# Accredited Laboratory

A2LA has accredited

## PTC METROLOGY

*Los Angeles, CA*

for technical competence in the field of

## Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 6th day of April 2018.

President and CEO
For the Accreditation Council
Certificate Number 1896.01
Valid to March 31, 2020

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*

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

PTC METROLOGY
2301 Federal Avenue
Los Angeles, CA 90064
John Marcus Ph.D. Phone: 310 478 1134

CALIBRATION

Valid To: March 31, 2020 Certificate Number: 1896.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Mechanical

| Parameter/Equipment | Range | CMC[2] (±) | Comments |
|---|---|---|---|
| Durometer Calibration – | | | |
| Indentor Shape | | | |
| Diameter | (0.045 to 0.055) in<br>(0.0897 to 0.0977) in<br>(0.030 to 0.032) in | 100 µin<br>100 µin<br>100 µin | ASTM D2240, comparator overlay |
| Radius | (0.248 to 0.252) radii<br>(0.0466 to 0.0470) radii<br>(0.0035 to 0.0045) radii | 300 µin<br>300 µin<br>100 µin | |
| Angle | (34.75 to 35.25) degrees<br>(29.5 to 30.5) degrees | 0.04 degrees<br>0.04 degrees | |
| Indentor Extension | (0.096 to 0.1) in<br>(0.048 to 0.05) in<br>(0.298 to 0.302) in | 50 µin<br>50 µin<br>50 µin | Gage blocks |



5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

| Parameter/Equipment | Range | CMC[2, 3] (±) | Comments |
|---|---|---|---|
| Durometer Calibration – (cont) | | | |
| Readout Linearity | (0.01 to 0.3) in | 50 µin | Gage blocks |
| Spring Calibration – Force | (1 to 821) gf<br>(1 to 4534) gf<br>(1 to 9112) gf<br>(1 to 142) gf | 0.6 gf<br>3.1 gf<br>6 gf<br>0.3 gf | Durocalibrator, electronic scale, load cell |
| Pressure – | (6 to 12 140) psig<br>Barometric | 0.005 % rdg + 0.6*R*<br>0.3 mmHg | Ruska 2400<br>Druck DPI740 |
| Transmitter Output | (0 to 100) mA dc<br>(0 to 100) V dc | 0.1 mA<br>0.008 V | Fluke 8845A |

II. Thermodynamics

| Parameter/Equipment | Range | CMC[2] (±) | Comments |
|---|---|---|---|
| Temperature – | | | |
| Temperature Immersion | (77 to 196) K<br>(-196 to -77) °C | 16 mK<br>0.016 °C | Liquid Nitrogen comparator |
| | (196 to 273.2) K<br>(-77 to 0) °C | 11 mK<br>0.011 °C | Stirred bath ULT80 |
| | (253.2 to 373.2) K<br>(-20 to 100) °C | 9 mK<br>0.009° C | Stirred bath Hart 7030 |
| | (323.2 to 551.2) K<br>(50 to 278) °C | 9 mK<br>0.009 °C | Stirred bath Hart 6022 |
| | 273.16 K<br>0.01 °C | 0.2 mK | TPW Hart 5901A |

| Parameter/Equipment | Range | CMC[2] (±) | Comments |
|---|---|---|---|
| Temperature – (cont) | | | |
| Temperature Immersion | Ambient air temp | 150 mK | PTC stirred air bath |
| | (323.2 to 953.2) K<br>(50 to 680) °C | 68 mK<br>0.068 °C | Comparator Hart 9260 |
| | (573.2 to 1273.2) K<br>(300 to 1000) °C | 600 mK<br>0.6 °C | Comparator Hart 9112 deep well 16” |
| | (423.2 to 1273.2) K<br>(150 to 1000) °C | 700 mK<br>0.7 °C | Comparator Hart 9150 deep well 7” |
| Surface | (268.2 to 313.2) K<br>(-5 to 40) °C | 120 mK<br>0.12 °C | PTC cold calibrator |
| | (293.2 to 673.2) K<br>(20 to 400) °C | 130 mK<br>0.13 °C | Hart 3125 w/ Hart 1502A |
| | (673.2 to 798.2) K<br>(400 to 525) °C | 400 mK<br>0.4 °C | PTC hot calibrator |
| Infrared Black Body | (293.2 to 773.2) K<br>(20 to 500) °C | 850 mK<br>0.8 °C | Hart 9132 w/ Hart 1502A |
| Transmitter Output | (0 to 100) mA DC<br>(0 to 100) V DC | 0.1 mA<br>0.008 V | Fluke 8845A |
| Relative Humidity – Measure | (10 to 80) % RH | 3 % RH | Rotronic HC2-S |

[1] This laboratory offers commercial calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMC’s represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer’s device and to influences from the circumstances of the specific calibration.

[3] In the statement of CMC, $R$ is the numerical value of the resolution of the device.