



**National Voluntary
Laboratory Accreditation Program**



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Global Calibration Laboratory

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CALIBRATION LABORATORIES

NVLAP LAB CODE 200566-0
Scope Revised: 2009-10-14

DC/LOW FREQUENCY ELECTROMAGNETICS

NVLAP Code: 20/E05
Resistance Source ^{note 2}

| <i>Fixed Point Resistance in Ohms</i> | <i>Best Uncertainty ^{note 1} (±) in ohms</i> | <i>Remarks</i> |
|---------------------------------------|---|---------------------|
| 0.000 | 0.0006 | |
| 0.050 | 0.0020 | Calibrated Resistor |
| 0.150 | 0.0006 | Calibrated Resistor |
| 1.800 | 0.0024 | GR-1433K |
| 0.7 M | 0.0006 M | HRRS-B-5KV |
| 1.0 M | 0.0009 M | HRRS-B-5KV |
| 2.0 M | 0.0015 M | HRRS-B-5KV |
| 3.1 M | 0.0024 M | HRRS-B-5KV |
| 6.5 M | 0.0044 M | HRRS-B-5KV |
| 10.0 M | 0.007 M | HRRS-B-5KV |
| 18 M | 0.0126 M | HRRS-B-5KV |
| 22 M | 0.0154 M | HRRS-B-5KV |
| 60 M | 0.042 M | HRRS-B-5KV |
| 100 M | 0.07 M | HRRS-B-5KV |

2009-10-01 through 2010-09-30

Effective dates

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Resistance Measure *note 2*

| | | |
|-------|----------|-------|
| 50 | 0.018 | 8846A |
| 100 | 0.028 | 8846A |
| 150 | 0.05 | 8846A |
| 250 | 0.07 | 8846A |
| 450 | 0.11 | 8846A |
| 850 | 0.19 | 8846A |
| 1 k | 0.0001 k | 8846A |
| 1.5 k | 0.0005 k | 8846A |
| 2 k | 0.0003 k | 8846A |

DC Current Source *note 2*

| Current Range | Best Uncertainty <i>note 1</i> (\pm) | Remarks |
|---------------------------|--|----------------|
| 10 μ A to 500 μ A | 150 μ A/A + 0.02 μ A | 5520A |
| 1.0 mA to 7.0 mA | 0.0006 mA | 5520A |

DC Current Measure *note 2*

| | | |
|------------------|----------|-------|
| 0.1 mA to 2.0 mA | 0.005 mA | 8846A |
|------------------|----------|-------|

AC Current Source *note 2*

| | | |
|-----------------------------------|----------------------|--------------|
| 5 mA to 27.5 mA (60Hz) | .024 mA | 6221 & 8846A |
| 1 μ A to 760 μ A (120 Hz) | 0.5 % + 0.02 μ A | 6221 |
| 1 mA to 16 mA (120 Hz) | 0.1 % + 0.018 mA | 6221 |
| 1 mA (1 kHz) | 0.0014 mA | 5520A |
| 1 mA (10 kHz) | 0.0045 mA | 5520A |

AC Current Measure *note 2*

| | | |
|------------------------|-----------|--------------------------|
| 0.1 to 2.0 mA (60 Hz) | 0.0015 mA | 8846A |
| 0.1 A to 8.5 A (60 Hz) | 0.04 A | 8846A & 34330A |
| 14 A to 15 A (60 Hz) | 0.002 A | 8846A & Calibrated Shunt |
| 3.5 mA (50/60 Hz) | 0.11 mA | 8846A |

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| | | |
|-------------------|-----------|-------|
| 7.5 mA (50/60 Hz) | 0.17 mA | 8846A |
| 1 mA (1 kHz) | 0.0016 mA | 8846A |
| 1 mA (10 kHz) | 0.0016 mA | 8846A |

NVLAP Code: 20/E06
DC Voltage Measure ^{note 2}

| Range in VDC | Best Uncertainty ^{note 1} (\pm) | Remarks |
|---------------------|--|----------------|
| 0.5 mV to 5.0 mV | 0.002 mV | 5520A & 8846A |
| 7.0 to 10.0 mV | 0.003 mV | 5520A & 8846A |
| 200 V to 500 V | 40 uV/V | 8846A |

NVLAP Code: 20/E09
AC Voltage Source (Frequency range 45 Hz to 65 Hz) ^{note 2}

| Range in ACV | Best Uncertainty ^{note 1} (\pm) | Remarks |
|---------------------|--|----------------|
| 0.01 V to 240 V | 75 uV/V + 5 mV | 5520A |

AC Voltage Measure (Frequency 50/60 Hz) ^{note 2}

| | | |
|----------------|---------------|-------|
| 0.1 V to 230 V | 0.06 % + 5 mV | 8846A |
|----------------|---------------|-------|

NVLAP Code: 20/E12
LF Power/Energy

| Range in Joules | Best Uncertainty ^{note 1} (\pm) | Remarks |
|------------------------|--|-------------------|
| 0.1 to 360 | 0.16 % | Monophasic Power |
| 15 to 180 | 0.19 % | Biphasic AC Power |

TIME & FREQUENCY

NVLAP Code: 20/F01
Frequency ^{note 2}

| Frequency Range in Hz | Best Uncertainty ^{note 1} (\pm) in Hz | Remarks |
|------------------------------|--|----------------|
| 0.1 to 3.0 | 0.001 | TDS 2002B |

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MECHANICAL

NVLAP Code: 20/M06
Force ^{note 2}

| Range in ozf | Best Uncertainty ^{note 1} (\pm) in ozf | Remarks |
|--------------|---|---------|
| 0.1 to 24.0 | 0.12 | 475040 |

IONIZING RADIATION DOSIMETRY

NVLAP Code: 20/I01
Dosimetry of X-Rays, Gamma Rays, and Electrons

Calibration of Reference Class Instruments

| Calibration Category | Radiation Type or Beam Code | Nominal Intensity Range (in Gy/s) | Best Uncertainty ^{note 1} (in % of applied intensity) |
|----------------------|-----------------------------|-----------------------------------|--|
| Gamma | Co-60 | 2.4E-05 to 6.1E-03 | 2.0 |
| | Cs-137 | 9.8E-11 to 7.1E-04 | 2.0 |
| X-Ray | L100 | 1.2E-06 to 1.2E-04 | 1.9 |
| | M30 | 6.1E-07 to 3.6E-04 | 1.9 |
| | M50 | 7.3E-07 to 3.4E-04 | 1.9 |
| | M60 | 7.3E-07 to 2.8E-04 | 1.9 |
| | M80 | 7.3E-07 to 5.5E-04 | 1.9 |
| | M100 | 7.3E-07 to 2.7E-04 | 1.9 |
| | M150 | 9.7E-07 to 3.9E-04 | 1.9 |
| | M200 | 9.7E-07 to 3.9E-04 | 1.9 |
| | M250 | 4.9E-07 to 3.7E-04 | 1.9 |
| | H50 | 9.7E-07 to 4.9E-06 | 1.9 |
| | H60 | 9.7E-07 to 7.3E-06 | 1.9 |
| | H100 | 7.3E-07 to 9.7E-06 | 1.9 |
| | H150 | 4.9E-07 to 4.9E-06 | 1.9 |
| | H200 | 7.3E-07 to 7.3E-06 | 1.9 |
| | H250 | 1.2E-06 to 7.3E-06 | 1.9 |
| | Mo/Mo 28 | 4.9E-07 to 7.3E-04 | 1.9 |

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| | | |
|-----------|--------------------|-----|
| Mo/Mo 35 | 4.9E-07 to 7.3E-04 | 1.9 |
| Mo/Mo 28X | 4.9E-07 to 7.3E-04 | 1.9 |
| Mo/Rh 28 | 4.9E-07 to 7.3E-04 | 1.9 |
| Mo/Rh 35 | 4.9E-07 to 7.3E-04 | 1.9 |
| Rh/Rh 25 | 4.9E-07 to 7.3E-04 | 1.9 |
| Rh/Rh 35 | 4.9E-07 to 7.3E-04 | 1.9 |
| Rh/Rh 40 | 4.9E-07 to 7.3E-04 | 1.9 |
| Rh/Rh 30X | 4.9E-07 to 7.3E-04 | 1.9 |

Calibration of Survey Instruments

| <i>Calibration Category</i> | <i>Radiation Type or Beam Code</i> | <i>Nominal Intensity Range (in Gy/s)</i> | <i>Best Uncertainty^{note 1} (in % of applied intensity)</i> |
|-----------------------------|------------------------------------|--|--|
| Gamma | Cs-137 | 9.8E-11 to 7.1E-04 | 2.4 |
| | Co-60 | 2.4E-05 to 6.1E-03 | 2.4 |
| X-Ray | L100 | 1.2E-06 to 1.2E-04 | 2.4 |
| | M30 | 6.1E-07 to 3.6E-04 | 2.4 |
| | M50 | 7.3E-07 to 3.4E-04 | 2.4 |
| | M60 | 7.3E-07 to 2.8E-04 | 2.4 |
| | M80 | 7.3E-07 to 5.5E-04 | 2.4 |
| | M100 | 7.3E-07 to 2.7E-04 | 2.4 |
| | M150 | 9.7E-07 to 3.9E-04 | 2.4 |
| | M200 | 9.7E-07 to 3.9E-04 | 2.4 |
| | M250 | 4.9E-07 to 3.7E-04 | 2.4 |
| | H50 | 9.7E-07 to 4.9E-06 | 2.4 |
| | H60 | 9.7E-07 to 7.3E-06 | 2.4 |
| | H100 | 7.3E-07 to 9.7E-06 | 2.4 |
| | H150 | 4.9E-07 to 4.9E-06 | 2.4 |
| | H200 | 7.3E-07 to 7.3E-06 | 2.4 |
| | H250 | 1.2E-06 to 7.3E-06 | 2.4 |
| | Mo/Mo 28 | 4.9E-07 to 7.3E-04 | 2.4 |

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1. Represents an expanded uncertainty using a coverage factor, $k = 2$, at an approximate level of confidence of 95 %.
2. Scope of accreditation in this parameter is for calibration of electrical analyzers used in the biomedical field and do not apply to other devices.

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A handwritten signature in cursive script that reads 'Sally S. Bruce'.

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