

Length, New Zealand, MSL (Measurement Standards Laboratory)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	NMI Service Identifier
Class	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?		
Laser radiations	Frequency stabilized laser	Optical beat frequency	633	633	nm			0.025	MHz	2	95%	No		1
Laser radiations	Frequency stabilized laser	Optical beat frequency	633	633	nm			0.27	fm	2	95%	No	Approved on 28 January 2010	2
Laser radiations	Frequency stabilized laser	Optical beat frequency	474	474	THz			0.2	MHz	2	95%	No	Approved on 28 January 2010	3
End standards	Gauge blocks: central length L	Fringe fraction interferometer	0.5	100	mm			Q[30, 0.4L], L in mm, values range from 30 nm to 50 nm	nm	2	95%	No		4
End standards	Gauge blocks: central length L	Mechanical comparison	0.1	100	mm			Q[36, 1.4L], L in mm, varies from 40 nm to 155 nm	nm	2	95%	No	Approved on 10 April 2018	5
Length instruments	Electronic distance meter	Laser interferometer	1	206	m			Q[0.13, 7E-04L], L in m	mm	2	95%	No	Approved on 28 January 2010	6
End standards	Gauge block	Comparison with end standards	100	300	mm			Q[91, 1.3L], L in mm	nm	2	95%	No	Approved on 10 April 2018	7
End standards	Length bar	Comparator with laser interferometer	300	1500	mm			Q[370, 0.48L], L in mm	nm	2	95%	No	Approved on 28 January 2010	8
Line standards	Micrometer scale	Laser interferometer	0.5	10	mm			0.5	μm	2	95%	No	Approved on 28 January 2010	9
Line standards	Surveyor or engineer tape	Laser interferometer	4	50	m			Q[10, 10.5L], L in m	μm	2	95%	No	Approved on 28 January 2010	10
Line standards	Surveyor levelling rod	Laser interferometer	0.5	3	m			Q[10, 10L], L in m	μm	2	95%	No	Approved on 28 January 2010	11



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Line standards	Engineer or machinist scale	Laser interferometer	0.1	4	m			Q[10, 8.2L], L in m	µm	2	95%	No	Approved on 28 January 2010	12
Diameter standards	External cylinder	Comparison with end standards	0.5	25	mm			Q[130, 1.4L], L in mm	nm	2	95%	No	Approved on 10 April 2018	13
Diameter standards	External cylinder	Comparison with end standards	25	300	mm			Q[95, 1.8L], L in mm	nm	2	95%	No	Approved on 10 April 2018	14
Diameter standards	Internal cylinder	Comparison with end standards	1	300	mm			Q[95, 1.8L], L in mm	nm	2	95%	No	Approved on 10 April 2018	15
Flatness standard	Optical flat	Comparison with reference flat	0	2.5	µm	Diameter	10 mm to 35 mm	0.07	µm	2	95%	No	Approved on 28 January 2010	16
Flatness standard	Optical parallel	Comparator	0	10	µm	Diameter	10 mm to 35 mm	0.08	µm	2	95%	No	Approved on 28 January 2010	17
End standards	Step gauge	Comparison with end standards on CMM	90	700	mm			Q[0.70, 1.2E-03L], L in mm	µm	2	95%	No	Approved on 28 January 2010	17
CMM artefacts	Ball plate, hole plate	Comparison with end standards on CMM	100 x 100	600 x 600	mm ²			Q[0.90, 1.3E-03L], L in mm	µm	2	95%	No	Approved on 28 January 2010	18
Roundness standards	External cylinder	Stylus on spindle roundness instrument	0	400	µm	Diameter	1 mm to 300 mm	Q[0.14, 0.05R], R in µm	µm	2	95%	No	Approved on 28 January 2010	19
Roundness standards	Internal cylinder	Stylus on spindle roundness instrument	0	400	µm	Diameter	1 mm to 300 mm	Q[0.14, 0.05R], R in µm	µm	2	95%	No	Approved on 28 January 2010	20
Roundness standards	Sphere	Stylus on spindle roundness instrument	0	400	µm	Diameter	1 mm to 300 mm	Q[0.14, 0.05R], R in µm	µm	2	95%	No	Approved on 28 January 2010	21