



## **EUROMET Traceability**

This document describes traceability within EUROMET and is one out of four types of collaborative efforts taking place in EUROMET. The document lists recommendations for and arrangements between the NMIs.

The version 01.0 of Guide n° 6 corresponds to the original version of December 1998. The version 01.1 takes into account minor amendments (ISO/IEC 17025, CIPM MRA) and the changes due to the new EUROMET names adopted at the EUROMET General Assembly in May 2001.



## **1 Introduction**

This Guidance Document addresses the case in which one national metrology institute (NMI) takes formal traceability from another. This has come to be called 'vertical traceability'. The circumstances in which this can occur include:

**TYPE 1:** An NMI chooses only to maintain a secondary standard, calibration of which is traceable to a superior (primary) standard held at another NMI. This is often done for reasons of convenience, reduction of expense and a relatively low level of demand in a particular country. In some cases the secondary standard is maintained at laboratories other than the National Metrology Institutes;

**TYPE 2:** An NMI chooses only to maintain a minimal technical capability relying almost entirely on another NMI to provide calibration and other services for national users.

In both these situations, traceability is achieved by the issuing of a calibration certificate from the 'providing' NMI. This must be done within the quality system of the 'providing' laboratory and must also satisfy any similar requirements of the receiving laboratory or the users in that country.

In general, and in accordance with EUROMET Guide n° 1, ISO/IEC 17025 is recommended as it provides the necessary assurance for the quality management of routine calibration services. Current EUROMET policy accepts self declaration as well as formal third party certification for an NMI's quality system. EUROMET's informal practice is also that certificates from NMIs in member countries are generally accepted throughout EUROMET and that the primary standards held in NMIs are regarded as metrologically equivalent within some associated uncertainty budget. World metrology is, however, moving towards a more formal system of mutual recognitions which has to be reflected in EUROMET policy; section (4) deals with the relevant trends.

## **2 Arrangements between NMIs**

**2.1** Traceability arrangements agreed between NMIs bring obligations and responsibilities to the provider as well as to the user. These transcend the provider's normal service provision largely because of the trust and reliance placed with it by the user, even though current practices are that the user pays no additional premium for this arrangement

**2.2** EUROMET has no formal 'Traceability Agreement' but recommends that supplier and user NMIs discuss, agree, and formally record their co-operation on the following general points which should be contained in a Service Agreement

On the provider's side:

- an agreement that, should it decide to withdraw, suspend, or otherwise change the service, it will notify the user. A formal notice period should be agreed in advance so that other arrangements may be made;
- an undertaking to ensure fair and equal treatment as far as lead time, turn-around and priority for all customers regardless of national origin;
- information concerning the Quality Management System (normally ISO/IEC 17025) under which calibration certificates are produced;
- a named individual who would act as the contact and who would deal with any specific problems;
- details of comparisons with other NMIs or the BIPM through which it is possible to demonstrate metrological equivalence of the standards maintained. This is specific to individual arrangements and would normally be contained in an Annex to the more general Service Agreement containing the issues discussed in this Section and which are intended to be covered in all such EUROMET traceability agreements;



- to provide a statement of measurement uncertainty in accordance with international best practice;
- an undertaking, when asked for by the receiving NMI, to provide on commercial terms technical advice on matters relating to the utilisation of relevant technologies, or special, high accuracy calibrations, which are not part of the providing NMI's standard service. Such special arrangements would usually be co-ordinated and arranged through the receiving NMI and would be on the providing NMI's normal commercial terms;
- an undertaking to accept a reasonable number of technical liaison and discussion visits from the receiving NMI provided appropriate notice is given. This is in order to help the receiving NMI to remain up to date with relevant technical developments in the field.

On the recipient's side:

- to ensure that users meet suppliers' normal service requirements, for example for the timing of artefacts sent for calibration (e.g. batched calibrations or other specific normal 'booking' arrangements);
- to ensure that the uncertainty specified on calibration certificates issued by the receiving NMI takes full account of uncertainties specified by the providing NMI as well as any additional uncertainties of the receiving NMI's secondary standards and calibration process.
- to provide a named contact who would liaise with the provider laboratory and who would, in the first instance, act as the interface with national users.

**2.3** Recipient NMIs or - as is the case in some countries - laboratories designated by the national NMI to hold a limited range of national standards, should take part in appropriate comparison projects organised by EUROMET so as to create confidence in their own calibration procedures and their ability to maintain and disseminate national (secondary) standards.

### **3 Recommendations to recipient NMIs**

One of the benefits of maintaining and disseminating a national standard lies in the technical advice an NMI can give to users. EUROMET therefore recommends that the recipient NMI makes every effort to maintain some technical expertise. This will enable the receiving NMI to maintain 'intelligent customer' role, to judge the capability of the providing NMI to offer advice to users, or to refer users to the consultancy services of the providing NMI.

### **4 Future arrangements/technical and market trends**

The 'vertical' traceability agreements described in this Guidance Note create a special relationship between the provider and the recipient NMIs. Such links strengthen the mutual dependence and efficiency of working together in a Regional Metrology Organisation.

There is, however, increasing attention being paid by NMIs to 'horizontal' traceability or 'metrological equivalence': this is a statement of how closely two or more realisations of the same unit or quantity agree with each other and usually is associated with an appropriate uncertainty. Together with a quality system based on ISO/IEC 17025, this is a precursor to mutual acceptance of calibration certificates.

Two particular initiatives are shaping this trend:

- the CIPM Mutual Recognition Arrangement on metrological equivalence at the highest level and recognition of calibration certificates based on Key Comparisons organised by the CIPM's Consultative Committees;



- a set of RMO comparisons in areas covered by the Key Comparisons and which will be at the lower accuracies/greater uncertainties more appropriate to some RMO members. In addition, RMOs will organise other comparisons in subject areas which are important to that particular region. In EUROMET's case, EUROMET Guide n° 3 sets out guidelines for the organisation of comparisons, many of which will be identified by and managed through the relevant Technical Committee Chairman/Contact Persons network.

These initiatives will have various degrees of impact on the traceability situation within EUROMET. Specifically:

- the nested set of Key and RMO comparisons will provide published, formal evidence of traceability and the metrological equivalence of the standards, units and quantities maintained at NMIs. This may enable 'recipient' NMIs to have a much wider range of options from which to choose their 'providing' NMI. In addition, this may encourage traceability arrangements with provider NMIs from outside EUROMET.
- if RMOs fulfill their obligation of a full and thorough set of comparisons in support of key comparisons, and of supplementary comparisons, then these will establish de-facto traceability ('vertical' as well as 'horizontal') between all NMIs. NMIs maintaining secondary standards (TYPE 1 in paragraph 1) will be able to claim clear 'vertical traceability' and metrological equivalence (at a stated level of uncertainty) from many more NMIs. The TYPE 2 situation is, of course, substantially unchanged, but the choice of NMIs to which to go for validated traceability is widened.

In these circumstances, the requirements for evidence of metrological equivalence within annexes to Service Agreements at the specific NMI-NMI level is reduced. The residual, and not insignificant, value of a traceability agreement therefore lies in the benefits of continuity of supply, fair treatment and an agreement on provision of technical advice or special services to comparisons in the 'receiving' EUROMET member.

## **5 Note**

In some countries, national standards are held outside the relevant NMI, which authorises or designates the other organisations to maintain and disseminate them. The general provisions, some of which have specifically been noted in 2.3, in this Guide apply, on a case by case basis, to the organisations which are part of these decentralized National Measurement Systems. In all cases, though, negotiations and formal agreements should be between NMIs although, to a great extent, these designated laboratories act as an NMI and are welcome at EUROMET meetings when nominated by the relevant NMI.