Scotia Instrumentation Calibration Capabilities

ABERDEEN

PRESSURE MEASUREMENT

Range	Uncertainty	Cal. device	Notes
0 to 10 mbara 0 to 1000 mbara	0.35% rdg 0.1% rdg	Heated Baratron Capacitance Diaphragm Gauges with PDR Controller	Chell vac kit with turbo pump. Calibrations using oxygen free nitrogen.
0.2 to 160 mbarg	0.015% rdg	Pressurements V1600/1 DWT	Calibrations on Industrial Nitrogen.
1 to 70 barg 15 to 1000 psig	0.03% rdg	Budenberg 450 DWT	Calibrations on Industrial Nitrogen.
1 to 120 barg	0.025% rdg	Budenberg 450 DWT	Calibrations on Industrial Nitrogen.
1 to 600 barg 10 to 8000 psig	0.03% rdg	Budenberg 380/480D	Calibrations on Tellus oil. Water and other fluids on request using Fig 28 seal.
1 to 1200 barg 10 to 16000 psig	0.05% rdg	Budenberg 380/480H DWT	Calibrations on Tellus oil.
1 to 1400 barg 10 to 20000 psig	0.05% rdg	Budenberg 480 VHx DWT	Calibrations on Tellus oil.
1 to 2600 barg 10 to 40000 psig	0.04% rdg	Budenberg 580 EHx	Calibrations on Tellus oil.
100 to 4000 barg 1000 to 60000 psig	0.06% rdg	Budenberg 283 DWT	Calibrations on Tellus oil.
Barometric range	0.1% rdg	Druck DPI145	Comparison Barometer.
Barometric range	0.1% rdg	Druck DPI145	Barometers and Chamber barographs
0 to 70 barg	N/A	Vac Chamber	Depth Gauges Cal on Ind Nitrogen
0 to 200 mbarg	± (0.01% rdg +0.01% fs)	Pace 6000	Gauge mode Calibrations on industrial nitrogen
-1 to 2 barg -1 to 20 barg -1 to 135 barg	± (0.005% rdg +0.005% fs)	Pace 6000	Gauge mode Calibrations on industrial nitrogen
0 to 3 bara 0 to 21 bara 0 to 136 bara	± (0.005% rdg +0.005% fs)	Pace 6000	Absolute mode Calibrations on industrial nitrogen
Pressure absolute mode	0.025mbar	Gauge precision	
0 to 20barg	±(0.005% rig +0.005% fs)	PACE 6000	To calibrate tyre pressure gauges

Scotia Instrumentation Calibration Capabilities

ABERDEEN

TEMPERATURE MEASUREMENT

Range	Uncertainty	Cal. device	Notes
-30°C to 250°C	±0.08°C	ASL F25/F250/CTR2000	Glycol/water bath/Silicon oil bath
35°C to 500°C	±0.5 to 0.8°C	Fluke 4181 IR Calibrator	
-30°C to 250°C	±0.05 to 0.1°C	6mm OD Pt100 RTD	ASL CTR2000
0°C to 650°C	±0.05 to 0.1°C	6mm OD Pt100 RTD	Via Newport Ind.
K type (-200°C to 1370°C) Thermocouple	0.1°C to 1.5°C	Unomat TRX Calibrator	Simulate/measure
J type (-210°C to +1200°C) Thermocouple	0.1°C to 1.5°C	Unomat TRX Calibrator	Simulate/measure
T type (-250°C to +400°C) Thermocouple	0.1°C to 1°C	Unomat TRX Calibrator	Simulate/measure
Thermocouple types K, J, T, B, C, E, N, R, S (-250°C to 2320°C)	0.15°C	Wavetek 9100 Calibrator	Generate only
Pt100 (-200°C to 850°C)	0.05°C	Wavetek 9100 Calibrator	Generate only

Scotia Instrumentation Calibration Capabilities

ABERDEEN

ELECTRICAL MEASUREMENT

Section 1: Voltage DC

Generate

Range	Accuracy	Cal. device	Notes
100µV	10ppm +1µV	Wavetek 4805	
1mV	0.006%	Wavetek 4805/ 9100/5080A/ 5560A	
10mV	0.006%	Wavetek 4805/ 9100/5080A/ 5560A	
100mV	0.006%	Wavetek 4805/ 9100/5080A/ 5560A	
1V	0.006%	Wavetek 4805/ 9100/5080A/ 5560A	
10V	0.0065%	Wavetek 4805/ 9100/5080A/ 5560A	
100V	0.0065%	Wavetek 4805/ 9100/5080A/ 5560A	
1000V	0.006%	Wavetek 4805/ 9100/5080A/ 5560A	
40kV	±2%	HV probe	Using T&R PT30-10.

Measure

Range	Accuracy	Cal. device	Notes
100mV	10ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
1V	8ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
10V	7ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
100V	8ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
1000V	11ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
up to 40kV	±2%	HV probe	
up to 100kV	±3%	Avo OTS VCM100D	

Scotia Instrumentation Calibration Capabilities

ABERDEEN

ELECTRICAL MEASUREMENT

Section 2: Voltage AC

Generate

Range	Accuracy	Cal. device	Notes
1mV	120ppm +6µV	Wavetek 4805/9100/5080A/ Fluke 5560A	
10mV	120ppm +6µV	Wavetek 4805/9100/5080A/ Fluke 5560A	
100mV	110ppm +6µV	Wavetek 4805/9100/5080A/ Fluke 5560A	
1V	110ppm +8µV	Wavetek 4805/9100/5080A/ Fluke 5560A	
10V	110ppm +50µV	Wavetek 4805/9100/5080A/ Fluke 5560A	
100V	110ppm +3.5mV	Wavetek 4805/9100/5080A/ Fluke 5560A	
1000V	110ppm +80mV	Wavetek 4805/9100/5080A/ Fluke 5560A	
40kV	5%	HV Probe	T&R PT 30-40

Measure

Range	Accuracy	Cal. device	Notes
100mV	10ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
1V	8ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
10V	7ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
100V	8ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
1000V	11ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
up to 40kV	±5%	HV probe	
up to 100kV	±3%	Avo OTS VCM 100D	

Scotia Instrumentation Calibration Capabilities

ABERDEEN

ELECTRICAL MEASUREMENT

Section 3: Current DC

Generate

Range	Accuracy	Cal. device	Notes
1µA	97ppm +6nA	Wavetek 9100/Fluke 5080A/ Fluke 5560A	
10µA	97ppm +6nA	Wavetek 9100/Fluke 5080A/ Fluke 5560A	
100µA	97ppm +6nA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
1mA	78ppm +15nA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
10mA	78ppm + 80nA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
100mA	78ppm +800nA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
2A	120ppm +10µA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
30A	780ppm +500µA	Wavetek 9100/Fluke 5080A/ Fluke 5560A	
1500A	0.65%	Wavetek 9100/Fluke 5080A/ Fluke 5560A	Via current coil

Measure

Range	Accuracy	Cal. device	Notes
100µA up to 10mA	13ppm +4ppm/rng	Wavetek 1271/Fluke 8508A/ Transmille 8104	
100mA	36ppm + 6ppm/rng	Wavetek 1271/Fluke 8508A/ Transmille 8104	
2A	150ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
2000A	±1.3% of rdg	Heme LH 2015 clampmeter/ Transmille 8104	
2000A	+0.01%	High current transformer/ Transmille 8104	
30A	569ppm + 145ppm/rng	Transmille 8104/Fluke 8508A	

Scotia Instrumentation Calibration Capabilities

ABERDEEN

ELECTRICAL MEASUREMENT

Section 4: Current AC

Generate

Range	Accuracy	Cal. device	Notes
1µA	190ppm +10nA	Wavetek 9100/Fluke 5080A/ Fluke 5560A	
10µA	190ppm +10nA	Wavetek 9100/Fluke 5080A/ Fluke 5560A	
100µA	190ppm +10nA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
1mA	190ppm +100nA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
10mA	190ppm +1µA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
100mA	190ppm +8µA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
2A	190ppm +50µA	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
30A	540ppm +8mA	Wavetek 9100/Fluke 5080A/ Fluke 5560A	
1500A	0.65%	Heme LH2015/Wavetek 9100/ High current transformer/Fluke 5080A/Fluke 5560A via coil	Via high current inj set.

Measure

Range	Accuracy	Cal. device	Notes
100µA up to 100mA	200ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
2A	500ppm	Wavetek 1271/Fluke 8508A/ Transmille 8104	
2000A	±1.3% of rdg	Heme LH2015	
2000A	±0.01%	High current transformer	

Scotia Instrumentation Calibration Capabilities

ABERDEEN

ELECTRICAL MEASUREMENT

Section 5: Resistance

Generate

Range	Accuracy	Cal. device	Notes
50µΩ to 2Ω	±0.8%	Time 5070	
1Ω	0.025% +10mΩ	Wavetek 9100/Fluke 5080A	Used as transfer standard against Time 5070
10Ω	0.025% +10mΩ	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	The 1271 is a meter and can only measure the stated values.
100Ω	0.02% +20mΩ	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
1kΩ	0.015% +80mΩ	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
10kΩ	0.020% +800mΩ	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
100kΩ	0.02% +8Ω	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
1MΩ	0.05% +100Ω	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
10MΩ	0.15% +2kΩ	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
100MΩ	0.26% +40kΩ	Wavetek 4805/9100/Fluke 5080A/Fluke 5560A	
100GΩ	±1%	Hi Ohms Box/Fluke 5320A	

Measure

Range	Accuracy	Cal. device	Notes
50µΩ to 2000Ω	± 0.01%	Time 5070	
10Ω	18ppm	Wavetek 1271/Fluke 8508A/Transmille 8104	
100Ω to 100KΩ	10ppm	Wavetek 1271/Fluke 8508A/Transmille 8104	
1MΩ	15ppm	Wavetek 1271/Fluke 8508A/Transmille 8104	
10MΩ	30ppm	Wavetek 1271/Fluke 8508A/Transmille 8104	
100MΩ	400ppm	Wavetek 1271/Fluke 8508A/Transmille 8104	
1GΩ	±0.3%	Wavetek 1271/Fluke 8508ATransmille 8104	

Scotia Instrumentation Calibration Capabilities

ABERDEEN

ELECTRICAL MEASUREMENT

Section 6: Frequency

Generate

Range	Accuracy	Cal. device	Notes
0.1Hz to 10MHz	0.01ppm	Global 4401/Wavetek 395	
0.5Hz to 10MHz	25ppm of rdg	Wavetek 9100/Fluke 5560A	

Measure

Range	Accuracy	Cal. device	Notes
10Hz to 200MHz	±1 count +time base	Racal Dana 9904	Standard used: GPS Frequency Reference.

Section 7: Conductivity and Capacitance

Generate

Range	Accuracy	Cal. device	Notes
2.5nS to 2.5mS	±0.04% (Best)	Wavetek 9100	
500pF to 120mF	±0.3 +15pF (Best)	Wavetek 9100/Fluke 5560A	
10pF to 100µF	±1%	Time 1071 Decade box	
1mH to 11.11H	±5%	Hameg HM8118	Via Time 1053 Inductance Box.

Measure

Range	Accuracy	Cal. device	Notes
2.5µS to 2.5mS	±0.04%	Wavetek 9100	
500pF to 40mF	±0.2%	Wavetek 9100	

Scotia Instrumentation Calibration Capabilities

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Section 8: RCD Testers

Measure

Range	Accuracy	Cal. device	Notes
3mA to 3000mA	0.1mA on 3000mA rng	Fluke 5320A	
10ms to 5000ms	±0.25ms	Fluke 5320A	

Section 9: Tachometers

Generate

Range	Accuracy	Cal. device	Notes
90000rpm	±0.01%	Global 4401/Wavetek 395	Via test box.
10000rpm	±1%	Global 4401/Wavetek 395	Via motor and calibrated tacho.

Section 10: Sound Level Calibration

Generate

Range	Accuracy	Cal. device	Notes
94 & 104dB	±0.3dB	Cirrus Calibrator	Generate. Dual Frequency

Measure

Range	Accuracy	Cal. device	Notes
35dB to 135dB			Via calibrated sound level meter.

Scotia Instrumentation Calibration Capabilities

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PUMP TESTING

Range	Uncertainty	Cal. device	Notes
Testing to 60,000psi	0.5%	Test Cabinet	Testing of adaptors, valves, hose assemblies etc.

GAS BOOSTER TESTING

Range	Uncertainty	Cal. device	Notes
Testing to 25,000psi	0.2%	Remote test panel/Test bay (SDAS).	Testing with industrial Nitrogen.

Scotia Instrumentation Calibration Capabilities

ABERDEEN

DIMENSIONAL METROLOGY

Device type	Range	Cal. device	Uncertainty & Notes
External Micrometers	0 to 48” 0 to 1200mm	Slip gauges Optical flat	BS870:2008 To 24”/600mm >24” Manufacturer’s spec.
Internal Micrometers	0 to 40” 0 to 1000mm	Trimos Linear Meas. Device	BS959:2008 To 36”/900mm >36” Manufacturer’s spec.
Depth Micrometers	0 to 12” 0 to 300mm	Trimos Linear Meas. Device Slip Gauges	BS6468:2008
Vernier Calipers	0 to 48” 0 to 1200mm	Slip gauges Trimos Linear Meas. Device Inside Microchecker	BS887:2008
Plug gauges	0 to 6” 0 to 150mm	ULM	BS969:2008
Engineers Steel Rules	2m	Rabone Chesterman	BS4732:1968
Depth Verniers	0 to 40”	Traceable Slip gauges/ Trimos Linear Meas. Device	BS6365:2008 To 24”/600mm >24” Manufacturer’s spec.
Height Gauges	0 to 40”	Traceable Slip/Rod Gauges	BS1643:2008
Dial Indicator Plunger/Lever	0.0001/001”	Traceable Slip Gauges/ Trimos Linear Meas. Device	BS907:2008/ BS2795:1981
Feeler Gauges	Length 75 to 300mm 3 to 12”	ULM	BS957:2008
Tape Measure	20m	Rabone Chesterman	Manufacturer’s spec.
Crankhaft Deflection	0.0001”/Gauges	Trimos Linear Meas. Device 001”	Manufacturer’s spec.
Protractors	Digital & Mechanical	Sine Bar/Slip gauges	Digital - Manufacturer’s spec. BS1685:2008
Engineers Square	18” max.	Angle Plate/Slips Cylindrical Square	BS939:2007
Angle Plate	18” max.	Angle Plate/Slips	BS5535:1978
Coatings Thickness Foils	1000microns	ULM	±0.005mm/ Manufacturer’s spec.
Paint Thickness meters	1000microns	Calibrated foils	Manufacturer’s spec.
Ultrasonic Thickness meters	120mm max.	Panametric Test Block	Manufacturer’s spec.

Scotia Instrumentation Calibration Capabilities

ABERDEEN

DIMENSIONAL METROLOGY contd

Device type	Range	Cal. device	Uncertainty & Notes
3 Point Bore Micrometers	0.25 to 6”	Calibrated rings/ULM	Manufacturer’s spec.
Engineers Level	0 to 14” Level	10” Sine bar/Slip Blocks	BS958:1968
Straight Edges	0 to 72” length	Slip blocks Granite Table	BS5204-Pt 2:1977
Screw Thread Gauges Plug Go/No Go	1/4” up to 6” dia. UN/Metric, BSP, Whitworth	ULM	BS1580:2007, BS3643:2007, BS919:200
Screw Thread Gauges Ring Go and No Go	>1/2” up to 4” UN, Metric	ULM	BS1580:2007, BS3643:2007, BS919:2007
Plain Rings	0.2” up to 6” dia.	ULM	BS4064 & BS4065:1966
Plate & Form Gauges		Baty Profile Projector	Drawing spec.
Taper Ring & Plug Gauges	0 to 12” dia.	Slip Blocks Calibrated Rollers	Drawing spec.
Lead Gauge Setting Standard	Various	Baty Profile Projector	API Spec 7-2
Mass weights	0.1g to 31kg	A, N, D Analytical balances	Calibration of weights M3 - F2 class

Scotia Instrumentation Calibration Capabilities

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TORQUE MEASUREMENT

Range	Accuracy	Cal. device	Notes
10 to 1000 lbf.in	±0.25% of reading	Torque analysers	Torque wrenches are also serviced and adjusted. BS EN ISO 6789 2003
10 to 750 lbf.ft	±0.25% of reading	Torque analysers	BS EN ISO 6789 2003
100 to 2800 Nm / 2100 lbf.ft	±0.25% of reading	Torque analysers	BS EN ISO 6789 2003
Multipliers	±0.25% of reading	Torque analysers	Max output 2000 lbf.ft Documented in-house method
0 to 1000 ft/lbs	±0.25% of reading	Torque transducer	Analogue static torque meters Documented in-house method
1 to 1500 Nm	±0.5% of reading (Transducers) ±0.05% of reading (T-Box 2)	T-Box 2 With various ranges of transducers	New standard for torque wrenches and drivers BSENISO6789-1:2017 BSENISO6789-2:2017
Dip Tapes	±2mm	Traceable master tape	Rig will accept a maximum of 30m

Scotia Instrumentation Calibration Capabilities

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GAS MEASUREMENT

Type	Cal. device	Notes
Methane Oxygen Hydrogen Sulphide Carbon Dioxide Carbon Monoxide Nitrogen Sulphur Dioxide Butane in Nitrogen	GMI Gas Distributor Box	Calibration of most gas meters.

Scotia Instrumentation Calibration Capabilities

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HUMIDITY

Range	Accuracy	Cal. device	Notes
10 to 98% RH/-10 to 100°C	1%RH	Vaisala HM141	

DEWPOINT

Range	Accuracy	Cal. device	Notes
-80°C to 20°C	±0.1°C dp	Michell series 8000RS Precision Dewpoint Hygrometer	

FLOWMETERS (LIQUID)

Range	Accuracy	Cal. device	Notes
N/A	N/A	Standard Pipework Flowloop	Test only.

AIRFLOW

Range	Accuracy	Cal. device	Notes
0 to 60Knots	±1kt	Munro IM159	Rotating cup type.
0.4 to 40m/s	±3% of reading or ±0.1m/s	Kestrel 1000	25mm Rotating vane type.
0.25 to 30m/s/ 5 to 45°C	±1% of reading or ±0.02m/s/ ±1°C	TSI Airflow LCA501	100mm Rotating vane type.
0 to 20m/s/-18 to 93°C	±5% of rdg or 0.025m/s/ ±0.3°C	TSI TA410	Hot Wire Type

Scotia Instrumentation Calibration Capabilities

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VARCO

Load Testing

Range	Accuracy	Cal. device	Notes
0 to 50tonne (compression)	0.2%	Druck DPI620 c/w PDCR910 transducer	Roebuck 50T press
0 to 50000lbs (tension)	1%	M/D Totco 6” gauge	M/D Totco tension test rig
Large mass weights	0 to 11kg	UWE digital scales	M3 - M1 class Certify Mass Weights

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info@scotia-instrumentation.com

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