

Metrology

Measurement in Sport



Traceability

The accuracy of the second, as transmitted by microwave signals, is better than 1 in 100,000,000,000 – a clock this accurate would lose or gain less than one second in 3000 years. This accuracy is needed in many applications like the navigational systems which enable the automatic landing of aircrafts today.

Everything that is measured is based ultimately on a primary standard. In mass, the primary standard is the lump of metal (a mixture of platinum and iridium) which is kept in Paris – the International prototype of the kilogram. In other base quantities, these primary standards are given in the form of a “recipe” based on the unchanging properties of nature such as the speed of light – so that even if all the metrology laboratories in the world disappeared, all the primary standards could be recreated. (There is research at present into replacing the International prototype of the kilogram with a similar “recipe”.)

Primary standards are defined with incredible accuracy, but there would be little point in this if accurate measurements were only possible in metrology laboratories.

So, how do we know our watches, bathroom scales, or rulers are accurate?

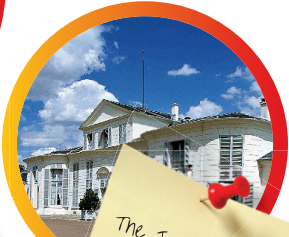
There is always a chain of **traceable measurements** – watches, scales and rulers are set by the factories that make them, using devices which are checked against a working standard in a metrology laboratory. The testing laboratories use reference standards, checked finally by national metrology institutes (NMI) against primary standards. The national metrology institutes of the world, in collaboration with the International Bureau of Weights and Measures (BIPM), ensures that all the primary standards give consistent answers.



Future primary standard for mass being developed at the BIPM

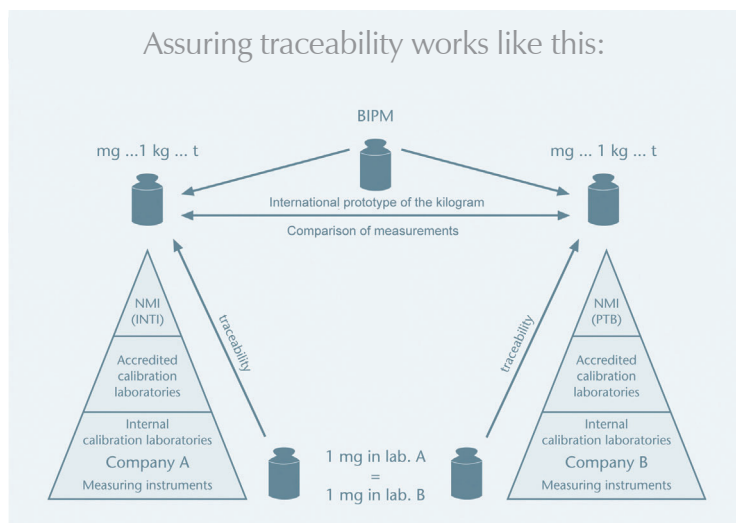


First successful atomic clock built by Louis Essen in 1955 at the National Physical Laboratory in the UK



The International Bureau of weights and measures in the outskirts of Paris, France

Assuring traceability works like this:



World Metrology Day 20 May 2008

No games without Measurement

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