

Key Comparison

Final report on key comparison CCM.P-K4 of absolute pressure standards from 1 Pa to 1000 Pa

*A. P. Müller, M. Bergoglio, N. Bignell,
K. M. K. Fen, S. S. Hong, K. Jousten, P. Mohan,
F. J. Redgrave and M. Sardi*

Abstract. A key comparison of low absolute pressure standards, organized under the auspices of the Consultative Committee for Mass and Related Quantities (CCM), was carried out at seven national metrology institutes (NMIs) between March 1998 and September 1999 in order to determine the degrees of equivalence of the standards at pressures in the range 1 Pa to 1000 Pa. The primary standards, which represent two principal measurement methods, included five liquid-column manometers and four static expansion systems. The transfer standard package consisted of four high-precision pressure transducers: two capacitance diaphragm gauges to provide high resolution at low pressures, and two resonant silicon gauges to provide the required calibration stability. Two nominally identical transfer packages were used to reduce the time required for the measurements, with Package A being circulated among laboratories in the European region (Istituto di Metrologia G. Colonnetti, Italy; National Physical Laboratory, UK; Physikalisch-Technische Bundesanstalt, Germany) and Package B in the Asia-Pacific region (CSIRO-National Measurement Laboratory, Australia; Korea Research Institute of Standards and Science; National Physical Laboratory of India). The results obtained were normalized using data obtained from simultaneous calibrations of the two packages at the pilot laboratory (National Institute of Standards and Technology, USA). The degrees of equivalence of the measurement standards were determined in two ways: deviations from key comparison reference values and pairwise differences between these deviations. Apart from results from one NMI that were identified as outliers, the absolute-pressure standards of the participants were generally found to be equivalent and the results revealed no significant relative bias between the two principal methods tested.

Main text

To reach the main text of this paper, click on [Final Report](#). Note that this text is that which appears in Appendix B of the BIPM key comparison database, www.bipm.org/kcdb.

A. P. Müller: National Institute of Standards and Technology (NIST), Gaithersburg, MD 20899, USA.

M. Bergoglio and M. Sardi: Istituto di Metrologia G. Colonnetti (IMGC), 10135 Turin, Italy.

N. Bignell and K. M. K. Fen: Commonwealth Scientific and Industrial Research Organization (CSIRO), Lindfield, NSW 2070, Australia.

S. S. Hong: Korea Research Institute of Standards and Science (KRISS), Daejeon, Republic of Korea.

K. Jousten: Physikalisch-Technische Bundesanstalt (PTB), Berlin, Germany.

P. Mohan: National Physical Laboratory (NPL), New Delhi 110012, India.

F. J. Redgrave: National Physical Laboratory (NPL), Teddington, Middlesex TW11 0LW, UK.

This Final Report has been peer-reviewed and approved for publication by the CCM according to the provisions of the Mutual Recognition Arrangement (MRA).