Activities in Mass and Related Quantities EURAMET

TC-M Report to CCM

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EUROPEAN METROLOGY RESEARCH PROGRAMME

EMRP

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EUROPEAN METROLOGY PROGRAMME FOR INNOVATION AND RESEARCH

EMPIR

High Pressure Metrology for Industrial Applications

SCOPE: Pressures up to 1.5 GPa are used in high-pressure technologies in general engineering, automotive, petrochemical, pharmaceutical and food industries.

GOAL: Traceability up to 1.6 GPa with a relative expanded uncertainty as low as 0.05 %.

PARTNERS: PTB, CMI, EJPD, LNE, SMU, TUC.

Traceable Dynamic Measurement of Mechanical Quantities

SCOPE: Many applications of the measurement of force, torque and pressure are dynamic (strong variation over time). Transducers are calibrated by static procedures but mechanical sensors exhibit distinctive dynamic behaviour.

GOAL: Traceability for force, torque and pressure for measurements under dynamic conditions.

PARTNERS: CEM, CMI, INRIM, LNE, MIKES, NPL, PTB, SP, UME.

Vacuum metrology for production environments

SCOPE: Traditional measurements are based on the pressures of pure gases in stable conditions. In industry it is the opposite: gas mixtures and pressures changing with time.

GOAL: This research will lead to a facility for dynamic pressures and establish traceability for partial pressures, outgassing rates and leak rate measurement in industry.

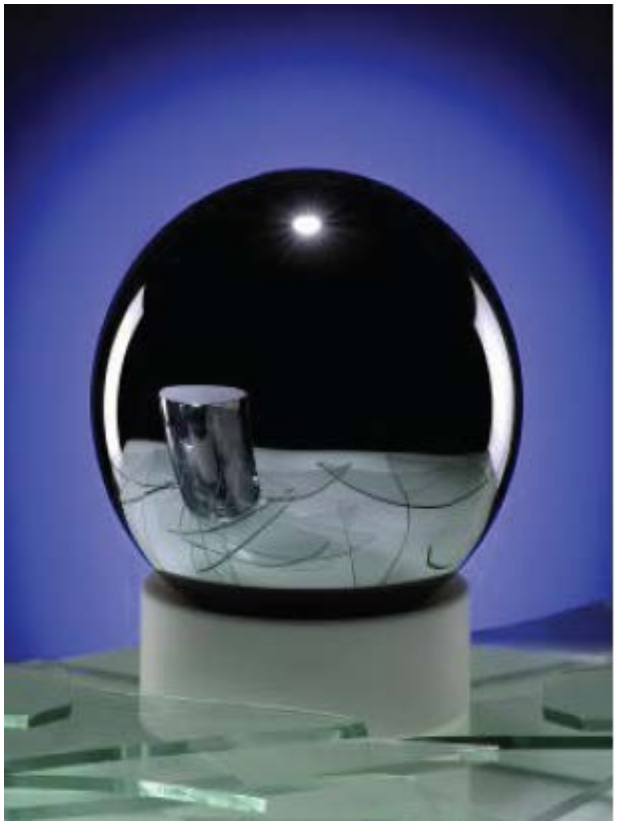
PARTNERS: PTB, CEM, CMI, IMT, INRIM, LNE, UME, DANFOSS, INFICON, LAZZERO, VACOM.

Realisation of the awaited definition of the kilogram - resolving the discrepancies

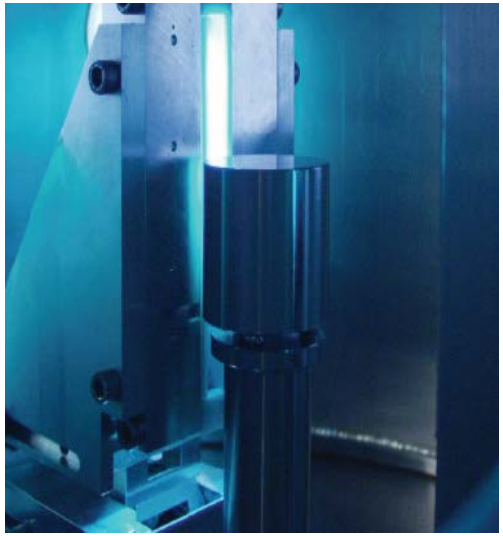
SCOPE: A significant international effort is under way to establish a new definition of the kilogram based on the Planck constant *h*. These experiments have been completed (watt-balance and Si-sphere Avogadro), but the results show discrepancies.

GOAL: Resolving the existing discrepancies with relative standard uncertainties not larger than $5x10^{-8}$

PARTNERS: PTB, INRIM, NPL, CNAM, NIMJ, NCR, EJPD.



Developing a practical means of disseminating the new kilogram



SCOPE: Practical experiments for the new definition of the kilogram cannot be performed as frequently as desired.
In the new definition the kilogram will have an uncertainty, the traceability chain has to be improved to avoid affecting uncertainties provided to the user.

GOAL: Ensuring the continuity of the practical realisation of the mass unit between existing and new realisations of the kilogram.
Dissemination at the level of the NMIs must be achievable with relative uncertainty $< 2 \times 10^{-8}$.

PARTNERS: NPL, CMI, DFM, EJPD, LNE, PTB, MIKES, CNAM, MHEST, UME, INRIM, NCR

Force traceability within the meganewton range

SCOPE:
In mechanical engineering, aerospace industry, power production, building industry, safety engineering and testing, forces with nominal values in excess of 15 MN are measured. The application conditions are different from calibration conditions.

GOAL: Ensuring traceability up to 50 MN and investigating influencing factors in industry

PARTNERS: PTB, BAM, CEM, CMI, INRIM, LNE, METAS, MIKES, MG, UME, NPL

Industrial standards in the intermediate pressure-to-vacuum range

SCOPE: New pressure standards and calibration methods will be developed to increase the efficiency and safety of industrial processes, provide a basis for new technologies and reduce the risk of environmental contamination (mercury free standards).

GOAL: Traceability for absolute, positive and negative gauge pressures in the intermediate range 1 to 10^4 Pa

PARTNERS: PTB, CMI, CEM, LNE, CNAM, TUBITAK, IMT, SP, IPQ, UTH, UmU, FCT/UNL, CUNI, INRIM, INFICON AG, TRESCAL

Torque measurement in the MN·m range

SCOPE: Traceability in the MN·m range to improve the efficiency of wind industry

GOAL: Tracebility for nacelle test benches

PARTNERS: PTB, CEM, CMI, MIKES, RWTH, IWES, CENER

Other activities

Projects

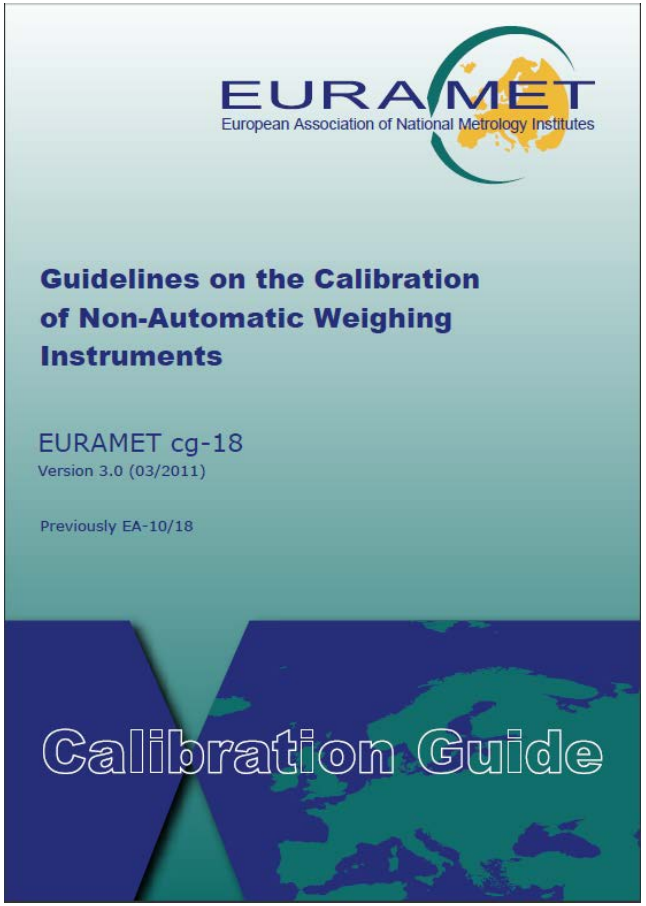
	Comparison	Research	Traceability	Consultation	Total
Proposed	15	2	1	0	18
Agreed	20	5	2	0	28
Completed	55	40	7	16	116
Total	**89**	**47**	**10**	**16**	**162**

Calibration guidelines

EURAMET Calibration Guide 18 “Guidelines on the Calibration of Non-Automatic Weighing Instruments”

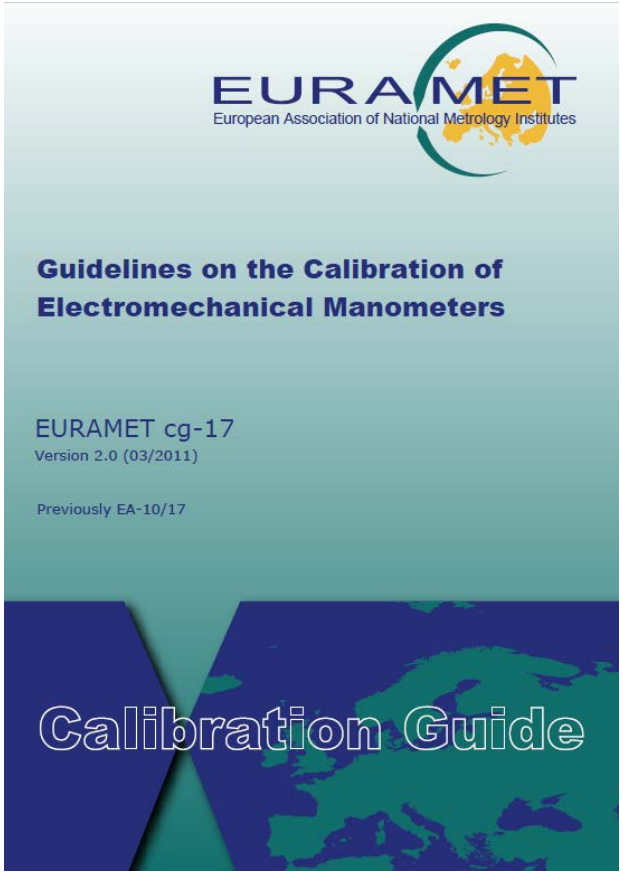
IMPACT: It has being adopted also by other RMOs and broadly used by accreditation bodies as mandatory

New version is expected in 2015



EURAMET Calibration Guide 17 “Guidelines on the Calibration of Electromechanical Manometers”

New version is expected in 2015



Thank you for your attention