



# CERTIFICATE OF ACCREDITATION

## ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

**TesCom**

**2600 Longhorn Blvd., Ste. 112**

**Austin, Texas 78758**

**(and satellite location listed on the scope)**

has been assessed by ANAB  
and meets the requirements of international standard

**ISO/IEC 17025:2005**

and national standard

**ANSI/NCSL Z540-1-1994 (R2002)**

while demonstrating technical competence in the field of

**CALIBRATION**

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations to which this accreditation applies.

AC-1417

Certificate Number

  
ANAB Approval

Certificate Valid: 06/04/2018-11/20/2019

Version No. 008 Issued: 06/04/2018



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. 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 17025:2005  
AND ANSI/NCSL Z540-1-1994 (R2002)**

**TesCom**  
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 Austin, Texas 78758  
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**CALIBRATION**

Valid to: **November 20, 2019**

Certificate Number: **AC-1417**

**Electrical – DC/Low Frequency**

| Parameter/Equipment  | Range   | Expanded Uncertainty of Measurement (+/-)  | Reference Standard, Method, and/or Equipment                    |
|----------------------|---|--|---|
| DC Voltage - Source  | Up to 220 mV<br>220 mV to 2.2 V<br>(2.2 to 11) V<br>(11 to 22) V<br>(22 to 220) V<br>220 V to 1.1 kV                      | 7.9 $\mu\text{V/V} + 0.4 \mu\text{V}$<br>5.2 $\mu\text{V/V} + 0.7 \mu\text{V}$<br>3.6 $\mu\text{V/V} + 2.5 \mu\text{V}$<br>3.6 $\mu\text{V/V} + 4 \mu\text{V}$<br>5.1 $\mu\text{V/V} + 40 \mu\text{V}$<br>6.7 $\mu\text{V/V} + 0.4 \text{ mV}$ | Fluke 5720A Multi Product Calibrator with Fluke 5725A Amplifier |
| DC Voltage - Measure | Up to 200 mV<br>200 mV to 2 V<br>(2 to 20) V<br>(20 to 200) V<br>200 V to 1 kV  | 3.2 $\mu\text{V/V} + 0.1 \mu\text{V}$<br>2.9 $\mu\text{V/V} + 0.4 \mu\text{V}$<br>2.6 $\mu\text{V/V} + 4 \mu\text{V}$<br>4.1 $\mu\text{V/V} + 40 \mu\text{V}$<br>4.3 $\mu\text{V/V} + 1 \text{ mV}$  | Fluke 8508A Opt 01 Multimeter                                   |
|                      | (1 to 30) kV <sup>3</sup>   | 1 mV/V   | Ross VD 30 Voltage Divider                                      |
| DC Current - Measure | (100 to 200) $\mu\text{A}$<br>200 $\mu\text{A}$ to 2 mA<br>(2 to 20) mA<br>(20 to 200) mA<br>200 mA to 2 A<br>(2 to 20) A | 7.7 $\mu\text{A/A} + 0.4 \text{ nA}$<br>6.9 $\mu\text{A/A} + 4 \text{ nA}$<br>12 $\mu\text{A/A} + 40 \text{ nA}$<br>36 $\mu\text{A/A} + 0.8 \mu\text{A}$<br>0.15 mA/A + 16 $\mu\text{A}$<br>0.32 mA/A + 0.4 mA                                 | Fluke 8508A Opt 01 Multimeter                                   |



Electrical – DC/Low Frequency

| Parameter/Equipment  | Range  | Expanded Uncertainty of Measurement (+/-)   | Reference Standard, Method, and/or Equipment                    |
|----------------------|--|---|---|
| DC Current - Source  | Up to 220 $\mu$ A<br>220 $\mu$ A to 2.2 mA<br>(2.2 to 22) mA<br>(22 to 100) mA<br>(100 to 220) mA<br>220 mA to 1 A<br>(1 to 2.2) A   | 42 $\mu$ A/A + 6 nA<br>37 $\mu$ A/A + 7 nA<br>37 $\mu$ A/A + 40 nA<br>46 $\mu$ A/A + 0.7 $\mu$ A<br>46 $\mu$ A/A + 0.7 $\mu$ A + (200 x I <sup>2</sup> ) $\mu$ A/A<br>82 $\mu$ A/A + 12 $\mu$ A<br>82 $\mu$ A/A + 12 $\mu$ A + (10 x I <sup>2</sup> ) $\mu$ A/A   | Fluke 5720A Multi Product Calibrator with Fluke 5725A Amplifier |
|                      | (2.2 to 2.999 99) A<br>(3.0 to 10.999 9) A<br>(11 to 20.5) A   | 0.31 mA/A + 40 $\mu$ A<br>0.4 mA/A + 0.5 mA<br>0.8 mA/A + 0.75 mA   | Fluke 5520A/SC1100 Multi Product Calibrator                     |
| Capacitance - Source | 190 pF to 1.1 nF<br>(1.1 to 3.3) nF<br>(3.3 to 11) nF<br>(11 to 110) nF<br>(110 to 330) nF<br>330 nF to 1.1 $\mu$ F<br>(1.1 to 3.3) $\mu$ F<br>(3.3 to 11) $\mu$ F<br>(11 to 33) $\mu$ F<br>(33 to 110) $\mu$ F<br>(110 to 330) $\mu$ F<br>330 $\mu$ F to 1.1 mF<br>(1.1 to 3.3) mF <sup>3</sup><br>(3.3 to 11) mF <sup>3</sup><br>(11 to 33) mF <sup>3</sup><br>(33 to 110) mF <sup>3</sup> | 4.3 mF/F + 10 pF<br>4.1 mF/F + 10 pF<br>2.1 mF/F + 10 pF<br>2.1 mF/F + 0.1 nF<br>2.1 mF/F + 0.3 nF<br>2.2 mF/F + 1 nF<br>2.1 mF/F + 3 nF<br>2.1 mF/F + 10 nF<br>3.3 mF/F + 30 nF<br>3.8 mF/F + 0.1 $\mu$ F<br>3.8 mF/F + 0.3 $\mu$ F<br>3.8 mF/F + 1 $\mu$ F<br>3.6 mF/F + 3 $\mu$ F<br>3.6 mF/F + 10 $\mu$ F<br>6 mF/F + 30 $\mu$ F<br>8.7 mF/F + 0.1 mF   | Fluke 5520A/SC1100 Multi Product Calibrator                     |
| Resistance - Measure | Up to 2 $\Omega$<br>(2 to 20) $\Omega$<br>(20 to 200) $\Omega$<br>200 $\Omega$ to 2 k $\Omega$<br>(2 to 20) k $\Omega$<br>(20 to 200) k $\Omega$<br>200 k $\Omega$ to 2 M $\Omega$<br>(2 to 20) M $\Omega$<br>(20 to 200) M $\Omega$<br>200 M $\Omega$ to 2 G $\Omega$   | 11 $\mu\Omega/\Omega$ + 4 $\mu\Omega$<br>6.8 $\mu\Omega/\Omega$ + 14 $\mu\Omega$<br>6.5 $\mu\Omega/\Omega$ + 50 $\mu\Omega$<br>6.5 $\mu\Omega/\Omega$ + 0.5 m $\Omega$<br>6.4 $\mu\Omega/\Omega$ + 5 m $\Omega$<br>6.6 $\mu\Omega/\Omega$ + 50 m $\Omega$<br>7.4 $\mu\Omega/\Omega$ + 1 $\Omega$<br>12 $\mu\Omega/\Omega$ + 0.1 k $\Omega$<br>53 $\mu\Omega/\Omega$ + 10 k $\Omega$<br>1.1 m $\Omega/\Omega$ + 1 M $\Omega$ | Fluke 8508A Opt 01 Multimeter                                   |



Electrical – DC/Low Frequency

| Parameter/Equipment                         | Range   | Expanded Uncertainty of Measurement (+/-)  | Reference Standard, Method, and/or Equipment |
|---|---|--|--|
| Resistance – Source<br>Characterized Values | (1, 1.9) Ω<br>(10, 19) Ω<br>(100, 190) Ω<br>(1 k, 1.9 k) Ω<br>(10 k, 19 k) Ω<br>(100 k, 190 k) Ω<br>(1 M, 1.9 M) Ω<br>10 MΩ<br>19 MΩ<br>100 MΩ  | 97 μΩ/Ω<br>23 μΩ/Ω<br>10 μΩ/Ω<br>8.8 μΩ/Ω<br>8.8 μΩ/Ω<br>11 μΩ/Ω<br>21 μΩ/Ω<br>41 μΩ/Ω<br>50 μΩ/Ω<br>0.1 mΩ/Ω  | Fluke 5720A Multi Product Calibrator         |
| Resistance – Source                         | Up to 11 Ω<br>(11 to 33) Ω<br>(33 to 110) Ω<br>110 Ω to 1.1 kΩ<br>(1.1 to 11) kΩ<br>(11 to 110) kΩ<br>110 kΩ to 1.1 MΩ<br>(1.1 to 3.3) MΩ<br>(3.3 to 11) MΩ<br>(11 to 33) MΩ<br>(33 to 110) MΩ<br>(110 to 330) MΩ<br>330 MΩ to 1.1 GΩ | 34 μΩ/Ω + 1 mΩ<br>25 μΩ/Ω + 1.5 mΩ<br>23 μΩ/Ω + 1.4 mΩ<br>23 μΩ/Ω + 2 mΩ<br>23 μΩ/Ω + 20 mΩ<br>24 μΩ/Ω + 0.2 Ω<br>26 μΩ/Ω + 2 Ω<br>49 μΩ/Ω + 30 Ω<br>0.1 mΩ/Ω + 50 Ω<br>0.21 mΩ/Ω + 2.5 kΩ<br>0.4 mΩ/Ω + 3 kΩ<br>2.4 mΩ/Ω + 0.1 MΩ<br>12 mΩ/Ω + 0.5 MΩ | Fluke 5520A Multi Product Calibrator         |
| AC Voltage - Source                         | Up to 2.2 mV<br>(10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz  | 0.4 mV/V + 4 μV<br>0.3 mV/V + 4 μV<br>0.3 mV/V + 4 μV<br>0.4 mV/V + 4 μV<br>0.6 mV/V + 5 μV<br>1.2 mV/V + 10 μV<br>2.2 mV/V + 20 μV<br>3.2 mV/V + 20 μV  | Fluke 5720A Multi Product Calibrator         |





Electrical – DC/Low Frequency

| Parameter/Equipment | Range              | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------|--------------------|---|--|
| AC Voltage - Source | (2.2 to 22) mV     |   | Fluke 5720A Multi Product Calibrator         |
|                     | (10 to 20) Hz      | 0.25 mV/V + 4 μV                          |  |
|                     | (20 to 40) Hz      | 0.11 mV/V + 4 μV                          |  |
|                     | 40 Hz to 20 kHz    | 0.1 mV/V + 4 μV                           |  |
|                     | (20 to 50) kHz     | 0.25 mV/V + 4 μV                          |  |
|                     | (50 to 100) kHz    | 0.53 mV/V + 5 μV                          |  |
|                     | (100 to 300) kHz   | 1.1 mV/V + 10 μV                          |  |
|                     | (300 to 500) kHz   | 1.6 mV/V + 20 μV                          |  |
|                     | 500 kHz to 1 MHz   | 2.8 mV/V + 20 μV                          |  |
|                     | (22 to 220) mV     |   |  |
|                     | (10 to 20) Hz      | 0.25 mV/V + 12 μV                         |  |
|                     | (20 to 40) Hz      | 94 μV/V + 7 μV                            |  |
|                     | 40 Hz to 20 kHz    | 84 μV/V + 7 μV                            |  |
|                     | (20 to 50) kHz     | 0.21 mV/V + 7 μV                          |  |
|                     | (50 to 100) kHz    | 0.47 mV/V + 17 μV                         |  |
|                     | (100 to 300) kHz   | 0.92 mV/V + 20 μV                         |  |
|                     | (300 to 500) kHz   | 1.5 mV/V + 25 μV                          |  |
|                     | 500 kHz to 1 MHz   | 2.8 mV/V + 45 μV                          |  |
|                     | 220 mV to 2.2 V    |   |  |
|                     | (10 to 20) Hz      | 0.25 mV/V + 40 μV                         |  |
|                     | (20 to 40) Hz      | 94 μV/V + 15 μV                           |  |
|                     | 40 Hz to 20 kHz    | 47 μV/V + 8 μV                            |  |
|                     | (20 to 50) kHz     | 79 μV/V + 10 μV                           |  |
|                     | (50 to 100) kHz    | 0.11 mV/V + 30 μV                         |  |
|                     | (100 to 300) kHz   | 0.43 mV/V + 80 μV                         |  |
|                     | (300 to 500) kHz   | 1 mV/V + 0.2 mV                           |  |
|                     | 500 kHz to 1 MHz   | 1.7 mV/V + 0.3 V                          |  |
| (2.2 to 22) V       |                    |   |  |
| (10 to 20) Hz       | 0.25 mV/V + 0.4 mV |   |  |
| (20 to 40) Hz       | 93 μV/V + 0.15 mV  |   |  |
| 40 Hz to 20 kHz     | 47 μV/V + 50 μV    |   |  |
| (20 to 50) kHz      | 79 μV/V + 0.1 mV   |   |  |
| (50 to 100) kHz     | 0.1 mV/V + 0.2 mV  |   |  |
| (100 to 300) kHz    | 0.30 mV/V + 0.6 mV |   |  |
| (300 to 500) kHz    | 1.1 mV/V + 2 mV    |   |  |
| 500 kHz to 1 MHz    | 1.6 mV/V + 3.2 mV  |   |  |

**Electrical – DC/Low Frequency**

| Parameter/Equipment  | Range   | Expanded Uncertainty of Measurement (+/-)   | Reference Standard, Method, and/or Equipment                    |
|----------------------|---|---|---|
| AC Voltage - Source  | (22 to 220) V<br>(10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz<br>220 V to 1.1 kV<br>(15 to 50) Hz<br>50 Hz to 1 kHz<br>40 Hz to 1 kHz<br>(1 to 20) kHz<br>(20 to 30) kHz<br>(220 to 750) V<br>(30 to 50) kHz<br>(50 to 100) kHz | 0.25 mV/V + 4 mV<br>94 μV/V + 1.5 mV<br>54 μV/V + 0.6 mV<br>87 μV/V + 1 mV<br>0.16 mV/V + 2.5 mV<br>0.92 mV/V + 16 mV<br>4.5 mV/V + 40 mV<br>8.2 mV/V + 80 mV<br>0.31 mV/V + 16 mV<br>74 μV/V + 3.5 mV<br>94 μV/V + 4 mV<br>0.17 mV/V + 6 mV<br>0.6 mV/V + 11 mV<br>0.6 mV/V + 11 mV<br>2.35 mV/V + 45 mV | Fluke 5720A Multi Product Calibrator with Fluke 5725A Amplifier |
| AC Voltage – Measure | (20 to 200) mV<br>(10 to 40) Hz<br>(40 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>200 mV to 2 V<br>(10 to 40) Hz<br>(40 to 100) Hz<br>100 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz                                       | 0.11 mV/V + 4 μV<br>91 μV/V + 4 μV<br>91 μV/V + 2 μV<br>0.11 mV/V + 4 μV<br>0.27 mV/V + 8 μV<br>0.61 mV/V + 20 μV<br>95 μV/V + 20 μV<br>71 μV/V + 20 μV<br>57 μV/V + 20 μV<br>83 μV/V + 20 μV<br>0.18 mV/V + 40 μV<br>0.45 mV/V + 0.2 mV<br>2.4 mV/V + 2 mV<br>7.9 mV/V + 20 mV                           | Fluke 8508A Opt 01 Multimeter                                   |



Electrical – DC/Low Frequency

| Parameter/Equipment  | Range                              | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment                    |
|----------------------|------------------------------------|---|---|
| AC Voltage – Measure | (2 to 20) V                        |   | Fluke 8508A Opt 01 Multimeter                                   |
|                      | (10 to 40) Hz                      | 95 $\mu$ V/V + 0.2 mV                     |   |
|                      | (40 to 100) Hz                     | 71 $\mu$ V/V + 0.2 mV                     |   |
|                      | 100 Hz to 2 kHz                    | 58 $\mu$ V/V + 0.2 mV                     |   |
|                      | (2 to 10) kHz                      | 83 $\mu$ V/V + 0.2 mV                     |   |
|                      | (10 to 30) kHz                     | 0.17 mV/V + 0.4 mV                        |   |
|                      | (30 to 100) kHz                    | 0.45 mV/V + 2 mV                          |   |
|                      | (100 to 300) kHz                   | 2.4 mV/V + 20 mV                          |   |
|                      | 300 kHz to 1 MHz                   | 7.9 mV/V + 0.2 V                          |   |
|                      | (20 to 200) V                      |   |   |
|                      | (10 to 40) Hz                      | 96 $\mu$ V/V + 2 mV                       |   |
|                      | (40 to 100) Hz                     | 72 $\mu$ V/V + 2 mV                       |   |
|                      | 100 Hz to 2 kHz                    | 58 $\mu$ V/V + 2 mV                       |   |
|                      | (2 to 10) kHz                      | 84 $\mu$ V/V + 2 mV                       |   |
|                      | (10 to 30) kHz                     | 0.17 mV/V + 4 mV                          |   |
| (30 to 100) kHz      | 0.45 mV/V + 20 mV                  |   |   |
| (100 to 300) kHz     | 2.4 mV/V + 0.2 V                   |   |   |
| (200 to 1 050) V     |                                    |   |   |
| 40 Hz to 10 kHz      | 80 $\mu$ V/V + 20 mV               |   |   |
| (10 to 30) kHz       | 0.17 mV/V + 40 mV                  |   |   |
| (30 to 100) kHz      | 0.49 mV/V + 0.2 V                  |   |   |
| AC Voltage - Measure | (1 to 30) kV <sup>3</sup><br>60 Hz | 5 mV/V                                    | Ross VD – 30 Voltage Divider with Fluke 8508A Opt 01 Multimeter |
| AC Current - Measure | Up to 200 $\mu$ A                  |   | Fluke 8508A Opt 01 Multimeter                                   |
|                      | 10 Hz to 10 kHz                    | 0.23 mA/A + 20 nA                         |   |
|                      | 200 $\mu$ A to 2 mA                |   |   |
|                      | 10 Hz to 10 kHz                    | 0.21 mA/A + 0.2 $\mu$ A                   |   |
|                      | (2 to 20) mA                       |   |   |
|                      | 10 Hz to 10 kHz                    | 0.22 mA/A + 2 $\mu$ A                     |   |
|                      | (20 to 200) mA                     |   |   |
|                      | 10 Hz to 10 kHz                    | 0.25 mA/A + 20 $\mu$ A                    |   |
|                      | 200 mA to 2 A                      |   |   |
|                      | 10 Hz to 2 kHz                     | 0.5 mA/A + 0.2 mA                         |   |
|                      | (2 to 10) kHz                      | 0.72 mA/A + 0.2 mA                        |   |
|                      | (2 to 20) A                        |   |   |
| 10 Hz to 2 kHz       | 0.67 mA/A + 2 mA                   |   |   |
| (2 to 10) kHz        | 2.1 mA/A + 2 mA                    |   |   |

**Electrical – DC/Low Frequency**

| Parameter/Equipment | Range  | Expanded Uncertainty of Measurement (+/-)  | Reference Standard, Method, and/or Equipment |  |
|---------------------|--|--|--|--|
| AC Current - Source | Up to 220 $\mu$ A<br>(10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz     | 0.34 mA/A + 16 nA<br>0.28 mA/A + 10 nA<br>0.26 mA/A + 8 nA<br>0.36 mA/A + 12 nA<br>1.2 mA/A + 65 nA                                | Fluke 5720A Multi Product Calibrator         |  |
|                     | 220 $\mu$ A to 2.2 mA<br>(10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz | 0.34 mA/A + 40 nA<br>0.28 mA/A + 35 nA<br>0.25 mA/A + 35 nA<br>0.3 mA/A + 0.11 $\mu$ A<br>1.2 mA/A + 0.65 $\mu$ A                  |  |  |
|                     | (2.2 to 22) mA<br>(10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz        | 0.34 mA/A + 0.4 $\mu$ A<br>0.28 mA/A + 0.35 $\mu$ A<br>0.25 mA/A + 0.35 $\mu$ A<br>0.3 mA/A + 0.55 $\mu$ A<br>1.2 mA/A + 5 $\mu$ A |  |  |
|                     | (22 to 220) mA<br>(10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz        | 0.28 mA/A + 4 $\mu$ A<br>0.21 mA/A + 3.5 $\mu$ A<br>0.17 mA/A + 2.5 $\mu$ A<br>0.23 mA/A + 3.5 $\mu$ A<br>1.13 mA/A + 10 $\mu$ A   |  |  |
|                     | 220 mA to 2.2 A<br>10 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz   | 0.27 mA/A + 35 $\mu$ A<br>0.46 mA/A + 80 $\mu$ A<br>7.2 mA/A + 0.16 nA   |  |  |
|                     | (2.2 to 11) A<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz   | 0.49 mA/A + 0.17 $\mu$ A<br>0.98 mA/A + 0.38 $\mu$ A<br>3.7 mA/A + 0.75 $\mu$ A  |  | Fluke 5720A Multi Product Calibrator w/Fluke 5725A Amplifier |
|                     | (11 to 20.5) A<br>(45 to 100) Hz<br>100 Hz to 1 kHz<br>(1 to 5) kHz  | 1.2 mA/A + 5 mA<br>1.5 mA/A + 5 mA<br>30 mA/A + 5 mA   |  | Fluke 5520A/SC1100 Multi Product Calibrator                  |



**Electrical – DC/Low Frequency**

| Parameter/Equipment                   | Range  | Expanded Uncertainty of Measurement (+/-)  | Reference Standard, Method, and/or Equipment  |
|---------------------------------------|--|--|---|
| Clamp-on Ammeter<br>Non-Toroidal type | (1.65 to 16.5) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(16.5 to 55) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(55 to 150) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(150 to 550) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(550 to 1 000) A<br>(45 to 65) Hz<br>(65 to 440) Hz | 0.06 A<br>0.11 A<br>0.1 A<br>0.18 A<br>0.34 A<br>0.59 A<br>0.93 A<br>1.6 A<br>3.4 A<br>5.9 A | Fluke 5520A/SC 1100<br>Multi Product Calibrator<br>with Fluke 5500A 50 turn<br>coil |
| Clamp-on Ammeter<br>Toroidal type     | (1.65 to 16.5) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(16.5 to 55) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(55 to 150) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(150 to 550) A<br>(45 to 65) Hz<br>(65 to 440) Hz<br>(550 to 1 000) A<br>(45 to 65) Hz<br>(65 to 440) Hz | 0.04 A<br>0.09 A<br>0.06 A<br>0.14 A<br>0.2 A<br>0.47 A<br>0.55 A<br>1.3 A<br>2 A<br>4.7 A   | Fluke 5520A/SC 1100<br>Multi Product Calibrator<br>with Fluke 5500A 50 turn<br>coil |

**Electrical – DC/Low Frequency**

| <b>Parameter/Equipment</b>  | <b>Range</b>   | <b>Expanded Uncertainty of Measurement (+/-)</b>         | <b>Reference Standard, Method, and/or Equipment</b> |
|---|--|--|---|
| Oscilloscopes<br>Amplitude – DC<br>DC Signal into 50 Ω Load<br>DC Signal into 1 MΩ Load | ± (0 to 6.6) V<br>± (0 to 130) V   | 2 mV/V + 40 μV<br>0.4 mV/V + 40 μV                       | Fluke 5520A/SC1100<br>Multi Product Calibrator      |
| Amplitude - Square Wave<br>10 Hz to 10 kHz<br>50 Ω Load<br>1 MΩ Load                    | 1 mV to 6.6 V p-p<br>1 mV to 130 V p-p   | 2 mV/V + 40 μV<br>0.9 mV/V + 40 μV                       |   |
| Amplitude -<br>Leveled Sine Flatness<br>(Relative to 50 kHz)                            | 5 mV to 5.5 V<br>50 kHz to 100 MHz<br>(100 to 300) MHz<br>(300 to 600) MHz                   | 15 mV/V + 0.1 mV<br>18 mV/V + 0.1 mV<br>33 mV/V + 0.1 mV |   |
| Amplitude - Leveled Sine<br>Absolute Amplitude  | 4 mV to 3.5 V<br>600 MHz to 1.1 GHz<br>5 mV to 5.5 V<br>50 kHz Reference                     | 41 mV/V + 0.1 mV<br>16 mV/V + 0.3 mV                     |   |
| Time Marker <sup>2</sup><br>(into 50 Ω Load)  | 5 s to 50 ms   | (20 + 1 000t) μs/s                                       |   |
| Spike or Square Wave  | 20 ms to 100 ns  | 2 μs/s   |   |
| Spike, Square, 20 % Pulse   | (50 to 20) ns  | 2 μs/s   |   |
| Spike or Square Wave  | 10 ns  | 2 μs/s   |   |
| Square or Sine Wave   | (5 to 1) ns  | 2 μs/s   |   |
| Sine Wave   |  |  |   |
| Edge Specs<br>(into 50 Ω Load)<br>Rise Time   | < 300 ps   | 7.5 ps   |   |
| Electrical Simulation of<br>Thermocouple Indicating<br>Devices                          | Type B<br>(600 to 800) °C<br>(800 to 1 000) °C<br>(1 000 to 1 550) °C<br>(1 550 to 1 820) °C | 0.35 °C<br>0.27 °C<br>0.24 °C<br>0.26 °C                 | Fluke 5520A Multi<br>Product Calibrator             |

**Electrical – DC/Low Frequency**

| Parameter/Equipment                                      | Range               | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|---------------------|---|--|
| Electrical Simulation of Thermocouple Indicating Devices | Type C              |   | Fluke 5520A Multi Product Calibrator         |
|  | (0 to 150) °C       | 0.24 °C                                   |  |
|  | (150 to 650) °C     | 0.21 °C                                   |  |
|  | (650 to 1 000) °C   | 0.25 °C                                   |  |
|  | (1 000 to 1 800) °C | 0.4 °C                                    |  |
|  | (1 800 to 2 316) °C | 0.67 °C                                   |  |
|  | Type E              |   |  |
|  | (-250 to -100) °C   | 0.4 °C                                    |  |
|  | (-100 to -25) °C    | 0.13 °C                                   |  |
|  | (-25 to 350) °C     | 0.11 °C                                   |  |
|  | (350 to 650) °C     | 0.14 °C                                   |  |
|  | (650 to 1 000) °C   | 0.18 °C                                   |  |
|  | Type J              |   |  |
|  | (-210 to -100) °C   | 0.21 °C                                   |  |
|  | (-100 to -30) °C    | 0.13 °C                                   |  |
|  | (-30 to 150) °C     | 0.11 °C                                   |  |
|  | (150 to 760) °C     | 0.14 °C                                   |  |
|  | (760 to 1 200) °C   | 0.18 °C                                   |  |
|  | Type K              |   |  |
|  | (-200 to -100) °C   | 0.26 °C                                   |  |
|  | (-100 to -25) °C    | 0.14 °C                                   |  |
|  | (-25 to 120) °C     | 0.14 °C                                   |  |
|  | (120 to 1 000) °C   | 0.21 °C                                   |  |
|  | (1 000 to 1 372) °C | 0.32 °C                                   |  |
|  | Type L              |   |  |
|  | (-200 to -100) °C   | 0.29 °C                                   |  |
|  | (-100 to 800) °C    | 0.21 °C                                   |  |
|  | (800 to 900) °C     | 0.14 °C                                   |  |
| Type N   |                     |   |  |
| (-200 to -100) °C  | 0.32 °C             |   |  |
| (-100 to -25) °C   | 0.18 °C             |   |  |
| (-25 to 120) °C  | 0.15 °C             |   |  |
| (120 to 410) °C  | 0.14 °C             |   |  |
| (410 to 1 300) °C  | 0.22 °C             |   |  |
| Type R   |                     |   |  |
| (0 to 250) °C  | 0.45 °C             |   |  |
| (250 to 400) °C  | 0.28 °C             |   |  |
| (400 to 1 000) °C  | 0.26 °C             |   |  |
| (1 000 to 1 767) °C                                      | 0.32 °C             |   |  |



Electrical – DC/Low Frequency

| Parameter/Equipment                                      | Range               | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|---------------------|---|--|
| Electrical Simulation of Thermocouple Indicating Devices | Type S              |   | Fluke 5520A Multi Product Calibrator         |
|  | (0 to 250) °C       | 0.37 °C                                   |  |
|  | (250 to 1 000) °C   | 0.29 °C                                   |  |
|  | (1 000 to 1 400) °C | 0.29 °C                                   |  |
|  | (1 400 to 1 767) °C | 0.37 °C                                   |  |
|  | Type T              |   |  |
|  | (-250 to -150) °C   | 0.5 °C                                    |  |
|  | (-150 to 0) °C      | 0.19 °C                                   |  |
|  | (0 to 120) °C       | 0.13 °C                                   |  |
|  | (120 to 400) °C     | 0.11 °C                                   |  |
| Type U   |                     |   |  |
| (-200 to 0) °C   | 0.45 °C             |   |  |
| (0 to 600) °C  | 0.22 °C             |   |  |

Length – Dimensional metrology

| Parameter/Equipment      | Range       | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--------------------------|-------------|---|--|
| Micrometers <sup>2</sup> | Up to 12 in | (57 + 9L) μin                             | Gage Blocks                                  |
| Calipers <sup>2</sup>    | Up to 40 in | (520 + 6.9L) μin                          |  |
| Height Gage <sup>2</sup> | Up to 40 in | (283 + 4.7L) μin                          |  |

Mass

| Parameter/Equipment  | Range                 | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--|-----------------------|---|--|
| Scales<br>0.1mg resolution<br>0.1 mg resolution<br>1 mg resolution | Up to 120 g           | 0.2 mg                                    | Class 1 Weights                              |
|  | (120 to 200) g        | 0.24 mg                                   |  |
|  | Up to 300 g           | 1.7 mg                                    |  |
| Torque tools   | (25 to 50) lbf-in     | 1.8 % of reading                          | CDI Torque analyzer<br>Model 2000-610-02     |
|  | (100 to 250) lbf-in   | 1 % of reading                            |  |
|  | (250 to 1 000) lbf-in | 0.75 % of reading                         |  |
|  | (60 to 250) lbf-ft    | 0.8 % of reading                          |  |



**Thermodynamic**

| Parameter/Equipment   | Range  | Expanded Uncertainty of Measurement (+/-)    | Reference Standard, Method, and/or Equipment  |
|-----------------------|--|--|---|
| Temperature – Measure | (-196 to 400) °C   | 0.004 °C                                     | Fluke 8508A Multimeter<br>Rosemount 162N100A<br>Platinum Resistance<br>Thermometer                          |
| Temperature Generate  | (-45 to -5) °C<br>(-5 to 110) °C<br>(110 to 140) °C<br>(140 to 400) °C | 0.007 °C<br>0.004 °C<br>0.006 °C<br>0.005 °C | Liquid Bath, Drywells<br>Fluke 8508A Multimeter<br>Rosemount 162N100A<br>Platinum Resistance<br>Thermometer |

**Time and Frequency**

| Parameter/Equipment             | Range            | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|---------------------------------|------------------|---|--|
| Frequency - Source <sup>3</sup> | 0.01 Hz to 2 MHz | 2.5 μHz/Hz + 5 μHz                        | Fluke 5520A Multi Product<br>Calibrator      |



**Services performed at satellite location**

12132 Colwick St  
San Antonio, Texas 78216

**Length – Dimensional metrology**

| Parameter/Equipment      | Range       | Expanded Uncertainty of Measurement (+/-) | Reference Standard, Method, and/or Equipment |
|--------------------------|-------------|---|--|
| Micrometers <sup>2</sup> | Up to 1 in  | $(70 + 1.8L) \mu\text{in}$                | Gage Blocks                                  |
| Calipers <sup>2</sup>    | Up to 6 in  | $(638 + 15L) \mu\text{in}$                |  |
| Height Gage <sup>2</sup> | Up to 12 in | $(327 + 4.5L) \mu\text{in}$               |  |

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 all parameters, 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. L = length in inches, t = time in seconds.
3. Uncertainties do not include possible contributions from a “best available” unit under test, and/or contributions due to repeatability. In these cases, these contributors will be included in reported expanded uncertainties at time of calibration.
4. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-1417.



Vice President

