

Photometry and Radiometry, New Zealand, MSL (Measurement Standards Laboratory)



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

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/ Independent Variable		Expanded Uncertainty					NMI Service Identifier	Comments
Quantity	Instrument or Artefact	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?		
Luminous intensity	Tungsten lamp	Reference photometer	10	5000	cd	Correlated colour temperature	2700 K to 3000 K	0.8	%	4.3	95%	Yes	MSLT.O.025	
Illuminance responsivity, tungsten source	Illuminance meter	Standard lamp			A/lx, V/lx, Reading/lx	Illuminance	10 lx to 3000 lx	0.8	%	4.3	95%	Yes	MSLT.O.001 MSLT.O.016	
						Correlated colour temperature	2700 K to 3000 K							
Illuminance responsivity, tungsten source	Illuminance meter	Standard lamp			A/lx, V/lx, Reading/lx	Illuminance	0.005 lx to 10 lx	3	%	2.3	95%	Yes	MSLT.O.001 MSLT.O.016	Approved on 29 November 2012
						Correlated colour temperature	2700 K to 3000 K							
Luminance responsivity	Luminance meter	Tungsten-based source			A/(cd m ⁻²), V/(cd m ⁻²), Reading/(cd m ⁻²)	Luminance	2 cdm ⁻² to 800 cdm ⁻²	1.4	%	2.4	95%	Yes	MSLT.O.002	Approved on 27 September 2004
						Type of source used	Illuminant A							
Responsivity, Spectral Power	Broadband detector	Monochromator and reference detectors			A/W	Wavelength range	240 nm to 300 nm	5.3 to 1.1, varies with wavelength	%	2.8 to 2.1	95%	Yes	MSLT.O.040 or MSLT.O.009	Approved on 20 October 2005
						Bandwidth	1 nm to 5 nm							
						Power level	0.1 µW to 10 µW							
Responsivity, Spectral Power	Broadband detector	Monochromator and reference detectors			A/W	Wavelength range	300 nm to 420 nm	1.1	%	2.1	95%	Yes	MSLT.O.040 or MSLT.O.009	Approved on 20 October 2005
						Bandwidth	1 nm to 5 nm							
						Power level	0.1 µW to 10 µW							

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Responsivity, Spectral Power	Broadband detector	Monochromator and reference detectors			A/W	Wavelength range	420 nm to 680 nm	0.06	%	2.1	95%	Yes	MSLT.O.040 or MSLT.O.009	Approved on 20 October 2005
						Bandwidth	1 nm to 5 nm							
						Power level	0.1 µW to 10 µW							
Responsivity, Spectral Power	Broadband detector	Monochromator and reference detectors			A/W	Wavelength range	680 nm to 800 nm	0.08	%	2.1	95%	Yes	MSLT.O.040 or MSLT.O.009	Approved on 20 October 2005
						Bandwidth	1 nm to 5 nm							
						Power level	0.1 µW to 10 µW							
Responsivity, Spectral Power	Broadband detector	Monochromator and reference detectors			A/W	Wavelength range	800 nm to 950 nm	0.14 to 0.16, varies with wavelength	%	2.1	95%	Yes	MSLT.O.040 or MSLT.O.009	Approved on 20 October 2005
						Bandwidth	1 nm to 5 nm							
						Power level	0.1 µW to 10 µW							
Responsivity, spectral, power	Broadband detectors, silicon diode or silicon diode trap	Cryogenic radiometer & laser			A/W	Wavelengths	Ar & Kr lines 488 nm to 752 nm	0.022	%	2.2	95%	Yes	MSLT.O.023	Approved on 27 September 2004
						Bandwidth	1 nm to 5 nm							
						Power level	50 µW to 250 µW							
Irradiance, spectral	Tungsten lamp	Standard lamp & spectroradiometer	0.001	0.5	W m ⁻² nm ⁻¹	Wavelength range	250 nm to 350 nm	2.6 to 1.6, varies with wavelength	%	2.1	95%	Yes	MSLT.O.032	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							
Irradiance, spectral	Tungsten lamp	Standard lamp & spectroradiometer	0.001	0.5	W m ⁻² nm ⁻¹	Wavelength range	350 nm to 850 nm	1.6 to 1.4, varies with wavelength	%	2.1	95%	Yes	MSLT.O.032	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							

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Quantity	Instrument or Artefact	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?		
Transmittance, regular, spectral	Spectrally-neutral material	Spectrophotometer	0.01	1.0		Wavelength range	240 nm to 380 nm	0.5	%	2	95%	Yes	MSLT.O.006	Approved on 16 January 2011
						Bandwidth	1 nm to 3 nm							
Transmittance, regular, spectral	Spectrally-neutral material	Spectrophotometer	0.0001	0.01		Wavelength range	380 nm to 1000 nm	0.00005		2	95%	No	MSLT.O.006	Approved on 27 September 2004
						Bandwidth	1 nm to 3 nm							
Transmittance, regular, spectral	Spectrally-neutral material	Spectrophotometer	0.01	0.1		Wavelength range	380 nm to 1000 nm	0.00005 to 0.0001 varies with transmittance		2	95%	No	MSLT.O.006	Approved on 16 January 2011
						Bandwidth	1 nm to 3 nm							
Transmittance, regular, spectral	Spectrally-neutral material	Spectrophotometer	0.1	1.0		Wavelength range	380 nm to 1000 nm	0.1	%	2	95%	Yes	MSLT.O.006	Approved on 16 January 2011
						Bandwidth	1 nm to 3 nm							
Transmittance, diffuse, spectral	Spectrally-neutral material	Spectrophotometer, integrating sphere	0.0001	0.1		Wavelength range	300 nm to 400 nm	0.005 to 0.0002 (varies with wavelength)		2	95%	No	MSLT.O.020	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							
						Specific measurement conditions	0/d							
Transmittance, diffuse, spectral, T	Spectrally-neutral material	Spectrophotometer, integrating sphere	0.1	1		Wavelength range	300 nm to 400 nm	0.057		2	95%	Yes	MSLT.O.020	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							
						Specific measurement conditions	0/d							

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Transmittance, diffuse, spectral	Spectrally-neutral material	Spectrophotometer, integrating sphere	0.0001	0.004		Wavelength range	400 nm to 1000 nm	0.0002		2	95%	No	MSLT.O.020	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							
						Specific measurement conditions	0/d							
Transmittance, diffuse, spectral, T	Spectrally-neutral material	Spectrophotometer, integrating sphere	0.004	1		Wavelength range	400 nm to 1000 nm	0.057		2	95%	Yes	MSLT.O.020	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							
						Specific measurement conditions	0/d							
Reflectance, diffuse, spectral	Spectrally-neutral material	Spectrophotometer	0.05	0.8		Wavelength range	360 nm to 820 nm	0.008		2	95%	No	MSLT.O.024	Approved on 20 October 2005
						Bandwidth	1 nm to 3 nm							
						Specific measurement conditions	0 deg / diffuse, 6 deg / diffuse							
Reflectance, diffuse, spectral	Spectrally-neutral material	Spectrophotometer	0.8	1	1	Wavelength range	360 - 820 nm	1	%	2	95%	Yes	MSLT.O.024	Approved on 27 September 2004
						Bandwidth	1 - 3 nm							
						Specific measurement conditions	0 deg / diffuse, 6 deg / diffuse.							
Reflectance, regular, spectral	Spectrally-neutral material	Spectrophotometer	0.05	1		Wavelength range	280 nm to 800 nm	1	%	2	95%	Yes	MSLT.O.026	Approved on 27 September 2004
						Bandwidth	1 nm to 3 nm							

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Quantity	Instrument or Artefact	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?		
						Specific measurement conditions	0 deg / 0 deg							
Wavelength	Spectrally selective transmitting material	Spectrophotometer	240	800	nm	Bandwidth	0.1 nm to 0.2 nm	0.13	nm	2	95%	No	MSLT.O.006	Approved on 16 January 2011
Wavelength	Spectrally selective transmitting material	Spectrophotometer	800	1100	nm	Bandwidth	0.1 nm to 0.2 nm	0.13 to 0.25, varies with wavelength	nm	2	95%	No	MSLT.O.006	Approved on 20 October 2005
Correlated colour temperature	Tungsten lamp	Standard lamp & spectroradiometer	2700	3000	K			50	K	2	95%	No	MSLT.O.013	
Colour, surface x,y	Diffusely-reflecting material	Spectroradiometer	CIE x,y colour space			Specific measurement conditions	45 deg / 0 deg	0.003		2	95%	No	MSLT.O.010	Approved on 27 September 2004
Y	Diffusely-reflecting material	Spectroradiometer	Y: 0.1	1		Specific measurement conditions	45 deg / 0 deg	5	%	2	95%	Yes	MSLT.O.010	Approved on 27 September 2004
Colour transmitted x,y	General material	Spectrophotometer/spectroradiometer	CIE x,y colour space			Specific measurement conditions	0 deg / 0 deg	0.005		2	95%	No	MSLT.O.005 MSLT.O.006	Approved on 27 September 2004
Y	General material	Spectrophotometer/spectroradiometer	Y: 0.1	1		Specific measurement conditions	0 deg / 0 deg	5	%	2	95%	Yes	MSLT.O.005 MSLT.O.006	Approved on 27 September 2004