

RECOMMENDATION OF THE CONSULTATIVE COMMITTEE FOR MASS AND RELATED QUANTITIES SUBMITTED TO NATIONAL METROLOGY INSTITUTES HAVING AN EXPERIMENT FOR THE REALIZATION OF THE SI UNIT OF MASS

RECOMMENDATION

To address lack of agreement between current realisations of the kilogram

The Consultative Committee for Mass and Related Quantities (CCM), at its 19th meeting in 2023,

recalling the redefinition of the kilogram in terms of a fixed numerical value of the Planck constant on 20 May 2019 and the “CCM detailed note on the dissemination process after the redefinition of the kilogram” outlining phases for the implementation of the redefined kilogram,

recognizing the excellent work of NMIs to improve experiments and to develop new experiments but noting that the results of Key Comparisons CCM.M-K8.2019 and CCM.M-K8.2021 do not fulfil the conditions shown below,

considering

- the approval of the final version of the *mise en pratique* for the realization of the new definition of the kilogram and its future dissemination,
- that as many (consistent) realizations of the kilogram as possible should be available to NMIs,
- that the following conditions to allow sovereign realizations of the kilogram have been outlined in the “CCM detailed note on the dissemination process after the redefinition of the kilogram”:
 - A minimum of five consistent realization experiments which:
 - I. Achieve Key Comparison results with a relative standard uncertainty of 40 parts in 10^9 or better
 - II. Demonstrate consistency with the KCRV
 - III. Demonstrate stability by producing consistent (equivalent) results for two consecutive Key Comparisons
 - At least three of the realization experiments meeting the above criteria should have uncertainties less than or equal to 20 parts in 10^9
 - The consistent set of experiments must include two independent methods of realizing the SI unit of mass (e.g. Kibble balance and X-ray crystal density experiments)
 - The difference between the Consensus Value for the kilogram (determined from the three last Key Comparison results) and the KCRV for the final Key Comparison is less than 5 parts in 10^9 ,

encourages all National Metrology Institutes to continue research and further improve experiments in support of primary realizations of the SI unit of mass at appropriate levels of accuracy and at different mass values suitable for current and anticipated applications,

requests those National Metrology Institutes having a realization of the kilogram to engage in targeted activities to directly investigate any lack of agreement between individual NMIs’ realizations of the kilogram,

reminds members of the CCM that all Member States not having realizations of the new definition of the kilogram will have direct access to traceability to the same consensus value as determined by the ongoing comparison through the calibration services of the BIPM,

recommends that the CCM Task Group on the Phases for the Dissemination of the kilogram following redefinition outlines a strategy and coordinates a structured approach to the global advancement of realization experiments and to addressing any lack of agreement between experiments.