RAAD VOOR ACCREDITATIE

Dutch Accreditation Council RvA
PO Box 2768 NL-3500 GT Utrecht

The Dutch Accreditation Council RvA, by law appointed as the national accreditation body for The Netherlands, hereby declares that accreditation has been granted to:

TRESCAL Hengelo B.V.
Calibration Laboratory
Hengelo

The organisation has demonstrated to be able to generate technical valid results in a competent way and work according to a management system.

This accreditation is based on an assessment against the requirements as laid down in EN ISO/IEC 17025:2017.

The accreditation covers the activities as specified in the authorized annex bearing the registration number.

The accreditation is valid provided that the organisation continues to meet the requirements.

The accreditation with registration number:

K 018

is granted on 15 September 1980

This declaration is valid until
1 December 2028

The board of the Dutch Accreditation Council,
on its behalf,

mr. J.A.W.M. de Haas

The Dutch Accreditation Council (RvA) is a signatory of the European co-operation for Accreditation (EA) Multilateral Agreement for accreditation in this field.

Annex to declaration of accreditation (scope of accreditation)
Normative document: EN ISO/IEC 17025:2017
Registration number: **K 018**

of **TRESCAL Hengelo B.V.**
Calibration Laboratory

This annex is valid from: **10-06-2026** to **01-12-2028** Replaces annex dated: **17-09-2025**

Location(s) where activities are performed under accreditation

Head Office

Joseph Schumpeterstraat 10
7559 SG
Hengelo
The Netherlands

Location	Abbreviation/ location code
Joseph Schumpeterstraat 10 7559 SG Hengelo The Netherlands	HLO
On site	OS

HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
DM 0 0	DIMENSIONAL QUANTITIES				
DM 1 0	Gauge blocks				HLO
	Gauge blocks, steel	0.5 mm – 100 mm 0.02 inch – 4 inch	0.06 µm + $1.2 \cdot 10^{-6} \cdot l$	Central length, fixed sizes	
	Gauge blocks, tungsten carbide	0.5 mm – 100 mm 0.02 inch – 4 inch	0.06 µm + $0.7 \cdot 10^{-6} \cdot l$	Central length, fixed sizes	
	Gauge blocks, ceramic	0.5 mm – 100 mm 0.02 inch – 4 inch	0.06 µm + $1.0 \cdot 10^{-6} \cdot l$	Central length, fixed sizes	

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

J.A.W.M. de Haas

[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".

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	Gauge blocks, steel / tungsten carbide / ceramic		0.05 µm + 0.1·10^{-6}·*l*	Length variation	
	Step gauge	up to 1000 mm	1.2 µm + 6.0·10^{-6}·*l*		
DM 1 0	Length gauges			Comparative measure	HLO
	Steel	125 mm – 500 mm	0.2 µm + 3·10^{-6} ·*l*		
DM 2 0	Line scales, distances				HLO
	Rulers (all models)	up to 300 mm	0.8 µm + 4·10^{-6}·*l*		
		up to 600 mm	1.1 µm + 4·10^{-6}·*l*		
		up to 3000 mm	6 µm + 5·10^{-6}·*l*		
		up to 100 m	6 µm + 6·10^{-6}·*l*		
DM 3 0	Length measuring instruments				HLO, OS
	1D-measuring machines (i)			Laser interferometer; machine equipped with	
		up to 20 m	0.15 µm + 0.7·*r* + 1.0·10^{-6}·*l*	Zerodur scales	
		up to 20 m	0.15 µm + 0.7·*r* + 1.3·10^{-6}·*l*	Glass scales	
		up to 20 m	0.15 µm + 0.7·*r* + 1.6·10^{-6}·*l*	Steel scales	
		up to 400 mm	0.3 µm + 0.7·*r* + 3·10^{-6}·*l*	Optical systems	
		up to 700 mm	0.05 µm + 0.5·10^{-6}·*l* + *S*	Using special gauge blocks	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
	Handheld tools for external measurements	0 mm – 200 mm	$0.45\ \mu m + 0.5 \cdot r + 25 \cdot 10^{-6} \cdot l$	e.g. vernier, micrometer	
		200 mm – 2000 mm	$4\ \mu m + 0.5 \cdot r + 5 \cdot 10^{-6} \cdot l$		
	Handheld tools for internal measurements (2-point)	0 mm – 200 mm	$0.7\ \mu m + 0.5 \cdot r + 25 \cdot 10^{-6} \cdot l$	e.g. vernier, internal micrometer	
		200 mm – 400 mm	$5\ \mu m + 0.5 \cdot r + 4 \cdot 10^{-6} \cdot l$		
	Handheld tools for internal measurements (2- and 3-point)	1 mm – 250 mm	$1.5\ \mu m + 0.5 \cdot r + 25 \cdot 10^{-6} \cdot l$	e.g. internal micrometers	
	Handheld tools for height- and depth measurements	0 mm – 200 mm	$0.7\ \mu m + 0.5 \cdot r + 25 \cdot 10^{-6} \cdot l$	e.g. (depth) vernier	
		200 mm – 500 mm	$4\ \mu m + 0.5 \cdot r + 5 \cdot 10^{-6} \cdot l$		
	Linear displacement sensor	up to 200 mm	$0.05\ \mu m + 0.7 \cdot r + 2.5 \cdot 10^{-6} \cdot l + S$	e.g. dial gauge	
		200 mm – 300 mm	$0.7\ \mu m + 0.7 \cdot r + 3.5 \cdot 10^{-6} \cdot l$	e.g. dial gauge	HLO
	Height gauge	up to 1500 mm	$0.8\ \mu m + 0.7 \cdot r + 2.5 \cdot 10^{-6} \cdot l$		HLO, OS
	Inside micrometer	up to 300 mm	$0.7\ \mu m + 0.7 \cdot r + 2.5 \cdot 10^{-6} \cdot l$		
		300 mm – 1000 mm	$0.4\ \mu m + 0.7 \cdot r + 2 \cdot 10^{-6} \cdot l$		
		1000 mm – 3000 mm	$0.4\ \mu m + 0.7 \cdot r + 2 \cdot 10^{-6} \cdot l$		HLO
	Film thickness gauge	up to 25 mm	$0.6\ \mu m + 0.7 \cdot r + 22 \cdot 10^{-6} \cdot l$		
	Laser distance meter	up to 25 m	$0.5\ mm + 40 \cdot 10^{-6} \cdot l + 0.6 \cdot r$		

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DM 4 0	Diameter, length				HLO
	Setting rings and ring gauges	Ø 1 mm – 4 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
		Ø 4 mm – 200 mm	1.0 µm + $2 \cdot 10^{-6} \cdot l$		
		Ø 200 mm – 500 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
	Pin gauge	up to Ø 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		
	Plug gauge	up to Ø 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		
	Thread wires	up to Ø 20 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		
	Other external diameters	up to Ø 100 mm	0.5 µm + $(1+6 \cdot \Delta T) \cdot 10^{-6} \cdot l$		HLO, OS
		up to Ø 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		HLO
	Other internal diameters	Ø 1 mm – 4 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
		Ø 4 mm – 200 mm	1.0 µm + $2 \cdot 10^{-6} \cdot l$		
		Ø 200 mm – 500 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
	Feeler gauges	up to 5 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		
	Setting gauges for micrometers	up to 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		HLO, OS
		300 mm – 1000 mm	0.4 µm + $2 \cdot 10^{-6} \cdot l$		HLO, OS
		1000 mm – 3000 mm	0.4 µm + $2 \cdot 10^{-6} \cdot l$		HLO
	Other distances for parallel faces	up to 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		HLO, OS
		300 mm – 1000 mm	0.4 µm + $2 \cdot 10^{-6} \cdot l$		HLO, OS
		1000 mm – 3000 mm	0.4 µm + $2 \cdot 10^{-6} \cdot l$		HLO
	Conical (taper) ring and pin	Ø 1 mm – 500 mm	1.8 µm + $0.4 \cdot 10^{-6} \cdot l$	$h \leq 390$ mm	HLO

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
DM 5 0	Form error				
	Roundness in- and externally	Ø 1 mm – 500 mm	0.05 µm + 0.01·*A*	A = roundness deviation	HLO
	Roundness testers and other instruments for measuring roundness		0.04 µm + 0.5·*A*	A = measured roundness	HLO, OS
	Knife edge straight edge	up to 100 mm	0.25 µm		
		100 mm – 300 mm	0.6 µm		
		300 mm – 500 mm	0.7 µm		
	Straight edge	up to 10 m	0.4 µm + 0.25·10^{-6}·*l*		
	Surface plate	Up to 6 x 10 m^2	0.2 µm + 1.5·10^{-6}·*l*	*l* = longest side of the surface plate	
	Flick standard (roundness standard)		0.15 µm		HLO
DM 6 0	Roughness				
	Surface texture measuring instruments	*R*a up to 5 µm	0.01 µm + 0.02·*A* + 0.5·*r*+*S*	*A* = *R*a-value of reference	HLO, OS
		*R*z up to 10 µm	0.01 µm + 0.05·*A* + 0.5·*r*+*S*	*A* = *R*z-value of reference	
		*R*t *R*max up to 10 µm	0.01 µm + 0.05·*A* + 0.5·*r*+*S*	*A* = *R*t *R*max-value of reference	
	Roughness standards	*R*a up to 10 µm	0.015 µm + 0.045·*A*	*A* = measured *R*a-value	HLO
		*R*z up to 15 µm	0.025 µm + 0.07·*A*	*A* = measured *R*z-value	
		*R*t (*R*max) up to 15 µm	0.025 µm + 0.07·*A*	*A* = measured *R*t (*R*max)-value	
	Groove depth (-standaard)	up to 6 mm	0.05 µm + 0.007·*A*	*A* = measured profile height	HLO

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
DM 7 0	Thread quantities external			e.g. screw plug gauge	HLO
	Pitch	up to 10 mm	2 µm		
	Profile angle	up to 180°	(0.2 + 9/*L*) arcmin		
	Simple pitch diameter	Ø 1 mm – 300 mm	α = 30°: (6.0 – 7.5) µm	According to Euramet/CG-10, method 1a or 1b	
		Ø 1 mm – 300 mm	α = 55° 60°: (3.2 – 4.1) µm		
		Ø 1 mm – 300 mm	α = 90°: (2.6 – 3.4) µm		
	Pitch diameter	Ø 1 mm – 300 mm	α = 30°: (6.0 – 7.5) µm	According to Euramet/CG-10, method 2a, 2b or 3	
		Ø 1 mm – 300 mm	α = 55° 60°: (3.2 – 4.1) µm		
		Ø 1 mm – 300 mm	α = 90°: (2.6 – 3.4) µm		
DM 7 0	Thread quantities				HLO
	Thread quantities measured with master scanner (*Thread trapezium excluded*)			Euramet/CG-10, § 4.3.1 d = nominal diameter α = flank angle P = pitch Cylindrical & Conical thread	
	Thread plug gauges (external thread)				
	outside, core diameter pitch diameter	Ø 2 mm – 90 mm	1.5 µm + $5 \cdot 10^{-6} \cdot l$	α ≥ 27°	
		Ø 2 mm – 90 mm	2.5 µm + $10 \cdot 10^{-6} \cdot l$		
			4.5 µm + $10 \cdot 10^{-6} \cdot l$	α < 27°	

HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
	Thread ring gauges (internal thread)				
	outside, core diameter pitch diameter	Ø 3 mm – 100 mm	1.5 µm + $10 \cdot 10^{-6} \cdot l$	α ≥ 27°	
		Ø 3 mm – 100 mm	2.5 µm + $10 \cdot 10^{-6} \cdot l$		
			4.5 µm + $10 \cdot 10^{-6} \cdot l$	α < 27°	
DM 7 0	Thread quantities internal			e.g. screw ring gauge	HLO
	Pitch	up to 10 mm	2 µm		
	Profile angle	up to 180°	(0.2 + 9/*L*) arcmin	Measurement on cast	
	Simple pitch diameter	Ø 4 mm – 200 mm	α = 30°: (9 – 14) µm	Euramet/CG-10, method 1a or 1b	
		Ø 4 mm – 200 mm	α = 55° 60°: (3.6 – 7) µm		
		Ø 4 mm – 200 mm	α = 90°: (3.1 – 6.2) µm		
	Pitch diameter	Ø 4 mm – 200 mm	α = 30°: (9 – 14) µm	Euramet/CG-10, method 2a or 2b	
		Ø 4 mm – 200 mm	α = 55° 60°: (3.6 – 7) µm		
		Ø 4 mm – 200 mm	α = 90°: (3.1 – 6.2) µm		
DM 8 0	Combined instruments (i)				HLO, OS
	1D-, 2D- en 3D-measuring machines	up to 20 m	0.15 µm + $0.7 \cdot r$ + $1.0 \cdot 10^{-6} \cdot l$	Laser interferometer, Zerodur scales	
		up to 20 m	0.15 µm + $0.7 \cdot r$ + $1.3 \cdot 10^{-6} \cdot l$	Laser interferometer, glass scales	
		up to 20 m	0.15 µm + $0.7 \cdot r$ + $1.6 \cdot 10^{-6} \cdot l$	Laser interferometer, steel scales	

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		up to 400 mm	0.3 µm + 0.7·r + 2.3·10^{-6}·l	Optical systems	
		up to 700 mm	0.05 µm + 0.5·10^{-6}·l + S	Using special gauge blocks	
	Deviation of nominal displacement	up to 20 m	0.15 µm + 0.7·r +1.0·10^{-6}·l	Laser interferometer, Zerodur scales	
		up to 20 m	0.15 µm + 0.7·r + 1.3·10^{-6}·l	Laser interferometer, glass scales	
		up to 20 m	0.15 µm + 0.7·r + 1.6·10^{-6}·l	Laser interferometer, steel scales	
		up to 400 mm	0.3 µm + 0.7·r + 2.3·10^{-6}·l	Optical systems	
		up to 700 mm	0.05 µm + 0.5·10^{-6}·l + S	Using special gauge blocks	
	Deviations transverse to the translation directions	up to 0.5 mm	0.1 µm + 3·10^{-6}·l + 0.005·A	A = measured deviation; measuring length up to 3000 mm	
	Rotational deviations around the translation direction	up to 400 arcsec	0.5 arcsec + 0.0035·H	H = measured angle; only horizontal translations	
		up to 2000 µm/m	2.5 µm/m + 0.0035·H		
		up to 400 arcsec	1.6 arcsec + 0.007·H	Up to 2000 mm translation; ceramic straight edge and 2 displacement sensors	
		up to 2000 µm/m	8 µm/m + 0.007·H		
	Other rotational deviations	up to 7200 arcsec	0.5 arcsec + 0.0016·H	H = measured angle, translation up to 20 m	
	Translation deviation along a rotational axis		0.025 µm		
	Parallelism of a rotation and a translation	translation up to 500 mm	1 arcsec		

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
	Squareness of 2 translations	up to 500 x 500 mm^2	1 arcsec	Ceramic square and displacement sensor	
		up to 500 x 500 mm^3	0.6 arcsec	Ceramic square and measurement system op measuring machine; reversal method	
	Squareness of a rotation and a translation	translation up to 150 mm	0.07 µm		
		translation up to 300 mm	0.7 µm		
DM 8 0	Coordinate Measuring Machines X, Y and Z axis			using calibration fixture (stepgauge) measuring (reference).	HLO, OS
		0 – 1020 mm	0.30 µm + $1.0 \cdot 10^{-6} \cdot l$		
		1020 – 2020 mm	0.70 µm + $1.0 \cdot 10^{-6} \cdot l$		
DM 8 0	Focus variation measuring machine	0 – 360 mm	0.5 µm + $0.5 \cdot 10^{-6} \cdot l$		OS
DM 8 1	Tools, products				HLO
	Surface profiles	up to 6 x 120 mm^2	0.05 µm + 0.007·*A*	*A* = measured profile height	
	Roughness	*R*a: up to 10 µm	0.015 µm + 0.045·*A*	*A* = measured Ra-value	
		*R*z: up to 15 µm	0.025 µm + 0.07·*A*	*A* = measured Rz-value	
		*R*t. (Rmax): up to 15 µm	0.025 µm + 0.07·*A*	*A* = measured Rt. (Rmax)-value	
	Straightness	up to 6 x 120 mm^2	0.05 µm + 0.007·*A*	*A* = measured profile height	
		up to 100 mm	0.25 µm		

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		100 mm – 300 mm	0.6 µm		
		300 mm – 500 mm	0.7 µm		
		up to 1000 mm	1.3 µm + $2 \cdot 10^{-6} \cdot l$		
		up to 10 m	0.5 µm + $0.5 \cdot 10^{-6} \cdot l$	-	HLO, OS
	Roundness external	up to Ø 500 mm	0.05 µm + $0.01 \cdot A$	A = measured roundness	HLO
	Roundness internal	Ø 0.7 mm – 500 mm	0.05 µm + $0.01 \cdot A$	A = measured roundness	
	Cylindricity	up to Ø 500 and up to height 100 mm	0.5 µm + $1.1 \cdot 10^{-6} \cdot H$ + $0.01 \cdot A$	A = measured cylindricity H = height cylinder	
		up to Ø 500 and up to height 500 mm	1.1 µm + $2 \cdot 10^{-6} \cdot H$ + $0.01 \cdot A$		
	Coaxiallity and concentricity	up to Ø 500 and up to height 500 mm	0.1 µm + $0.02 \cdot A$	A = measured coaxiallity / concentricity	
	Flatness	up to Ø 60 mm	0.04 µm		
		up to Ø 145 mm	0.06 µm		
		up to Ø 300 mm	0.6 µm		
		up to 6 x 10 m^2	0.2 µm + $1.5 \cdot 10^{-6} \cdot l$		HLO, OS
	Angles between sides or planes	up to 180°	(0.2 + 9/A) arcmin	A = leg length; leg length up to 200 mm	HLO
	Diameter external	up to Ø 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		
		up to Ø 100 mm	0.5 µm + $(1 + 6 \cdot \Delta T) \cdot 10^{-6} \cdot l$		HLO, OS
		Ø 300 mm – 500 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		HLO
	Diameter internal	Ø 1 mm – 4 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
		Ø 4 mm – 200 mm	1.0 µm + $2 \cdot 10^{-6} \cdot l$		
		Ø 200 mm – 500 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		

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DM 8 1	Tools, products	Distance of 2 parallel planes			HLO
	External	up to 300 mm	0.8 µm + $2.5 \cdot 10^{-6} \cdot l$		
		up to 100 mm	0.5 µm + $(1 + 6 \cdot \Delta T) \cdot 10^{-6} \cdot l$		HLO, OS
		300 mm – 3000 mm	0.4 µm + $2 \cdot 10^{-6} \cdot l$		HLO
	Internal	Ø 1 mm – 4 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
		Ø 4 mm – 200 mm	1.0 µm + $2 \cdot 10^{-6} \cdot l$		
		Ø 200 mm – 500 mm	1.2 µm + $6 \cdot 10^{-6} \cdot l$		
DM 8 1	Tools, products	Thread external			HLO
	Pitch	up to 10 mm	2 µm		
	Profile angle	up to 180°	(0.2 + 9/*L*) arcmin		
	Simple pitch diameter	Ø 1 mm – 300 mm	α = 30°: (6.0 – 7.5) µm	Euramet/CG-10, method 1a or 1b	
		Ø 1 mm – 300 mm	α = 55° 60°: (3.2 – 4.1) µm		
		Ø 1 mm – 300 mm	α = 90°: (2.6 – 3.4) µm		
	Pitch diameter	Ø 1 mm – 300 mm	α = 30°: (6.0 – 7.5) µm	Euramet/CG-10, method 2a or 2b	
		Ø 1 mm – 300 mm	α = 55° 60°: (3.2 – 4.1) µm		
		Ø 1 mm – 300 mm	α = 90°: (2.6 – 3.4) µm		
		Thread internal			
	Simple pitch diameter	Ø 4 mm – 100 mm	α = 30°: (9 – 14) µm	Euramet/CG-10, method 1a or 1b	
		Ø 4 mm – 100 mm	α = 55° 60°: (3.6 – 7) µm		
		Ø 4 mm – 100 mm	α = 90°: (3.1 – 6) µm		

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	Pitch diameter	Ø 4 mm – 100 mm	α = 30°: (9 – 14) µm	Euramet/CG-10, method 2a or 2b	
		Ø 4 mm – 100 mm	α = 55° 60°: (3.6 – 7) µm		
		Ø 4 mm – 100 mm	α = 90°: (3.1 – 6) µm		
DM 8 1	Tools, products			Using Alicona µCMM	HLO
	Distance of 2 features (planes, diameters, etc)	up to (310 × 310 × 310) mm^3	1.0 µm + $8.0 \cdot 10^{-6} \cdot l$		
	Diameter	up to 310 mm	1.0 µm + $7.5 \cdot 10^{-6} \cdot d$		
	Straightness	up to 310 mm	1.0 µm + $7.4 \cdot 10^{-6} \cdot l$		
	Roundness internal or external	up to Ø 310 mm	1.0 µm + $7.4 \cdot 10^{-6} \cdot d$		
	Position	up to (310 × 310 × 310) mm^3	2.1 µm + $18 \cdot 10^{-6} \cdot l$		
	Concentricity	up to Ø 310 mm	2.1 µm + $0.02 \cdot A$	A = measured concentricity	
	Flatness	up to (310 × 310) mm^2	1.0 µm + $7.2 \cdot 10^{-6} \cdot l$	l = largest length	
DM 9 0	Angle measurement				HLO
	Angle gauge block	0° – 180°	2 arcsec		
	Cylindrical square	up to Ø 300 mm, up to height 500 mm	0.9 µm + $2.1 \cdot 10^{-6} \cdot l$ + $0.02 \cdot A$	A = measured squareness	
	Square	up to 500 mm leg length	0.7 µm + $2.2 \cdot 10^{-6} \cdot l$ + $0.02 \cdot A$	A = measured squareness	
	Angle plate	90°	0.5 arcsec		

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	Autocollimator	up to 12.5 mm/m	0.5 µm/m + 0.001·*H* + 0.7·*r*		
		up to 2600 arcsec	0.1 arcsec + 0.001·*H* + 0.7·*r*		
	Spirit level	up to 12.5 mm/m	0.5 µm/m + 0.001·*H* + 0.7·*r*		
		up to 2600 arcsec	0.1 arcsec + 0.001·*H* + 0.7·*r*		
DM 9 1	Angle measurement				HLO
	Leveling instruments		0.01 mm/m		
DM 9 2	Angle measurement				HLO
	Polygon	up to 360°	0.5 arcsec		
	Pentagon prism	90°	0.5 arcsec		
DM 9 3	Angle measurement				HLO, OS
	Deviation of the nominal rotation	360°	0.9 arcsec + 0.7·*r*	f.i. rotary heads and rotary table	
DM 9 4	Angle measurement				HLO, OS
	Clinometer	up to 360°	5 arcsec		
MW 1 0	MASS AND WEIGHT				HLO, OS
MW 1 2	Weighing instruments	1 mg – 33 kg	$2.5 \cdot 10^{-5} \cdot m$ + last digit + h/2	h = Repeatability	
		1 mg – 2500 kg	$6 \cdot 10^{-5} \cdot m$ + last digit + h/2	h = Repeatability	

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HCS code	Measured quantity, Instrument, Measure	Frequency	CMC[1]	Remarks	Location
LF 0 0	DC/LF ELECTRICITY				
LF 1 0	Direct voltage				HLO, OS
	0 mV – 200 mV		$1.0 \cdot 10^{-5} \cdot U$, minimum 0.15 µV	Measuring	
	0.2 V – 2 V		$7 \cdot 10^{-6} \cdot U$		
	2 V – 20 V		$5 \cdot 10^{-6} \cdot U$		
	20 V – 200 V		$7 \cdot 10^{-6} \cdot U$		
	200 V – 1000 V		$8 \cdot 10^{-6} \cdot U$		
	0 mV – 220 mV		$2.0 \cdot 10^{-5} \cdot U$, minimum 1.5 µV	Generate	
	0.22 V – 2.2 V		$7 \cdot 10^{-6} \cdot U$		
	2.2 V – 22 V		$1.0 \cdot 10^{-5} \cdot U$		
	22 V – 220 V		$1.5 \cdot 10^{-5} \cdot U$		
	220 V – 1100 V		$1.0 \cdot 10^{-5} \cdot U$		
LF 2 0	Direct current				HLO, OS
	1 µA – 200 µA		$1 \cdot 10^{-4} \cdot I$, minimum 0.5 nA	Measuring	
	200 µA – 20 mA		$3 \cdot 10^{-5} \cdot I$		
	20 mA – 200 mA		$7 \cdot 10^{-5} \cdot I$		
	0.2 A – 2 A		$2.5 \cdot 10^{-4} \cdot I$		
	2 A – 20 A		$6 \cdot 10^{-4} \cdot I$		
	0 µA – 220 mA		$1.0 \cdot 10^{-4} \cdot I$, minimum 0.5 nA	Generate compliance < 0,5 V	
	0.22 A – 2.2 A		$1 \cdot 10^{-4} \cdot I$		
	2.2 A – 20 A		$2.0 \cdot 10^{-4} \cdot I$		
	20 A – 1000 A		$5 \cdot 10^{-3} \cdot I$	Generate, with coils	

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HCS code	Measured quantity, Instrument, Measure	Frequency	CMC[1]	Remarks	Location
LF 3 0	Alternating voltage				HLO, OS
	10 mV – 200 mV	20 Hz – 20 kHz	$1.4 \cdot 10^{-3} \cdot U$	Measuring	
	10 mV – 200 mV	20 kHz – 100 kHz	$4 \cdot 10^{-3} \cdot U$		
	0.2 V – 2 V	20 Hz – 10 kHz	$2.0 \cdot 10^{-4} \cdot U$		
	0.2 V – 2 V	10 kHz – 100 kHz	$1.0 \cdot 10^{-3} \cdot U$		
	2 V – 20 V	20 Hz – 10 kHz	$1.6 \cdot 10^{-4} \cdot U$		
	2 V – 20 V	10 kHz – 100 kHz	$1 \cdot 10^{-3} \cdot U$		
	20 V – 200 V	20 Hz – 10 kHz	$1.6 \cdot 10^{-4} \cdot U$		
	20 V – 200 V	10 kHz – 100 kHz	$1 \cdot 10^{-3} \cdot U$		
	200 V – 1000 V	55 Hz – 10 kHz	$2.0 \cdot 10^{-4} \cdot U$		
	200 V – 1000 V	10 kHz – 30 kHz	$1.0 \cdot 10^{-3} \cdot U$		
	1 kV – 100 kV	50 Hz	$1.0 \cdot 10^{-3} \cdot U$		
	2.2 mV – 22 mV	40 Hz – 20 kHz	$5 \cdot 10^{-4} \cdot U$	Generate	
	22 mV – 220 V	40 Hz – 20 kHz	$1.0 \cdot 10^{-4} \cdot U$		
	220 V – 1100 V	40 Hz – 1 kHz	$1.0 \cdot 10^{-4} \cdot U$		
LF 4 0	Alternating current				HLO, OS
	10 µA – 100 µA	55 Hz – 1 kHz	$4 \cdot 10^{-3} \cdot I$	Measuring	
	100 µA – 200 mA	55 Hz – 1 kHz	$6 \cdot 10^{-4} \cdot I$		
	0.2 A – 2 A	55 Hz – 1 kHz	$1.0 \cdot 10^{-3} \cdot I$		
	2 A – 20 A	55 Hz – 1 kHz	$1.3 \cdot 10^{-3} \cdot I$		
	20 A – 600 A	50 Hz	$6 \cdot 10^{-4} \cdot I$		
	100 µA – 220 mA	40 Hz – 1 kHz	$2.0 \cdot 10^{-4} \cdot I$	Generate	
	0.22 A – 2.2 A	40 Hz – 1 kHz	$3 \cdot 10^{-4} \cdot I$		
	2.2 A – 20 A	40 Hz – 440 Hz	$1.0 \cdot 10^{-3} \cdot I$		
	20 A – 1000 A	45 – 60 Hz	$5 \cdot 10^{-3} \cdot I$	Generate, with coils Calibration of clamps	HLO
	20 A – 200 A	60 – 440 Hz	$7.5 \cdot 10^{-3} \cdot I$		HLO

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HCS code	Measured quantity, Instrument, Measure	Frequency	CMC[1]	Remarks	Location
LF 6 1	Resistance				HLO, OS
	100 µΩ – 1 mΩ		$3 \cdot 10^{-4} \cdot R$	Measuring	
	1 mΩ – 100 mΩ		$1.5 \cdot 10^{-4} \cdot R$		
	100 mΩ – 1 Ω		$5 \cdot 10^{-5} \cdot R$		
	1 Ω – 2 Ω		$3.0 \cdot 10^{-5} \cdot$ R		
	2 Ω – 2 kΩ		$1.3 \cdot 10^{-5} \cdot R$		
	2 kΩ – 20 kΩ		$1.1 \cdot 10^{-5} \cdot R$		
	20 kΩ – 2 MΩ		$1.2 \cdot 10^{-5} \cdot R$		
	2 MΩ – 20 MΩ		$3.6 \cdot 10^{-5} \cdot R$		
	20 MΩ – 200 MΩ		$2.8 \cdot 10^{-4} \cdot R$		
	200 MΩ – 2 GΩ		$3.0 \cdot 10^{-3} \cdot R$		
	0 Ω		70 µΩ	Generate	
	100 µΩ, 1 mΩ, 10 mΩ		$1 \cdot 10^{-4} \cdot R$		
	100 mΩ		$4 \cdot 10^{-5} \cdot R$		
	1 Ω, 1.9 Ω		$8 \cdot 10^{-5} \cdot R$		
	10 Ω		$2.5 \cdot 10^{-5} \cdot R$		
	19 Ω, 100 Ω , 190 Ω, 1 kΩ, 1.9 kΩ, 10 kΩ , 19 kΩ, 100 kΩ, 190 kΩ		$2.0 \cdot 10^{-5} \cdot R$		
	1 MΩ, 1.9 MΩ		$3 \cdot 10^{-5} \cdot R$		
	10 MΩ		$4 \cdot 10^{-5} \cdot R$		
	19 MΩ, 100 MΩ		$6 \cdot 10^{-5} \cdot R$		
LF 6 5	LF Capacity				HLO, OS
	2 nF, 10 nF, 20 nF, 200 nF	1 kHz	$1.0 \cdot 10^{-3} \cdot C$	Generate only sine-shaped signals	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
PV 0 0	PRESSURE AND VACUUM				
PV 1 0	Gas pressure				
PV 1 1	Absolute pressure	(75 – 115) kPa	0.03 kPa	By comparison to a reference barometer	HLO
		(0.01 – 1.1) MPa	0.03 hPa + $\lvert 25 \cdot 10^{-5} \cdot (p - 0{,}1\ \text{MPa}) \rvert$		
		(1.1 – 60.1) MPa	$\lvert 1 \cdot 10^{-3} \cdot (p - 0.1\ \text{MPa}) \rvert$	By comparison with digital pressure indicators	HLO, OS
PV 1 2	Relative pressure	(-1.5 – -90) kPa	$25 \cdot 10^{-5} \cdot p_e$	[2]	HLO
		(1.5 – 1000) kPa	$25 \cdot 10^{-5} \cdot p_e$	[2]	
		(1 – 60) MPa	$1 \cdot 10^{-3} \cdot p_e$	[2] By comparison with digital pressure indicators	HLO, OS
PV 2 0	Liquid pressure				
PV 2 1	Absolute pressure	(120 – 300) kPa a	0.3 hPa + $1 \cdot 10^{-3} \cdot (p$ - 100 kPa)	By comparison with digital pressure indicators	HLO, OS
		(0.3 – 70.1) MPa a	0.3 hPa + $25 \cdot 10^{-5} \cdot (p$ - 0.1 MPa)		
PV 2 2	Relative pressure	(20 – 200) kPa g	$1 \cdot 10^{-3} \cdot p_e$	[2] By comparison with digital pressure indicators	HLO, OS
		(0.2 – 70) MPa g	$25 \cdot 10^{-5} \cdot p_e$	[2]	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
TE 0 0	TEMPERATURE				
TE 1 0	Resistance thermometer with and without readout	-20 °C up to 250 °C	0.10 °C	By comparison in liquid block baths with external reference probe	HLO, OS
		250 °C up to 650 °C	0.20 °C		
TE 3 0	Thermocouple with and without readout	-20 °C up to 250 °C	0.10 °C	By comparison in liquid block baths with external reference probe	HLO, OS
		250 °C up to 650 °C	0.20 °C		
TF 0 0	TIME AND FREQUENCY				
TF 2 0	Relative time				HLO
	Electronic chronometers	24 h	0.1 s / 24 h	Direct measurement	
	Mechanical chronometers	24 h	5 s / 24 h	Direct measurement	
TF 2 1	Time and Frequency				HLO
	10 Hz – 225 MHz		$3 \cdot 10^{-6} \cdot f$	Measure	
TF 2 2	Time interval				HLO
	1 µs – 1000 s		$3 \cdot 10^{-6} \cdot t$	Measuring; period applicable to repetitive signals	
	6 min^{-1} – 100.000 min^{-1}		$4 \cdot 10^{-6} \cdot n$	By comparison with frequency references with n = number of revolutions min^{-1}	

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HCS code	Measured quantity, Instrument, Measure	Range	CMC[1]	Remarks	Location
TQ 0 0	TORQUE				HLO, OS
TQ 1 2	Torque wrenches	0.1 – 1350 Nm	$1.5 \cdot 10^{-2} \cdot M + 0.5 \cdot r$		

Remarks
r = reading accuracy of the instrument

Temperature conditions for electrical calibrations is nominal 23 °C; temperature conditions for geometrical and torque calibrations is nominal 20 °C, temperature conditions for pressure and temperature calibrations is nominal 21 °C

This list of calibrations is, unless otherwise stated, applicable for calibrations performed inside the laboratory.

[2] $P_e = P - P_{amb}$: P_e is overpressure, P_{amb} is ambient pressure