Photometry and Radiometry, Singapore, SPRING Singapore (Standards, Productivity and Innovation Board)

Note: Approval dates are shown only for the CMCs published after 24 May 2004

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum value**	**Maximum value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Comments**
Luminous intensity	Tungsten lamp	Reference lamps / photometers	10	2000	cd	Correlated colour temperature	2800 K to 2856 K	1.1	%	2	95%	Yes	
Illuminance responsivity, tungsten source	Illuminance meter	Reference lamps / photometers			A/lx or V/lx or reading/lx	Illuminance	10 lx to 2000 lx	1.1	%	2	95%	Yes	
						Correlated colour temperature	2800 K to 2856 K						
Luminous flux	Tungsten lamp	Integrating sphere	20	5000	lm	Correlated colour temperature	2000 K to 3200 K	0.9	%	2	95%	Yes	
Illuminance	Tungsten lamp	Illuminance meter	10	2000	lx	Correlated colour temperature	2800 K to 2856 K	1.2	%	2	95%	Yes	
Illuminance	Tungsten lamp	Illuminance meter	2000	20000	lx	Correlated colour temperature	2800 K to 2856 K	1.4	%	2	95%	Yes	
Luminance	Tungsten sphere source	Reference illuminance meter and precision aperture	20	2000	cd/m^2	Correlated colour temperature	2800 K to 2856 K	2.0	%	2	95%	Yes	
Luminance	Tungsten sphere source	Reference illuminance meter and precision aperture	2000	10000	cd/m^2	Correlated colour temperature	2800 K to 2856 K	1.8	%	2	95%	Yes	
Luminance	Tungsten sphere source	Reference illuminance meter and precision aperture	10000	25000	cd/m^2	Correlated colour temperature	2800 K to 2856 K	2.0	%	2	95%	Yes	

Photometry and Radiometry, Singapore, SPRING Singapore (Standards, Productivity and Innovation Board)

Note: Approval dates are shown only for the CMCs published after 24 May 2004

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum value**	**Maximum value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Comments**
Responsivity, spectral, power	Broad band detector	Transfer standard silicon photodiode and monochromator source			A/W or V/W or reading/W	Wavelength range	248.3 nm to 350 nm	5.0	%	2	95%	Yes	
						Bandwidth	4 nm						
						Power level	0.001mW to 0.2 mW						
Responsivity, spectral, power	Broad band detector	Transfer standard silicon photodiode and monochromator source			A/W or V/W or reading/W	Wavelength range	350 nm to 1000 nm	1.1	%	2	95%	Yes	
						Bandwidth	4 nm						
						Power level	0.001mW to 0.2 mW						
Responsivity, spectral, irradiance	Broad band detector	Transfer standard silicon photodiode, UV source and filter			A/(W/m^2) or V/(W/m^2) or reading/(W/m^2)	Wavelength	254 nm	7.0	%	2	95%	Yes	
						Bandwidth	10 nm						
						Irradiance level	1 W/m^2 to 15 W/m^2						
						Type of detector	silcon photodiode						
Responsivity, spectral, irradiance	Broad band detector	Transfer standard silicon photodiode, UV source and filter			A/(W/m^2) or V/(W/m^2) or reading/(W/m^2)	Wavelength	365 nm	3.4	%	2	95%	Yes	
						Bandwidth	10 nm						
						Irradiance level	1 W/m^2 to 150 W/m^2						
						Type of detector	silicon phodiode						

Photometry and Radiometry, Singapore, SPRING Singapore (Standards, Productivity and Innovation Board)

Note: Approval dates are shown only for the CMCs published after 24 May 2004

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum value**	**Maximum value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Comments**
Responsivity, laser, power	General detector	Reference power meter, and He - Ne diode and Kr ion lasers			A/W or V/W or reading/W	Wavelengths	350.7, 356.4, 406.7, 413.1, 476.2, 482.5, 520.8, 530.9, 568.2, 632.8, 647.1, 676.4, 752.5, 799.3, 780, 785, 810, 830 and 840 nm	2.0	%	2	95%	Yes	
						Power level	100 µW to 100 mW						
						Type of detector	silicon phodiode, thermal detector						
Irradiance, spectral	Tungsten lamp	Reference lamps and spectroradiometer			$(W/m^2)/nm$	Wavelength range	250 nm to 300 nm	3.9	%	2	~95%	Yes	Approved on 27 September 2004
						Bandwidth	2.5 nm						
						Lamp operating power	200 W to 1000 W						
Irradiance, spectral	Tungsten lamp	Reference lamps and spectroradiometer			$(W/m^2)/nm$	Wavelength range	300 nm to 400 nm	3.2	%	2	~95%	Yes	Approved on 27 September 2004
						Bandwidth	2.5 nm						
						Lamp operating power	200 W to 1000 W						
Irradiance, spectral	Tungsten lamp	Reference lamps and spectroradiometer			$(W/m^2)/nm$	Wavelength range	400 nm to 800 nm	1.8	%	2	~95%	Yes	Approved on 27 September 2004
						Bandwidth	5 nm						

Photometry and Radiometry, Singapore, SPRING Singapore (Standards, Productivity and Innovation Board)

Note: Approval dates are shown only for the CMCs published after 24 May 2004

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum value**	**Maximum value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Comments**
						Lamp operating power	200 W to 1000 W						
Irradiance, spectral	Tungsten lamp	Reference lamps and spectroradiometer			$(W/m^2)/nm$	Wavelength range	800 nm to 1600 nm	3.0	%	2	~95%	Yes	Approved on 27 September 2004
						Bandwidth	5 nm						
						Lamp operating power	200 W to 1000 W						
Transmittance, regular, spectral	Spectrally-neutral material	Scanning spectrometer	0.001	1		Wavelength range	350 nm to 860 nm	1.5 to 0.5, varies with transmittance	% (relative to reading)	2	~95%	Yes	Approved on 27 September 2004
						Bandwidth	1 nm to 5 nm						
Transmittance, regular, spectral	Spectrally-neutral material	Scanning spectrometer	0.001	1		Wavelength range	860 nm to 1100 nm	2.4 to 0.8, varies with transmittance	% (relative to reading)	2	~95%	Yes	Approved on 27 September 2004
						Bandwidth	4 nm to 20 nm						
Reflectance, diffuse, spectral	Spectrally-neutral material	Integrating sphere spectrometer	0.1	1		Wavelength range	320 nm to 780 nm	0.006		2	~95%	No	Approved on 27 September 2004
						Bandwidth	1 nm to 5 nm						
						Specific measurement conditions	8/d						
Colour, surface, x, y, Y	Diffusely reflecting material	Integrating sphere spectrophotometer	x: 0	0.9		Specific measurement conditions	8/d, 0/45	0.0004 to 0.004, varies with colour of sample		2	~95%	No	Approved on 27 September 2004

Photometry and Radiometry, Singapore, SPRING Singapore (Standards, Productivity and Innovation Board)

Note: Approval dates are shown only for the CMCs published after 24 May 2004

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum value**	**Maximum value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Comments**
						Type of material	non-fluorescent, flat surface						
Colour, surface, x, y, Y	Diffusely reflecting material	Integrating sphere spectrophotometer	y: 0	0.9		Specific measurement conditions	8/d, 0/45	0.0004 to 0.004, varies with colour of sample		2	~95%	No	Approved on 27 September 2004
						Type of material	non-fluorescent, flat surface						
Colour, surface, x, y, Y	Diffusely reflecting material	Integrating sphere spectrophotometer	Y : 0	1		Specific measurement conditions	8/d, 0/45	0.002 to 0.007, varies with colour of sample		2	~95%	No	Approved on 27 September 2004
						Type of material	non-fluorescent, flat surface						
Responsivity	Fibre optic power meter	Fibre optic power meter calibration facility	-30	0	dBm	Wavelength	850 nm ± 25 nm	1.2	%	2	~95%	Yes	Approved on 27 September 2004
Responsivity	Fibre optic power meter	Fibre optic power meter calibration facility	-30	0	dBm	Wavelength	1310 nm ± 20 nm	1.2	%	2	~95%	Yes	Approved on 27 September 2004
Responsivity	Fibre optic power meter	Fibre optic power meter calibration facility	-30	0	dBm	Wavelength	1550 nm ± 20 nm	1.2	%	2	~95%	Yes	Approved on 27 September 2004