

EURAMET TC-M, Mass Area Roadmap

Drivers & Benefits

1. Underpinning Extending and improving the current mass scale to support (emerging) industrial requirements	2. Underpinning Maintain and develop the dissemination of the mass scale after the redefinition of the kilogram by developing a <i>mise en pratique</i> .	3. Advanced Manufacturing Ensure continuity of scale and minimise increase in uncertainties due to redefinition. Extend scale to sub-milligram for (among others) pharmaceutical and biotech areas	4. Strategic Improvement in kilogram realisation uncertainty and dissemination of the mass scale at NMI level with next generation watt/joule balance
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Targets

Mass traceability for the pharmaceutical and biotechnology sectors

Achieve kilogram re-definition (while meeting industrial requirements)

Validated and financially viable watt balance technology allows individual NMIs to disseminate the mass scale

Improved uncertainties in the realisation of the kilogram (parts in 10^9)

Deliverables

Traceable mass standards and micro-balances down to $1\ \mu\text{g}$ Q4/13

Practical means of disseminating re-defined kilogram Q3/14

Next generation watt (or joule) balances Q4/20

Next generation Si sphere with uncertainty <1 in 10^8 Q4/20

Technologies

Vision CMM, Si pyknometry stds, vibrating element micro-balance

Apparatus/protocol for weighing and transfer of weights in vacuum

Improved mass stability and cleaning Q1/14

Optimised mass standards and storage conditions

New watt (or joule) balance design, nano-fabrication

Improvement in XRR, XRF, XPS and ellipsometry uncertainties

Ion Beam machining, numerical modelling of volume data, surface analysis

Vacuum & weighing technology

Next generation mass standards and cleaning techniques

Electrical (QHR, CCC, Josephson), atomic gravimetry

Enabling Science

Spherical particulates helium pyknometry, Fraunhofer diffraction

surface analysis techniques

Mathematical modelling, production techniques Surface analysis

Provide continuity of traceability to the primary unit of mass following redefinition of the scale, minimising the increase in uncertainty passed on to end users.

2012

2015

2020