to 460 nm: 1.6% | | | |
| | | | 465 nm to 780 nm: 1.5% | | | |



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| 20 | Regular spectral reflectance | $5 \leq \%R \leq 100\%$ $200 \text{ nm} \leq \lambda \leq 2500 \text{ nm}$ 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 2500 nm *Typical values for a high reflective aluminum mirror. Uncertainties for other materials are likely higher. | 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 |
| 21 | 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> | $75\% < \%R \leq 100\%$ | 380 nm to 400 nm: 1.7% | 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 |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.86% | | | |
| | | $40\% < \%R \leq 75\%$ | 380 nm to 400 nm: 1.7% | | | |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.84% | | | |
| | | $20\% < \%R \leq 40\%$ | 380 nm to 400 nm: 1.8% | | | |
| | | | 405 nm to 460 nm: 1.3% | | | |
| | | | 465 nm to 780 nm: 0.90% | | | |
| | | $7.5\% < \%R \leq 20\%$ | 380 nm to 400 nm: 1.9% | | | |
| | | | 405 nm to 460 nm: 1.5% | | | |
| | | | 465 nm to 780 nm: 1.1% | | | |
| | | $2.5\% \leq \%R \leq 7.5\%$ | 380 nm to 400 nm: 2.1% | | | |
| | | | 405 nm to 460 nm: 1.6% | | | |
| | | | 465 nm to 780 nm: 1.5% | | | |



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| 22 | 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> | 75% < %R ≤ 100% | 380 nm to 400 nm: 1.7% | 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 |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.86% | | | |
| | | 40% < %R ≤ 75% | 380 nm to 400 nm: 1.7% | | | |
| | | | 405 nm to 460 nm: 1.2% | | | |
| | | | 465 nm to 780 nm: 0.84% | | | |
| | | 20% < %R ≤ 40% | 380 nm to 400 nm: 1.8% | | | |
| | | | 405 nm to 460 nm: 1.3% | | | |
| | | | 465 nm to 780 nm: 0.90% | | | |
| | | 7.5% < %R ≤ 20% | 380 nm to 400 nm: 1.9% | | | |
| | | | 405 nm to 460 nm: 1.5% | | | |
| | | | 465 nm to 780 nm: 1.1% | | | |
| | | 2.5% ≤ %R ≤ 7.5% | 380 nm to 400 nm: 2.1% | | | |
| | | | 405 nm to 460 nm: 1.6% | | | |
| | | | 465 nm to 780 nm: 1.5% | | | |
| 23 | Wavelength calibration of a transmitted wavelength standard (holmium oxide solution, holmium oxide filter, dydimium oxide filter etc.) | 200 nm to 2 000 nm | 200 nm to 830 nm: 0.08 nm | 2,500 for first peak identification + 1,250 for any additional peak | Measurement by reference spectrometer | 13025-14150 |
| | | | 830 nm to 2 000 nm: 0.50 nm | | | |
| 24 | Wavelength calibration of a reflectance wavelength standard (holmium oxide doped ceramic tile etc.) | 200 nm to 2 000 nm | 200 nm to 830 nm: 0.15 nm | 3,750 for first peak identification + 1,250 for any additional peak | Measurement by reference spectrometer with integrating sphere accessory | 13025-14151 |
| | | | 830 nm to 2 000 nm: 0.70 nm | | | |

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| 25 | Surface color of general reflecting material, x, y, Y, u', v', L*, a*, b* | Varied be parameter of interest, please contact a laboratory staff for full details. | 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 |
| 26 | 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, please contact a laboratory staff for full details. | 6,250 | Direct measurement by using the basic color checked standard | 13026-16010 |
| 27 | Transmitted color of a transmitting material | 360 nm to 860 nm | Values and uncertainties vary depending on sample's color. Contact the Colorimetry Laboratory for details | 3,500/sample | Direct measurement by single-beam primary reference spectrophotometer | 13025-16030 |
| 28 | Gloss of a gloss sample | 20°, 60° and 85° | At 20° $U_{rel} = 0.77\%$ At 60° $U_{rel} = 0.49\%$ At 85° $U_{rel} = 0.20\%$ | 3,750/sample | Reflectance measurement by spectrophotometer and applying Fresnel Equation | 13025-16060 |
| 29 | 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 |
| 30 | 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 |

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| 31 | Absolute spectral irradiance responsivity of a spectroradiometer with irradiance probe | 200 nm to 2 400 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 | 13038-12023 |
| 32 | 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 |
| 33 | Power responsivity of a trap detector | Power level: < 1 mW | 0.025% | 20,000 per wavelength point | Cryogenic radiometer (Wavelength range: 476.2 nm, 488.0 nm, 632.8 nm, 647.1 nm, 799.3 nm) | 13030-12040 |
| 34 | 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 |
| 35 | Solar irradiance responsivity of a thermopile-detector pyranometer | 400 nm to 1 100 nm (160 W.m ² to 520 W.m ²) | 2.1% | 9,000 | Soruce based calibration against a working standard spectroradiometer applying a solar simulator system | 13034-12717 |



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| 36 | Integrated 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 |
| 37 | Integrated irradiance responsivity of narrowband radiometer | 365 nm \pm 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 \pm 10 nm | 10% | | | 13034-12113 |
| | | Arbitrary range within 280 nm to 1 020 nm | Varied by selected range | | | 13034-12119 |
| 38 | Integrated irradiance responsivity of broadband radiometer | 220 nm to 280 nm | 4.5% | 7,100 per probe for the first irradiance level point + 3,200 for any additional irradiance level point | Source based calibration against a reference spectroradiometer using low pressure Hg lamps unit as light source | 13034-12093 |
| 39 | Erythemally Weighted Effective Global Solar UV Irradiance Responsivity of a UVE Radiometer/UV Index Meter | 0.012 W \times m-2 \leq E \leq 0.500 W \times m-2 250 nm \leq λ \leq 400 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 \leq 20.0 250 nm \leq λ \leq 400 nm | | | | |



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| 40 | 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) | 2.2 % varied with mean spectral irradiance level and DUT | | | |
| | | $50.0 \mu\text{W} \cdot \text{cm}^{-2} \leq E_b \leq 750.0 \mu\text{W} \cdot \text{cm}^{-2}$ $400 \text{ nm} \leq \lambda \leq 500 \text{ nm}$ (Other CPGs) | 2.1 % varied with irradiance level and DUT | | | |
| 41 | Integrated Radiant Exposure Responsivity of a UV Radiometer | $315 \text{ nm} \leq \lambda \leq 400 \text{ nm}$ $2 \text{ W} \cdot \text{m}^{-2} \leq E_e \leq 40 \text{ W} \cdot \text{m}^{-2}$ $30 \text{ s} \leq t \leq 120 \text{ s}$ | 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 Hg(Xe) arc lamp | 13034-12100 |
| | | $280 \text{ nm} \leq \lambda \leq 400 \text{ nm}$ $5 \text{ W} \cdot \text{m}^{-2} \leq E_e \leq 40 \text{ W} \cdot \text{m}^{-2}$ $30 \text{ s} \leq t \leq 180 \text{ s}$ | 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 |
| 42 | 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 |
| 43 | Spectral irradiance of a tungsten-halogen lamp (FEL and Ushio type) | $250 \text{ nm} \leq \lambda \leq 430 \text{ nm}$ | 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 |
| | | $430 \text{ nm} < \lambda \leq 1\,100 \text{ nm}$ | 2.2% to 1.7% | | | |
| | | $1\,100 \text{ nm} < \lambda \leq 1\,750 \text{ nm}$ | 1.9% to 3.0% | | | |
| | | $1\,750 \text{ nm} < \lambda \leq 2\,400 \text{ nm}$ | 3.0% to 7.0% | | | |
| 44 | 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 |



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Price List

| Item No. | Description | Range | Accuracy / Uncertainty | Price (THB) | Remark | Code |
|----------|--|--|---|--|---|-------------|
| 45 | 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 |
| 46 | 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 |
| 47 | 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 |
| 48 | 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 | 201 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 |
| 49 | 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 |
| 50 | 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 |

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| Item No. | Description | Range | Accuracy / Uncertainty | Price (THB) | Remark | Code |
|----------|--|---|---|---|---|-------------|
| 51 | 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 |
| 52 | Emitted color of a general source | Color space: (x,y), (u,v), (u',v') | 0.001 (tungsten lamp) 0.002 (discharge lamp, LED) | 6,500 (+ 500 for correlated color temperature) | Spectroradiometer and photometric bench | 13041-15040 |
| 53 | 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 |
| 54 | Chromaticity response of a colorimeter | Color space: (x,y), (u,v), (u',v') | 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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| Item No. | Description | Range | Accuracy / Uncertainty | Price (THB) | Remark | Code |
|----------------------------|--|---|--|--|---|-------------|
| On-site Calibration | | | | | | |
| 55 | Spectral hemispherical reflectance of a spectrally-neutral material | 30 % to 100 % | 2.2 % to 1.4 % (400 nm to 430 nm) 1.4 % to 1.3 % (430 nm to 700 nm) | 10,000 | Spectrophotometer | 13015-34051 |
| 56 | 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 |
| 57 | 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 |
| 58 | Solar simulator performance testing according to IEC 60904-9 | 400 nm to 1,100 nm for spectral match evaluation | 0.006* to 0.02* | 6,250/irradiance level/DUT | Measurements based on IEC 60904-9 | 13034-33014 |
| | | ≥ 6,606 cm ² for designated test area of non-uniformity evaluation | 0.10% | 10,000 for 64 test positions + 500/additional test position | | |
| | | Data sampling time of DUT ≥ 2 ms for instability evaluation | 0.05% | 6,250/DUT | | |
| 59 | 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 |

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.