

Sergei Jacobson

Accreditation of calibration laboratories to normative documents: diversity or standardization

Received: 12 November 2003
Accepted: 18 November 2003
Published online: 29 April 2004
© Springer-Verlag 2004

Abstract Calibration of measuring equipment is conducted by following some normative or applicable documents such as standards, manufacturer manuals and instructions, technical orders issued by defense organizations, or scientific papers. An accreditation body provides its recognition to the calibration laboratories by evaluating their technical competence and their compliance with the quality requirements of ISO/IEC 17025. The accreditation body must have defined criteria in order to evaluate different calibration methods which should ensure that the laboratories are performing the calibration in a technically competent manner when they are fully or even only partially based on the relevant reference documents. A discussion with different points of view about choosing the criteria, as well as the Israel Laboratory Accreditation Authority (ISRAC) policy on this issue, are presented.

Keywords ISRAC policy on accreditation · Calibration laboratories · Normative documents

Introduction

It is quite common to find that the calibration laboratories have developed their own procedures to provide calibration services. These calibration procedures are custom products in the sense that they take into account the client's requirements, the laboratory's set of standard instruments, and the staff know-how. A wide variety of proce-

dures may be found in different calibration laboratories for the calibration of any particular instrument. The reason for the calibration is to make sure that the instrument can be used to conduct a measurement over some specific range and to some specific uncertainty.

In the field of testing there are some regulatory requirements which dictate the reference standard to be used. For environmental monitoring, test methods from NIOSH or EPA are used, while, for testing water, the Standard Methods for the examination of waste water have been made a requirement in Israel. Because of this, some tests are required to be conducted in full accordance with standard documents or standard methods. When tests follow a well-defined standard they should be performed in a similar way in different laboratories.

Diversity in reference documents for calibration

Normative or applicable documents such as standards, manufacturer manuals and instructions, technical orders issued by defense organizations, or scientific papers may be used by the calibration laboratory to develop a calibration procedure that complies with relevant needs and requirements.

It is not unusual that several standard documents relevant to one calibration issue may exist. For example, there are series of national standards JIS B7507 (1993), DIN 862 (1988), BS 887 (1982), GGG-C-111C (1987), as well as the ISO standard ISO 3611 (1978) for the calibration of mechanical instruments like micrometers and calipers.

In contrast there are very few standard documents dealing with calibration in the electrical domain. Electrical measurement equipment is calibrated in accordance with manufacturers recommendations. When comparing the manufacturers recommendations and technical standards for similar or identical measuring equipment, it is noted that the recommendations from various sources often do not correlate. Therefore, some questions may be raised concerning these calibration reference documents:

- What are the reasons for these differences in recommendations: differences in instruments or different points of view and criteria?
- What should the calibration laboratory do when non-correlations between recommendations are found? Which ref-

erence document or standard should be chosen when several different documents are found?

- What should the laboratory do when reference document recommendations go far beyond the customer's needs or, on the contrary, do not fulfill the customer's needs for calibration?
- What are the criteria we need in order to make a reference to an applicable technical document?

Discrepancies in technical recommendations may correspond to different professional points of view as well as different properties of different measuring instruments. The criteria used to choose a suitable reference document must follow technical, professional judgments on the correctness of the calibration method and the fitness of the calibration of measurement.

ISRAC policy

ISRAC does not make statements concerning mandatory normative reference documents for calibration, except on rare occasions. They are solely concerned with the official and the mandatory state standards. It is for the laboratory to decide upon the appropriate reference document. The laboratory may decide to adopt the relevant recommendations fully or partially.

ISRAC policy is to assess the laboratory quality system, including its decision making process and the qualifications of its staff, especially those responsible for choosing the proper calibration methods and the relevant reference documents.

Qualified technical assessors, together with a lead assessor from ISRAC, assess the correctness of the calibration method. The technical assessor must be highly competent in the particular field of calibration. During the assessment, the evaluation takes into account the purpose of the calibration and the technical parameters of the calibration relevant to the measurement range and uncertainty.

ISRAC accredited laboratories are required to obtain details about the range, calibration points, uncertainty, and tolerance margins from the customer prior to conducting the calibration. This policy ensures that the calibration is fit for its purpose, and provides traceability of measurements conducted by the calibrated instruments.

A different policy may be found in other accreditation bodies. An alternative is to adhere to specific reference documents as mandatory, and require a full implementation by the accredited laboratories. In ISRAC's view this approach would not be accepted as an optimal one.

Diversity in laboratory facilities, in customer requirements, and sometimes

technically non-correct or obsolete recommendations in reference documents, are the main disadvantages of the policy of following reference documents fully with no exceptions. It must be emphasized clearly that ISRAC policy calls for a careful, technically sound, and critical view of the recommendations in the reference documents. Implementation of this policy eliminates careless, light-minded approaches to technical recommendations.

Compliance of an instrument to tolerance requirements

Calibration laboratories may provide data on the compliance of calibration results to tolerance requirements. In accordance with ISO/IEC 17025: 1999, when "statements of compliance are made, the uncertainty of measurement shall be taken into account". Very often the recommendations for tolerance margins found in standard documents and manufacturers recommendations can-

not be implemented in the way required by ISO/IEC 17025: 1999.

The reason for this is the narrow margins stated in the standard documents and manufacturers recommendations, which are defined with no considerations of uncertainty. Frequently, instruments that comply with tolerance requirements by neglecting the uncertainty considerations cannot be identified as such by following ISO/IEC 17025: 1999 requirements.

- ISRAC accredited laboratories are required to strictly follow the ISO/IEC 17025: 1999 requirements
- ISRAC accredited laboratories may provide data on compliance to more realistic, wider, margins, on the condition that the margin values are clear to the customer.

Conclusions

- ISRAC policy to give freedom to accredited laboratories to choose their own reference documents is presented and justified
- ISRAC policy requires a very careful examination of the reference documents and the customer requirements for cali-

bration by both the laboratory and the accreditation body

- Implementation of the policy presented requires a tight, professional interaction between the calibration laboratory and their customers
- An alternative approach for deciding on mandatory reference documents was discussed and was found to be less appropriate.

Presented at the 2nd International Conference on Metrology – Trends and Applications in Calibration and Testing Laboratories, November 4–6, 2003, Eilat, Israel.

S. Jacobson (✉)
Calibration Department,
Israel Laboratory Accreditation Authority,
2 Habonim St. Beit Habonim, Ramat Gan,
52522, Israel
e-mail: ornad@israc.gov.il
Tel.: +972-3-5751690
Fax: +972-3-5751695