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: **14-07-2021** to **01-10-2022** Replaces annex dated: **23-09-2020**

Location(s) where activities are performed under accreditation

Head Office

Wiltonstraat 25
3905 KW
Veenendaal
The Netherlands

Location	Abbreviation/ location code
Mitutoyo Research Center Nederland B.V. De Rijn 18 5684 PJ Best The Netherlands	BE
On site	OS

HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
DM 0 0	DIMENTIONAL QUANTITIES				BE, OS
DM 1 0	Length gauges				BE
	Long rectangular gauge blocks				
	- steel and ceramic - zero-glass	(100 – 1510) mm (100 – 1510) mm	0,10 µm + 0,34·10^{-6}·/ 0,10 µm + 0,20·10^{-6}·/	laser interferometer + CMM laser interferometer + CMM	

[1] 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".

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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	- 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^{-6}·l 0,10 µm + 0,40·10^{-6}·l	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^{-6}·l	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^{-6}·l_s + 0,12·10^{-6}·l_t	laser interferometer + CMM	
	- variation in length	till 1510 mm	0,06 µm	laser interferometer + CMM	
DM 2 0	Line standards, distances				BE, OS
	Deviations of translations			r = rotation, t = straightness deviation l = length of translation (m)	OS
	- linear displacements	till 20 m till 20 m	0,20 µm + 0,7·10^{-6}·l 0,20 µm + 2,3·10^{-6}·l	laser interferometer laser interferometer, with thermal compensation for the object	
	- straightness deviation	till 1,5 mm till 1,5 mm	0,8 µm + 0,8·10^{-3}·t + 0,4·10^{-6}·l 2,5 µm + 8,0·10^{-3}·t + 0,4·10^{-6}·l	laser with straightness optics $l \leq$ 3 m $l \leq$ 20 m	

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	- rotation around horizontal axis with translation (pitch, roll)	-100" to 100" -100" to 100"	0,2" + 2,0·10^{-2}·r + 3,5·10^{-2}· (//m)" 1,5" + 2,0·10^{-2}·r	laser with rotation optics, $l \leq$ 20 m electronic levels	
	- rotation around vertical axis with translation (yaw)	-100" to 100"	0,2" + 2,0·10^{-2}·r + 3,5·10^{-2}· (//m)"	laser with rotation optics, $l \leq$ 20 m	
	Deviations of combined displacements				OS
	- squareness of guides	-300" to 300"	1,2" (≈ 6 µm/m)	laser with squareness optics, with length per guide ≤ 20 m	
	Line standards				BE
	- zero-glas - normal glas	till 650 mm	0,08 µm + 0,50·10^{-6}·l 0,08 µm + 1,0·10^{-6}·l	laser interferometer + Vision system	
	Line scales				BE
	- normal glas	till 650 mm	0,40 µm + 1,0·10^{-6}·l	laser interferometer + Vision system	
	Calibration charts				BE
	- normal glas	till 10 mm	0,24 µm	laser interferometer + Vision system	
	Motic calibration slide	(0 – 1,5) mm	10 µm	Vision system	BE
	Distance standard	(0 - 400) mm	0,24 µm + 2,0·10^{-6}·l	laser interferometer + Vision system	BE
	2-D Grids (zero-glass)				BE
	- distance between 2 points	till 200x200 mm	0,8 µm + 0,5·10^{-6}·l	laser interferometer + Vision system	
	- linearity		0,2 µm + 0,5·10^{-6}·l		

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	- straightness		0,2 µm		
	- squareness		0,2″		
	- rotation		0,4″		
DM 3 0	Length measuring instruments			*l* = measured length (m) *d* = measured diameter (m)	OS
	Dial indicator, Calibration tester				
	- i-Checker	(0 – 100) mm	0,10 µm + 2,2·10^{-6}·*l* 0,06 µm + 0,8·10^{-6}·*l*	digital (gauge blocks) digital (laser interferometer)	
	- tester 521-105	(0 – 5) mm	0,3 µm 0,9 µm	analog (gauge blocks) analog (laser interferometer)	
	- tester 521-103	(0 – 1) mm	0,3 µm 4,5 µm	analog (gauge blocks) analog (laser interferometer)	
	Low-force height gauges	VL-50 / VL-50A / Elecont- type (0 – 50) mm	0,9 µm	digital (gauge blocks)	
	Linear heights				
	- linear displacements	(0 – 1000) mm	0,8 µm + 3,8· 10^{-6}·*l* 0,2 µm + 2,3· 10^{-6}·*l*	steel step gauge 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	precision square	
	- straightness		1,6 µm	longest leg of precision square	
	Profile projectors	PJ / PV / PH-type (0 – 50) mm (0 – 300) mm	1,5 µm + 2,4·10^{-6}·*l* 1,4 µm + 6,6·10^{-6}·*l*		

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		Magnification error	0,02%		
	Measurement microscopes	TM-type (0 – 50) mm	2,0 µm + 3,2·10^{-6}·/		
		MF-type (0 – 50) mm (0 – 300) mm	0,9 µm + 3,6·10^{-6}·/ 0,9 µm + 7,9·10^{-6}·/		
	Vision systems				
	3-D (QV-type): glass With automatic thermal compensation	(0 – 200) mm (0 – 400) mm (0 – 1000) mm	0,2 µm + 0,8·10^{-6}·/ 0,2 µm + 1,2·10^{-6}·/ 0,2 µm + 1,3·10^{-6}·/	X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D	
		(0 – 100) mm (0 – 250) mm	0,5 µm + 1,0·10^{-6}·/ 0,5 µm + 1,6·10^{-6}·/	Z-axis Z-axis	
	3- D (QV-type): glass With manual handmatige thermal compensation	(0 – 200) mm (0 – 400) mm (0 – 1000) mm	0,2 µm + 2,0·10^{-6}·/ 0,2 µm + 2,5·10^{-6}·/ 0,2 µm + 2,7·10^{-6}·/	X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D	
		(0 – 100) mm (0 – 250) mm	0,5 µm + 1,8·10^{-6}·/ 0,5 µm + 2,5·10^{-6}·/	Z-axis Z-axis	
	3- D (QV-type): glass Without thermal compensation	(0 – 200) mm (0 – 400) mm (0 – 1000) mm	0,2 µm + 2,5·10^{-6}·/ 0,2 µm + 2,9·10^{-6}·/ 0,2 µm + 3,2·10^{-6}·/	X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D	
		(0 – 100) mm (0 – 250) mm	0,5 µm + 2,4·10^{-6}·/ 0,5 µm + 3,3·10^{-6}·/	Z-axis Z-axis	
	3- D (QV-type): zero-glass With automatic thermal compensation	(0 – 400) mm (0 – 1000) mm	0,2 µm + 0,4·10^{-6}·/ 0,2 µm + 1,3·10^{-6}·/	X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D	
		(0 – 100) mm (0 – 250) mm	0,1 µm + 2,8·10^{-6}·/ 0,2 µm + 2,4·10^{-6}·/	Z-axis Z-axis	
	3- D (QV-type): zero-glas With manual thermal compensation	(0 – 400) mm (0 – 1000) mm	0,2 µm + 0,4·10^{-6}·/ 0,2 µm + 1,3·10^{-6}·/	X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D	
		(0 – 100) mm (0 – 250) mm	0,1 µm + 3,4·10^{-6}·/ 0,2 µm + 3,1·10^{-6}·/	Z-axis Z-axis	
	3- D (QV-type): zero-glas	(0 – 400) mm (0 – 1000) mm	0,2 µm + 0,4·10^{-6}·/ 0,2 µm + 9,7·10^{-6}·/	X- and Y-axis, 2D en 3D X- and Y-axis, 2D en 3D, met normal glass scale	

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	Without thermal compensation	(0 – 100) mm (0 – 250) mm	0,1 µm + $12 \cdot 10^{-6} \cdot l$ 0,2 µm + $13 \cdot 10^{-6} \cdot l$	Z-axis Z-axis	
	- squareness		15 µm	block square	
	- probing error	(0 – 1) µm	44 nm	ISO 10360-7:2011	
	2-D & 3-D (QS-type):	(0 – 200) mm (0 – 400) mm	0,7 µm + $7,5 \cdot 10^{-6} \cdot l$ 0,7 µm + $8,6 \cdot 10^{-6} \cdot l$	X- and Y-axis X- and Y-axis	
		(0 – 100) mm (0 – 250) mm	1,4 µm + $2,6 \cdot 10^{-6} \cdot l$ 1,4 µm + $2,0 \cdot 10^{-6} \cdot l$	Z-axis Z-axis	
	2-D (QI-type):	(0 – 200) mm (0 – 400) mm	0,7 µm + $7,5 \cdot 10^{-6} \cdot l$ 0,7 µm + $8,5 \cdot 10^{-6} \cdot l$	X- and Y-axis X- and Y-axis	
	Roundness instruments				
	- radial spindle	(0 – 100) nm	10 nm + 2 %·*RON*t	Hemisphere with reversal method, straight master, square master, optical flat, gauge blocks, Cylinder gauge, piëzo and laser, scale	
	- axial spindle	(0 – 100) nm	12 nm		
	- straightness column	(0 – 10) µm	38 nm + 3,5 %·z	In case probe linearity ≤ 1%	
	- straightness x-axis	(0 – 10) µm	0,14 µm + 1,2 %·z		
	- squareness rotating axis/x-axis	(0 – 10) µm	0,14 µm + 1,2 %·z		
	- parallelism rotating axis/column	(0 – 100) µm	0,28 µm + 1,2 %·z		
	- detector linearity	(0 – 100) µm	20 nm + 0,2 %·z		
	- detector force	(0 – 150) mN	2 mN		
	Roughness instruments			In accordance with ISO 12179:2000	
	- inclined optical flat		0,14 µm	Optical flat, Type A1,	

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	- Linearity X-axis		0,06 %·*RSm*	Type C1, Type D1 standards according to ISO 5436-1:2000 (high-end: with piëzo and laer).	
	- Vertical profile		12 nm+ 2 %·*d*		
	- roughness type D	(0 – 800) µm			
	Ra-value		4,2 nm + 4,2 %·*Ra*		
	Rz-value		42 nm + 2,8 %·*Rz*		
	- detector		20 nm + 0,2 %·z		
	Contour meters			Conform factory standard	
	- Linearity X1-axis / Y-axis Z2-axis	 (0 – 200) mm (0 – 600) mm	 0,09 µm + 0,29·10^{-6}·*l* 0,11 µm + 0,28·10^{-6}·*l*	With laser interferometer	
	- X1-axis measurement accuracy	(0 – 50) mm	0,24 µm + 0,80·10^{-6}·*l*	With X-axis master object	
	- X1-axis straightness	(0 – 200) mm	0,12 µm	With optical flat or straight edge	
	- Z1-axis measurement accuracy	(-30 – 30) mm	0,30 µm + 0,40·10^{-6}· *l*	With gauge blocks and optical flat	
	- Z2-axis measurement accuracy	(0 – 600) mm	1,0 µm + 2,4·10^{-6}· *l*	With steel step gauge	
DM 4 0	Diameter			*d* = measured diameter (m)	BE
	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	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
DM 5 0	Form error				BE
	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	
	- straightness of straight edges	(0 – 50) µm	36 nm + 0,12·10^{-6}·*L*	With autocolimator + 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	
	Roundness	*d* till 300 mm		With Roundness machine conform ISO 12181:2011 guideline	
		RONt:			
	- in- & outside ring	(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	
	- Test circles for ISO 10360-7:2011 (calibration chart)	RONt: (0 - 1) µm	40 nm	Vision system with multi step method	
	Contour				
	x-axis standard	(0-200) mm	0,24 µm + 0,16·10^{-6}·*l*	Formtracer SV-C4500	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
DM 6 0	Roughness				BE
	Surface Roughness			With roughness tester conform ISO 4287:1997	
	Groove depth step height	(0 – 20) µm		Formtracer SV-C4500	
	d		10 nm + 2%·*d*		
	Pt		10 nm + 2%·*Pt*		
	Ra	(0 – 20) µm	3 nm + 3%·*Ra*	Formtracer SV-C4500	
	Rz	(0 – 80) µm	30 nm + 2%·*Rz*	Formtracer SV-C4500	
	Rt	(0 – 80) µm	40 nm + 3%·*Rt*	Formtracer SV-C4500	
	RSm	10 µm – 250 µm	0,1%·*RSm*	Formtracer SV-C4500	
	RSm	10 µm – 250 µm	0,01%·*RSm*	laser interferometer + vision system	
DM 8 0	Co-ordinate Measuring Machines				OS
	Probe systems				
	- touch-trigger probe systems		0,10 µm	ISO 10360-5:2020	
	- scanning probe systems		0,10 µm	ISO 10360-5:2020	
	- 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		0,5 µm + $3{,}3 \cdot 10^{-6} \cdot l$	Steel / ceramic step gauge	
	Manual CMM With thermal compensation		0,6 µm + $0{,}4 \cdot 10^{-6} \cdot l$	Steel / ceramic step gauge	

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	CNC CMM No thermal compensation		$0{,}3\ \mu m + 3{,}6 \cdot 10^{-6} \cdot l$	Steel / ceramic step gauge	
	CNC CMM With thermal compensation		$0{,}3\ \mu m + 0{,}5 \cdot 10^{-6} \cdot l$ $0{,}05\ \mu m + 0{,}2 \cdot 10^{-6} \cdot l$ $0{,}1\ \mu m + 0{,}4 \cdot 10^{-6} \cdot l$ $0{,}1\ \mu m + 0{,}8 \cdot 10^{-6} \cdot l$	Steel / ceramic step gauge Zero ceramic eindmaat Zero Glass gauge blocks Steel / ceramic gauge blocks	
	CMM acceptance- or re-verification-measurements		$0{,}3\ \mu m + 0{,}7 \cdot 10^{-6} \cdot l$	With laserinterferometer and short gauge conform ISO 10360-2:2009	
	CMM components: -linear displacements -straightness -rotation and squareness	(0 – 20) m	See DM 2 0 $0{,}3\ \mu m + 0{,}7 \cdot 10^{-6} \cdot L$	VDI/VDE 2617, part 3 (1989) Assessment by laser, $l \leq 20$ m. ISO 10360-2:2009	
DM 9 0	Angle			With CMM: l = distance on longest leg (m) L = length shortest leg (m)	BE
	Angle gauges Blade type squares 90° (stock support squares)				
	- angle deviation	± 0,5°	$(0{,}5 \cdot m/L)''$ (≈ 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	$(1{,}5 + 1{,}0 \cdot l/L)$ µm	length of legs till (700 x 1000) mm	
TE 0 0	Temperature				B
TE 4 1	Self indicating thermometers	(5 – 40) °C	0,03 °C	Temperature bath (1)	

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) Secondary calibrations related to primary dimensional calibrations (DM)