CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

H.Rohloff (Pty) Limited
Unit 20 & 21, Falcon Lane, Lanseria Business Park, Erf 805
Lanseria Corporate Estate, Pelindaba Rd., Lanseria Ext. 26
Gauteng, South Africa

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION and **TESTING**

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

R. Douglas Leonard Jr., VP, PILR SBU

Expiry Date: 13 November 2023
Certificate Number: AC-2519

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

H.Rohloff (Pty) Limited

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Corporate Estate, Pelindaba Rd., Lanseria Ext. 26
Gauteng, South Africa
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CALIBRATION AND TESTING

Valid to: **November 13, 2023** Certificate Number: **AC-2519**

CALIBRATION

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Magnetic Particle Unit [1] Power Packs Benches	(100 to 500) A (501 to 3 000) A (3001 to 7 000) A	0.028 A/A 0.016 A/A 0.011 A/A	Current Timer Meter
Magnetometer / Gauss meter & Hall Effects Probes	5 G 10 G 20 G 25 G 50 G 65 G 75 G 100 G	0.18 G 0.35 G 0.7 G 0.88 G 1.8 G 2.3 G 2.6 G 3.5 G	Helmholtz Coil, Current Source
Eddy Current Flaw Detector [1]	100 Hz > 100 Hz to 1 kHz > 1 kHz to 2 MHz	0.3 Hz 9.6 Hz 13 kHz	Oscilloscope Gain test Box

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Ultrasonic Flaw Detectors [2]			Electrical verification of Ultrasonic Flaw Detectors per EN 12668-1:2010 Group 2 – Periodic and Repair Tests, Ranges and methods are as defined in the associated standard
Stability After Warm-up Time	Height Width	1.7 % of FSH 0.8 % of FSW	
Display Jitter	Screen Height Screen Width	1.3 % of FSH 0.3 % of FSW	
Stability Against Voltage Variation	Height Width	1.6 % of FSH 0.6 % of FSW	
Transmitter Voltage	Up to 110 V PRF: Up to 1000 Hz	5.5 % of reading	
Transmitter Rise time	Up to 20 ns	5 % of reading	
Transmitter Reverberation	Up to 110 V PRF: Up to 1000 Hz	0.2 % of reading	
Pulse Duration	Up to 100 ns	0.3 % of reading	
Amplifier Frequency Response	Up to 20 MHz	1.7 % of reading	
Centre Frequency	Up to 20 MHz	4 % of reading	
Equivalent Input Noise [3]	(10 to 100) V/√Hz	0.52 V/√Hz	
Accuracy of Calibrated Attenuator (Attenuation)	Up to 20 dB Up to 60 dB	0.6 dB 0.3 dB	
Vertical Linearity	Up to 100 % FSH	0.3 % of FSH	
Linearity of Time-base	Up to 100 % FSW	0.3 %of FSW	

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
PAUT Flaw Detectors [2]			Electrical verification of ultrasonic phased array equipment per ISO 18563-1:2015 Group 2 – Periodic and Repair Tests, ranges and methods are as defined in the associated standard
Transmitter:			
Voltage	40 V	5.5 % of reading	
Rise Time	Up to 2.5 ns	5 % of reading	
Pulse Duration	Up to 250 ns	0.8 % of reading	
Linearity of Time Delays	Up to 10 µs	0.8 % of reading	
Receiver:			
Frequency Response	Up to 20 MHz	2 % of reading	
Channel Gain Variation	80 % FSH	2 % of FSH	
Equivalent Input Noise	0.4 V (p-p) and 22.4 dB	1 % of FSH	
Gain Linearity	Up to 40 dB	0.6 dB	
Linearity of Vertical Display	Up to 100 % FSH	0.7 % of FSH	
Linearity of Time Delays	Up to 100 % FSW	0.5 % of FSW	

Ionizing Radiation

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Ambient Dose Equivalent Rate	(20 to 1000) µSv/h	14 % of reading	^{137}Cs Source and Ambient Dose Equivalent Rate meter
Dose Equivalent	(20 to 200) µSv (201 to 1 000) µSv	13 % of reading 13 % of reading	^{137}Cs Source, Ambient Dose Equivalent Rate meter, and time measuring device

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Coating Thickness Meters	24 µm (50 to 52) µm (252 to 254) µm 466 µm	2.1 µm 2.1 µm 2.2 µm 2.3 µm	Coating Thickness Foil
Ultrasonic Thickness Gauges	(1 to 5) mm (5.1 to 10) mm (10.1 to 25) mm (25.1 to 100) mm	0.07 mm 0.07 mm 0.083 mm 0.083 mm	Step Wedge Gauge V1 Block
Surface Roughness Testers	(0 to 0.8) µm Ra (0.9 to 1.6) µm Ra (1.7 to 3.2) µm Ra	0.21 µm 0.21 µm 0.21 µm	Surface Roughness Standards

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
UCI Hardness Testers	(50 to 312) HV (313 to 534) HV (535 to 767) HV	4 HV 8.3 HV 9.2 HV	Indirect verification using Vickers Hardness Test Block
Rebound Hardness Tester	Low: up to 240 HV Mid: (240 to 600) HV High: > 600 HV	3.2 HV 6.4 HV 13 HV	Indirect verification using Vickers Hardness Test Block
AC and DC Hand Yoke	4.5 kgf 18 kgf	0.02 kgf 0.02 kgf	Weight Lift Test Bar

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Visible Light Lux Meters	(50 to 272) lux (273 to 530) lux (531 to 1 095) lux (1 096 to 2 000) lux	7 lux 14 lux 26 lux 44 lux	Reference Lux Meter
UV-A UV-A Meters	(150 to 820) µW/cm^2 (821 to 1 025) µW/cm^2 (1 026 to 1 530) µW/cm^2 (1 531 to 2 000) µW/cm^2	80 µW/cm^2 100 µW/cm^2 150 µW/cm^2 200 µW/cm^2	Reference UVA-Meter

Thermodynamic

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature IR Cameras IR Thermometers	20 °C 70 °C 140 °C	2.8 °C 3.1 °C 4 °C	Black Body $\lambda = 8$ to 14 µm, $\varepsilon = 0.95$
	150 °C 550 °C 980 °C	6.2 °C 11 °C 14 °C	Black Body $\lambda = 8$ to 14 µm, $\varepsilon = 0.99$
Temperature [1] Industrial Ovens	(40 to 80) °C	1.1 °C	Type K thermocouple and readout

TESTING

Mechanical

Specific Tests and/or Properties Measured	Specification, Standard, Method, or Test Technique	Items, Materials or Product Tested	Key Equipment or Technology
Evaluating Performance Characteristics: Horizontal Linearity, Vertical Linearity, Resolution, Sensitivity and Noise	ASTM E317 – 16, Except 6.6 and 6.7	Ultrasonic Pulse-Echo Testing Instruments and Systems, including Ultrasonic Flaw Detectors[1]	Vertical and Horizontal Linearity Test Blocks and Resolution Test Block
Crack Detection Performance Evaluation.	Internal Procedure: HRSC-001	Eddy Current Crack Detectors	Eddy Current Crack Detection Blocks

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 (k=2), corresponding to a confidence level of approximately 95%.

Notes:

1. On-site calibration service is available for this parameter, since on-site conditions are typically more variable than those in the laboratory, larger measurement uncertainties are expected on-site than what is reported on the accredited scope.
2. FSH = full screen size height, FSW = full screen width.
3. For instruments designed to comply with EN 12668-1:2010, the centre frequency (f_o) is calculated using $f_o = \sqrt{(f_u \times f_l)}$, otherwise the expression $f_o = (f_u + f_l)/2$ is used
4. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2519.

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