

Measurement Services Covered:

- ◆ Acoustics, Ultrasound and Vibration;
- ◆ Chemical standards (amount of substance);
- ◆ Electricity and Magnetism;
- ◆ Ionizing radiation;
- ◆ Length;
- ◆ Mass (e.g. mass standards, force, pressure, density, hardness, viscosity and fluid flow);
- ◆ Photometry and Radiometry;
- ◆ Thermometry;
- ◆ Time and Frequency.

Participants in the CIPM MRA:

- ◆ Declare the uncertainties associated with their calibration and measurement capabilities (CMCs) used in day to day services and have these validated by international experts.
- ◆ Participate in 'key comparisons' organized by the CIPM's Consultative Committees or by Regional Metrology Organizations, chosen to characterize activities and calibration services in a particular technical area (some results are seen in the accompanying figures), and to provide evidence to backup CMCs.
- ◆ Install a quality management system.

This activity has helped participants improve their techniques for realizing national standards and the International System of Units (SI), and has led to increased technical confidence in the world's measurement systems.



The principal output of the CIPM MRA is the BIPM key comparison database (KCDB), which is maintained at the BIPM as part of its role to ensure worldwide conformity of measurements and their traceability to the SI.

The BIPM KCDB provides a searchable database of:

- ◆ Results of international (key) comparisons of national standards.
- ◆ Internationally reviewed and recognized capabilities associated with uncertainties of measurement services.



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The BIPM key comparison database



Internationally Recognized Measurement Standards and Calibration Capabilities

www.bipm.org/kcdb

Mutual Recognition

The CIPM MRA (Mutual Recognition Arrangement of the International Committee of Weights and Measures) creates a framework within which participating national metrology laboratories can establish the degrees of equivalence of their national measurement standards as well as the mutual recognition of their calibration and measurement certificates.

The objectives of the CIPM MRA are:

- ◆ To provide international recognition of, and to improve the realization of national standards.
- ◆ To provide confidence in, and knowledge of the measurement capabilities of participating laboratories for all users, including the regulatory and accreditation communities.
- ◆ To provide the technical basis for acceptance between countries of measurements used to support the trade of goods and services - "equivalent" certificates issued in the framework of the MRA, which can be accepted worldwide.
- ◆ To reduce Technical Barriers to Trade arising from lack of traceability and equivalence.

The CIPM MRA is open to Member States of the Metre Convention and Associates of the General Conference on Weights and Measures.

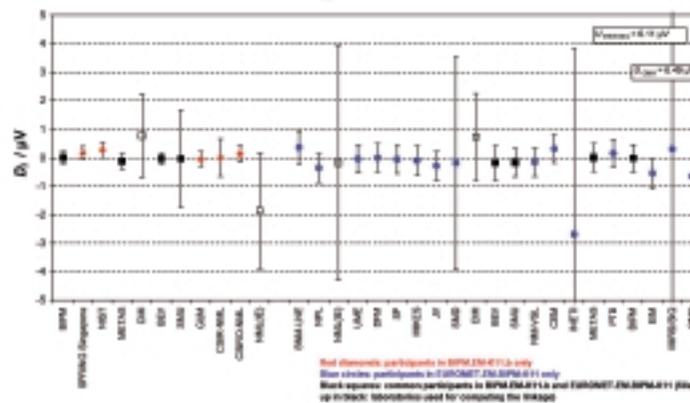
Calibration and Measurement Capabilities (CMCs):

Data on the ranges and uncertainties of the measurement services of national institutes in many areas of physics, chemistry and engineering is available.

- ◆ Free access;
- ◆ Calibrations based on reference materials;
- ◆ Guaranteed traceability to the SI;
- ◆ Reviewed measurement uncertainties;
- ◆ Recognized by accreditors.

An opportunity to choose the laboratory you use for traceability to the SI.

BIPM.EM-K11.b and EUROMET.EM.BIPM-K11 10 V Zener diode Degrees of equivalence [D , and its expanded uncertainty ($k = 2$), U]



Carbon Monoxide in Nitrogen

Gases, Environmental
 United States, NIST (National Institute of Standards and Technology)
 Complete CMCs in Amount of Substance for Gases for United States (.pdf file)

Matrix or material	Analyte or component	Dissemination range of measurement capability		Range of certified values in reference materials	
		Amount-of-substance fraction in µmol/mol	Relative expanded uncertainty in %	Amount-of-substance fraction in µmol/mol	Relative expanded uncertainty in %
nitrogen	carbon monoxide	1 to 1.8E+05	0.5 to 1	15 to 130000	0.5 to 1

Media/Matrix(s) for measurement service delivery: NTPM, SRM 3677, SRM 3678, SRM 3679, SRM 3680, SRM 3626, SRM 2927, SRM 2928, SRM 2929, SRM 2640, SRM 2641, SRM 2642, SRM 2740, SRM 2742

Traceability

The international standard ISO/IEC 17025 requires evidence of the traceability of measurement results to the SI. A certificate issued by a laboratory under the CIPM MRA can be accepted by accreditors with the highest level of confidence, because measurements made under the MRA are traceable to the SI.

All the laboratories that meet the requirements of the MRA have agreed to recognize the CMCs and national measurement standards of the other participants. The following statement is affixed to an MRA Certificate:

"Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C of the KCDB."