



**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
& ANSI/NCSL Z540-1-1994**

**Martin Calibration, Inc.**

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**CALIBRATION**

Valid to: April 6, 2013

Certificate Number: AC-1265

**I. Electromagnetic - DC/Low Frequency**

| PARAMETER / EQUIPMENT | RANGE                                                                                                                | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                                               | REFERENCE STANDARD OR EQUIPMENT                | METHOD(S)                |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------|
| DC Voltage - Source   | Up to 220 mV<br>220 mV to 2.2 V (2.2 to 11) V<br>(11 to 22) V<br>(22 to 220) V<br>220 V to 1.1 kV                    | 7.5 µV/V + 400 nV<br>5 µV/V + 700 nV<br>3.5 µV/V + 2.5 µV<br>3.5 µV/V + 4 µV<br>5 µV/V + 40 µV<br>6.5 µV/V + 400 µV                | Fluke 5720A                                    | GIDEP Sourced Procedures |
| DC Voltage - Measure  | Up to 200 mV<br>200 mV to 2 V (2 to 20) V<br>(20 to 200) V<br>(200 to 1 050) V                                       | 5 µV/V + 50 nV<br>3.5 µV/V + 20 nV<br>3.5 µV/V + 2 µV<br>5.5 µV/V + 2 µV<br>5.5 µV/V + 5 µV                                        | Fluke 8508A                                    |                          |
| DC Current - Source   | Up to 220 µA<br>220 µA to 2.2 mA (2.2 to 22) mA<br>(22 to 220) mA<br>220 mA to 2.2 A (2.2 to 11) A<br>(11 to 20.5) A | 40 µA/A + 6 nA<br>35 µA/A + 7 nA<br>35 µA/A + 40 nA<br>45 µA/A + 700 nA<br>80 µA/A + 12 µA<br>360 µA/A + 480 µA<br>1 mA/A + 750 µA | Fluke 5720A and Fluke 5725A<br><br>Fluke 5520A |                          |
| DC Current - Measure  | Up to 200 µA<br>200 µA to 2 mA (2 to 20) mA<br>(20 to 200) mA<br>200 mA to 2 A (2 to 20) A                           | 12 µA/A + 2 nA<br>12 µA/A + 2 nA<br>14 µA/A + 2 nA<br>48 µA/A + 40 nA<br>185 µA/A + 8 µA<br>400 µA/A + 20 µA                       | Fluke 8508A                                    |                          |



| PARAMETER / EQUIPMENT       | RANGE                 | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|-----------------------------|-----------------------|----------------------------------------------------------------------|---------------------------------|--------------------------|
| AC Voltage - Source (cont.) | <b>Up to 2.2 mV</b>   |                                                                      | Fluke 5720A and Fluke 5725A     | GIDEP Sourced Procedures |
|                             | (10 to 20) Hz         | 240 μV/V + 4 μV                                                      |                                 |                          |
|                             | (20 to 40) Hz         | 90 μV/V + 4 μV                                                       |                                 |                          |
|                             | 40 Hz to 20 kHz       | 80 μV/V + 4 μV                                                       |                                 |                          |
|                             | (20 to 50) kHz        | 200 μV/V + 4 μV                                                      |                                 |                          |
|                             | (50 to 100) kHz       | 500 μV/V + 5 μV                                                      |                                 |                          |
|                             | (100 to 300) kHz      | 1.05 mV/V + 10 μV                                                    |                                 |                          |
|                             | (300 to 500) kHz      | 1.4 mV/V + 20 μV                                                     |                                 |                          |
|                             | 500 kHz to 1 MHz      | 2.7 mV/V + 20 μV                                                     |                                 |                          |
|                             | <b>(2.2 to 22) mV</b> |                                                                      |                                 |                          |
|                             | (10 to 20) Hz         | 240 μV/V + 4 μV                                                      |                                 |                          |
|                             | (20 to 40) Hz         | 90 μV/V + 4 μV                                                       |                                 |                          |
|                             | 40 Hz to 20 kHz       | 80 μV/V + 4 μV                                                       |                                 |                          |
|                             | (20 to 50) kHz        | 200 μV/V + 4 μV                                                      |                                 |                          |
|                             | (50 to 100) kHz       | 500 μV/V + 5 μV                                                      |                                 |                          |
|                             | (100 to 300) kHz      | 1.05 mV/V + 10 μV                                                    |                                 |                          |
|                             | (300 to 500) kHz      | 1.4 mV/V + 20 μV                                                     |                                 |                          |
|                             | 500 kHz to 1 MHz      | 2.7 mV/V + 20 μV                                                     |                                 |                          |
|                             | <b>(22 to 220) mV</b> |                                                                      |                                 |                          |
|                             | (10 to 20) Hz         | 240 μV/V + 12 μV                                                     |                                 |                          |
|                             | (20 to 40) Hz         | 90 μV/V + 7 μV                                                       |                                 |                          |
|                             | 40 Hz to 20 kHz       | 80 μV/V + 7 μV                                                       |                                 |                          |
|                             | (20 to 50) kHz        | 200 μV/V + 7 μV                                                      |                                 |                          |
|                             | (50 to 100) kHz       | 460 μV/V + 17 μV                                                     |                                 |                          |
| (100 to 300) kHz            | 900 μV/V + 20 μV      |                                                                      |                                 |                          |
| (300 to 500) kHz            | 1.4 mV/V + 25 μV      |                                                                      |                                 |                          |
| 500 kHz to 1 MHz            | 2.7 mV/V + 45 μV      |                                                                      |                                 |                          |
| <b>220 mV to 2.2 V</b>      |                       |                                                                      |                                 |                          |
| (10 to 20) Hz               | 240 μV/V + 40 μV      |                                                                      |                                 |                          |
| (20 to 40) Hz               | 90 μV/V + 15 μV       |                                                                      |                                 |                          |
| 40 Hz to 20 kHz             | 45 μV/V + 8 μV        |                                                                      |                                 |                          |
| (20 to 50) kHz              | 75 μV/V + 10 μV       |                                                                      |                                 |                          |
| (50 to 100) kHz             | 110 μV/V + 30 μV      |                                                                      |                                 |                          |
| (100 to 300) kHz            | 420 μV/V + 80 μV      |                                                                      |                                 |                          |
| (300 to 500) kHz            | 1 mV/V + 200 μV       |                                                                      |                                 |                          |
| 500 kHz to 1 MHz            | 1.7 mV/V + 300 μV     |                                                                      |                                 |                          |
| <b>(2.2 to 22) V</b>        |                       |                                                                      |                                 |                          |
| (10 to 20) Hz               | 240 μV/V + 400 μV     |                                                                      |                                 |                          |
| (20 to 40) Hz               | 90 μV/V + 150 μV      |                                                                      |                                 |                          |
| 40 Hz to 20 kHz             | 45 μV/V + 50 μV       |                                                                      |                                 |                          |
| (20 to 50) kHz              | 75 μV/V + 100 μV      |                                                                      |                                 |                          |
| (50 to 100) kHz             | 100 μV/V + 200 μV     |                                                                      |                                 |                          |
| (100 to 300) kHz            | 275 μV/V + 600 μV     |                                                                      |                                 |                          |
| (300 to 500) kHz            | 1 mV/V + 2 mV         |                                                                      |                                 |                          |
| 500 kHz to 1 MHz            | 1.5 mV/V + 3.2 mV     |                                                                      |                                 |                          |



| PARAMETER / EQUIPMENT       | RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                                                                                                                                                                                                                                                                                                                                                                                                                          | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------|
| AC Voltage - Source (cont.) | <b>(22 to 220) V</b><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>(300z to 500) kHz<br>500 kHz to 1 MHz<br><b>220 V to 250 V</b><br>(15 to 50) Hz<br>50 Hz to 1 kHz<br><b>250 V to 1.1 kV</b><br>50 Hz to 1 kHz                                                                                                                                                                                                                                                     | 240 µV/V + 4 mV<br>90 µV/V + 1.5 mV<br>52 µV/V + 600 µV<br>80 µV/V + 1 mV<br>150 µV/V + 2.5 mV<br>900 µV/V + 16 mV<br>4.4 mV/V + 40 mV<br>8 mV/V + 80 mV<br><br>300 µV/V + 16 mV<br>70 µV/V + 3.5 mV<br><br>70 µV/V + 3.5 mV                                                                                                                                                                                                                                                                                  | Fluke 5720A and Fluke 5725A     |                          |
| AC Voltage - Measure        | <b>Up to 200 mV</b><br>(1 to 10) Hz<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 300) kHz<br><b>200 mV to 2 V</b><br>(1 to 10) Hz<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<br><b>(20 to 200) V</b><br>(1 to 10) Hz<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 | 165 µV/V + 70 µV<br>140 µV/V + 20 µV<br>115 µV/V + 20 µV<br>110 µV/V + 10 µV<br>135 µV/V + 20 µV<br>340 µV/V + 40 µV<br>765 µV/V + 100 µV<br><br>150 µV/V + 60µV<br>115 µV/V + 10 µV<br>90 µV/V + 10 µV<br>75 µV/V + 10 µV<br>110 µV/V + 10 µV<br>220 µV/V + 20 µV<br>570 µV/V + 10 µV<br>6 mV/V + 2 mV<br>20 mV/V + 10 mV<br><br>150 µV/V + 60µV<br>115 µV/V + 10 µV<br>90 µV/V + 10 µV<br>75 µV/V + 10 µV<br>110 µV/V + 10 µV<br>220 µV/V + 20 µV<br>570 µV/V + 10 µV<br>6 mV/V + 20 mV<br>20 mV/V + 100 mV | Fluke 8508A                     | GIDEP Sourced Procedures |



| PARAMETER / EQUIPMENT        | RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                                                                                                                                                                                                                                                                                                                                                | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------|
| AC Voltage - Measure (cont.) | <b>(20 to 200) V</b><br>(1 to 10) Hz<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<br><b>200 V to 1.05 kV</b><br>(1 to 10) Hz<br>(10 to 40) Hz<br>40 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                                                                                                                                                                                    | 150 µV/V + 60µV<br>115 µV/V + 10 µV<br>90 µV/V + 10 µV<br>75 µV/V + 10 µV<br>110 µV/V + 10 µV<br>220 µV/V + 20 µV<br>570 µV/V + 10 µV<br>6 mV/V + 200 mV<br>10 mV/V + 1 V<br><br>150 µV/V + 70 µV<br>120 µV/V + 20 µV<br>115 µV/V + 20 µV<br>225 µV/V + 40 µV<br>580 µV/V + 200 µV                                                                                                                                                  |                                 |                          |
| AC Current - Measure         | <b>Up to 200 µA</b><br>(1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br><b>200 µA to 2 mA</b><br>(1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br><b>(2 to 20) mA</b><br>(1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br><b>(20 to 200) mA</b><br>(1 to 10) Hz<br>10 Hz to 10 kHz<br>(10 to 30) kHz<br><b>200 mA to 2 A</b><br>10 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br><b>(2 to 20) A</b><br>10 Hz to 2 kHz<br>(2 to 10) kHz | 310 nA/A + 100 nA<br>300 nA/A + 100 nA<br>710 nA/A + 100 nA<br>0.4% + 100 nA<br><br>310 nA/A + 100 nA<br>300 nA/A + 100 nA<br>710 nA/A + 100 nA<br>0.4% + 100 nA<br><br>310 µA/A + 100 µA<br>300 µA/A + 100 µA<br>710 µA/A + 100 µA<br>0.4% + 100 µA<br><br>310 µA/A + 100 µA<br>290 µA/A + 100 µA<br>625 µA/A + 100 µA<br><br>620 µA/A + 100 µA<br>725 µA/A + 100 µA<br>3 mA/A + 100 µA<br><br>820 µA/A + 100 µA<br>0.25% + 100 µA | Fluke 8508A                     | GIDEP Sourced Procedures |



| PARAMETER / EQUIPMENT   | RANGE                   | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|-------------------------|-------------------------|----------------------------------------------------------------------|---------------------------------|--------------------------|
| AC Current - Source     | <b>(9 to 220) µA</b>    | 250 µA/A + 16 nA                                                     | Fluke 5720A and 5725A           | GIDEP Sourced Procedures |
|                         | (10 to 20) Hz           | 160 µA/A + 10 nA                                                     |                                 |                          |
|                         | (20 to 40) Hz           | 120 µA/A + 8 nA                                                      |                                 |                          |
|                         | 40 Hz to 1 kHz          | 280 µA/A + 12 nA                                                     |                                 |                          |
|                         | (1 to 5) kHz            | 1.1 mA/A + 65 nA                                                     |                                 |                          |
|                         | (5 to 10) kHz           |                                                                      |                                 |                          |
|                         | <b>220 µA to 2.2 mA</b> | 250 µA/A + 40 nA                                                     |                                 |                          |
|                         | (10 to 20) Hz           | 160 µA/A + 35 nA                                                     |                                 |                          |
|                         | (20 to 40) Hz           | 120 µA/A + 35 nA                                                     |                                 |                          |
|                         | 40 Hz to 1 kHz          | 200 µA/A + 110 nA                                                    |                                 |                          |
|                         | (1 to 5) kHz            | 1.1 mA/A + 650 nA                                                    |                                 |                          |
|                         | (5 to 10) kHz           |                                                                      |                                 |                          |
|                         | <b>(2.2 to 22) mA</b>   | 700 µA/A + 400 nA                                                    |                                 |                          |
|                         | (10 to 20) Hz           | 350 µA/A + 350 nA                                                    |                                 |                          |
|                         | (20 to 40) Hz           | 140 µA/A + 350 nA                                                    |                                 |                          |
|                         | 40 Hz to 1 kHz          | 600 µA/A + 4 µA                                                      |                                 |                          |
|                         | (1 to 5) kHz            | 1.6 mA/A + 8 µA                                                      |                                 |                          |
|                         | (5 to 10) kHz           |                                                                      |                                 |                          |
| <b>(22 to 220) mA</b>   | 700 µA/A + 4 µA         |                                                                      |                                 |                          |
| (10 to 20) Hz           | 350 µA/A + 3.5 µA       |                                                                      |                                 |                          |
| (20 to 40) Hz           | 140 µA/A + 3.5 µA       |                                                                      |                                 |                          |
| 40 Hz to 1 kHz          | 600 µA/A + 40 µA        |                                                                      |                                 |                          |
| (1 to 5) kHz            | 1.6 mA/A + 80 µA        |                                                                      |                                 |                          |
| (5 to 10) kHz           |                         |                                                                      |                                 |                          |
| <b>220 mA to 2.2 A</b>  | 650 µA/A + 35 µA        |                                                                      |                                 |                          |
| 40 Hz to 1 kHz          | 750 µA/A + 80 µA        |                                                                      |                                 |                          |
| (1 to 5) kHz            | 8.5 mA/A + 160 µA       |                                                                      |                                 |                          |
| (5 to 10) kHz           |                         |                                                                      |                                 |                          |
| <b>(2.2 to 11) A</b>    | 460 µA/A + 170 µA       |                                                                      |                                 |                          |
| 40 Hz to 1 kHz          | 950 µA/A + 380 µA       |                                                                      |                                 |                          |
| (1 to 5) kHz            | 3.6 mA/A + 750 µA       |                                                                      |                                 |                          |
| (5 to 10) kHz           |                         |                                                                      |                                 |                          |
| <b>(29 to 330) µA</b>   | 16 mA/A + 400 nA        |                                                                      |                                 |                          |
| (10 to 30) kHz          |                         |                                                                      |                                 |                          |
| <b>330 µA to 3.3 mA</b> | 10 mA/A + 600 nA        |                                                                      |                                 |                          |
| (10 to 30) kHz          |                         |                                                                      |                                 |                          |
| <b>(3.3 to 33) mA</b>   | 4 mA/A + 4 µA           |                                                                      |                                 |                          |
| (10 to 30) kHz          |                         |                                                                      |                                 |                          |
| <b>(33 to 330) mA</b>   | 4 mA/A + 200 µA         |                                                                      |                                 |                          |
| (10 to 30) kHz          |                         |                                                                      |                                 |                          |
| <b>(11 to 20.5) A</b>   | 1.2 mA/A + 5 mA         | Fluke 5520A                                                          |                                 |                          |
| (45 to 100) Hz          | 1.5 mA/A + 5 mA         |                                                                      |                                 |                          |
| 100 Hz to 1 kHz         | 30 mA/A + 5 mA          |                                                                      |                                 |                          |
| (1 to 5) kHz            |                         |                                                                      |                                 |                          |





| PARAMETER / EQUIPMENT                  | RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                                                                                                                                                                                                                                                                                            | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------|
| Capacitance - Source                   | <b>10 Hz to 10 kHz</b><br>0.19 nF to 1.1 nF<br><b>10 Hz to 3 kHz</b><br>(1.1 to 3.3) nF<br><b>10 Hz to 1 kHz</b><br>(3.3 to 11) nF<br>(11 to 110) nF<br>(110 to 330) nF<br><b>10 Hz to 600 Hz</b><br>330 nF to 1.1 μF<br><b>10 Hz to 300 Hz</b><br>(1.1 to 3.3) μF<br><b>10 Hz to 150 Hz</b><br>(3.3 to 11) μF<br><b>10 Hz to 120 Hz</b><br>(11 to 33) μF<br><b>10 Hz to 80 Hz</b><br>(33 to 110) μF<br><b>(0 to 50) Hz</b><br>(110 to 330) μF<br><b>(0 to 20) Hz</b><br>330 μF to 1.1 mF<br><b>(0 to 6) Hz</b><br>(1.1 to 3.3) mF<br><b>(0 to 2) Hz</b><br>(3.3 to 11) mF<br><b>(0 to 0.6) Hz</b><br>(11 to 33) mF<br><b>(0 to 0.2) Hz</b><br>(33 to 110) mF | 5 mF/F + 10 pF<br><br>5 mF/F + 10 pF<br><br>2.5 mF/F + 100 pF<br>2.5 mF/F + 100 pF<br>2.5 mF/F + 300 pF<br><br>2.5 mF/F + 1 nF<br><br>2.5 mF/F + 3 nF<br><br>2.5 mF/F + 10 nF<br><br>4.0 mF/F + 30 nF<br><br>4.5 mF/F + 100 nF<br><br>4.5 mF/F + 300 nF<br><br>4.5 mF/F + 100 μF<br><br>4.5 mF/F + 3 μF<br><br>4.5 mF/F + 10 μF<br><br>7.5 mF/F + 30 μF<br><br>11 mF/F + 100 μF | Fluke 5520A                     | GIDEP Sourced Procedures |
| Inductance - Source<br>100 Hz to 1 kHz | 500 μH<br>2 mH<br>20 mH<br>1 H<br>10 H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 390 μH/H<br>660 μH/H<br>350 μH/H<br>610 μH/H<br>340 μH/H                                                                                                                                                                                                                                                                                                                        | Standard Inductors              |                          |



| PARAMETER / EQUIPMENT                                               | RANGE                                                                                               | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]           | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                   |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------|-----------------------------|
| <b>Oscilloscopes</b>                                                |                                                                                                     |                                                                                |                                 |                             |
| Square Wave Signal<br>50 Ω at 1 kHz<br>Source                       | (1 to 110) mV<br>110 mV to 2.2 V<br>(2.2 to 11) V<br>11 V to 1.1 kV                                 | 2.8 mV/V + 48 μV<br>2.8 mV/V + 120 μV<br>2.8 mV/V + 1.2 mV<br>2.8 mV/V + 12 mV | Fluke 5520A SC1100              | GIDEP Sourced<br>Procedures |
| Square Wave Signal<br>1 MΩ at 1 kHz<br>Source                       | (1 to 110) mV<br>110 mV to 2.2 V<br>(2.2 to 11) V<br>11 V to 1.1 kV                                 | 1.2 mV/V + 48 μV<br>1.2 mV/V + 120 μV<br>1.2 mV/V + 1.2 mV<br>1.2 mV/V + 12 mV |                                 |                             |
| Leveled Sine Wave<br>Amplitude                                      | 50 kHz reference<br>50 kHz to 100 MHz<br>(100 to 300) MHz<br>(300 to 600) MHz<br>600 MHz to 1.1 GHz | 20 mV/V + 300 μV<br>35 mV/V + 300 μV<br>40 mV/V + 300 μV<br>60 mV/V + 300 μV   |                                 |                             |
| Leveled Sine Wave<br>Flatness (relative<br>to 50 kHz)               | 50 kHz to 100 MHz<br>(100 to 300) MHz<br>(300 to 600) MHz<br>600 MHz to 1.1 GHz                     | 70 mV/V + 300 μV<br>15 mV/V + 100 μV<br>20 mV/V + 100 μV<br>40 mV/V + 100 μV   |                                 |                             |
| Time Marker 50 Ω<br>Source and Period                               | 5 s to 50 ms<br>20 ms to 2 ns                                                                       | 26 μs/s + 70 μs<br>2.6 μs/s                                                    |                                 |                             |
| Rise Time                                                           | ≤ 300 ps                                                                                            | +0 / -100 ps                                                                   |                                 |                             |
| Electrical Simulation of<br>Thermocouple<br>Indicators <sup>3</sup> |                                                                                                     |                                                                                |                                 |                             |
| Type B                                                              | (600 to 800) °C<br>(800 to 1 000) °C<br>(1 000 to 1 550) °C<br>(1 550 to 1 820) °C                  | 0.44 °C<br>0.34 °C<br>0.30 °C<br>0.33 °C                                       | SCP-120-0014                    |                             |
| Type C                                                              | (0 to 150) °C<br>(150 to 650) °C<br>(650 to 1 000) °C<br>(1 000 to 1 800) °C<br>(1 800 to 2 316) °C | 0.30 °C<br>0.26 °C<br>0.31 °C<br>0.50 °C<br>0.84 °C                            |                                 |                             |
| Type E                                                              | (-250 to -100) °C<br>(-100 to -25) °C<br>(-250 to 350) °C<br>(350 to 650) °C<br>(650 to 1 000) °C   | 0.50 °C<br>0.16 °C<br>0.14 °C<br>0.16 °C<br>0.21 °C                            |                                 |                             |

| PARAMETER / EQUIPMENT                                                 | RANGE                                                                                                | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)    |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------|--------------|
| Electrical Simulation of Thermocouple Indicators <sup>3</sup> (cont.) |                                                                                                      |                                                                      |                                 |              |
| Type J                                                                | (-210 to -100) °C<br>(-100 to -30) °C<br>(-30 to 150) °C<br>(150 to 760) °C<br>(760 to 1 200) °C     | 0.27 °C<br>0.16 °C<br>0.14 °C<br>0.17 °C<br>0.23 °C                  |                                 |              |
| Type K                                                                | (-200 to -100) °C<br>(-100 to -25) °C<br>(-25 to 120) °C<br>(120 to 1 000) °C<br>(1 000 to 1 372) °C | 0.33 °C<br>0.18 °C<br>0.16 °C<br>0.26 °C<br>0.40 °C                  |                                 |              |
| Type L                                                                | (-200 to -100) °C<br>(-100 to 800) °C<br>(-800 to 900) °C                                            | 0.37 °C<br>0.26 °C<br>0.17 °C                                        |                                 |              |
| Type N                                                                | (-200 to -100) °C<br>(-100 to -25) °C<br>(-25 to 120) °C<br>(120 to 410) °C<br>(410 to 1 300) °C     | 0.40 °C<br>0.22 °C<br>0.19 °C<br>0.18 °C<br>0.27 °C                  | Fluke 5520A                     | SCP-120-0014 |
| Type R                                                                | (0 to 250) °C<br>(250 to 400) °C<br>(400 to 1 000) °C<br>(1 000 to 1 767) °C                         | 0.57 °C<br>0.35 °C<br>0.33 °C<br>0.40 °C                             |                                 |              |
| Type S                                                                | (0 to 250) °C<br>(250 to 400) °C<br>(400 to 1 000) °C<br>(1 000 to 1 767) °C                         | 0.47 °C<br>0.36 °C<br>0.37 °C<br>0.46 °C                             |                                 |              |
| Type T                                                                | (-250 to -150) °C<br>(-150 to 0) °C<br>(0 to 120) °C<br>(120 to 400) °C                              | 0.63 °C<br>0.24 °C<br>0.16 °C<br>0.14 °C                             |                                 |              |
| Type U                                                                | (-200 to 0) °C<br>(0 to 600) °C                                                                      | 0.56 °C<br>0.27 °C                                                   |                                 |              |



| PARAMETER / EQUIPMENT                      | RANGE           | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)   |                          |
|--------------------------------------------|-----------------|----------------------------------------------------------------------|---------------------------------|-------------|--------------------------|
| Electrical Simulation of RTDs <sup>3</sup> | PT 395<br>100Ω  | (-200 to -80)                                                        | 0.05                            | Fluke 5520A | GIDEP Sourced Procedures |
|                                            |                 | -80 to 0                                                             | 0.05                            |             |                          |
|                                            |                 | 0 to 100                                                             | 0.07                            |             |                          |
|                                            |                 | 100 to 300                                                           | 0.09                            |             |                          |
|                                            |                 | 300 to 400                                                           | 0.10                            |             |                          |
|                                            |                 | 400 to 630                                                           | 0.12                            |             |                          |
|                                            |                 | 630 to 800                                                           | 0.23                            |             |                          |
|                                            | PT 3926<br>100Ω | -200 to -80                                                          | 0.05                            |             |                          |
|                                            |                 | -80 to 0                                                             | 0.05                            |             |                          |
|                                            |                 | 0 to 100                                                             | 0.07                            |             |                          |
|                                            |                 | 100 to 300                                                           | 0.09                            |             |                          |
|                                            |                 | 300 to 400                                                           | 0.10                            |             |                          |
|                                            |                 | 400 to 630                                                           | 0.12                            |             |                          |
|                                            | PT 3916<br>100Ω | -200 to -190                                                         | 0.25                            |             |                          |
|                                            |                 | -190 to -80                                                          | 0.04                            |             |                          |
|                                            |                 | -80 to 0                                                             | 0.05                            |             |                          |
|                                            |                 | 0 to 100                                                             | 0.06                            |             |                          |
|                                            |                 | 100 to 260                                                           | 0.07                            |             |                          |
|                                            |                 | 260 to 300                                                           | 0.08                            |             |                          |
|                                            |                 | 300 to 400                                                           | 0.09                            |             |                          |
|                                            |                 | 400 to 600                                                           | 0.10                            |             |                          |
|                                            |                 | 600 to 630                                                           | 0.23                            |             |                          |
|                                            | PT 385<br>200Ω  | -200 to -80                                                          | 0.04                            |             |                          |
|                                            |                 | -80 to 0                                                             | 0.04                            |             |                          |
|                                            |                 | 0 to 100                                                             | 0.04                            |             |                          |
|                                            |                 | 100 to 260                                                           | 0.05                            |             |                          |
|                                            |                 | 260 to 300                                                           | 0.12                            |             |                          |
|                                            |                 | 300 to 400                                                           | 0.13                            |             |                          |
|                                            |                 | 400 to 600                                                           | 0.14                            |             |                          |
|                                            |                 | 600 to 630                                                           | 0.16                            |             |                          |
| PT 385<br>500 Ω                            | -200 to -80     | 0.04                                                                 |                                 |             |                          |
|                                            | -80 to 0        | 0.05                                                                 |                                 |             |                          |
|                                            | 0 to 100        | 0.05                                                                 |                                 |             |                          |
|                                            | 100 to 260      | 0.06                                                                 |                                 |             |                          |
|                                            | 260 to 300      | 0.08                                                                 |                                 |             |                          |
|                                            | 300 to 400      | 0.08                                                                 |                                 |             |                          |
|                                            | 400 to 600      | 0.09                                                                 |                                 |             |                          |
|                                            | 600 to 630      | 0.11                                                                 |                                 |             |                          |



| PARAMETER / EQUIPMENT                                    | RANGE                                                                                                     | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------|--------------------------|
| Temperature Calibration (RTD) (cont.)<br>PT 385<br>1000Ω | -200 to -80<br>-80 to 0<br>0 to 100<br>100 to 260<br>260 to 300<br>300 to 400<br>400 to 600<br>600 to 630 | 0.03<br>0.03<br>0.04<br>0.05<br>0.06<br>0.07<br>0.07<br>0.23         | Fluke 5520A                     | GIDEP Sourced Procedures |
| PtNi<br>120Ω                                             | -80 to 0<br>0 to 100<br>100 to 260                                                                        | 0.08<br>0.08<br>0.14                                                 |                                 |                          |
| Cu 427<br>10Ω                                            | -100 to 260                                                                                               | 0.3                                                                  |                                 |                          |

## II. Time & Frequency

| PARAMETER / EQUIPMENT           | RANGE            | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)                |
|---------------------------------|------------------|----------------------------------------------------------------------|---------------------------------|--------------------------|
| Frequency - Source              | 10 MHz           | 1 x 10 <sup>-10</sup> Hz                                             | SRS FS Rubidium GPSDO           | GIDEP Sourced Procedures |
| Frequency - Source <sup>3</sup> | 10 Hz to 300 MHz | 25 μHz/Hz                                                            | Fluke 5520A                     |                          |

## III. Thermodynamic

| PARAMETER / EQUIPMENT | RANGE                                                                                                             | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)    |
|-----------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------|--------------|
| Temperature - Measure | (-200 to -100) °C<br>(-100 to 100) °C<br>(100 to 200) °C<br>(200 to 300) °C<br>(300 to 450) °C<br>(450 to 500) °C | 0.05 °C<br>0.03 °C<br>0.04 °C<br>0.06° C<br>0.08 °C<br>0.13 °C       | Platinum Resistance Thermometer | SCP-120-0008 |

| PARAMETER / EQUIPMENT | RANGE                                                                                                         | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                           | REFERENCE STANDARD OR EQUIPMENT                    | METHOD(S)    |
|-----------------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------|
| Infrared Temperature  | (50 to 100) °C<br>(100 to 200) °C<br>(200 to 250) °C<br>(250 to 300) °C<br>(300 to 400) °C<br>(400 to 500) °C | (0.8 + 0.6R) °C<br>(0.93 + 0.6R) °C<br>(0.96 + 0.6R) °C<br>(1 + 0.6R) °C<br>(1.1 + 0.6R) °C<br>(1.2 + 0.6R) °C | Black Body Calibrator<br>Monitored with a PRT      | SCP-120-0032 |
|                       | (550 to 1 500) °C                                                                                             | (0.46% of reading + 0.6R) °C                                                                                   | Comparison to<br>Reference Infrared<br>Thermometer | SCP-120-0033 |
| Humidity <sup>3</sup> | (20 to 50) %RH<br>(50 to 90) %RH                                                                              | 1.6 %RH<br>2.1 %RH                                                                                             | Humidity Indicator                                 | SCP-120-0002 |

#### IV. Mechanical

| PARAMETER / EQUIPMENT            | RANGE                                                             | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]             | REFERENCE STANDARD OR EQUIPMENT           | METHOD(S)    |
|----------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------|--------------|
| Force <sup>3,4</sup>             | 0.000035 oz to 500 lb                                             | 0.03 % of applied value                                                          | Dead Weight                               | SCP-110-0003 |
|                                  | (350 to 100 000) lb                                               | 0.06 % of applied value                                                          | Load Cells, Class AA                      | SCP-120-0004 |
|                                  | (30 000 to 400 000) lb                                            | 0.29 % of applied value                                                          | Load Cells, Class A<br>(compression only) |              |
| Viscometers <sup>3</sup>         | ≤ 25 cP<br>≤ 1 500 cP<br>≤ 75 000 cP                              | 0.33 % of reading + 0.6R<br>0.52 % of reading + 0.6R<br>0.55 % of reading + 0.6R | Viscosity Standards                       | SCP-120-0018 |
| pH Meters <sup>3</sup>           | 4, 7, 10 pH                                                       | 0.017 pH + 0.6R                                                                  | Buffer Solutions                          | SCP-120-0011 |
| Conductivity Meters <sup>3</sup> | (25 to 2 060) µS                                                  | 0.25% of reading + 0.6R                                                          | Conductivity Standards                    | SCP-120-0001 |
| Pressure <sup>3</sup>            | (-14.7 to 300) psi<br>(300 to 1 000) psi<br>(1 000 to 10 000) psi | 0.1 % of reading<br>0.1 % of reading<br>0.12 % of reading                        | Pressure Calibrator                       | SCP-130-0001 |
| Pressure                         | (1 to 30) inHg<br>(0 to 10 000) psi                               | 0.02 % of reading + 0.6R                                                         | Dead Weight Tester                        | SCP-130-0005 |



| PARAMETER / EQUIPMENT                                                                  | RANGE                                                                                                                                                                                    | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                                                                                 | REFERENCE STANDARD OR EQUIPMENT                                        | METHOD(S)                                 |
|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------|
| Accelerometers                                                                         | (0.5 to 5) Hz<br>(5 to 10) Hz<br>(10 to 99) Hz<br>100 Hz<br>(100 to 920) Hz<br>920 Hz to 5 kHz<br>(5 to 10) kHz<br>(10 to 15) kHz                                                        | 3.26 % of reading<br>2.81 % of reading<br>1.72 % of reading<br>0.94 % of reading<br>1.23 % of reading<br>1.47 % of reading<br>2.03 % of reading<br>3.46 % of reading | PCB Shaker Table with<br>PCB Reference<br>Accelerometer                | SCP -110-0013                             |
| Torque Tools <sup>3,4</sup>                                                            | 0.5 ozf-in to 1 000<br>lbf-ft                                                                                                                                                            | 0.86 % of reading                                                                                                                                                    | Torque Tester                                                          | SCP-140-0001                              |
| Torque Transducers <sup>3</sup>                                                        | 0.5 ozf-in to 1 000<br>lbf-ft                                                                                                                                                            | 0.08 % of reading                                                                                                                                                    | Dead Weight<br>Torque Arms                                             | SCP-140-0002                              |
| Mass                                                                                   | 2 mg to 100 g<br>(100 to 500) g<br>500 g to 3 kg<br>(3 to 10) kg<br>(10 to 25) kg                                                                                                        | 0.25 mg<br>0.002 g<br>0.013 g<br>0.13 g<br>0.14 g                                                                                                                    | Class 1 Weights                                                        | SCP-110-0042<br>SCP-110-0043              |
| Scales and Balances <sup>3,4</sup>                                                     | Up to 30 g<br>(30 to 50) g<br>(50 to 100) g<br>(100 to 200) g<br>(200 to 300) g<br>(300 to 500) g<br>500 g to 1 kg<br>(1 to 2) kg<br>(2 to 3) kg<br>(3 to 5) kg<br><br>(0.5 to 2 000) lb | 0.09 mg<br>0.16 mg<br>0.38 mg<br>0.64 mg<br>0.85 mg<br>1.3 mg<br>2.2 mg<br>5.2 mg<br>7.9 mg<br>12 mg<br><br>0.01 % reading + 0.6R                                    | Class 1 Weights<br><br><br><br><br><br><br><br><br><br>Class 6 Weights | SCP-110-0021 based on<br>NIST Handbook 44 |
| Durometers<br><br>Spring Force<br>Indenter Angle<br>Indenter Length<br>Indenter Radius | (0.1 to 45) N<br>(20 to 40) °<br>(0.049 to 0.198) in<br>(0.05 to 0.1) in                                                                                                                 | 0.06 N<br>0.05 °<br>215 μin<br>243 μin                                                                                                                               | Shore Durometer<br>Calibrator                                          | SCP-150-0064                              |

| PARAMETER / EQUIPMENT                                                                       | RANGE                                                            | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT      | METHOD(S)    |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------|--------------|
| Indirect Verification of Microindentation Hardness Testers <sup>4</sup> (Knoop and Vickers) | Repeatability under forces P (gf):<br>100 ≤ HK ≤ 500<br>HV = 100 | 2.1 % of Reading<br>4.1 % of Reading                                 | Indirect Verification to Test Blocks | SCP-150-0058 |
| Hardness Testers <sup>4</sup>                                                               | HRA Low                                                          | 1.6 HRA                                                              | Indirect Verification to Test Blocks | SCP-150-0071 |
|                                                                                             | HRA Middle                                                       | 1.6 HRA                                                              |                                      |              |
|                                                                                             | HRA High                                                         | 1.2 HRA                                                              |                                      |              |
|                                                                                             | HRBW Low                                                         | 1.6 HRBW                                                             |                                      |              |
|                                                                                             | HRBW Middle                                                      | 2.1 HRBW                                                             |                                      |              |
|                                                                                             | HRBW High                                                        | 1.6 HRBW                                                             |                                      |              |
|                                                                                             | HRC Low                                                          | 1.6 HRC                                                              |                                      |              |
|                                                                                             | HRC Middle                                                       | 1.6 HRC                                                              |                                      |              |
|                                                                                             | HRC High                                                         | 1.2 HRC                                                              |                                      |              |
|                                                                                             | HREw Low                                                         | 1.6 HREw                                                             |                                      |              |
|                                                                                             | HREw Middle                                                      | 1.6 HREw                                                             |                                      |              |
|                                                                                             | HREw High                                                        | 1.6 HREw                                                             |                                      |              |
|                                                                                             | HRMw Low                                                         | 1.6 HRMw                                                             |                                      |              |
|                                                                                             | HRMw Middle                                                      | 1.6 HRMw                                                             |                                      |              |
|                                                                                             | HRMw High                                                        | 1.6 HRMw                                                             |                                      |              |
|                                                                                             | HR15N Low                                                        | 1.7 HR15N                                                            |                                      |              |
|                                                                                             | HR15N Middle                                                     | 1.6 HR15N                                                            |                                      |              |
|                                                                                             | HR15N High                                                       | 1.3 HR15N                                                            |                                      |              |
| HR15Tw Low                                                                                  | 1.6 HR15Tw                                                       |                                                                      |                                      |              |
| HR15Tw Middle                                                                               | 1.6 HR15Tw                                                       |                                                                      |                                      |              |
| HR15Tw High                                                                                 | 1.6 HR15Tw                                                       |                                                                      |                                      |              |
| HR30N Low                                                                                   | 1.6 HR30N                                                        |                                                                      |                                      |              |
| HR30N Middle                                                                                | 1.6 HR30N                                                        |                                                                      |                                      |              |
| HR30N High                                                                                  | 1.4 HR30N                                                        |                                                                      |                                      |              |
| HR30Tw Low                                                                                  | 1.6 HR30Tw                                                       |                                                                      |                                      |              |
| HR30Tw Middle                                                                               | 1.6 HR30Tw                                                       |                                                                      |                                      |              |
| HR30Tw High                                                                                 | 1.6 HR30Tw                                                       |                                                                      |                                      |              |
| HR45N Low                                                                                   | 1.6 HR45N                                                        |                                                                      |                                      |              |
| HR45N Middle                                                                                | 1.6 HR45N                                                        |                                                                      |                                      |              |
| HR45N High                                                                                  | 1.6 HR45N                                                        |                                                                      |                                      |              |



## V. Dimensional

| PARAMETER / EQUIPMENT                             | RANGE                                                                                               | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)]                                                    | REFERENCE STANDARD OR EQUIPMENT                                                                                          | METHOD(S)    |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------|
| Gage Blocks                                       | (0.01 to 1) in<br>(1 to 5) in<br><br>(5 to 12) in<br>(12 to 20) in<br><br>100 mm<br>(125 to 500) mm | (2.9 + 0.9 L) μin<br>(2.5 + 1.3 L) μin<br><br>(1.6 + 1.5 L) μin<br>(7.7 + 1L) μin<br><br>0.17 μm<br>(0.06 + 0.0006L) μm | Gage Blocks<br>Gage Block Comparator<br><br>Horizontal Measuring Machine<br><br>Comparison to Primary Master Gage Blocks | SCP-150-0055 |
| Indicators <sup>3,4</sup>                         | (0.0001 to 6) in                                                                                    | (5.8 + 3.5L + 0.6R) μin                                                                                                 | Horizontal Measuring Machine                                                                                             | SCP-150-0006 |
| Calipers <sup>3,4</sup>                           | Up to 60 in                                                                                         | (189 + 5.7L + 0.6R) μin                                                                                                 | Gage Blocks                                                                                                              | SCP-150-0002 |
| Micrometers OD <sup>3,4</sup>                     | Up to 12 in                                                                                         | (44 + 2.6L + 0.6R) μin                                                                                                  | Gage Blocks<br>Optical Parallels                                                                                         | SCP-150-0008 |
| Height Gages <sup>3,4</sup>                       | Up to 36 in                                                                                         | (55 + 3.8L + 0.6R) μin                                                                                                  | Gage Blocks                                                                                                              | SCP-150-0030 |
| Grind Gages                                       | Up to 100 μm                                                                                        | 0.35 μm                                                                                                                 | Digital Indicator                                                                                                        | SCP-150-0238 |
| Coating Thickness Gages <sup>3</sup>              | Up to 0.02 in                                                                                       | 58 μin + 0.6R                                                                                                           | Coating Thickness Standards                                                                                              | SCP-150-078  |
| Coating Thickness Gage Standards                  | Up to 0.10 in                                                                                       | 21 μin                                                                                                                  | Horizontal Measuring Machine                                                                                             | SCP-150-045  |
| External Diameter <sup>3,4</sup><br>(Plain Plugs) | (0.0001 to 4) in                                                                                    | (4.3 + 3L) μin                                                                                                          | Horizontal Measuring Machine                                                                                             | SCP-150-0005 |
| Internal Diameter <sup>4</sup><br>(Plain Rings)   | (0.04 to 13) in                                                                                     | (5.4 + 4.8L) μin                                                                                                        | Horizontal Measuring Machine                                                                                             | SCP-150-0070 |
| Thread Plugs <sup>3,4</sup><br>Pitch Diameter     | Up to 4 in<br>Pitch (0.2 to 5) mm                                                                   | (86.8 + 1.9L) μin                                                                                                       | Horizontal Measuring Machine                                                                                             | SCP-150-0031 |
| Major Diameter                                    | Pitch 90 – 4 TPI<br>Up to 4 in                                                                      | (3.5 + 4.6L) μin                                                                                                        | Thread Measuring Wires                                                                                                   |              |

| PARAMETER / EQUIPMENT                                 | RANGE                      | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT      | METHOD(S)    |
|-------------------------------------------------------|----------------------------|----------------------------------------------------------------------|--------------------------------------|--------------|
| Thread Rings <sup>4</sup>                             | Up to 2 in                 | 320 µin                                                              | Thread Setting Plug                  | SCP-150-0014 |
| Optical Comparators <sup>3,4</sup><br>Linear Accuracy | Up to 12 in                | (117 + 3.5L+0.6R) µin                                                | Glass Scale                          | SCP-150-0027 |
| Magnification                                         | 5X to 100X                 | 300 µin                                                              | Glass Scale (Sphere)                 |              |
| Surface Plates <sup>3,4</sup><br>Flatness             | Up to (168 by 168) in      | (25 + 2.9L) µin                                                      | Laser System                         | SCP-150-0029 |
| Repeatability                                         | Up to (168 by 168) in      | 34 µin                                                               | Repeat-O-Meter                       |              |
| Roundness / Cylindricity                              | Up to 150 mm               | 0.02 µm                                                              | Rondcom41c                           | SCP-150-0228 |
| Surface Finish Analysis                               | Up to 500 µin              | 2.4 µin                                                              | Profilometer<br>Master Patch         | SCP-150-0032 |
| Profilometers <sup>3</sup>                            | Up to 500 µin              | 3.1 µin                                                              | Master Patch                         | SCP-150-0089 |
| Steel Rulers                                          | Up to 54 in<br>54 to 72 in | (73 + 4L) µin<br>(289 + 7L) µin                                      | Laser System                         | SCP-150-0039 |
| Tape Measures                                         | Up to 200 ft               | (9300 + 58.2L) µin                                                   | Comparison to Master Rule            | SCP-150-0065 |
| <b>Optical Flats</b><br>Parallelism<br>Flatness       | Up to 2 in                 | 2.7 µin<br>4.7 µin                                                   | Gage Block Comparator<br>Master Flat | SCP-150-0016 |
| CMMs <sup>3</sup>                                     | Linearity                  | (25 + 2.4L) µin                                                      | Laser Measuring System               | SCP-150-0061 |
|                                                       | Volumetric Repeatability   | 66 µin<br>45 µin                                                     | Ball Bar<br>CMM Sphere               |              |
| Glass Scales                                          | Up to 12 in                | (25.4 + 2L) µin                                                      | Laser Measuring System               | SCP-150-0086 |

| PARAMETER / EQUIPMENT        | RANGE                | CALIBRATION AND MEASUREMENT CAPABILITY [EXPRESSED AS UNCERTAINTY(±)] | REFERENCE STANDARD OR EQUIPMENT | METHOD(S)    |
|------------------------------|----------------------|----------------------------------------------------------------------|---------------------------------|--------------|
| Horizontal Measuring Systems | Up to 4 in of travel | (2.9 + 1.9L) μin                                                     | Gage Blocks                     | SCP-150-0053 |

**Notes:**

1. Calibration and Measurement Capabilities (CMC)(Expanded Uncertainties) are based on approximately a 95% confidence interval, using a coverage of  $k=2$ .
2. This laboratory's capabilities include in-laboratory and on-site calibration. 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.
3. These parameters are available for on-site calibrations.
4. This capability is available from the satellite office at 1210 Allanson Road, Mundelein, Illinois 60060. Some ranges may be limited.
5. The use of (R) signifies the Resolution of the unit under test (UUT).
6. The use of (L) represents Length in inches.
7. CMC listed for Electromagnetic - DC/Low Frequency do not include possible contributions from a "best available" unit under test.
8. This scope is part of and must be included with the Certificate of Accreditation No. AC-1265.

*Karl Greenway*

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Vice-President

