

International Accreditation Service
CERTIFICATE OF ACCREDITATION

This is to signify that

AL HOTY ANALYTICAL SERVICES, CALIBRATION DEPARTMENT

YARD NO. 304, ROAD 4306, BLOCK 343
MINA SULMAN
INDUSTRIAL AREA
KINGDOM OF BAHRAIN

Calibration Laboratory CL-132

has met the requirements of the IAS Accreditation Criteria for Calibration Laboratories (AC204), has demonstrated compliance with the ANS/ISO/IEC Standard 17025:2005, *General requirements for the competence of testing and calibration laboratories*, and has been accredited commencing October 3, 2012, for the calibration discipline(s) listed in the approved scope of accreditation. The laboratory meets IAS program requirements in the field of calibration.



Patrick V. McCullen
Vice President



C. P. Ramani, P.E.
President



(see attached scope of accreditation for fields of calibration and accredited calibration methods)

Print Date: 11/20/2012

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Al Hoty Analytical Services, Calibration Department CL-132

Al Hoty Analytical Services, Calibration Department
 Yard No. 304, Road 4306, Block 343
 Mina Sulman, Industrial Area
 Kingdom of Bahrain

Marcelino Arevalo
 Quality Manager
 973 17727450

MEASUREMENT AREA	RANGE & RESOLUTION	CALIBRATION MEASUREMENT CAPABILITY ¹ (CMC) (±)	TECHNIQUE, REFERENCE STANDARD, EQUIPMENT
<i>Dimensional</i>			
Calipers	0 to 300mm/0.01 >300mm to 1M/0.01	16.4µm 19 µm	Gauge blocks, caliper checker
Micrometers	0 to 25mm/0.001 >25 to 50mm/0.001 >50 to 100mm/0.001	1.1 µm 1.8 µm 2.5 µm	Gauge blocks
Dial indicators	0 to 1mm/0.002 (10 to 10mm/0.01)	3.1 µm 5.8 µm	Dial indicator calibrator

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<i>Mechanical</i> Scales and balances	0 to 220g/0.0001g (0 to 2kg/0.01g) (0 to 40kg/0.1g)	0.15mg 9.8mg 0.81g	Class E2 Standard Weights Class E2 Standard Weights Class E2 and F1 Standard Weights
Torque wrenches	0 to 100Nm >100 to 1000Nm	1.62% 1.2%	Torque wrench analyzer
Pressure gages	10 to 10,000psi	0.27% of Reading	Dead Weight Tester
Force, Compression and Tension	(1 to 100kN) (1 to 1000kN) (1 to 3000kN)	0.29% of reading 0.29% of reading 0.29% of reading	Master load cells

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<i>Thermal</i>			
Thermometers			
Digital	-20 to 150°C/0.01°C	0.08°C	SPRT and calibration bath
Liquid-in-glass	-20 to 150°C/1°C	0.23°C	
Dial	-20 to 150°C/1°C	0.48°C	
Thermocouple – Generate/Measure Type B	600°C to 800°C >800°C to 1000°C >1000°C to 1550°C >1550°C to 1820°C	0.44°C 0.34°C 0.30°C 0.33°C	Fluke 5520A Calibrator
Type C	0 to 150°C >150°C to 650°C >650°C to 1000°C >1000°C to 1800°C >1800°C to 2316°C	0.30°C 0.26°C 0.31°C 0.50°C 0.84°C	Fluke 5520A Calibrator



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<i>Thermal(continued)</i> Thermocouple – Generate/Measure Type E Type J	-250°C to -100°C	0.50°C	Fluke 5520A Calibrator
	>-100°C to -25°C	0.16°C	
	>-25°C to 350°C	0.14°C	
	>350°C to 650°C	0.16°C	
	>650°C to 1000°C	0.21°C	
	-210°C to -100°C	0.27°C	Fluke 5520A Calibrator
	>-100°C to -30°C	0.16°C	
	>-30°C to 150°C	0.14°C	
	>150°C to 760°C	0.17°C	
	>760°C to 1200°C	0.23°C	

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<i>Thermal(continued)</i> Thermocouple – Generate/Measure Type K	-200°C to -100°C	0.33°C	Fluke 5520A Calibrator	
	>-100°C to -25°C	0.18°C		
	>-25°C to 120°C	0.16°C		
	>120°C to 1000°C	0.26°C		
	>1000°C to 1372°C	0.40°C		
	Type L	-200°C to -100°C	0.37°C	Fluke 5520A Calibrator
		>-100°C to 800°C	0.26°C	
		>800°C to 900°C	0.17°C	
	Type N	-200°C to -100°C	0.40°C	Fluke 5520A Calibrator
		>-100°C to -25°C	0.22°C	
		>-25°C to 120°C	0.19°C	
		>120°C to 410°C	0.18°C	
>410°C to 1300°C		0.27°C		

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<i>Thermal(continued)</i> Thermocouple – Generate/Measure Type R	0°C to 250°C >250°C to 400°C >400°C to 1000°C >1000°C to 1767°C	0.57°C 0.35°C 0.33°C 0.40°C	Fluke 5520A Calibrator
Type S	0°C to 250°C >250°C to 1000°C >1000°C to 1400°C >1400°C to 1767°C	0.47°C 0.36°C 0.37°C 0.46°C	Fluke 5520A Calibrator
Type T	-250°C to -150°C >-150°C to 0°C >0°C to 120°C >120°C to 400°C	0.63°C 0.24°C 0.16°C 0.14°C	Fluke 5520A Calibrator



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<i>Thermal(continued)</i> Thermocouple – Generate/Measure Type U	-200°C to 0°C >0°C to 600°C	0.56°C 0.27°C	Fluke 5520A Calibrator
RTD - Generate	PT-395, 100Ω -200 to -80°C >-80 to 0°C >0 to 100°C >100 to 300°C >300 to 400°C >400 to 630°C >630 to 800°C	0.05°C 0.05°C 0.7°C 0.09°C 0.1°C 0.12°C 0.23°C	Fluke 5520A Calibrator

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<i>Electrical – DC/LF</i> DC Voltage – Generate	(0 to 329.9999 mV) (0 to 3.299999 V) (0 to 32.99999 V) (30 to 329.9999 V) (100 to 1000.000 V)	ppm of output + μV 20 + 1 11 + 2 12 + 20 18 + 150 18 + 1500	Fluke 5520A Calibrator
AC Voltage – Generate	1.0 to 32.999 mV (10 to 45 Hz) (45 Hz to 10 kHz) (10 to 20 kHz) (20 to 50 kHz) (50 to 100 kHz) (100 to 500 kHz)	ppm of output + μV 800 + 6 150 + 6 200 + 6 1000 + 6 3500 + 12 8000 + 50	Fluke 5520A Calibrator

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<i>Electrical – DC/LF(continued)</i> AC Voltage – Generate	0.33 to 3.29999 V (10 to 45 Hz)	300 + 50	Fluke 5520A Calibrator
	(45 Hz to 10 kHz)	150 + 60	
	(10 to 20 kHz)	190 + 60	
	(20 to 50 kHz)	300 + 50	
	(50 to 100 kHz)	700 + 125	
	(100 to 500 kHz)	2400 + 600	
	3.3 to 32.9999 V (10 to 45 Hz)	190 + 2000	
	(45 Hz to 10 kHz)	200 + 6000	
	(10 to 20 kHz)	250 + 6000	
	(20 to 50 kHz)	300 + 6000	
(50 to 100 kHz)	2000 + 50000		

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<i>Electrical – DC/LF(continued)</i> AC Voltage – Generate	330 to 1020 V (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz) (0 to 329.999 µA) (0 to 3.29999 mA) (0 to 32.9999 mA) (0 to 329.999 mA) (0 to 1.09999 A) (1.1 to 2.99999 A) (0 to 10.9999 A on 20 A Range) (11 to 20.5 A)	300 + 10000 250 + 10000 300 + 10000 ppm of output + µA 150 + 0.02 100 + 0.05 100 + 0.25 100 + 2.5 200 + 40 380 + 40 500 + 500 1000 + 750	Fluke 5520A Calibrator

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<i>Electrical – DC/LF(continued)</i> AC Current – Generate	29.00 to 329.99 µA (10 to 20 Hz) (20 to 45 Hz) (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz) (10 to 30 kHz)	% of output + µA 0.2 + 0.1 0.15 + 0.1 0.125 + 0.1 0.3 + 0.15 0.8 + 0.2 1.6 + 0.4	Fluke 5520A Calibrator
	0.33 to 3.2999 mA (10 to 20 Hz) (20 to 45 Hz) (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz) (10 to 30 kHz)	0.2 + 0.15 0.125 + 0.15 0.1+ 0.15 0.2 + 0.2 0.5 + 0.3 1.0 + 0.6	

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<i>Electrical – DC/LF(continued)</i> AC Current – Generate	3.3 to 32.999 mA (10 to 20 Hz) (20 to 45 Hz) (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz) (10 to 30 kHz)	0.18 + 2 0.09 + 2 0.04 + 2 0.08 + 2 0.2 + 3 0.4 + 4	Fluke 5520A Calibrator
	33 to 329.99 mA (10 to 20 Hz) (20 to 45 Hz) (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz) (10 to 30 kHz)	0.18 + 20 0.09 + 20 0.04 + 20 0.10 + 50 0.2 + 100 0.4 + 200	

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<i>Electrical – DC/LF(continued)</i> AC Current – Generate	0.33 to 1.09999 A (10 to 45 Hz) (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz)	0.18 + 100 0.05 + 100 0.6 + 1000 2.5 + 5000	Fluke 5520A Calibrator
	1.1 to 2.99999 A (10 to 45 Hz) (45 Hz to 1 kHz) (1 to 5 kHz) (5 to 10 kHz)	0.18 + 100 0.06 + 100 0.6 + 1000 2.5 + 5000	
	3 to 10.9999 A (45 to 100 Hz) (100 Hz to 1 kHz) (1 to 5 kHz)	0.06 + 2000 0.10 + 2000 3.0 + 2000	



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<i>Electrical – DC/LF(continued)</i> AC Current – Generate	11 to 20.5 A (45 to 100 Hz) (100 Hz to 1 kHz) (1 to 5 kHz)	0.12 + 5000 0.15 + 5000 3.0 + 5000	Fluke 5520A Calibrator
Ohms – Generate	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω (330 to 1100) Ω (1.1 to 3.3) kΩ	40 μΩ/Ω + 0.001 Ω 30 μΩ/Ω + 0.0015 Ω 28 μΩ/Ω + 0.0014 Ω 28 μΩ/Ω + 0.002 Ω 28 μΩ/Ω + 0.002 Ω 28 μΩ/Ω + 0.02 Ω	Fluke 5520A Calibrator

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Ohms – Generate (continued)	(3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ (330 to 1100) kΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ (330 to 1100) MΩ	28 μΩ/Ω + 0.02 Ω 28 μΩ/Ω + 0.2 Ω 28 μΩ/Ω + 0.2 Ω 32 μΩ/Ω + 2 Ω 32 μΩ/Ω + 2 Ω 60 μΩ/Ω + 30 Ω 130 μΩ/Ω + 50 Ω 250 μΩ/Ω + 2.5 kΩ 500 μΩ/Ω + 3 kΩ 3 mΩ/Ω + 100 kΩ 15 mΩ/Ω + 500 kΩ	Fluke 5520A Calibrator
Capacitance – Generate	0.19 to 3.2999 nF 3.3 to 10.9999 nF 11 to 109.999 nF 110 to 329.999 nF	(% output + floor) 0.5% + 0.01 nF 0.25% + 0.01 nF 0.25% + 0.1 nF 0.25% + 0.3 nF	Fluke 5520A Calibrator

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Capacitance – Generate (continued)	330 nF to 1.09999 μ F 1.1 to 3.29999 μ F 3.3 to 10.9999 μ F 11 to 32.9999 μ F 33 to 109.999 μ F 110 to 329.999 μ F 330 μ F to 1.09999 mF 1.1 to 3.2999 mF 3.3 to 10.9999 mF 11 to 32.9999 mF 33 to 110 mF	0.25% + 1 nF 0.25% + 3 nF 0.25% + 10 nF 0.4% + 30 nF 0.45% + 100 nF 0.45% + 300 nF 0.45% + 1 μ F 0.45% + 3 μ F 0.45% + 10 μ F 0.75% + 30 μ F 1.1% + 100 μ F	Fluke 5520A Calibrator

¹ "Calibration Measurement Capability" is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or of nearly ideal measuring instruments. "Calibration Measurement Capability" are expressed as uncertainties at approximately the 95% level of confidence, usually using a coverage factor of $k=2$. The measurement uncertainty of a specific calibration performed by the laboratory may be greater than the least uncertainty due to the behavior of the customer's device, to the environment (if the calibration is performed in the field), and to influences from the circumstances of the specific calibration.



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