CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

Golden Falls Trading 429 (Pty) Ltd
T/A Coral-i Services
508 Nupen Crescent, Halfway House
Midrand Gauteng, South Africa 1685

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

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.

Jason Stine, Vice President

Expiry Date: 30 March 2026

Certificate Number: L2448

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

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T/A Coral-i Services
508 Nupen Crescent
Halfway House
Midrand Gauteng, South Africa 1685
Werner Muller +27 (11) 315 5500

CALIBRATION

Valid to: **March 30, 2026** Certificate Number: **L2448**

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
DC Current – Generate [1]	(0 to 320) µA (0.32 to 3.2) mA (3.2 to 32) mA (32 to 320) mA (0.32 to 3.2) A (3.2 to 10.5) A (10.5 to 20) A	30 nA + 0.014 % of reading 0.1 pA + 0.014 % of reading 1.2 µA + 0.014 % of reading 13 µA + 0.016 % of reading 160 µA + 0.06 % of reading 1.5 mA + 0.055 % of reading 5.4 mA + 0.055 % of reading	Comparison to Wavetek 9100 Universal Calibration System
DC Current - Measure [1]	(0 to 10) mA (10 to 100) mA (0.1 to 1) A (1 to 3) A	23 µA + 0.05 % of reading 8 µA + 0.05 % of reading 0.15 mA + 0.1 % of reading 0.8 mA + 0.12 % of reading	Comparison to HP 34401A Multimeter
AC Current (Generate) [1]	(32 to 320) µA 10 Hz to 3 kHz (3 to 10) kHz (10 to 20) kHz (0.32 to 3.2) mA 10 Hz to 3 kHz (3 to 10) kHz (10 to 20) kHz (3.2 to 32) mA 10 Hz to 3 kHz (3 to 10) kHz (10 to 20) kHz	 4 µA + 0.07 % of reading 4.1 µA + 0.1 % of reading 4.6 µA + 0.2 % of reading 4 µA + 0.07 % of reading 4.1 µA + 0.1 % of reading 4.6 µA + 0.2 % of reading 8.8 µA + 0.07 % of reading 11 µA + 0.1 % of reading 17 µA + 0.2 % of reading	Comparison to Wavetek 9100 Universal Calibration System
AC Current (Generate) [1]	(32 to 320) mA 10 Hz to 3 kHz (3 to 10) kHz (10 to 20) kHz	 88 µA + 0.08 % of reading 97 µA + 0.1 % of reading 0.11 mA + 0.2 % of reading	Comparison to Wavetek 9100 Universal Calibration System

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Current (Generate) [1]	(0.32 to 3.2) A 10 Hz to 3 kHz (3 to 10) kHz (3.2 to 10.5) A 10 Hz to 3 kHz (3 to 10) kHz	 0.82 mA + 0.1 % of reading 3 mA + 0.25 % of reading 7 mA + 0.2 % of reading 13 mA + 0.5 % of reading	Comparison to Wavetek 9100 Universal Calibration System
AC Current (Measure) [1]	(0 to 1) A 10 Hz to 5 kHz (1 to 3) A 10 Hz to 5 kHz	 0.61 mA + 0.1 % of reading 2.4 mA + 0.15 % of reading	Comparison to HP 34401A Multimeter
Resistance (Generate) [1]	(0 to 40) Ω (40 to 400) Ω (400 to 4) kΩ (4 to 40) kΩ (40 to 400) kΩ (0.4 to 4) MΩ (4 to 40) MΩ	58 mΩ + 0.1 % of reading 0.12 µΩ + 0.035 % of reading 0.25 µΩ + 0.035 % of reading 2.4 Ω + 0.025 % of reading 24 Ω + 0.025 % of reading 0.23 kΩ + 0.04 % of reading 2.3 kΩ + 0.05 % of reading	Comparison to Wavetek 9100 Universal Calibration System
Resistance (Measure) [1]	(0 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ	0.05 Ω + 0.01 % of reading 0.02 Ω + 0.01 % of reading 0.15 Ω + 0.01 % of reading 1.7 Ω + 0.01 % of reading 23 Ω + 0.01 % of reading 0.42 kΩ + 0.04 % of reading 2.3 kΩ + 0.8 % of reading	Comparison to HP 34401A Multimeter
DC Voltage (Generate) [1]	(0 to 320) mV (0.32 to 3.2) V (3.2 to 32) V (32 to 320) V (320 to 1 050) V	5.5 µV + 0.006 % of reading 55 µV + 0.006 % of reading 550 µV + 0.006 5 % of reading 5.7 mV + 0.006 5 % of reading 30 mV + 0.006 % of reading	Comparison to Wavetek 9100 Universal Calibration System
DC Voltage (Measure) [1]	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1 000) V	0.004 mV + 0.005 % of reading 0.01 mV + 0.004 % of reading 0.07 mV + 0.003 5 % of reading 0.93 mV + 0.004 5 % of reading 14 mV + 0.004 5 % of reading	Comparison to HP 34401A Multimeter
AC Voltage (Generate) [1]	(0 to 10) mV 10 Hz to 3 kHz (3 to 10) kHz (10 to 32) mV 10 Hz to 3 kHz (3 to 10) kHz	 490 µV + 0.08 % of reading 630 µV + 0.08 % of reading 230 µV + 0.08 % of reading 250 µV + 0.08 % of reading	Comparison to Wavetek 9100 Universal Calibration System, HP 34401A Multimeter

Electrical – DC/Low Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
AC Voltage (Generate) [1]	(32 to 320) mV 10 Hz to 3 kHz (3 to 10) kHz (0.32 to 3.2) V 10 Hz to 3 kHz (3 to 10) kHz (3.2 to 32) V 10 Hz to 3 kHz (3 to 10) kHz (32 to 105) V 10 Hz to 3 kHz (3 to 10) kHz (105 to 320) V 40 Hz to 1 kHz (1 to 3) kHz (2 to 10) kHz (320 to 800) V 40 Hz to 1 kHz (1 to 3) kHz (2 to 10) kHz	 100 µV + 0.08 % of reading 110 µV + 0.08 % of reading 250 µV + 0.08 % of reading 320 µV + 0.08 % of reading 2.3 mV + 0.08 % of reading 3 mV + 0.1 % of reading 8 mV + 0.08 % of reading 10 mV + 0.1 % of reading 23 mV + 0.09 % of reading 23 mV + 0.12 % of reading 38 mV + 0.12 % of reading 90 mV + 0.09 % of reading 91 mV + 0.12 % of reading 140 mV + 0.12 % of reading	Comparison to Wavetek 9100 Universal Calibration System, HP 34401A Multimeter
AC Voltage (Measure) [1]	(0 to 100) mV 10 Hz to 20 kHz (0.1 to 1) V 10 Hz to 20 kHz (1 to 10) V 10 Hz to 20 kHz (10 to 100) V 10 Hz to 20 kHz (10 to 100) V 10 Hz to 20 kHz	 0.05 mV + 0.06 % of reading 0.35 mV + 0.06 % of reading 3.5 mV + 0.06 % of reading 35 mV + 0.06 % of reading 270 mV + 0.06 % of reading	Comparison to Wavetek 9100 Universal Calibration System, HP 34401A Multimeter
Oscilloscopes [1] Vertical System – 50 Ω Vertical System – 1 MΩ	1 mV to 2 V/div 1 mV to 20 V/div	0.65 % of reading	Comparison to Wavetek 9100 Universal Calibration System
Oscilloscopes Horizontal System – 50 Ω	2 ns to 5 s/div	0.31 % of reading	
Oscilloscopes [1] Bandwidth – 50 Ω 1 mV to 2 V/div	50 kHz to 100 MHz 50 kHz to 250 MHz 50 kHz to 600 MHz	5.4 % of bandwidth 6.2 % of bandwidth 7.7 % of bandwidth	Comparison to Wavetek 9100 Universal Calibration System

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Attenuation [1]	(0 to 11) dB, 1 dB steps 10 MHz to 10 GHz (0 to 70) dB, 10 dB steps (10 to 18) GHz	0.35 dB + 0.005 dB/dB 0.65 dB + 0.015 dB/dB	Comparison to Step attenuator, power meter, power senso
Voltage Reflection [1] Coefficient – (0 to 1) (N-M) VRC (N-F)	10 MHz to 2 GHz (2 to 10) GHz (10 to 18) GHz 10 MHz to 2 GHz (2 to 10) GHz (10 to 18) GHz	$0.016 + 0.013\rho^2 + 0.067\rho$ $0.033 + 0.043\rho^2 + 0.067\rho$ $0.085 + 0.062\rho^2 + 0.067\rho$ $0.016 + 0.013\rho^2 + 0.067\rho$ $0.029 + 0.046\rho^2 + 0.067\rho$ $0.036 + 0.076\rho^2 + 0.067\rho$	Comparison to Scalar network analyzer
RF Power – Measure [1]	1 mW 50 MHz	1 % of reading	Comparison to Step attenuator, power meter, power senso
RF Power – Measure [1]	(-25 to 13) dBm 100 kHz to 10 MHz (-50 to 13) dBm 10 MHz to 50 MHz 50 MHz to 6 GHz 6 GHz to 18 GHz 18 GHz to 26 GHz 26 GHz to 36 GHz 36 GHz to 40 GHz	0.33 dB 0.15 dB 0.14 dB 0.21 dB 0.27 dB 0.34 dB 0.53 dB	Comparison to RF Power meter w/Power Sensors. UUT SWR ≤1.5
RF Power – Measure [1]	(13 to 50) dBm 10 MHz to 1 GHz	0.21 dB	Comparison to RF Power meter w/Power Sensors, Attenuator
RF Power – Source [1]	1 mW 50 MHz	1 % of reading	Comparison to Output of RF Power Meter
RF Power – Source [1]	(-25 to 13) dBm 100 kHz to 10 MHz (-50 to 13) dBm 10 MHz to 50 MHz 50 MHz to 6 GHz (6 GHz to 18) GHz (18 GHz to 26) GHz (26 GHz to 36) GHz (36 GHz to 40) GHz (13 to 50) dBm 200 MHz to 1 GHz	0.46 dB 0.17 dB 0.16 dB 0.26 dB 0.32 dB 0.39 dB 0.66 dB 0.31 dB	Comparison to RF Power meter w/Power Sensors, RF Signal Generators, Power Amplifier

Electrical – RF/Microwave

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
RF Power Sensors – Calibration Factor [1]	100 kHz to 300 kHz 300 kHz to 50 MHz 50 MHz to 6 GHz 6 GHz to 18 GHz 18 GHz to 26 GHz 26 GHz to 36 GHz 36 GHz to 40 GHz	5.3 % of reading 1.7 % of reading 2 % of reading 3.4 % of reading 5 % of reading[2] 6.7 % of reading[2] 10 % of reading[2]	Comparison to Reference power sensor and power meter with RF Generator
Amplitude Modulation – Measure & Generate [1] CW: 10 MHz to 1.3 GHz CW: 150 kHz to 10 MHz	 Rate: 50 Hz to 50 kHz Depth (5 to 99) %Depth Rate: 50 Hz to 10 kHz Depth (5 to 99) %Depth	 1.7 % of reading 2.6 % of reading	Comparison to Modulation Meter w/ RF Signal Generator
Frequency Modulation – Measure & Generate [1] CW: 10 MHz to 1.3 GHz CW: 250 kHz to 10 MHz	 Rate: 50 Hz to 100 kHz 400 kHz Peak Deviation Rate: 20 Hz to 10 kHz 40 kHz Peak Deviation	 1.3 % of reading 2.4 % of reading	Comparison to Modulation Meter w/ RF Signal Generator
Distortion [1]	(-85 to 0) dB 20 Hz to 20 kHz 20 kHz to 100 kHz	 1.4 dB 2.5 dB	Comparison to Audio Analyzer

Length – Dimensional Metrology

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Calipers – Outside, Inside Measurements	(0 to 150) mm	17 µm	Comparison to Multifunction Gauge Block
Micrometers	(0 to 150) mm	12 µm	Comparison to Multifunction Gauge Block
Dial Gages	(0 to 10) mm	4.5 µm	Comparison to Multifunction Gauge Block

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Torque Tools	(2 to 40) N·m	1.8 % of reading	Comparison to Torque transducer and readout

Photometry and Radiometry

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Optical Time Domain Reflectometer – (OTDR): Distance – Wavelengths: (1310, 1550,1625) nm Refractive Index 1.46	Fiber Length: 18.8 km	0.5 m + 1 sampling interval	Comparison to Single mode Optical Delay Line
Optical Power Level (850 to 1 650) nm	(-50 to +20) dBm	0.3 dB + 46 nW	Comparison to Optical Power meter & head

Time and Frequency

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Frequency – Measure [3]	10 Hz to 100 kHz 100 kHz to 1 MHz (1 to 10) MHz 10 MHz to 40 GHz	$5.8 \times 10^{-8} \cdot f + 0.000\ 8$ Hz $5.8 \times 10^{-8} \cdot f + 0.0082$ Hz $5.8 \times 10^{-8} \cdot f + 0.082$ Hz $5.8 \times 10^{-8} \cdot f + 0.82$ Hz	Comparison to GPS Receiver, Frequency Counter
Frequency – Generate [3]	10 Hz to 100 kHz 100 kHz to 1 MHz (1 to 10) MHz 10 MHz to 40 GHz	$5.8 \times 10^{-8} \cdot f + 0.0010$ Hz $5.8 \times 10^{-8} \cdot f + 0.01$ Hz $5.8 \times 10^{-8} \cdot f + 0.1$ Hz $5.8 \times 10^{-8} \cdot f + 1.0$ Hz	Comparison to GPS Receiver, Frequency Counter, Signal Generator

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. For the calibration of RF Power Sensors - Calibration Factor excludes VRC measurements above 18 GHz.
3. f = frequency in hertz.
4. This scope is formatted as part of a single document including Certificate of Accreditation No. L2448.

Jason Stine, Vice President