

Annex to declaration of accreditation (scope of accreditation)  
Normative document: EN ISO/IEC 17025:2017  
Registration number: **K 086**

of **Mitutoyo Nederland B.V.**  
**Service Department, Calibration Service and Technical Department**

This annex is valid from: **29-10-2019** to **01-10-2022**

Replaces annex dated: **23-08-2018**

**Location(s) where activities are performed under accreditation**

**Head Office**

Wiltonstraat 25  
3905 KW  
Veenendaal  
The Netherlands

<b>Location</b>	<b>Abbreviation/ location code</b>
Wiltonstraat 25 3905 KW Veenendaal The Netherlands	A
Mitutoyo Research Center Nederland B.V. De Rijn 18 5684 PJ Best The Netherlands	B

This annex has been approved by the Board of the  
Dutch Accreditation Council, on its behalf,

J.A.W.M. de Haas

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**Service Department, Calibration Service and Technical Department**

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HCS code	Measured quantity, Range	Frequency	CMC <sup>1</sup>	Remarks	Location
DM 0 0	DIMENSIONAL QUANTITIES				B, (1)
DM 1 0	Length gauges			Performed by: Calibration Service	B
	Long rectangular gauge blocks				
	- steel and ceramic - zero-glass	(100 – 1510) mm (100 – 1510) mm	0,10 µm + 0,34·10 <sup>-6</sup> / 0,10 µm + 0,20·10 <sup>-6</sup> /	laser interferometer + CMM laser interferometer + CMM	
	- variation in length	(100 – 1510) mm	0,22 µm	laser interferometer + CMM	
	Long square gauge blocks				
	- steel - hard metal (tungsten carbide)	(100 – 500) mm (100 – 500) mm	0,10 µm + 0,34·10 <sup>-6</sup> / 0,10 µm + 0,40·10 <sup>-6</sup> /	laser interferometer + CMM laser interferometer + CMM	
	- variation in length	(100 – 500) mm	0,14 µm	laser interferometer + CMM	
	Micrometer-standards				
	- length	till 1510 mm	0,10 µm + 0,50·10 <sup>-6</sup> /	laser interferometer + CMM	
	- variation in length	till 1510 mm	0,04 µm	laser interferometer + CMM	
	Step gauges (check-masters)			$l_s$ = measurement position (m) $l_t$ = total length (m)	
	- length	till 1510 mm	0,12 µm + 0,34·10 <sup>-6</sup> · $l_s$ + 0,12·10 <sup>-6</sup> · $l_t$	laser interferometer + CMM	
	- variation in length	till 1510 mm	0,06 µm	laser interferometer + CMM	

<sup>1</sup> Calibration and Measurement Capability (CMC): Demonstrated measurement uncertainty, with coverage probability of 95%, in a given measurement point or measurement range. Measurement uncertainty,  $U$ , is calculated according to EA-4/02 "Evaluation of the Uncertainty of Measurement in Calibration".

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HCS code	Measured quantity, Range	Frequency	CMC <sup>1</sup>	Remarks	Location
DM 2 0	Line standards, distances			Performed by: Calibration Service & Technical Department	B, (1)
	Deviations of translations			$r$ = rotation, $t$ = straightness deviation $l$ = length of translation (m)	
	- linear displacements	till 20 m till 20 m	$0,20 \mu\text{m} + 0,7 \cdot 10^{-6} \cdot l$ $0,20 \mu\text{m} + 2,3 \cdot 10^{-6} \cdot l$	(1) laser interferometer (1) laser interferometer, with thermal compensation for the object	
	- straightness deviation	till 1,5 mm till 1,5 mm	$0,8 \mu\text{m} + 0,8 \cdot 10^{-3} \cdot t + 0,4 \cdot 10^{-6} \cdot l$ $2,5 \mu\text{m} + 8,0 \cdot 10^{-3} \cdot t + 0,4 \cdot 10^{-6} \cdot l$	(1) laser with straightness optics $l \leq 3 \text{ m}$ $l \leq 20 \text{ m}$	
	- rotation around horizontal axis with translation (pitch, roll)	-100" to 100" -100" to 100"	$0,2'' + 2,0 \cdot 10^{-2} \cdot r + 3,5 \cdot 10^{-2} \cdot (l/m)''$ $1,5'' + 2,0 \cdot 10^{-2} \cdot r$	(1) laser with rotation optics, $l \leq 20 \text{ m}$ (1) electronic levels	
	- rotation around vertical axis with translation (yaw)	-100" to 100"	$0,2'' + 2,0 \cdot 10^{-2} \cdot r + 3,5 \cdot 10^{-2} \cdot (l/m)''$	(1) laser with rotation optics, $l \leq 20 \text{ m}$	
	Deviations of combined displacements				
	- squareness of guides	-300" to 300"	1,2" ( $\approx 6 \mu\text{m}/\text{m}$ )	(1) laser with squareness optics, with length per guide $\leq 20 \text{ m}$	
	Line standards				
	- zero-glas - normal glas	till 400 mm	$0,08 \mu\text{m} + 0,50 \cdot 10^{-6} \cdot l$ $0,08 \mu\text{m} + 1,00 \cdot 10^{-6} \cdot l$	laser interferometer + Vision system	
	- zero-glas - normal glas	till 600 mm	$0,08 \mu\text{m} + 0,52 \cdot 10^{-6} \cdot l$ $0,08 \mu\text{m} + 1,02 \cdot 10^{-6} \cdot l$		
	Line scales				B
	- normal glas	till 400 mm till 600 mm	$0,40 \mu\text{m} + 1,00 \cdot 10^{-6} \cdot l$ $0,40 \mu\text{m} + 1,06 \cdot 10^{-6} \cdot l$	laser interferometer + Vision system	

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	Calibration charts				
	- normal glas	till 10 mm	0,24 µm	laser interferometer + Vision system	
	Motic calibration slide	(0 – 1,5) mm	10,0 µm	Vision system	
	2-D Grids (zero-glass)				
	- distance between 2 points - linearity - straightness - squareness - rotation	till 200x200 mm	0,8 µm + 0,5·10 <sup>-6</sup> /l 0,2 µm + 0,5·10 <sup>-6</sup> /l 0,2 µm 0,2" 0,4"	laser interferometer + Vision system	
DM 3 0	Length measuring instruments			Performed by: Technical Department  l = measured length (m) d = measured diameter (m)	B, (1)
	- i-Checker	(0 – 100) mm	0,10 µm + 2,2·10 <sup>-6</sup> /l 0,06 µm + 0,8·10 <sup>-6</sup> /l	digital (gauge blocks) (1) digital (laser interferometer)	
	- tester 521-105	(0 – 5) mm	0,3 µm 0,9 µm	analog (gauge blocks) (1) analog (laser interferometer)	
	- tester 521-103	(0 – 1) mm	0,3 µm 4,5 µm	analog (gauge blocks) (1) analog (laser interferometer)	
	Low-force height gauges	<u>VL-50 / VL-50A / Elecont- type</u> (0 – 50) mm	0,9 µm	(1) digital (gauge blocks)	

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	Linear heights				
	- linear displacements	(0 – 1000) mm	0,8 µm + 3,8 · 10 <sup>-6</sup> / 0,2 µm + 2,3 · 10 <sup>-6</sup> / 	(1) steel step gauge  (1) steel step gauge or laser interferometer and both with thermal compensation for the object. See DM 2 0  In combination with calibration of granite surface plate.	
	- squareness		7,0 µm	(1) precision square	
	- straightness		1,6 µm	(1) longest leg of precision square	
	Profile projectors	<u>PJ / PV / PH-type</u> (0 – 50) mm (0 – 300) mm  Magnification error	1,5 µm + 2,4 · 10 <sup>-6</sup> / 1,4 µm + 6,6 · 10 <sup>-6</sup> /  0,02%	(1) (1)	
	Measurement microscopes	<u>TM-type</u> (0 – 50) mm  <u>MF-type</u> (0 – 50) mm (0 – 300) mm	2,0 µm + 3,2 · 10 <sup>-6</sup> /  0,9 µm + 3,6 · 10 <sup>-6</sup> / 0,9 µm + 7,9 · 10 <sup>-6</sup> / 	(1)  (1) (1)	
	Vision systems				
	3-D ( <u>QV-type</u> ): glass With automatic thermal compensation	(0 – 200) mm (0 – 400) mm (0 – 1000) mm  (0 – 100) mm (0 – 250) mm	0,3 µm + 0,8 · 10 <sup>-6</sup> / 0,3 µm + 1,2 · 10 <sup>-6</sup> / 0,3 µm + 1,3 · 10 <sup>-6</sup> /  0,5 µm + 1,0 · 10 <sup>-6</sup> / 0,5 µm + 1,6 · 10 <sup>-6</sup> / 	(1) X- and Y-axis (1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	
	3- D ( <u>QV-type</u> ): glass With manual handmatige thermal compensation	(0 – 200) mm (0 – 400) mm (0 – 1000) mm  (0 – 100) mm (0 – 250) mm	0,3 µm + 2,0 · 10 <sup>-6</sup> / 0,3 µm + 2,5 · 10 <sup>-6</sup> / 0,3 µm + 2,7 · 10 <sup>-6</sup> /  0,5 µm + 1,8 · 10 <sup>-6</sup> / 0,5 µm + 2,5 · 10 <sup>-6</sup> / 	(1) X- and Y-axis (1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	

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	3- D (QV-type): glass Without thermal compensation	(0 – 200) mm (0 – 400) mm (0 – 1000) mm  (0 – 100) mm (0 – 250) mm	0,3 µm + 2,5·10 <sup>-6</sup> /l 0,3 µm + 2,9·10 <sup>-6</sup> /l 0,3 µm + 3,2·10 <sup>-6</sup> /l  0,5 µm + 2,4·10 <sup>-6</sup> /l 0,5 µm + 3,3·10 <sup>-6</sup> /l	(1) X- and Y-axis (1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	
	3- D (QV-type): zero-glass With automatic thermal compensation	(0 – 400) mm (0 – 1000) mm  (0 – 100) mm (0 – 250) mm	0,2 µm + 0,4·10 <sup>-6</sup> /l 0,3 µm + 1,3·10 <sup>-6</sup> /l  0,1 µm + 2,8·10 <sup>-6</sup> /l 0,2 µm + 2,4·10 <sup>-6</sup> /l	(1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	
	3- D (QV-type): zero-glas With manual thermal compensation	(0 – 400) mm (0 – 1000) mm  (0 – 100) mm (0 – 250) mm	0,2 µm + 0,4·10 <sup>-6</sup> /l 0,3 µm + 2,1·10 <sup>-6</sup> /l  0,1 µm + 3,4·10 <sup>-6</sup> /l 0,2 µm + 3,1·10 <sup>-6</sup> /l	(1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	
	3- D (QV-type): zero-glas Without thermal compensation	(0 – 400) mm (0 – 1000) mm  (0 – 100) mm (0 – 250) mm	0,2 µm + 0,4·10 <sup>-6</sup> /l 0,3 µm + 9,7·10 <sup>-6</sup> /l  0,1 µm + 12·10 <sup>-6</sup> /l 0,2 µm + 13·10 <sup>-6</sup> /l	(1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	
	2-D & 3-D (QS-type):	(0 – 200) mm (0 – 400) mm  (0 – 100) mm (0 – 250) mm	0,7 µm + 7,5·10 <sup>-6</sup> /l 0,7 µm + 8,6·10 <sup>-6</sup> /l  1,4 µm + 2,6·10 <sup>-6</sup> /l 1,4 µm + 2,0·10 <sup>-6</sup> /l	(1) X- and Y-axis (1) X- and Y-axis  (1) Z-axis (1) Z-axis	
	2-D (QI-type):	(0 – 200) mm (0 – 400) mm	0,7 µm + 7,5·10 <sup>-6</sup> /l 0,7 µm + 8,5·10 <sup>-6</sup> /l	(1) X- and Y-axis (1) X- and Y-axis	
	Roundness instruments				
	- radial spindle - axial spindle - straightness column - straightness x-axis - squareness rotating axis/x-axis	(0 – 100) nm (0 – 100) nm (0 – 10) µm (0 – 10) µm (0 – 10) µm	10 nm + 2 %-ROM 12 nm 38 nm + 1,2 %-z 0,22 µm + 1,2 %-z 0,22 µm + 1,2 %-z	(1) Hemisphere with reversal method, straight master, square master, optical flat, gauge blocks, Cylinder gauge, piëzo and laser, scale  In case probe linearity ≤ 1%	

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	- parallelism rotating axis/column - detector linearity - detector force	(0 – 100) µm (0 – 100) µm (0 – 150) mN	0,28 µm + 1,2 %·z 20 nm + 0,2 %·z 2 mN		
	Roughness instruments			Conform ISO/FDIS 12179	
	- inclined optical flat - Linearity X-axis - Vertical profile - roughness type D Ra-value Rz-value - detector	(0 – 800) µm	0,14 µm 0,06 %· <i>RSm</i> 12,4 nm+ 2 %· <i>d</i> 4,2 nm + 4,2 %· <i>Ra</i> 42 nm + 2,8 %· <i>Rz</i> 20 nm + 0,2 %·z	(1) Optical flat, Type A1, Type C1, Type D1 standards according to ISO 5436-1:1999 (high-end: with piëzo and laser).	
DM 4 0	Diameter			Performed by: Calibration Service  <i>d</i> = measured diameter (m)	B
	Ring gauges				
	- diameter	(4 – 50) mm	0,2 µm	laser interferometer + CMM	
	Spheres (master ball)				
	- diameter	(0 – 30) mm	0,2 µm	laser interferometer + CMM	
DM 5 0	Form error			Performed by: Calibration Service	B
	Measurement equipment for form				
	- straightness of straight edges	(0 – 2) mm	1,5 µm	With CMM: Straight edges till 1000 mm	
	- straightness of straight edges	(0 – 10) µm	38 nm + 3,5 %·z	With Roundness machine Straight edges till 280 mm	

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	- straightness of straight edges	(0 – 50) µm	36 nm + 0,12·10 <sup>-6</sup> ·L	With autocollimator + CMM: Straight edges till 700 mm (evt till 2000 mm)	
	- straightness of knife edge straight edges	(0 – 2) mm	1,5 µm	With CMM: Straight edges till 1000 mm	
	- flatness of surface plates	till (3 x 3) m	0,2 µm + 0,7·10 <sup>-6</sup> ·l	(1) Electronic levels, without temperature correction l = diagonal	
	Roundness	d till 300 mm		With Roundness machine conform ISO 12181:2009 guideline	
	- in- & outside ring	RONt: (0 – 12) µm	40 nm + 2 %·RONt	- at middle	
	- sphere (master ball)	(0 – 12) µm	40 nm + 2 %·RONt	- at equator	
	- roundness standard (hemisphere)	(0 – 1) µm	10 nm + 2 %·RONt	- at equator and reversal method or multi step method	
	- Flick standaard	2 µm < RONt < 100 µm	150 nm + 2 %·RONt	Met rondheidsmeetmachine	
DM 6 0	Roughness			Performed by: Calibration Service	B
	Surface Roughness			With roughness tester conform ISO 4287:1997	
	Groove depth step height	(0 – 20) µm		SV-C624	
	d		10 nm + 2%·d		
	Pt		10 nm + 2%·Pt		
	Ra	(0 – 20) µm	3 nm + 3%·Ra	SV-C624	
	Rz	(0 – 80) µm	30 nm + 2%·Rz	SV-C624	
	Rt	(0 – 80) µm	40 nm + 3%·Rt	SV-C624	



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	<i>RSm</i>	10 µm – 250 µm	0,1% <i>RSm</i>	SV-C624	
	<i>RSm</i>	10 µm – 250 µm	0,01% <i>RSm</i>	laser interferometer + vision system	
DM 8 0	Co-ordinate Measuring Machines			Performed by: Calibration Service & Technical Department	(1)
	Probe systems				
	- touch-trigger probe systems		0,10 µm	(1) ISO 10360-5:2008	
	- scanning probe systems		0,10 µm	(1) ISO 10360-4:1999	
	- 1D, 2D and 3D measuring machines	(0 – 1,5) m		VDI/VDE 2617, part 2.1 (1986) & ISO 10360-2:2009	
	Manual CMM No thermal compensation		0,7 µm + 3,4·10 <sup>-6</sup> /	(1) Steel / ceramic step gauge	
	Manual CMM With thermal compensation		0,7 µm + 0,5·10 <sup>-6</sup> /	(1) Steel / ceramic step gauge	
	CNC CMM No thermal compensation		0,5 µm + 3,6·10 <sup>-6</sup> /	(1) Steel / ceramic step gauge	
	CNC CMM With thermal compensation		0,5 µm + 0,6·10 <sup>-6</sup> / 0,1 µm + 0,4·10 <sup>-6</sup> / 0,1 µm + 0,8·10 <sup>-6</sup> /	(1) Steel / ceramic step gauge (1) Zero Glass gauge blocks (1) Steel / ceramic gauge blocks	
	CMM acceptance- or re-verification-measurements		0,3 µm + 0,7·10 <sup>-6</sup> /	(1) With laserinterferometer	
	CMM components: -linear displacements -straightness -rotation and squareness	(0 – 20) m	See DM 2 0  0,3 µm + 0,7·10 <sup>-6</sup> . L	VDI/VDE 2617, part 3 (1989)  (1) Assessment by laser, l ≤ 20 m. ISO 10360-2:2009	

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DM 9 0	Angle			Performed by: Calibration Service  With CMM: <i>l</i> = distance on longest leg (m) <i>L</i> = length shortest leg (m)	B
	Angle gauges Blade type squares 90° (stock support squares)				
	- angle deviation	± 0,5°	(0,5 m/L)" (≈ 2,4 μm/L)	length of legs till (700 x 1000) mm	
	- straightness	(0 – 2) mm	1,5 μm	length of legs till 700 mm	
	- form deviation of longest leg	± 1 mm	(1,5 + 1,0· <i>l</i> / <i>L</i> ) μm	length of legs till (700 x 1000) mm	
TE 0 0	Temperature			Performed by: Calibration Service	B
TE 4 1	Self indicating thermometers	(5 – 40) °C	0,03 °C	Temperature bath (2)	

Remarks:

The ambient temperature during the calibration within the laboratory is nominal 20 °C.  
 The "variation in length (v)" is defined conform the standard ISO 3650:1998.

- (1) These calibrations are carried out at customer site or at Mitutoyo Nederland  
 (2) Secondary calibrations related to primary dimensional calibrations (DM)