



# Frequently Asked Questions:

## *Requirements for Endorsed Calibration Certificates from an A2LA Accredited Laboratory*

### What is required to be included on a calibration certificate?

In accordance with ISO/IEC 17025:2005, section 5.10, in general, the accredited calibration certificate should include the following:

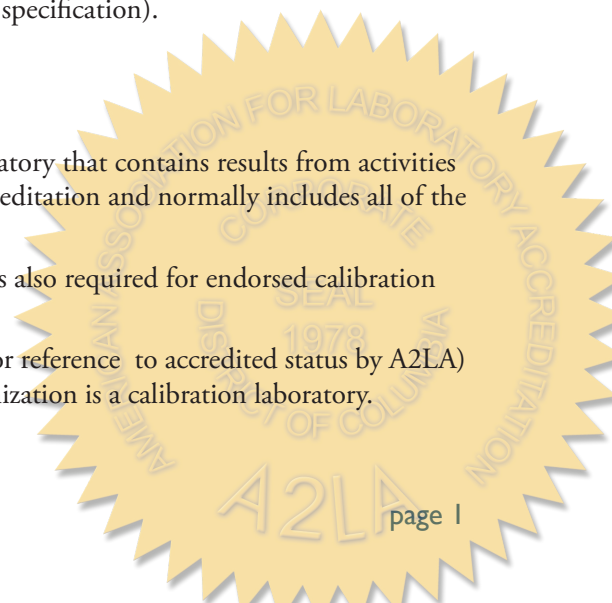
- A title (e.g. “Calibration Certificate”);
- The name and address of the laboratory and the location where the calibrations were carried out, if different from the address of the laboratory;
- Unique identification of the calibration certificate (such as the serial number);
- Inclusion on each page an identification in order to ensure that the page is recognized as a part of the calibration certificate (i.e. page 1 of 3), and a clear identification of the end of the calibration certificate;
- The name and address of the customer;
- Identification of the method used;
- A description of, the condition of, and unambiguous identification of the item(s) tested or calibrated;
- The date of receipt of the calibration item (where this is critical to the validity and application of the results) and the date of performance of the calibration;
- Reference to the sampling plan and procedures used by the laboratory or other bodies where these are relevant to the validity or application of the results;
- The calibration results with, where appropriate, the units of measurement;
- The name, function and signature or equivalent identification of those authorizing the calibration certificate;
- A statement to the effect that the results relate only to the items calibrated;
- The conditions (e.g. environmental) under which the calibrations were made that have an influence on the measurement results;
- Evidence that the measurements are traceable;
- In cases of adjustment or repair of an instrument, the before and after results adjustment, if available, are to be reported;
- The uncertainty of measurement (and/or statement of compliance with a specification).

### What does A2LA consider an endorsed calibration certificate?

This is a calibration certificate that is issued by an accredited calibration laboratory that contains results from activities that have been carried out within the laboratory’s official A2LA Scope of Accreditation and normally includes all of the bulleted items from ISO 17025, section 5.10 as listed above.

Beginning December 1, 2011 the inclusion of the measurement uncertainty is also required for endorsed calibration certificates.

The endorsement consists of the inclusion of the “A2LA Accredited” symbol (or reference to accredited status by A2LA) accompanied by the A2LA certificate number and an indication that the organization is a calibration laboratory.



## What is the purpose of this new requirement?

The purpose of this new requirement is to ensure that all endorsed calibration certificates are in alignment with JCGM 200:2008 the International Vocabulary of Metrology (VIM) for metrological traceability. The VIM defines metrological traceability as:

*“property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty”*

## Why is measurement uncertainty so important?

According to *ISO/IEC Guide 98-3 Guide to the expression of uncertainty in measurement (GUM:1995)*, the word “uncertainty” means doubt, so “uncertainty of measurement” means doubt about the validity of the result of a measurement.

The GUM further notes that it is now widely recognized that when all of the known or suspected components of error have been evaluated and the appropriate corrections have been applied, there still remains an uncertainty about the correctness of the stated result, that is, a doubt about how well the result of the measurement represents the value of the quantity being measured.

Finally, the GUM indicates that just as the nearly universal use of the International System of Units (SI) has brought coherence to all scientific and technological measurements, a worldwide consensus on the evaluation and expression of uncertainty in measurement would permit the significance of a vast spectrum of measurement results in science, engineering, commerce, industry, and regulation to be readily understood and properly interpreted. In this era of the global marketplace, it is imperative that the method for evaluating and expressing uncertainty be uniform throughout the world so that measurements performed in different countries can be easily compared.

The generally accepted practice for determining measurement uncertainty can be found in *ISO/IEC Guide 98-3 Guide to the expression of uncertainty in measurement (GUM:1995)*.

### Sample Uncertainty Budget for 10-inch Plain Ring Gage.

Uncertainty Source	Estimate (μin)	Type	Distribution	Divisor	Standard Uncertainty (μin)	Variance (μin <sup>2</sup> )
Gage Blocks	10	B	Normal	2	5	25
Repeatability	3.2	A	Normal	1	3.2	10.24
Uncertainty of CTE	20.0	B	Rectangular	√3	11.5	132.2
Master/part temperature difference	3.25	B	Rectangular	√3	1.88	3.52
Probe misalignment	0.5	B	Rectangular	√3	0.29	0.08
Comparator calibration	3	B	Rectangular	√3	1.73	3
Sum of the Variances	174.04					
Combined Standard Uncertainty	13.19					
Expanded Uncertainty $U (k=2)$	26.39 ≈ 27					

## How does requiring measurement uncertainty on calibration certificates impact calibration providers?

- Beginning December 1, 2011, if you are a calibration provider and an uncertainty of measurement is reported on the calibration certificate then an endorsed calibration certificate that includes the A2LA Accredited symbol can be issued.
- If **only** a statement of compliance (e.g. “pass/fail”) or **only** an implicit uncertainty statement (e.g. Test Uncertainty Ratio (TUR)), or both, is reported on the calibration certificate, then an endorsed, accredited calibration certificate **cannot** be issued.
- If a contract from a customer specifies that uncertainty be excluded from the calibration certificate, then an endorsed, accredited calibration certificate **cannot** be issued.

## How does requiring measurement uncertainty on calibration certificates impact calibration recipients?

If you are a calibration recipient, it is important that you:

- Request an accredited, endorsed calibration certificate when purchasing calibration services.
- Beginning December 1, 2011, during the inspection or verification of the calibration service received (per section 4.6.2 of ISO/IEC 17025), ensure that the accredited, endorsed calibration certificate received contains the measurement uncertainty result.

## What do you do if you requested an accredited, endorsed calibration certificate and did not receive the measurement uncertainty result(s) after December 1, 2011?

A2LA recommends that you first contact your calibration provider for an amended calibration certificate based on the newly implemented A2LA calibration program requirements. If this effort fails you should contact A2LA for resolution of the matter.

## What if I don't want or need the measurement uncertainty?

Beginning December 1, 2011, if a customer does not want inclusion of the measurement uncertainty in the calibration certificate then the accredited calibration provider will only be able to provide a calibration certificate that is not endorsed. This means that the certificate would not be suitable in ensuring that metrological traceability is established and would not meet *P102 - A2LA Policy on Traceability*.

## “No Uncertainty = No Traceability”

### In the past I was able to receive information on whether the instrument remained in tolerance with the manufacturer's (or other) specifications. Can I still receive this information on an endorsed calibration certificate?

Yes, as long as the measurement uncertainty is also reported.

ISO/IEC 17025 section 5.10.4.1.b allows for three options when reporting results:

- reporting the measurement uncertainty;
- reporting a statement of compliance with an identified metrological specification; or,
- reporting both measurement uncertainty and a statement of compliance.

In section 5.10.4.2 of the standard it says:

“When the statement of compliance with a specification is made omitting the measurement results and associated uncertainties, the laboratory shall record those results and maintain them for possible future reference...When statements of compliance are made, the uncertainty of measurement shall be taken into account.”

This means that the measurement uncertainty is calculated (with results maintained) and then considered when deciding the status of compliance with a specification.

Organizations that do not currently report measurement uncertainty on the calibration certificate can begin to report the measurement uncertainty that is already calculated for the purpose of determining compliance status.

For more information on statements of compliance see *ILAC-G8:03/2009 Guidelines of the Reporting of Compliance with Specification* which is freely available on the calibration page of our website at <http://www.a2la.org/appsweb/calibration.cfm>.

### **In the past I was able to receive information on whether the instrument remained in tolerance with the manufacturer's (or other) specifications without an indication of measurement uncertainty. Why is this no longer acceptable?**

This approach does not provide any overt information on the measurement uncertainty determined from the quantity being measured and without the uncertainty result included on the calibration certificate, metrological traceability is not readily apparent.

### **Were "bad" decisions made or "bad" product delivered as a consequence of not including measurement uncertainty on the calibration certificate before December 1, 2011?**

Not necessarily. *R205 – Specific Requirements: Calibration Laboratory Accreditation Program* states:

*When parameters are certified to be within specified tolerance, the associated uncertainty of the measurement result is properly taken into account with respect to the tolerance by a documented procedure or policy established and implemented by the laboratory that defines the decision rules used by the laboratory for declaring in or out of tolerance condition.*

This means that a defined decision rule was used to decide whether the instrument was within (or out) of tolerance. It also means that one component of these rules is consideration of the measurement uncertainty. The default decision rule may be found in *ILAC-G8:2009, Guidelines on Assessment and Reporting of Compliance with Specification*. With agreement from the customer, other decision rules may be used as noted in the contract of service.

It is important to keep in mind that while statements of compliance provide information on whether the instruments meet (or does not meet) the metrological specification, it does not provide any information on metrological traceability.

### **Will the inclusion of the measurement uncertainty change the cost of the calibration?**

Many organizations have several levels of calibration service where the cost will vary accordingly. It is important to discuss your needs with your calibration provider in order to ensure that you receive the service best suited for your company, especially if the goal is to achieve an accredited (endorsed, traceable) calibration.

### **What if I have questions about these changes?**

If you have questions regarding these changes to the A2LA Calibration Program and A2LA Policy on Traceability, please contact your Accreditation Officer or Pam Wright, Accreditation Manager, at [pwright@A2LA.org](mailto:pwright@A2LA.org).