

DRAFT SCOPE OF ACCREDITATION

1. Electrical-DC/Low Frequency

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|-------------------------|------------------|---|---|---|
| DC Voltage – Source | (1 to 10) V | 1.2 V/V | Fluke 732A and 752 A | Local Procedure or GIDEP/OEM Sourced Procedures |
| | (10 to 100) V | 2 V/V | | |
| | 100 V to 1 kV | 2 V/V | | |
| DC Voltage – Measure* | (10 to 100) V | 4.8 V/V | Fluke 752A and HP 3458A Opt 002 5101B | |
| | 100 V to 1 kV | 5.1 V/V + 50 V | | |
| | (0 to 1100) V | .005 + .001 + 5uV | | |
| DC Voltage – Measure* | Up to 100 mV | 5.5 V/V + 300 nV | 3458A Opt 002 | |
| | 100mV to 1 V | 5.1 V/V + 300 nV | | |
| | (1 to 10) V | 4.6 V/V + 500 nV | | |
| | 100V to 1 kV | 6.5 V/V + 30 nV | | |
| | | 18.5 V/V + 100 nV | | |
| DC Current – Measure | (10 to 100) A to | 10 A/A + 30 pA | Standard Resistors & 3458A Opt 2 | |
| | 1 mA | 10 A/A + 300 pA | | |
| | (1 to 10) mA | 10 A/A + 3 nA | Fluke Y5020 with HP 3458A Opt 002 | |
| | (10 to 100) mA | 10 A/A + 30 nA | | |
| | 1 mA to 1 A | 10 A/A + 300 nA | | |
| | (1 to 10) A | 10 A/A + 3 A | | |
| | (10 to 20) A | 120 A/A + 30 A | | |
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| AC Voltage – Source | 50Hz to 1 kHz | .05 + .005 + 50 uV | 5101B | |
| | 1 kHz to 10 kHz | | | |
| DC Current – Source | 10 uA to 2 A | .025 + .0025 + .01 uA | 5101B | |
| | 0 to 20 A | +(0.025% of output +1.0 mA) | 5220A | |
| AC Current – Source | 50 Hz to 1 kHz | .07 + .01 + 2 uA | 5101B | |
| | 30 Hz to 1 kHz | +(0.05% of output +1.0 mA) | 5220A | |
| | 1 kHz to 5 kHz | +(0.05% of output +1.0 mA) | | |

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| | | mA) x f f = frequency in kHz | |
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| PARAMETER/ EQUIPMENT | 4 RANGE | 2,9 BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---|---|--|---|---|
| 3 RF Attenuation – Generate 1 MHz to 1 GHz | (1 to 12) dB (10 to 90) dB (100 to 120) dB | 0.35 dB 1.5 dB 3.0 dB | HP 355C HP 355D | Local Procedure or GIDEP/OEM Sourced Procedures |
| RF Attenuation – Measure (-20 to +20) dBm (-100 to 0) dBm | 100 kHz to 1.3 GHz | 0.053 dB 0.11 dB | HP 8902A with 11793A, 11722A, 11792A, | |
| Amplitude Modulation- Generate Rate: 50 Hz to 100 kHz Depths: 5% to 99% | (11 to 13.5) MHz | 0.2% | HP 11715A | |
| Frequency Modulation- Generate Rate: DC Hz to 200 kHz Dev.: ≤ 400 kHz peak | (11 to 13.5) MHz (88 to 108) MHz (352 to 432) MHz | 0.3% | HP 11715A | |
| Amplitude Modulation- Measure | 150 kHz to 10 MHz (10 MHz to 26.5) GHz Rate: 50Hz to 20 kHz | 2.3% 2.2% | HP 8902A with 11793A, 11722A, 11792A | |
| Frequency Modulation- Measure | 250 kHz to 10 MHz (10 MHz to 26.5) GHz Rate: 50 Hz to 100 kHz | 2.3% 2.2% | HP 8902A with 11793A, 11722A, 11792A | |

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| Phase Modulation- Measure | (10 MHz to 26.5) GHz Rate: 200 Hz to 20 kHz | 4.5% | HP 8902A with 11793A, 11722A , 11792A | |
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| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---|------------------------------------|---|--|------------------|
| Distortion Measure (0 to 99.9) dB | (50 to 500) kHz (50 to 500) kHz | 1.2 dB 0.07 dB | 8903B | |
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2. Oscilloscopes

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|--|--|--|--|---|
| Frequency accuracy | 1.1 Hz to 4.9999 kHz: 5 to 49.999 kHz 50 kHz to 550 MHz | $-(0.0003\% \text{ iv} + 0.06\text{Hz})$ $\pm(0.0003\% \text{ iv} + 0.3 \text{ Hz})$ $\pm(0.0003\% \text{ iv} + 3 \text{ Hz})$ | SG 5030 | Measured with an electronic counter. |
| Output amplitude | Range: 4.5 mV to 5.5 V Tolerance: $\pm 1.5\% \text{ iv}$ | $\pm 1.5\% \text{ iv}$ | SG 5030 | Measured with a digital multimeter |
| Frequency response | 50.00 kHz to 100 MHz: <100MHz to 250 MHz: >250 MHz to 550 MHz: | $\pm 1.5\%$ of 50 kHz ref $\pm 3\%$ of 50 kHz ref $\pm 8\%$ of kHz ref | SG 5030 | Measured to 25 MHz using a thermal converter and digital multimeter. Measured to 550 MHz using a power meter and power sensor. |
| Voltage Range and \pm DC Accuracy | Range: 1 M Load, 40 V to 200 V 50 Load, 40 V to 5 V | $\pm 0.25\%$, $\pm 1 \text{ V}$ | CG 5011 OPT 01 | Measured with a Digital multimeter |
| Square-Wave Voltage | Range: 40 V to 200 V | $\pm 0.25\%$, $\pm 1 \text{ V}$ | CG 5011 OPT 01 | Measured with an Oscilloscope |
| DC Current and Variable Range | Range: 1 mA to 100 mA | $\pm(0.25\% + 2 \text{ A})$ $\pm 9.9\%$ | CG 5011 OPT 01 | Measured with a Digital multimeter |
| Low Amplitude Edge (50 Load only) | Range: 20 mV p-p to 1 V p-p | $\pm 3\%$ | CG 5011 OPT 01 | Measured with an Oscilloscope |
| High Amplitude Edge | Range: 1.2 V p-p to 100 V p-p | $\pm 3\%$ | CG 5011 OPT 01 | Measured with an Oscilloscope |

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3. Oscilloscopes (continued)

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---------------------------------|----------------------|---|--|-------------------------------------|
| Reference Frequency | Range: 5 MHz, OPT 01 | (+/-0.0003%, OPT 01) | CG 5011 OPT 01 | Measured with an Electronic Counter |
| Marker and Trigger Period | Range: 5 s to .5 ns | +/-0.0003%, OPT 01 | CG 5011 OPT 01 | Measured with an Electronic Counter |
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4. Thermodynamic

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---|---|---|---|--|
| Temperature Measuring Infrared Non-Contact | (50 – 650 degC) (-29 – 650 degC) (50 to 500) degC | +/- 0.1 degC +/- 0.11 degC 1.2 degC | Jofra ATC-650/AB Pt-100 – 90 deg Hart 9132 Black Body | OEM and GIDEP Sourced Calibration Procedures |
| Relative Humidity Measuring Instruments | 11%RH 33% RH 75.5%RH 97%RH | 1.3%RH 1.2%RH 1.5%RH 2.0%RH | Salt Solutions | ASTM E104 |
| Relative Humidity Generating Equipment | (0 to 90) %RH (90 to 100)%RH | 1.57%RH 2.34%RH | Vaisala HMP46 | OEM and GIDEP Sourced Calibration Procedures |
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5. Time & Frequency

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|------------------------------------|---|---|---|--|
| Frequency – Measuring Equipment | 10 MHz | 2.3 parts in 10 ¹² | Symmetricon Xli | OEM and GIDEP Sourced Calibration Procedures |
| Frequency – Measure | 10 Hz to 500 MHz (0.5 to 1.5) GHz (1.5 to 26.5) GHz (36 – 110) GHz | 6.7 Parts in 10 ⁹ 3 parts in 10 ¹⁰ 1.1 parts in 10 ⁸ 2.8 parts in 10 ⁶ | 10 MHz distributed Signal into HP 5345A w/5355A plug-in w/5356C head w/5356D head | |
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6. Mechanical

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---|---|--|---|--|
| ³ Scales ³ Scales and Balances | (0.5 to 5) lb (5 to 100) lb (100 to 1000) lb (1 to 500) mg 500 mg to 30 g 30 g to 8 kg (8 to 50) kg | 0.002 lb 0.02 lb 0.2 lb 0.003 mg 0.012 mg 1.1 mg 0.02 g | Verification with Class F weights Verification with Ultra Class 1, 2 | |
| Force – Tension & Compression | 30 -3000 LBF 200 – 10,000 LBF 2000 – 100,000 LBF 3000 – 300,000 LBF 5000 – 500,000 LBF 7500 – 750,000 LBF | 0.49 = (2.4 times S) in lbs 1.30 = (2.4 times S) in lbs 10.5 = (2.4 times S) in lbs 16.7 = (2.4 times S) in lbs 24.8 = (2.4 times S) in lbs 31.4 = (2.4 times S) in lbs | Morehouse Proving Rings | OEM, GIDEP and ASTM Sourced Calibrations Procedures |
| Accelerometers Acceleration Frequency | 10Hz to 2 kHz 2 kHz to 10 kHz 10 Hz to 10 kHz | +/- 0.3 db +/- 1.0 db .001% +/- 1 count | Endevco | |
| ³ Refractometers | (0 to 100) % | 0.28 % rdg | Standard solutions | |
| Manometers | (0 to 24) in H ₂ O | 0.00016 inH ₂ O | Hook gage | |
| Deadweight Testers- Piston and Cylinder Area | (0 to 10000) psi | (10) in | Laser Micrometer Ultra Class weights | |

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| Mass | | | and scales | |
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Chemical

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|-----------------------------------|--|--|--|--|
| Gs Concentration Alarms | | | | OEM and GIDEP Sourced Calibration Procedures |
| Carbon Monoxide (CO) | 25 parts in 10 ⁶ 50 parts in 10 ⁶ | 2.8 parts in 10 ⁶ 5.5 parts in 10 ⁶ | Standard Gases | |
| Sulfur Dioxide (SO ₂) | 10 parts in 10 ⁶ | 2 parts in 10 ⁶ | | |
| Conductivity | (0 to 15,000) us | 1.2 % | Standard Solutions | |
| pH Meters | (4, 7, 10) pH | 0.02 pH | Standard pH Solutions | |
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DRAFT SCOPE OF ACCREDITATION

6. Mechanical (continued)

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|--|---|---|--|--|
| Indirect Verification of Rockwell Hardness and Rockwell Superficial Hardness Testers | HRA: Low, Middle, High HRB: Low, Middle, High HRC: Low, Middle, High HRE: Low, Middle, High HRF: Low, Middle, High | 0.8 HRA 1.2 HRB 0.8 HRC 0.8 HRE 1.0 HRF | ASTM E18 | |
| Torque Wrenches Torque Watches Cable Tensiometers Torque – Calibration of Torque Meters and Sensors | (0.040 to 2.000) N.m (10 to 100) lbf.ft (25 to 250) lbf.ft (100 to 1000) lbf.ft (250 to 2000) lbf.ft (0.1 to 1000) ft lb | +/- 0.5 % rdg 20-100 % FS. 0.14 % rdg | Weights/12,24,48, ARMS | OEM and GIDEP Sourced Calibration Procedures |
| ³ Tachometers – Photo Contact | (0 to 100000) rpm (0 to 5000) rpm (5000 to 15000) rpm | 0.014 % rdg + 1.2R 1.3 rpm 0.032 % rdg + 0.6 rpm | Function generator/ optical pickup Tachometer calibrator | |

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7. Dimensional

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---------------------------------------|--|--|---|--|
| Cylindrical Plugs Fixed Points | Up to 1 in 1 in 2 in 3 in 4 in 5 in 6 in 7 in 8 in 9 in 10 in 11 in 12 in 13 in | 5.2 in 8.0 in 13 in 18 in 24 in 29 in 34 in 40 in 45 in 50 in 55 in 60 in 65 in 72 in | Labmaster/ Laser Micrometer | OEM and GIDEP Sourced Calibration Procedures |
| ³ Depth Gauge | Up to 12 in | $0.6R + (10L)$ in | Gage blocks or depth mikemaster | |
| Angle Blocks | 0 deg to 90 deg | 7" | Measuring Machine | |
| Optical Flats | Up to 8 in | 2.8 in | Reference flat and monochromatic light source | |
| Diameter External Threads | 0.10 to 4.0 in | $26 + 10L$ in | Supermicrometer and Thread Wires | |
| Length Rods | 2 to 49 in 1 to 85 in | +/- 30 in +/- 30 in | Height Master | |

| PARAMETER/ EQUIPMENT | 4 RANGE | 2,9 BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|-------------------------------------|--|--|---|---|
| Frequency Generate | 2.0 to 26.0 GHz 26.5 to 40 GHz 40.0 to 60.0 GHz 50 to 75 GHz 75 to 110 GHz | +/- 0.1825 ppm 9 kHz 12 kHz | 8673D and 8349B / 83554A, 83556A, 83557A, 83558A And wave guides | Local Procedure or GIDEP/OEM Sourced Procedures |
| RF level accuracy 2.0 to 6.6 GHz | -10 dBm -20 dBm -30 dBm | +/- 2.25 dB +/- 2.45 dB +/- 2.75 dB + 0.1 dB/10 dB step below -30 dBm | 8673D and 8349B / 83554A, 83556A, 83557A, 83558A And wave guides | |
| 6.6 to 12.3 GHz | -10 dBm -20 dBm -30 dBm | +/- 2.5 dB +/- 2.7 dB +/- 3.0 dB + 0.1 dB/10 dB step below -30 dBm | | |
| 12.3 to 18.6 GHz | -10 dBm -20 dBm -30 dBm | +/- 2.85 dB +/- 3.05dB +/- 3.45 dB + 0.1 dB/10 dB step below -30 dBm | | |
| 18.6 to 26.0 GHz | -10 dBm -20 dBm -30 dBm | +/- 3.3 dB +/- 3.6dB +/- 4.05 dB + 0.1 dB/10 dB step below -30 dBm | | |
| 40.0 to 60.0 GHz | -5 to +2 dBm | +/-2.5 dB | | |
| 50.0 to 75 GHz | -5 to +2 dBm | +/-2.5 dB | | |
| 75 to 110 GHz | -5 to -1 dBm | +/-2.5 dB | | |
| AM Modulation Generate | 0 to 30% and 0 – 100% | +/- 7% iv + 3% fs Depth range 0 to 75% | | 8673D |
| FM Modulation- Generate | 0 to 10 MHz | +/- 12% iv + 3% fs | 8673D | |
| Power Amplifier Generate | 0 dBm to + 20 dBm | +/- 1.5 dB | 8349B | |
| RF Output | +20 to -140 dBm | +/-1 dB | 8642B | |

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| Absolute | | | |
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| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---|--|---|---|--|
| Frequency Generate | 0.1 to 2115 MHz | +/- 3.7 * 10 ⁻⁷ | 8642B | |
| AM Modulation | 0 to 99% Depth Range | +/-3.5% rdg + 1% AM | 8642B | |
| FM Modulation | 3 to 11.718 kHz | +/- 5% of setting + 10 z | 86542B | |
| Power Level Measure 10MHz to 110GHz | +10 dBm to +20 dBm -30 dBm to +10 dBm -30 dBm to -20dBm -70 dBm to -30dBm | +/- 3% +/-1.5% +/- 1% +/- 2.5% | EPM E4418B/8484A, 8481A, 8481D, 8487D, 8486A | Local Procedure or GIDEP/OEM Sourced Procedures |
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Pressure

| PARAMETER/ EQUIPMENT | RANGE | BEST MEASUREMENT UNCERTAINTY (+/-) | REFERENCE STANDARD OR EQUIPMENT | METHOD(S) |
|---|-------------------------------|---|---|--|
| Manometers | (0 to 24) in H ₂ O | 0.00016 in H ₂ O | Hook gage | OEM and GIDEP Sourced Calibration Procedures |
| Deadweight Testers- Piston and Cylinder Area Mass - Measure | (0 to 10,000) psi | (10) in | Laser Micrometer Ultra Class weights and scales | |
| Pressure – Generate | (200 – 10,000) psi | | W2200 | |
| Pressure – Generate -Measure | (0 to 300) psi | 0.01% FS | PPC2/AF | |
| | (0 to 600) psi | 0.01% FS | | |
| | (0-1000) psi | 0.01% FS | PCS 400 | |
| | (0-500)psia | 0.016 psia | | |
| | (0 to 103) inHgA | 0.01% FS | | |
| | (0 to 50)psia | | 7010 | |
| | (0 to 10,000)psia | | 7310 | |
| Altitude | (-4000 to 100,000)FT | 0.01% FS | 8201 | |
| Airspeed | (20 to 1000) Knots | 0.01% FS | 8201 | |
| Air Velocity | (80 to 5900) ft/min | +/- (3% + 4) ft/min | AN100 | |
| | (92 to 2596) ccm | +/- 1% of rdg | 60510 | |