

Re-evaluation of the BIPM.RI(I)-K4 key comparison

The International Commission on Radiation Units and Measurements (ICRU) published in October 2016 its Report 90 *Key data for ionizing-radiation dosimetry: Measurement standards and applications*. Following the recommendations of this report, the BIPM made a re-evaluation of the standard for absorbed dose to water in ^{60}Co γ -radiation; the result, a change by the factor 0.9990, was presented by [Burns and Kessler 2018].

The Consultative Committee for Ionizing Radiation (CCRI) decided on the adoption of ICRU 90 as of 1 January 2018 but the full implementation of the changes to the standards worldwide was done gradually during 2019-2020.

Considering the implementation of the changes adopted by each National Metrology Institute (NMI), a re-evaluation of the BIPM.RI(I)-K4 on-going key comparison in terms of absorbed dose to water for ^{60}Co γ -radiation has been made by the BIPM to update the results published in the Key Comparison Database (KCDB).

The table presents the comparison results pre-ICRU 90 and the re-evaluation of the results adopting the changes adopted by each NMI. Those laboratories holding a water calorimeter standard reported no change.

	Comparison result pre-ICRU 90	Changes adopted by the NMIs	Revised comparison result
ARPANSA	0.9973	0.9972	0.9955
BEV	0.9996	0.999	0.9996
ENEA-INMRI	0.9999	0.999	0.9999
LNE-LNHB	0.9971	--- ^a	0.9981
METAS	1.0001	--- ^b	1.0011
MKEH	0.9983	--- ^a	0.9993
NIST	0.9984	--- ^b	0.9994
NMIJ	0.9960	--- ^b	0.9970
NPL	1.0013	--- ^c	1.0023
NRC	0.9980	--- ^b	0.9990
PTB	0.9977	--- ^b	0.9987
VNIFTRI	0.9976	--- ^a	0.9986
VSL	0.9960	--- ^b	0.9970

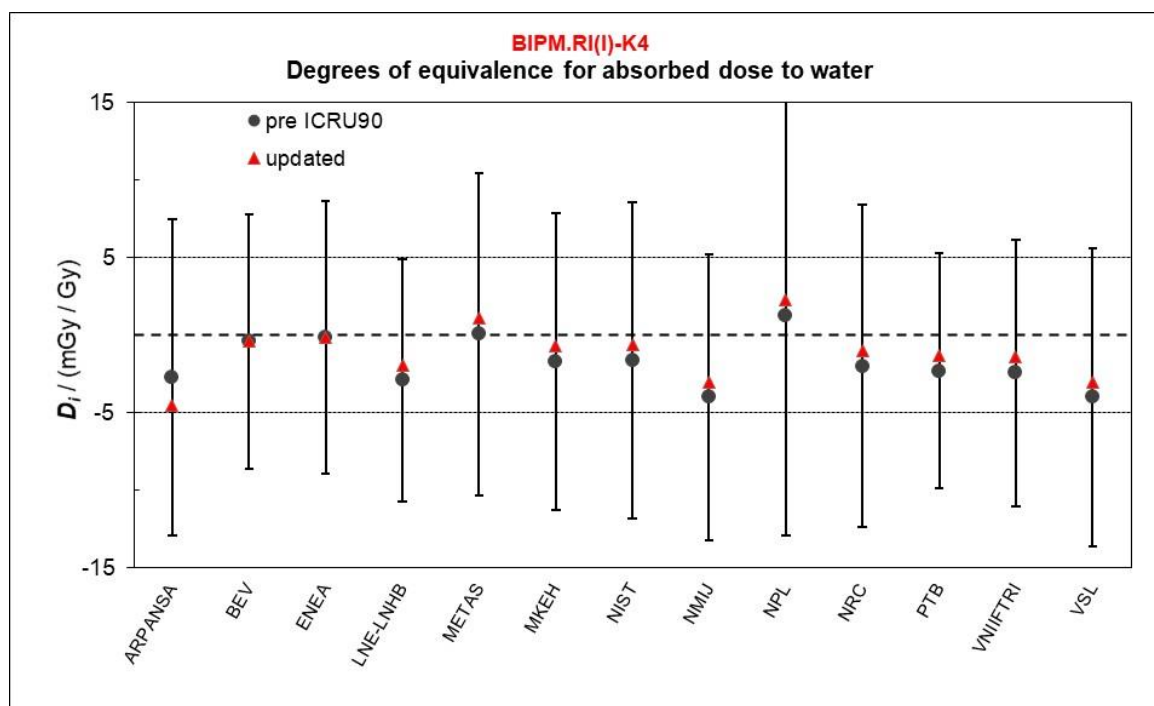
^a No change adopted

^b Water calorimeter standard, unaffected by ICRU 90

^c ICRU 90 adopted by the NPL at the time of the comparison in 2017

Note that the data presented in the fourth column become out-of-date as NMIs make new comparisons. The formal results under the CIPM MRA are those available in the key comparison database.

The comparison results pre-ICRU 90 and the updated values, expressed as the degrees of equivalence, are shown in the graph.



The present analysis replaces the original 2005 summary of the data for BIPM.RI(I)-K4 [Allisy-Roberts and Burns 2005].

References

Burns D. T. and Kessler C. Re-evaluation of the BIPM international dosimetry standards on adoption of the recommendations of ICRU Report 90 [Metrologia 2018 55 R21-R26](#)

Allisy-Roberts P. and Burns D. T. Summary of the BIPM.RI(I)-K4 comparison for absorbed dose to water in ^{60}Co gamma radiation [Metrologia 2005 42 Tech. Suppl. 06002](#)