

<b>Preparing Authority:</b>  Vincent Pugh	  <b>G132 - Technical Guidance from the Measurement Advisory Committee (MAC)</b>	<b>Publication Date:</b>  04/14/20
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This document has been created and reviewed by the A2LA Measurement Advisory Committee (MAC). It provides guidance on technical decisions voted on and approved by the Measurement Advisory Committee for use by laboratories and assessors. Dates in parentheses after each item indicate the date each was approved.

## **I. General**

- a. The acceptability of a single point calibration is determined on a case-by-case basis by the technical assessor. (1/13/11)

## **II. Fluke 50 Turn Coils**

- a. For Fluke coils (5500A/coil, 52120A/coil 3KA, 52120A/coil 6KA) purchased after March 20, 2015 the traceability requirements must comply with A2LA P102 as an accredited calibration service is available. As per the previous MAC decision an open ended calibration interval is acceptable supported with visual checks. (6/4/15).
- b. For Fluke Coils an open-ended calibration interval is acceptable as further calibrations would not be needed, only visual checks. (1/13/11)
- c. A Conformance Assessment Body (CAB) can elect to meet (T4) from [P102 – A2LA Policy on Metrological Traceability](#) in lieu of a calibration certificate for Fluke 50 turn coils. The in-house calibration must be limited to the range from the initial original calibration certificate for the coil. The initial calibration certificate must pre-date the reverse traceability information provided from Fluke. (1/13/11 – amended 6/4/15)

## **III. Surface Plate Flatness**

- a. The “Moody Method” for flatness using the "Union Jack" pattern is accepted as a standard method. (1/13/11)
- b. In order to avoid market confusion, scopes of accreditation that include surface plate – flatness only or surface plate – repeat reading or repeatability (only) shall indicate that only a “partial” calibration is offered. Consequently, any corresponding endorsed calibration certificates shall also indicate that only a “partial” calibration was provided. (6/4/15)
- c. Typically the parameters reported for surface plate calibration are flatness and repeat reading. It should be noted that a repeat reading only measures the local variation in flatness (e.g. every five inches). However, it is acceptable to calibrate a surface plate for only the local variation in flatness if that is what has been agreed upon by the customer and it is documented during the contract negotiation process in compliance with ISO/IEC 17025:2005, Section 4.4. The repeat reading shall not be reported in a way that implies that overall flatness has been measured. (6/4/15)

## **IV. Traceability of Environmental Chambers (5/5/11)**

- a. That three approaches are deemed as acceptably meeting [P102 – A2LA Policy on Metrological Traceability](#) for environmental chambers:
  1. An in-house calibration performed in accordance with the manufacturer instructions/recommendations and (T4) of P102, as long as the CAB, when using the environmental chamber, includes an accredited sensor with the load to measure the environment during the test; or

2. The CAB obtains an accredited calibration of the entire system; or
3. The CAB obtains an accredited calibration of the individual components of the entire system.

#### **V. Calibration of HE-NE lasers (2/4/16)**

The calibration of the vacuum wavelength of commercial He-Ne lasers used in normal\*, routine measurements is not required based on international recommendations (see references 1, 2 and 3). Rather the following values are accepted:

$$f(\text{He-Ne}_{\text{unstabilized}}) = 473.6127 \text{ THz}$$

and since  $\lambda = c/f$  with the speed of light in vacuum fixed at  $c = 299\,792\,458 \text{ m/s}$ , we have the corresponding wavelength of

$$\lambda(\text{He-Ne}_{\text{unstabilized}}) = 632.9908 \text{ nm}$$

with relative uncertainty of

$$u = 3.0 \times 10^{-6} \text{ (k=2)}.$$

For calibration work requiring more refined uncertainties and justifications the user is encouraged to seek traceable, stabilized calibrations through the appropriate National Metrology Institute or appropriate accredited source.

Note: this only applies to the vacuum wavelength and does not address the typical and necessary accessories of the common commercial laser system, e.g. sensors for measuring temperature, humidity, and pressure, and the associated optics. See ASME B89.1.8-2011.

\*Normal environmental conditions are limited to the following:

Operating Temperature: (- 20 to + 50) °C

Non-operating Temperatures: (- 40 to + 80) °C

Relative Humidity: < 80 % RH

Operating Altitude: up to 3000 m

Non-operating Altitude\*\*: up to 6000 m

Highest Shock: 15 g for 11 ms

\*\*Limiting the non-operating altitude to 6000 m (≈18 000 feet) allows for most commercial flights.

#### **References:**

1. Note by BIPM, August 2012, "Recommended Values of the Standard Frequencies for Application Including the Practical Realization of the Metre and Secondary Representation of the Second" (Attached)
2. Jack A Stone, Measure (NCSLI), Vol. 4, No.3 (2009) 52-58, "Uncalibrated Helium Neon Lasers in length Metrology".
3. J.A Stone, et al, Metrologia 46, (2009) 11-18, "Advice from the CCL on the use of unstabilized lasers as standards of wavelength: the helium-neon laser at 633 nm."

#### **VI. Calibration Kits and Verification Kits for S-Parameters (9/1/16)**

For S-parameter calibrations, as the calibration kit is critical to the performance of the calibration, an accredited calibration kit is required to ensure traceability of the calibration.

Note: There are cases where verification kits may also require an accredited calibration to ensure traceability.

## DOCUMENT REVISION HISTORY

Date	Description
04/14/2004/14/20	➤ Initial document publication to include guidance items from obsolete P109 for continued access to important technical guidance