CERTIFICATE OF ACCREDITATION

In terms of section 22(2) (b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-

NATIONAL METROLOGY INSTITUTE OF SOUTH AFRICA

DIMENSIONAL CALIBRATION LABORATORY

Accreditation Number: **1606**

is a South African National Accreditation System accredited Calibration laboratory provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying scope of accreditation Annexure "A", bearing the above accreditation number for

DIMENSIONAL METROLOGY

The facility is accredited in accordance with the recognised International Standard

ISO/IEC 17025:2017

The accreditation demonstrates technical competency for a defined scope and the operation of a laboratory quality management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

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Mr R Josias
Chief Executive Officer

Effective Date: 03 March 2020
Certificate Expires: 03 November 2024

ANNEXURE A

SCOPE OF ACCREDITATION

DIMENSIONAL METROLOGY

Accreditation Number: 1606

Permanent Address of Laboratory:
National Metrology Institute of SA
Dimensional Calibration Laboratory
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Technical Signatories
Mr O Krüger
Ms F Hungwe (Items 1.1, 4.1 & 5.1)
Mr P Masina (Items 2.1.2 , 2.2.1, 2.3.7 & 2.4.1)
Mr K Manana (Items 2.4.2, 2.2.4, 5.4.1, 5.4.2, 5.4.3 & 5.4.5)
Mr P Kuduntwane (Items 3.3, 5.4.3, 5.4.5 & 5.5.7)
Ms Z P Nzimande (Items 6.1.1, 6.1.4 & 6.1.8)

Nominated Representative: Ms L Ntatamala

Issue No.: 14
Date of Issue: 03 March 2020
Expiry Date: 03 November 2024

ITEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT	RANGE OF MEASURED QUANTITY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	METHOD/ PROCEDURE
1	**Radiations of the mise and Pratique**			
1.1	**Laser Radiations**			
1.1.2	Stabilized lasers Vacuum wavelength Optical frequency	 633 nm 474 THz	 8 fm 2.4 MHz	Comparison with a reference standard using master laser
2	**Linear Dimensions**			
2.1	**Length Instruments**			
2.1.1	Laser interferometer	0,1 m to 10 m	$\sqrt{(0,07)^2 + (0,2L)^2}$ µm L specified in m i.e. 0,07 to 2,00 µm	Comparison with a reference standard using master laser interferometer
2.1.2	EDM Instrument Comparison to length interferometer	0,1 m to 50 m	$\sqrt{(3)^2 + (0,012\ L)^2}$ mm L specified in m i.e. 3 to 3,06 mm	Comparison with a reference standard using laser interferometer
	Comparison to base line Comparison to base line Comparison to base line	50 m 500 m 1 000 m	3.5 mm 6.3 mm 11,0 mm	Comparison with a reference standard using base line

The CMC, expressed as an expanded uncertainty of measurement, is stated as the standard uncertainty of measurement multiplied by a coverage factor $k = 2$, corresponding to a confidence level of approximately 95%

Accreditation Manager

Accreditation No.: 1606
Date of Issue: 03 March 2020
Expiry Date: 03 November 2024

TEM	MEASURED QUANTITY OR TYPE OF GAUGE OR INSTRUMENT	RANGE OF MEASURED QUANTITY	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	METHOD/ PROCEDURE
2.2	**End Standards**			
2.2.1	Gauge Blocks	0,5 mm to 300 mm	$\sqrt{(20)^2 + (0{,}5L)^2}$ nm L specified in mm i.e. 20 nm to 151 nm	Comparison with a reference standard using laser interferometer or gauge block comparator
2.2.2	Length Bar	100 mm to 1 000 mm	$\sqrt{(0{,}1)^2 + (1L)^2}$ µm L specified in mm i.e. 100 µm to 1 000 µm	Comparison with a reference standard using gauge block and length interferometer
2.2.4	Step gauge	1 mm to 1 020 mm	0,3 + L µm L specified in m i.e. 0,3 to 1,3 µm	
2.3	**Line Standards**			
2.3.1	Precision line scale	0,001 mm to 400 mm	$\sqrt{(0{,}1)^2 + (0{,}002\ L)^2}$ µm L specified in mm i.e. 0,1 to 0,8 µm	Comparison with a reference standard using length interferometer
2.3.2	Stage micrometer	0,001 mm to 400 mm	$\sqrt{(0{,}1)^2 + (0{,}002\ L)^2}$ µm L specified in mm i.e. 0,1 to 0,8 µm	
2.3.7	Engineer or survey tape	10 m to 50 m	$\sqrt{(0{,}035)^2 + (0{,}007\ L)^2}$ mm L specified in m i.e. 0,078 to 0,352 mm	
2.3.9	Engineer steel rule	0,001 m to 2 m	$\sqrt{(0{,}03)^2 + (0{,}007\ L)^2}$ mm L specified in m i.e. 0,031 to 0,033 mm	

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Accreditation Manager

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2.4	**Diameter Standards**			
2.4.1	External Cylinder (plug) (Wedge comparison to gauge blocks)	0,1 mm to 30 mm	$\sqrt{(0,39)^2 + (0,003\ L)^2}$ µm L specified in mm i.e. 0,39 µm	Comparison with a reference standard using gauge blocks
	(1-D stylus comparator, gauge Substitution)	5 mm to 200 mm	$\sqrt{(0,07)^2 + (0,002\ L)^2}$ µm L specified in mm i.e. 0,07 µm to 0,41 µm	Comparison with a reference standard using 1-D stylus comparator or gauge substitution
2.4.2	Internal cylinder (ring) CMM (Zeiss) (1-D stylus comparator, gauge substitution)	5 mm to 250 mm	0,4 µm	Comparison with a reference standard using 1-D stylus comparator or gauge substitution
	(1-D stylus comparator, gauge substitution)	20 mm to 200 mm	$\sqrt{(0,07)^2 + (0,002\ L)^2}$ µm L specified in mm i.e. 0,08 µm to 0,41 µm	
3	**Angle**			
3.1	**Angle by Circle Dividers**			
3.1.1	Optical polygon	Up to 50 sec	$\sqrt{(0,11)^2 + (0,005\ A)^2}$ sec A specified in sec i.e. 0,11 to 0,27 sec	Direct measurement against a reference standard using Index table or flatness interferometer
3.3	**Angle Instruments**			
3.3.2 3.3.3 3.3.4	Electronic level Clinometer Spirit (bubble) level (calibration with laser interferometer small angle generator)	0.01 sec to 36 000 sec	$\sqrt{(0,4)^2 + (0,001\ A)^2}$ sec A specified in sec i.e. 4 to 36 sec	Direct measurement against a reference standard using Sine-bar or index table or flatness interferometer
	(Calibration using index table)	Up to 360º	2 sec	

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3.4	**Angle Artefacts**			
3.4.2	90º (steel, granite, try) square	Up to 10 µm	0,53 µm	Direct measurement against a reference standard using square tester
3.4.3	90º Cylinder square	Up to 10 µm	0,53 µm	
4	**Form**			
4.1	**Flatness Standards**			
4.1.1	Optical Flat	10 nm to 1 000 nm	15 nm	Direct measurement against a reference standard using Fizeau interferometer
4.1.2	Optical parallel	30 sec	0,3 sec	Direct measurement against a reference standard using master flat
4.2	**Roundness Standards**			
4.2.1	External cylinder (plug)	1 µm to 1 000 µm	$\sqrt{(0,06)^2 + (0,02\,R)^2}$ µm R specified in µm i.e. 0,06 to 20 µm	Direct measurement against a reference standard using Stylus-on-spindle roundness instrument
4.2.2	Internal cylinder (ring)	1 µm to 1 000 µm	$\sqrt{(0,06)^2 + (0,02\,R)^2}$ µm R specified in µm i.e. 0,06 to 20 µm	
4.2.3	Sphere or hemisphere	0,01 µm to 1 µm	15 nm	
4.2.4	Magnification standard	0,1 µm to 1 000 µm	$\sqrt{(0,49)^2 + (0,02\,R)^2}$ µm R specified in µm i.e. 0,49 to 20 µm	

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5	**Complex Geometry**			
5.1	**Surface Texture Standard**			
5.1.1	Groove (depth) or step height standard	0,01 µm to 3 000 µm	4 + 20d nm d specified in µm i.e. 4,2 to 60 000nm	Direct measurement against a reference standard using Stylus instrument
5.1.4	Roughness standard (Ra)	0,01 µm to 100 µm	10 + 30Ra nm Ra specified in µm i.e. 10 to 3 000 nm	
	Roughness standard (Rz)	0,01 µm to 100 µm	10 + 30Rz nm Rz specified in µm i.e. 10 to 3 000 nm	
5.4	**Coordinate Measuring Machine (CMM) artefacts**			
5.4.1 5.4.2 5.4.3 5.4.5	Ball (hole, bore) plate Ball bar Large CMM artifacts Test circle for imaging probing systems	Up to 1 m	0,55 + 2L µm L specified in mm	Direct measurement against a reference standard using CMM probe
6	**Various Dimensional**			
6.1	**Hand Instruments**			
6.1.1	External micrometer	Up to 25 mm	1,2 µm	Calibration by comparison to gauge blocks, length bars, flatness & parallelism with optical flats and parallels
6.1.4	Caliper	Up to 600 mm	28 µm	
6.1.8	Dial gauge	Up to 25 mm	3,3 µm	Calibration using a dial calibration tester, micrometer head and/or gauge blocks

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ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Accreditation Manager