FLUKE®

Calibration

A new format for Fluke Calibration Certificates of Calibration

Application Note

Fluke Calibration has brought together the pioneering metrology companies of Fluke Precision Measurement, Datron, Hart Scientific, DH Instruments and Ruska to form one metrology company. With that kind of heritage, innovation is in our DNA. Best practices are reviewed periodically and selected to become standard work across the business. As part of that process, Fluke metrology associates evaluated the calibration certificates and reports used by the various brands, and they developed a new standardized calibration certificate and report template. When these associates saw an opportunity to use new technology to benefit the metrology community, they took it.

This application note shares the new format for the calibration certificate for products manufactured and serviced by Fluke Calibration. You will see a sample of the new certificate and learn:

- Why Fluke Calibration decided to standardize on a common certificate
- What issues were evaluated and discussed
- Location and format of the certificate data
- New technologies that were employed

NVLAP Lab Code 105016-0

FLUKE Calibration

Certificate of Calibration
Fluke Park Laboratories
Everett Primary Electrical Laboratory

Description:	CALIBRATOR	Certificate Number:	3C9921
Manufacturer:	FLUKE	Date of Calibration:	29 Jun 2012
Model:	5720A	Date Due:	29 Jun 2013
Serial Number:	9630209	Temperature:	22.4 to 23.6 °C
Issue Date:	02 Jul 2012	Relative Humidity:	40 to 50 %RH
		Pressure:	96 to 103 kPa
Procedure:	Fluke 5720A: VER PSL Combine : 2.0		
Customer:	Dockweiler Calbration services Clinton, WA	RMA Number:	70052678
		Customer ID:	54T21
PO Number:	AV456Y34		

This calibration is traceable to the SI through recognized national measurement institutes, ratiometric techniques, or natural physical constants and is in compliance with ISO17025:2005 and ANSI/NCSL Z540.1. The calibration has been completed in accordance with the Fluke Calibration Quality System document MET-0. Calibration certificates without signatures are not valid. This certificate applies to only the item identified and shall not be reproduced other than in full, without the specific written approval by Fluke Corporation. This certificate shall not be used to claim product endorsement by the accreditation body.

This calibration certificate may contain data that is not covered by the Scope of Accreditation. The unaccredited test points, where applicable, are indicated by an asterisk (*), or confined to clearly marked sections. Functional tests are not accredited.

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in the ISO Guide to the Expression of Uncertainty in Measurement. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %.

Comments:

Nicholas Mason
Metrologist

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Figure 1. Example of the new calibration certificate, page 1.

Identifying the need for a standard certificate format

Fluke's newly acquired calibration businesses were allowed to operate independently at first. In 2010 the various product groups were united under a Fluke Calibration brand. The new brand symbolizes our goal to coordinate programs and operations to make it easier and more efficient for customers to interact with the company.

The metrology team is no exception. Associates from the various calibration laboratories took a close look at the different ways each lab operated, with a goal of standardizing on best practices that make it easy and efficient to deliver the best services to our customers. As part of that exercise, the team identified a need to standardize on calibration labels and certificates. Standardizing these materials would allow each lab to deliver a high quality product more efficiently. It would also help to provide a common experience to customers who interact with more than one lab.

How to be innovative with a calibration sticker

The Fluke metrology associates who designed the new report template found that some customers preferred calibration stickers to be affixed to the calibration report and others preferred the sticker placed on the calibrated instrument. To solve this problem, the metrology associates determined that they could print the sticker on the report in a way that would allow the customer to peel it off and place it on the instrument if that was their preference.

New technologies for automating equipment check-in

If you send a lot of equipment out for calibration service, checking the equipment back in when it returns can be a time consuming and potentially error-prone process. The team wanted to find a way to facilitate automating this process for their customers.

They discovered that Quick Response Codes (QR codes), a type of barcode made up of square dots arranged in a square pattern on a white background, could be a way to provide a lot of useful information within a small space. Invented by a Toyota subsidiary to track vehicles in production, QR codes have become increasingly popular because everyone with a smart phone has a QR code reader in their pocket.

To facilitate automating equipment check-in, the QR code would have to store information that would identify the instrument and other user required details about the calibration. The QR code would also need to remain legible after being photocopied up to three times. This suggested that an alphanumeric data type would be required, and the version of the QR code would have to have sufficiently large dimensions to withstand multiple photocopies. An important issue for the metrologists was the tradeoff between the amount of information that can be stored on a QR code (up to 4,296 alphanumeric characters), the error correction level, and the version of the symbol needed to maintain the integrity of photocopied reports.

The new certificate

A sample of page 1 of the new certificate is presented in Figure 1. The rest of this application note describes the various parts of the certificate and provides some insights into the reasons behind certain decisions on content, format, and technologies.

Header information

The certificate's header contains

- The **company logo**, in its position on the upper right of the page as specified by corporate brand standards. Since the company logo is placed on the right, the laboratory accreditation body logo is placed on the left, directly opposite. The size of the accreditation body logo appears proportionally the same size as the company logo, no bigger, no smaller, no higher, no lower, to communicate the balance between accreditation responsibility and corporate responsibility.
- The **report's title**. The team selected "Certificate of Calibration" because some countries prefer this title, rather than "report of calibration" or some other description.

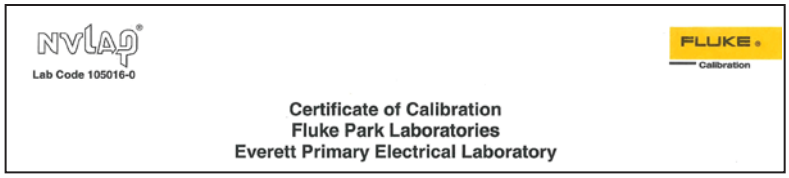


Figure 2. The certificate header contains logos for the company and accreditation body, the report title and laboratory location.

- The **laboratory location name**. The location name was placed immediately under the title so customers can quickly determine which Fluke facility performed the calibration.

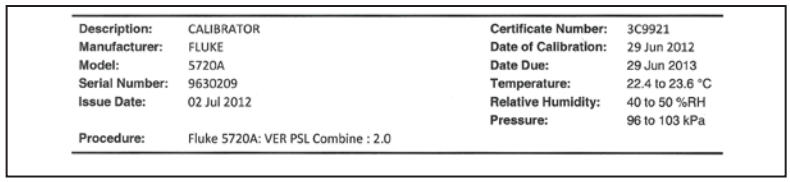
Unit under test information

This section of the certificate uniquely identifies the unit under test (UUT) by

- Description
- Manufacturer (as identified in the instrument)
- Model number
- Serial number

The rest of the information relates to the calibration event:

- An **issue date**, which will change if the customer requests a reprint of the calibration certificate
- A **unique certificate number**
- **Date of calibration.** The date format was selected to be internationally recognizable.
- **Calibration date due.** This date can be printed at the customer's request. If a calibration due date is not provided, the calibration due date is left blank. This is done as a convenience for the customer so that they may enter their own calibration due date.
- **Environmental conditions** of the calibration laboratory at the time of instrument calibration are expressed in SI units and can be suppressed if not relevant to the calibration.



Description:	CALIBRATOR	**Certificate Number:**	3C9921
Manufacturer:	FLUKE	**Date of Calibration:**	29 Jun 2012
Model:	5720A	**Date Due:**	29 Jun 2013
Serial Number:	9630209	**Temperature:**	22.4 to 23.6 °C
Issue Date:	02 Jul 2012	**Relative Humidity:**	40 to 50 %RH
		Pressure:	96 to 103 kPa
Procedure:	Fluke 5720A: VER PSL Combine : 2.0		

Figure 3. UUT information.

Customer information

The customer information contains the name and location of the customer. In the United States, the location is the city and state. International customers have similar appropriate information. Additional information was not included due to complexity of some addresses as well as the potential for discrepancies between shipping and billing locations.

Return Material Authorization Number (RMA) and customer ID (a unique identification number that Fluke Calibration associates with a specific customer) are always printed, purchase order (PO) Number and the customer's asset number are printed if they are provided by the customer. For the nuclear utility industry, most require the PO number on the calibration certificate.

Calibration statements

This section contains a statement of traceability and identifies the quality systems with which Fluke Calibration presently complies. In the traceability statement you may notice that the certificate of calibration does not explicitly state that Fluke is traceable to NIST. ISO 17025 requires laboratories to be traceable to the SI, which stands for the International System of Units. Traceability to the SI can be realized through an appropriately recognized National Measurement Institute (NMI) such as NIST in the United States, PTB in Germany, or NIM in China. Traceability may also be realized through ratiometric techniques or the unit of natural physical constants, which are under stringent metrological control. Fluke is an international corporation, and we obtain our measurement traceability from many different NMI's, depending on the locality and capability. Often due to the level of accuracy associated with our products, we are required to use the NMI that can provide the world's best uncertainty for the particular parameter. It may even be a good idea for you to review your purchasing documentation and update the language to require traceability to the SI. Other statements in the first paragraph are a supplemental requirement by the identified quality standards and/or most accreditation bodies. Paragraphs two and three contain information specific to the accredited test data and its associated uncertainty. Finally, there is a comments section for any other specific information that needs to be communicated to the customer on the certificate page.

Final page 1 data

The remaining data on page 1 of the calibration certificate are some of the greatest innovations from the team planning sessions.

- The **QR barcode** is on the left. This two-dimensional barcode can be read very easily from items such as cell phone cameras. The barcode is intentionally low resolution so that it will remain readable after being photocopied. It contains information on the laboratory location where the calibration was performed, and the information contained on the calibration label. Fluke plans to gather customer input on the content of this barcode for the purpose of placing information that will automate equipment check-in from the calibration service provider.

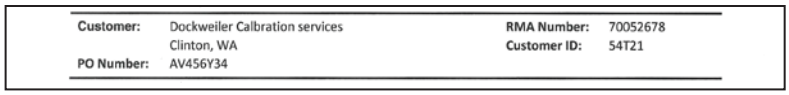


Figure 4. Customer Information.

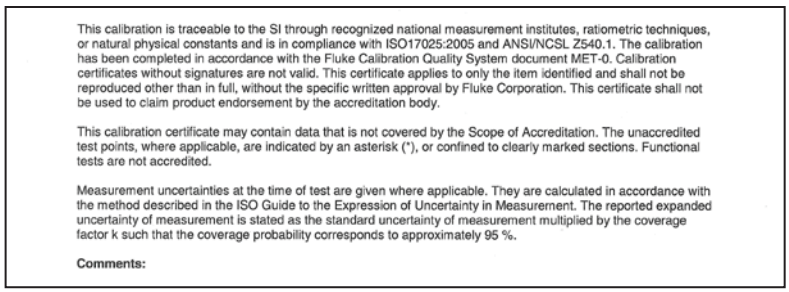


Figure 5. Calibration statements.

- The **calibration sticker** is in the center of the page. This is an adhesive label that has been integrated into page one of the calibration certificate. Now customers can either leave the calibration label on the certificate, or they can remove the label and place it on the instrument in a location that is most convenient to them. There is no longer a risk that the certificate and sticker will become separated because a paper clip came loose, or damaged because of being stapled together and pulled quickly apart. The calibration sticker also has a special coating on it that is resistant to smearing of the information printed on the label.
- The **signature area** is for the person who is accepting responsibility for the certificate's contents. This may or may not be the technician who performed the work. For some Fluke entities, removing the technician's signature was a major shift in thinking. For some calibrations, the signature may be the technician's, or it may be that of a metrologist who reviews the work. While ISO 17025 does not require the technician's signature on the calibration certificate, Fluke maintains the servicing technician's identity in our laboratory management system in case there are any questions about the calibration.
- The servicing laboratory's **address and phone number**
- **Page number** and **total number of pages**
- **Revision date** of the calibration certificate template

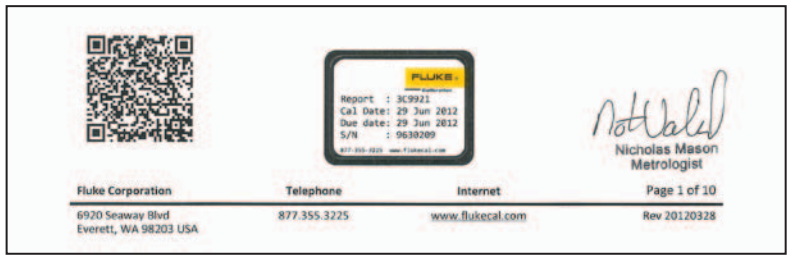


Figure 6. Final page 1 data.

FLUKE®
Calibration

Pages two and three

Page two of the new format contains information on the standards used during the calibration. Information is provided to identify

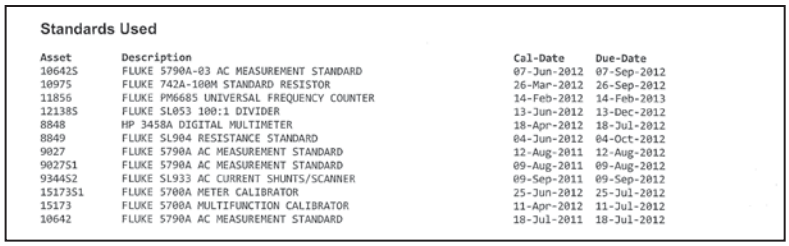
- The specific instruments used
- Description of the device (i.e. manufacturer and model number)
- Date of calibration
- Calibration date due for the instrument.

While ISO 17025 does not require the standards to be specifically listed, it does require evidence that measurements are traceable. Fluke provides evidence of traceability through the certificates of calibration for each standard used, which contain both the subsequent path of traceability and the uncertainty of measurements for the particular step.

It is at this point that the calibration certificates must diverge based upon the technical disciplines. It is important to balance the needs of delivering a consistent calibration certificate across Fluke Calibration with the necessity of providing technical information and data that is similar to those delivered by National Metrology Institutes. Data delivered for a pressure balance (piston gage), standard platinum resistance thermometer or a zener reference standard will all, therefore, have a different format appropriate to the technical requirements of the calibration.

The quest for continuous improvement

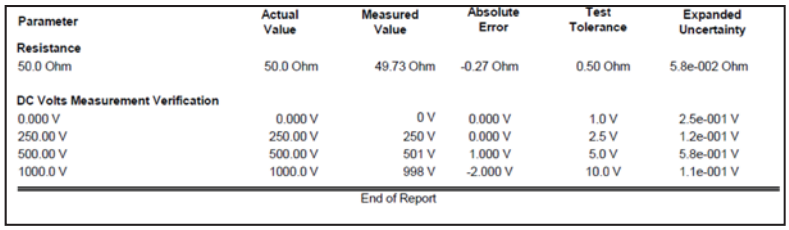
Fluke Calibration believes that the customer experience will be improved because of the standardized calibration certificate format. However, we expect that this will not be the final improvement to the calibration certificate format. We are very interested in hearing from customers about how we can deliver even better calibration certificates that clearly communicate relevant information in an innovative and useful fashion.



Standards Used

Asset	Description	Cal-Date	Due-Date
10642S	FLUKE 5790A-03 AC MEASUREMENT STANDARD	07-Jun-2012	07-Sep-2012
1097S	FLUKE 742A-100M STANDARD RESISTOR	26-Mar-2012	26-Sep-2012
11856	FLUKE PM6685 UNIVERSAL FREQUENCY COUNTER	14-Feb-2012	14-Feb-2013
12138S	FLUKE SL053 100:1 DIVIDER	13-Jun-2012	13-Dec-2012
8848	HP 3458A DIGITAL MULTIMETER	18-Apr-2012	18-Jul-2012
8849	FLUKE SL904 RESISTANCE STANDARD	04-Jun-2012	04-Oct-2012
9027	FLUKE 5790A AC MEASUREMENT STANDARD	12-Aug-2011	12-Aug-2012
9027S1	FLUKE 5790A AC MEASUREMENT STANDARD	09-Aug-2011	09-Aug-2012
934452	FLUKE SL933 AC CURRENT SHUNTS/SCANNER	09-Sep-2011	09-Sep-2012
1517351	FLUKE 5700A METER CALIBRATOR	25-Jun-2012	25-Jul-2012
15173	FLUKE 5700A MULTIFUNCTION CALIBRATOR	11-Apr-2012	11-Jul-2012
10642	FLUKE 5790A AC MEASUREMENT STANDARD	18-Jul-2011	18-Jul-2012

Figure 7. Standards information.



Parameter	Actual Value	Measured Value	Absolute Error	Test Tolerance	Expanded Uncertainty
Resistance					
50.0 Ohm	50.0 Ohm	49.73 Ohm	-0.27 Ohm	0.50 Ohm	5.8e-002 Ohm
DC Volts Measurement Verification					
0.000 V	0.000 V	0 V	0.000 V	1.0 V	2.5e-001 V
250.00 V	250.00 V	250 V	0.000 V	2.5 V	1.2e-001 V
500.00 V	500.00 V	501 V	1.000 V	5.0 V	5.8e-001 V
1000.0 V	1000.0 V	998 V	-2.000 V	10.0 V	1.1e-001 V

End of Report

Figure 8. Calibration data.

Fluke Calibration. *Precision, performance, confidence.™*

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