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Peter Mason
CIML President

Towards 2013

As I look forward to 2013, it becomes clearer to me that in many ways the "OIML new year" started last October in Bucharest. The Conference is an important opportunity to look back on the past four years of achievements, but it is also the occasion when we set our budgets and describe what we are hoping to accomplish over the next four years. In Bucharest these elements came together in the decision to reduce the Member State base contributory share. I see this as clear evidence of how tight financial management and modern working practices in the Bureau can improve the way in which we carry out our mission.

In many ways I expect 2013 to be a year of transition. There are still important tasks to complete in modernising the way the OIML operates: finishing the revision of the Staff Regulations, upgrading our IT systems and the OIML website, and carrying out much-needed repairs in the Bureau. But this is not an end in itself; it is being carried out to improve our ability to deliver the objectives set out in the Strategy we adopted last year.

So I very much hope that in Vietnam next October we will have less to say about modernisation and a lot more to say on the work which is directly relevant to Member States and others with an interest in what we do.

A key area for progress is our plan for work which particularly benefits countries whose metrology systems are still developing. I expect to have much more to report on this next year.

In the meantime, I wish all of our Members and Readers a very Happy New Year and every success in our mission. ■

Vers 2013

Alors que je commence à réfléchir à l'année 2013, il me semble de plus en plus manifeste que, à bien des égards, la « nouvelle année OIML » a en fait commencé en octobre dernier, à Bucarest. La Conférence est une occasion importante pour repenser aux quatre dernières années d'accomplissements, mais c'est également le moment où nous fixons nos budgets et où nous présentons ce que nous espérons accomplir au cours des quatre années à venir. À Bucarest, ces éléments se sont assemblés les uns avec les autres lorsque nous avons décidé de réduire la part contributive de base des États Membres. Je considère cela comme preuve évidente de l'importance d'une gestion financière serrée et des pratiques modernes de travail du Bureau afin d'améliorer la manière dont nous menons notre mission.

De bien des manières, je m'attends à ce que 2013 soit une année de transition. Il reste encore des tâches importantes à accomplir en ce qui concerne la modernisation du fonctionnement de l'OIML : l'achèvement de la révision des Statuts du Personnel, la mise à jour de nos systèmes informatiques et du site web de l'OIML, et la réalisation des réparations dont le Bureau a tant besoin. Mais tout cela n'est pas une fin en soi : ces actions servent à améliorer notre capacité à mener à bien les objectifs établis dans la Stratégie que nous avons adoptée l'année dernière.

J'espère donc vraiment qu'en octobre prochain, au Vietnam, nous aurons moins de choses à dire sur la modernisation et beaucoup plus sur le travail qui se rapporte directement aux États Membres et à ceux qui portent un intérêt à ce que nous faisons.

Parmi les plus importants domaines où nous devons progresser se trouve le projet de travail présentant un avantage particulier aux pays dont le système de métrologie est toujours en voie de développement. Je compte disposer de beaucoup plus d'informations à ce sujet l'année prochaine.

Entretemps, je souhaite à tous nos Membres et à tous nos Lecteurs une très bonne année et leur adresse tous mes vœux de réussite dans notre mission. ■

UNITS OF MEASUREMENT

The proposed new SI and consequences for legal metrology

ROMAN SCHWARTZ, PHILIPPE RICHARD, CHARLES EHRLICH AND YUKINOBU MIKI

1 Introduction

In response to Resolution 1 of the 24th International Conference on Weights and Measures (CGPM) [1], the CIML took a resolution (no. 25) in 2011 [2] encouraging all CIML Members and relevant Technical Committees (TCs) to actively participate in the discussion and provide comments to a respective OIML Working Group, which consisted of the authors of the present article. The results were reported to the CIML which, in turn, approved an OIML statement on the proposed new SI in 2012 (CIML Resolution no. 23) [3].

The intention of this article is to:

- support the CGPM in its efforts to inform user communities and alert them to the intention to redefine various units of the SI and to encourage consideration of the practical, technical, and legislative implications of such redefinitions, the emphasis being on possible consequences for legal metrology (chapters 2, 3 and 4),
- present the outcome of the inquiry amongst OIML Members and the TCs concerned (chapter 5), and
- provide information about the OIML statement on the proposed new SI that was approved by the CIML and that has since been submitted to the BIPM (chapter 6).

2 The rationale for a new SI

Of the seven base units of the SI, only the kilogram is still defined in terms of a material artefact, namely the international prototype of the kilogram (IPK) kept at the International Bureau of Weights and Measures (BIPM) [4]. Since the third verification of the national prototypes of the kilogram (NPK) against the IPK in the period 1989 to 1991 the stability of the IPK has been put into question, because the results of comparisons between the NPK and the IPK show some divergence with time, the average mass changes being in the order of 50 µg during a period of about 100 years. Whether these are due to a drift of the IPK, or of the NPK, or of both, could not be clarified so far.

Unknown changes in the mass unit influence the electrical units, because the definition of the ampere is related to the kilogram – see Figure 1. Similarly, the definitions of the mole and candela also depend on the kilogram.

At its 21st meeting (1999) the CGPM therefore recommended that efforts be continued to refine experiments linking the unit of mass to fundamental constants with a view to a future "quantum-based" redefinition of the kilogram. Any new definition would need to be consistent within "some parts" in 10^{-8} with the present definition to ensure continuity of mass values. This important condition was later (2010) rendered more precisely by the Consultative Committee for Mass and Related Quantities (CCM). With a redefined kilogram, it will, in principle, be possible to realize the SI unit of mass at any place, at any time and by anyone, as is already possible for other SI base units such as the second.

The uncertainties of all SI electrical units realized directly or indirectly by means of the Josephson and quantum Hall effects together with the SI values of the Josephson and von Klitzing constants K_J and R_K would be significantly reduced if the kilogram were redefined so as to be linked to an exact numerical value of the Planck constant h, and if the ampere were to be redefined so as to be linked to an exact numerical value of the elementary charge e.

The kelvin is currently defined in terms of an intrinsic property of water (temperature of the triple point) that, while being an invariant of nature, in practice depends on the purity and isotopic composition

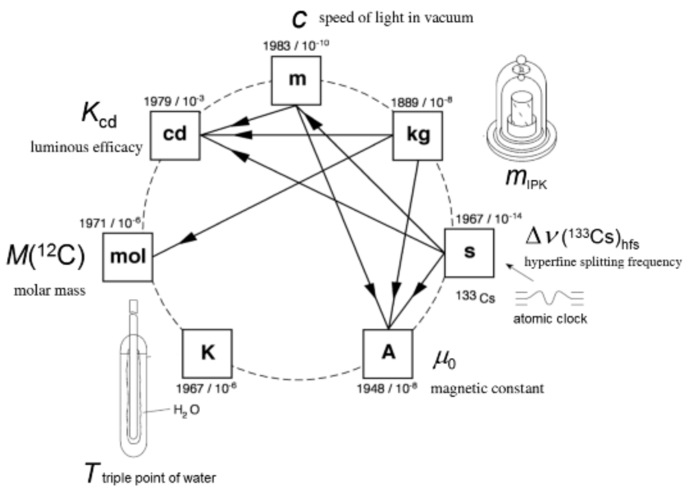

Fig. 1 The seven base units and their relationship in the current SI

of the water used. The kelvin would be better defined if it were linked to an exact numerical value of the Boltzmann constant k.

Redefining the mole so that it is linked to an exact numerical value of the Avogadro constant N_A would have the consequence that it is no longer dependent on the definition of the kilogram even when the kilogram is defined so that it is linked to an exact numerical value of h. This would thereby emphasize the distinction between the quantities "amount of substance" and "mass".

The uncertainties of the values of many other important fundamental constants and energy conversion factors would be eliminated or significantly reduced if h, e, k and N_A had exact numerical values when expressed in SI units.

Because of these many advantages the CGPM, at its 24th meeting in 2011, took its Resolution 1 "On the possible future revision of the International System of Units, the SI" [1] which outlines the intention to redefine not only the kilogram, but all seven SI base units, in terms of invariants of nature and to express all definitions uniformly. With this, the CGPM and the International Committee of Weights and Measures (CIPM) clearly intend to revise the SI with a view that it continues to meet the needs of science, technology, and commerce in the 21st century.

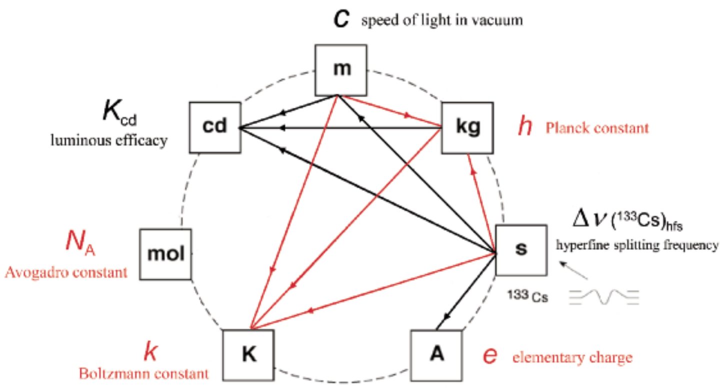

Fig. 2 Definition of and relationship between the seven base units in the proposed new SI. In the new SI all base units will be defined in terms of fundamental or atomic constants. The changes to the current SI, and the new relationships, are marked in red. The black arrows denote relationships that remain unchanged in the new SI.

3 The fundamentals of the new SI

The proposed changes to the SI can be summarized as follows [5].

Keep the existing seven SI base units, but define them all in terms of seven well-recognized fundamental or atomic constants, such as the Planck constant *h* – see Figure 2 and Table 1

The definitions for the second, the metre and the candela will remain unchanged, but:

- the **kilogram** would be defined in terms of the Planck constant h, instead of the mass of the International Kilogram Prototype (IPK),
- the **ampere** would be defined in terms of the elementary charge e, instead of the magnetic constant m_0,
- the **kelvin** would be defined in terms of the Boltzmann constant k, instead of the temperature of the triple point of water T, and
- the **mole** would be defined in terms of the Avogadro constant N_A, instead of the molar mass of carbon 12, $M(^{12}C)$.

Table 1 The seven SI base units and their reference in the current and new SI. The definitions of the four red marked base units will be changed; the others will remain.

base unit	symbol	current SI	new SI	fundamental constant
second	s	$\Delta\nu(^{133}Cs)_{hfs}$	$\Delta\nu(^{133}Cs)_{hfs}$	hyperfine splitting frequency
metre	m	c	c	speed of light in vacuum
kilogram	kg	m_{IPK}	h	Planck constant
ampere	A	μ_0	e	elementary charge
kelvin	K	T_{TPW}	k	Boltzmann constant
mole	mol	$M(^{12}C)$	N_A	Avogadro constant
candela	cd	K_{cd}	K_{cd}	luminous efficacy of a 540 THz source

Table 2 The International System of Units, the SI, will be the system of units in which seven fundamental or atomic constants are fixed, where the symbol X represents one or more additional digits to be added to the numerical values of h, e, k, and N_A, using values based on the most recent CODATA adjustment.

fundamental constant	symbol	proposed exact value	unit
ground state hyperfine splitting frequency of the caesium 133 atom	$\Delta\nu(^{133}\mathrm{Cs})_{\mathrm{hfs}}$	9 192 631 770	hertz
speed of light in vacuum	c	299 792 458	metre per second
Planck constant	h	$6.626\ 06\mathrm{X} \times 10^{-34}$	joule second
elementary charge	e	$1.602\ 17\mathrm{X} \times 10^{-19}$	coulomb
Boltzmann constant	k	$1.380\ 6\mathrm{X} \times 10^{-23}$	joule per kelvin
Avogadro constant	N_A	$6.022\ 14\mathrm{X} \times 10^{-23}$	reciprocal mole
luminous efficacy of monochromatic radiation of frequency 540×10^{12} Hz	K_{cd}	683	lumen per watt

Fix the values of all these constants to an exact number (with zero uncertainty), as is already the case for the speed of light in vacuum, c = 299 792 458 meter per second

Table 2 shows the values of the seven fundamental or atomic constants that will be fixed in the new SI. The symbol X represents one or more additional digits to be added to the numerical values of h, e, k, and N_A, based on a CODATA adjustment, as soon as the CGPM considers the measurement uncertainties of the respective experiments sufficiently small.

Use "explicit-constant" formulations to express the definitions of all seven SI base units in a uniform (but indirect) manner

As further explained in the draft Chapter 2 of the 9th edition of the SI brochure [6], the new SI will be scaled so that the numerical values of seven constants are fixed – see Table 2. Using the "explicit-constant" formulation each definition will state explicitly which numerical value it fixes [7].

For example, the second would still be defined in terms of the hyperfine splitting frequency of the ground state of the caesium 133 atom, $\Delta\nu(^{133}\mathrm{Cs})_{\mathrm{hfs}}$, but the formulation would be changed into an "explicit-constant" one, where the unit (here the second) would be defined indirectly by specifying explicitly an exact value for $\Delta\nu(^{133}\mathrm{Cs})_{\mathrm{hfs}}$ (9 192 631 770 hertz). The same would hold for the metre (defined in terms of the speed of light in vacuum c), and the candela (defined in terms of the luminous efficacy K_{cd} of monochromatic radiation of frequency 540 THz).

The new "explicit-constant" definition for the kilogram and its consequences are described in chapter 4.

Draw up specific "*mise en pratique*" for each base unit to explain how the units can be practically realized based on recommended top-level methods

A *mise en pratique* is a document containing a set of instructions and explanations of how a base unit can be practically realized; such a document may also include dissemination to the users through primary and secondary standards. For example, the CCM is currently drafting a *mise en pratique* for the redefined kilogram. This will explain how the kilogram can be realized in the future by different primary methods (e.g. the "Avogadro method", also known as "X-ray crystal density (XRCD) method", or the "Watt balance method") using primary mass standards, and how the NPK or other secondary mass standards of National Metrology Institutes (NMI) can be linked to the primary mass standards and the Planck constant h – see Figures 3 and 4.

4 Redefinition of the kilogram

In the present SI, one kilogram is defined as exactly the mass of the IPK – see Figure 5.

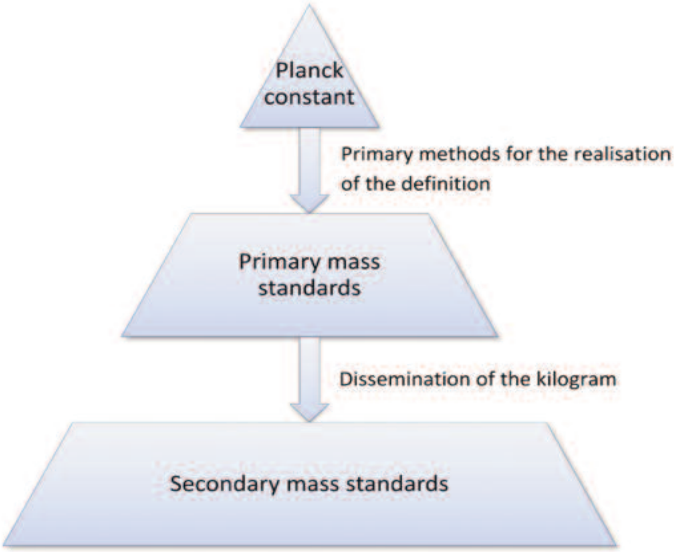

Fig. 3 Proposed future realization of the kilogram with primary methods that would link primary mass standards to the fundamental constant h, followed by the classical way of dissemination using the primary mass standards to calibrate secondary ones.

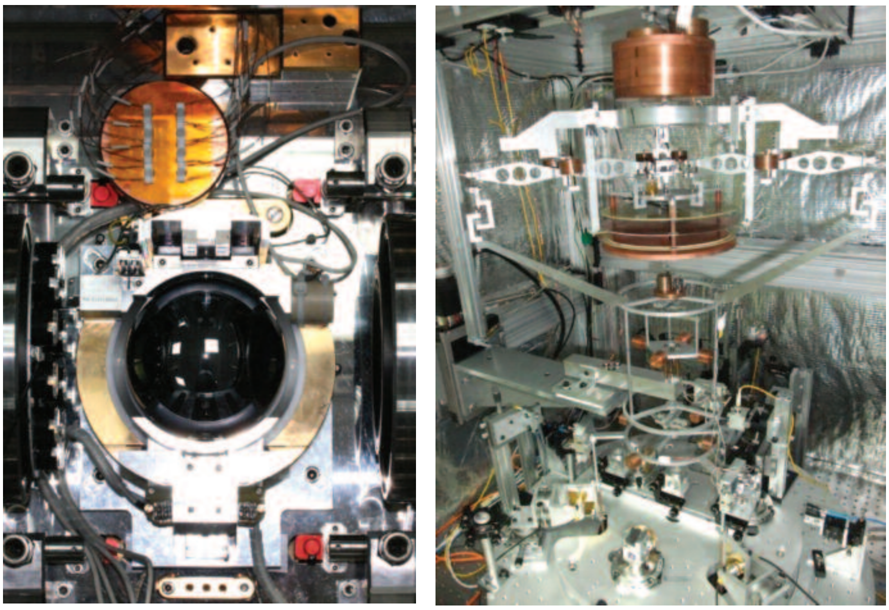

Fig. 4 Existing primary methods for the realization of the new kilogram are the "Avogadro method" (or "X-ray Crystal Density (XRCD) method") and the "Watt balance method".

Left: View of a single crystal silicon 28 (^{28}Si) sphere. The diameter of the sphere (about 90 mm), and hence its volume, is measured with a Fizeau interferometer, which forms part of the XRCD method (source: PTB Braunschweig, Germany).

Right: View into the BIPM watt balance [8].

Fig. 5 The IPK is kept at the BIPM in Sèvres. It still defines the unit of mass, the kilogram.
Its mass, m_{IPK}, is defined to be exactly 1 kg with zero uncertainty. In the proposed new SI it will have non-zero uncertainty (source: BIPM, Sèvres, France).

According to draft Chapter 2 of the 9th SI brochure [6], the new "explicit-constant" definition of the kilogram would read:

"The kilogram, kg, is the unit of mass; its magnitude is set by fixing the numerical value of the Planck constant, h, to be equal to exactly 6,626 06X $\cdot 10^{-34}$ *when it is expressed in the unit* s^{-1} m^2 *kg, which is equal to J s."*

The exact value for X, which will be fixed by the latest CODATA adjustment at the time of the redefinition (for the CODATA 2010 adjustment see [9]), requires further experimental effort to reach a relative measurement uncertainty on the order of 10^{-8}.

Compared with the redefinition of other base units the redefinition of the kilogram is the most sensitive one, for several reasons:

- Accurate weighings and mass determinations are of significant importance in science, trade and industry,
- There are high demands on the accuracy of mass determinations. For example, E_1 accredited mass laboratories keep reference standards with relative uncertainties between $2.5 \cdot 10^{-8}$ and $5 \cdot 10^{-8}$.

At its meeting in 2010 the CCM therefore recommended that the following conditions be met before the kilogram is redefined in terms of fundamental constants [10]:

1. At least three independent experiments, including work both from the watt balance and International Avogadro Coordination projects, yield values of the relevant constants with relative standard uncertainties not larger than $5 \cdot 10^{-8}$. At least one of these results should have a relative standard uncertainty not larger than $2 \cdot 10^{-8}$.
2. For each of the relevant constants, values provided by the different experiments should be consistent at the 95 % level of confidence.
3. Traceability of BIPM prototypes to the international prototype of the kilogram should be confirmed.

In addition, CCM Recommendation G1 (2010) states the following:

4. The CODATA recommended values should be adopted for the relevant fundamental constants.
5. The associated CODATA relative standard uncertainties should be suitably considered when the initial uncertainty is assigned to the international prototype of the kilogram.
6. A pool of reference standards should be established at the BIPM to facilitate the dissemination of the redefined kilogram.
7. The BIPM and a sufficient number of National Metrology Institutes should continue to operate, develop or improve facilities or experiments that allow the realization of the kilogram to be maintained with a relative standard uncertainty not larger than $2 \cdot 10^{-8}$.
8. The uncertainty component arising from the practical realization of the unit should be suitably taken into account.

The above CCM recommendations, especially the first three, have not yet been met, but researchers are actively working to understand the differences in the experimental results and close the gaps. Currently, only two experiments have achieved published relative uncertainties smaller than $5 \cdot 10^{-8}$ ($3.6 \cdot 10^{-8}$ for the NIST watt balance [11] and $3 \cdot 10^{-8}$ for the International Avogadro Coordination experiments [12]). These results are discrepant by $1.7 \cdot 10^{-7}$ as can be seen in Figure 6. The discrepancy between the recently published result of the NRC watt balance [13] and that of the NIST watt balance [11] is even larger and amounts to about $2.6 \cdot 10^{-7}$ (see Figure 6).

5 The impact on legal metrology

In response to Resolution 1 of the CGPM, the CIML took Resolution no. 25 at its 43rd Meeting in 2011 [2] that "*encourages all its Members and relevant Technical Committees, in particular TC 2, TC 9, TC 9/SC 3 and TC 11, to actively participate in the discussion and provide comments to the ad-hoc OIML Working Group "New SI"...*".

Based on this resolution an inquiry was carried out amongst all CIML Members and also the OIML Technical Committees TC 2 *Units of measurement*, TC 9 *Mass and density*, TC 9/SC 3 *Weights* and TC 11 *Temperature* in order to explore in more detail the possible practical consequences of a revised SI in general, and a redefined kilogram in particular, with the aim to provide an official statement on the proposed revision of the SI to the CGPM in October 2012 [3].

The responses received from the Technical Committees and some CIML Members are summarized in the following.

5.1 General comments on the proposed new SI

General comments related to the new SI were received from TC 2, TC 9, TC9/SC3 and some CIML Members. They indicate that:

- the proposed new SI is generally supported provided it has a sound, reliable experimental basis. The final

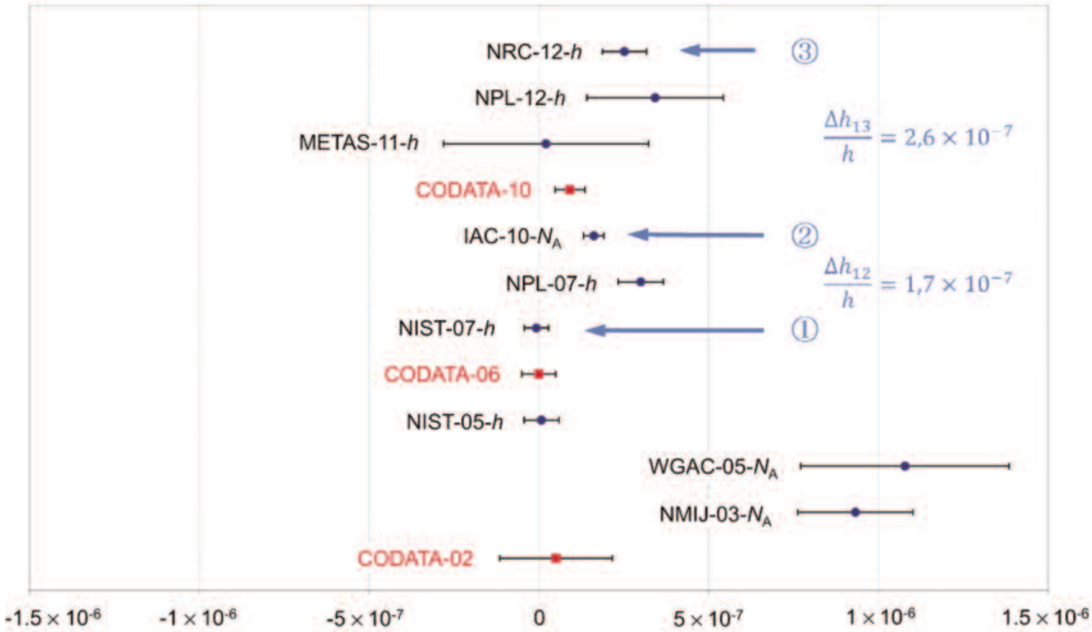

Fig. 6 Measurement results for the Avogadro constant N_A with standard uncertainties (k = 1), represented as relative deviations from the CODATA 2006 value (N_A = 6.02214179(30) × 10^{23} mol^{-1}). The results for Planck's constant, h, (watt balance) and for K_J (voltage balance) have been converted by means of the CODATA 2006 constants.

Explanations: "NPL-07-h", for instance, means: NPL's result in 2007 for a measurement of h. WGAC: CCM Working Group Avogadro Constant, IAC: International Avogadro Coordination. Currently, the three results with the smallest uncertainties are: (1) NIST-07-h (u_r = 3.6 · 10^{-8}), (2) IAC-10-N_A (u_r = 3.0 · 10^{-8}) and (3) NRC-12-h (u_r = 6.5 · 10^{-8})

decision is to be made by the CGPM considering all experimental data and the benefits of a revised SI,

- the new SI definitions will most likely have no impact on routine measurements of time, length, luminous intensity, electric current, temperature, amount of substance, and derived quantities,
- the biggest potential impact may be on high accuracy mass measurements. These comments are in line with recent publications [14, 15, 16],
- there is still work to be done to inform and educate the legal metrology community, manufacturers, testing laboratories and end users about the changes and ensure that a new SI will remain understandable to all those who need to use it. This is in line with CGPM Resolution 1 (2011) which itself invites *"the CIPM to continue its work towards improved formulations for the definitions of the SI base units in terms of fundamental constants, having as far as possible a more easily understandable description for users in general, consistent with scientific rigour and clarity"*.

5.2 Impact on mass measurement

Comments related to the redefinition of the kilogram and its possible impact on mass measurement were received from TC 2, TC 9, TC 9/SC 3 and some CIML Members. They concern:

- the continuity and accuracy of mass measurements,
- the traceability of mass measurements,
- the practical realization and dissemination of the redefined kilogram, and
- the present uncertainties claimed in OIML R 111 [17] for high-precision weights.

As to the **continuity and accuracy** it was stated that from the OIML and from a practical metrology point of view the new definition of the kilogram can only be accepted if the 2010 CCM conditions are met and if a sufficient number of independent realizations of the definition (XRCD method with silicon-28 spheres or watt balances) will be simultaneously available and maintained. The ideal situation would be reached if the present uncertainty for the calibration and measurement capabilities of mass standards at the highest accuracy level (see Figure 7) remains the same before and after the redefinition of the kilogram. This being said, a slight increase of the measurement uncertainty for mass calibrations at the highest accuracy level would be acceptable in exchange for the expected better long term stability of the kilogram.

A thorough examination of the realization, dissemination chain and uncertainty propagation for the redefined kilogram shows that [14, 16]:

- if the above CCM recommendations are closely observed and met, no serious changes in the calibration chain of mass standards will occur,
- even if the CCM recommendations are met, the uncertainty values in the "calibration and measurement capabilities" (CMCs) of NMIs will increase by up to a factor of 2 (see Figure 7), and
- if the CCM recommendations were not met, mass standards of high accuracy with a relative uncertainty smaller than or equal to $5 \cdot 10^{-8}$, as presently offered by NMIs, would no longer be available, and there would be the risk that accredited calibration laboratories would no longer be able to calibrate class E_1 weights according to OIML R 111:2004.

As for the **traceability of mass measurements** it was pointed out that OIML Document D 2 [19], ISO 17025 [20] in general and OIML Recommendation R 111 [17] in particular require traceability of measurements under legal control to be traceable to SI units. R 111 defines E_1 weights as weights intended to ensure traceability between national mass standards, with values derived from the IPK [17]. This language in R 111 would need to be revised under a new SI to indicate that E_1 weights will be traceable to the new SI definition of the kilogram and not the IPK. It is considered important that under a new SI, weights according to OIML R 111 remain traceable to the SI, and that there is no confusion possible between any new definition of the unit of mass and the "conventional mass" (or "conventional value of mass") as defined in OIML D 28 [21] for practical reasons.

TC 3/SC 9 rejects any concept of a non-SI "practical mass", be it a "conventional value of the kilogram" or

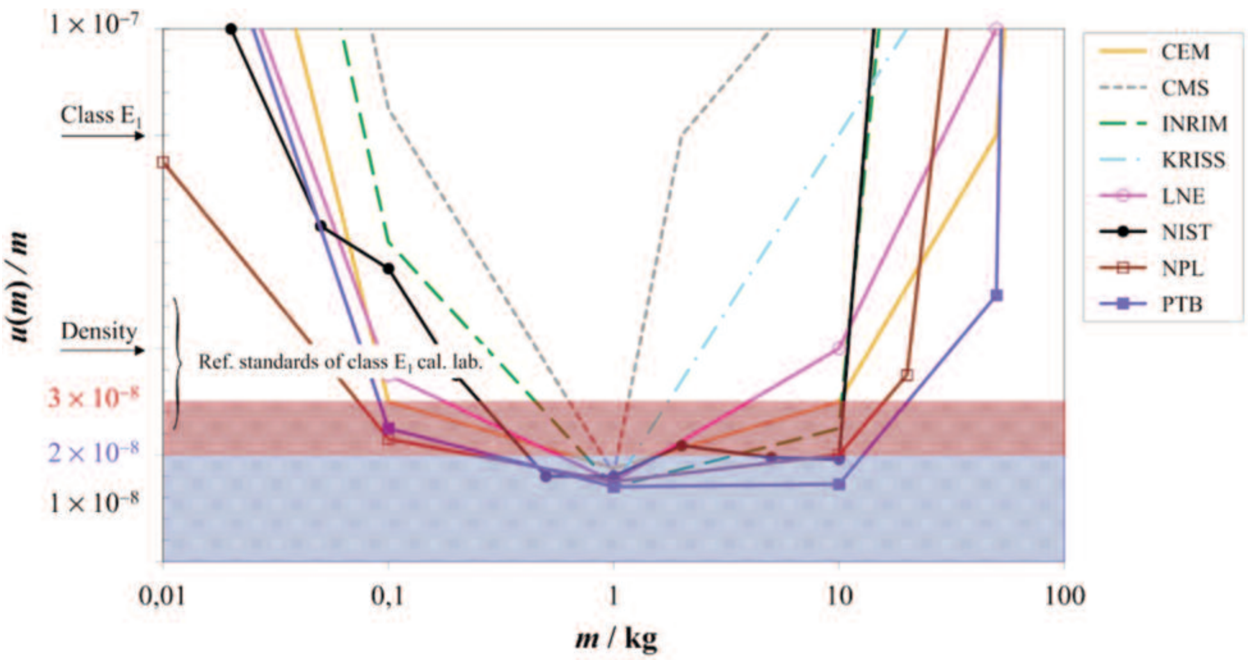

Fig. 7 Calibration and Measurement Capabilities (CMCs) for mass standards in the range from 10 g to 100 kg of eight selected NMIs [18] compared with different uncertainty limits for the realization of a redefined kilogram (blue and red marked range) [14], relative standard uncertainties of primary density standards (see pointer "Density"), reference standards of class E_1 calibration laboratories (see range indicated), and for class E_1 weights themselves (see pointer "Class E_1"). The blue marked range indicates the relative standard uncertainty required by the CCM for the best realization of the new kilogram (XRCD or watt balance method). The red marked range indicates the relative standard uncertainties that can best be reached after the redefinition of the kilogram, if the CCM conditions were met.

"conventional kilogram" [22], or a "usual mass" or "practical mass" [23]. Such concepts would disconnect the world of practical measurements (legal metrology) from the world of fundamental constants and the SI. In addition, any such concept would lead to confusion with the "conventional mass" as defined in R 111. It is mentioned that all "non-SI" concepts will be rendered superfluous if the XRCD method and watt balance experiments have reached sufficiently low uncertainties, and their discrepancies are resolved.

As to the **practical realization and dissemination** of the new kilogram it is emphasized that there is a need for a *mise en pratique* (see chapter 2), where, because of the expected impact on routine mass measurements, the CCM should continue to consult and engage with the OIML during the development process.

As to the **present uncertainties specified in R 111** for high-precision weights there is some concern that current claimed mass uncertainties of E_1 weights do not reflect the observed instabilities in mass artefacts, including the "hidden" uncertainty of the IPK, and that the OIML should consider revising R 111 to define more realistic uncertainties of mass in a redefined SI.

Here it must be responded that the current definition of the kilogram has up to now never suffered from any limitations due to a possible drift of the IPK (see Figure 8). It has quite successfully guaranteed up to now, that - all over the world - high-precision mass standards and weights of OIML accuracy classes E_1 and E_2 are calibrated and used in the global market without any problems, the CMCs (see Figure 7) being the basis. To estimate "more realistic uncertainties" is not possible without respective experimental data which are unavailable.

Figure 8 shows the long-term mass changes of platinum-iridium kilogram prototypes since 1889. This is contrasted with the values for h resulting from the CODATA adjustments since 1998 [9,16]. The CODATA values jump within four years by up to $1 \cdot 10^{-7}$ which is a factor two worse than the assumed ("hidden") instability of the IPK during the past hundred years. These jumps are due to the very active experimental work on the determination of h which is ongoing across the globe. It is obvious that jumps of such an order must be avoided if at all possible for mass calibrations, because of the consequences for high-precision mass standards and E_1 weights which would have to be corrected on the calibration certificates from mass calibration laboratories.

In summary it is concluded that the redefinition of the kilogram is still considered critical by the legal metrology community in the field of mass, mainly due to a possible negative impact on high-accuracy mass measurements, if the kilogram is redefined without a close observation of the respective recommendations set up by the CCM.

5.3 Impact on temperature measurement

Comments related to the redefinition of the kelvin and its possible impact on temperature measurement were received from TC 11 and some CIML Members.

To meet the need for most routine temperature measurements, International Temperature Scales (ITS) have been defined and are recipes for the realization of highly reproducible and precise temperature standards in close accord with the best thermodynamic measurements of the time. These scales have been based on sets of fixed points, the defined temperatures of equilibrium states of specified pure substances. Thus, the quantity determined in the vast majority of present-day temperature measurements is not thermodynamic temperature T but T_{90}, as defined by the ITS of 1990 (ITS-90).

The new definition for the kelvin will have little immediate impact on the status of ITS-90. For the foreseeable future, most temperature measurements in the core temperature range from about –200 °C to 960 °C will continue to be made using standard platinum resistance thermometers calibrated according to ITS-90. Because ITS-90 will remain intact, with defined values of T_{90} for all of the fixed points, the uncertainties in T_{90} will not change: they will continue to be dominated by uncertainties in the fixed-point realizations and the non-uniqueness of the platinum resistance thermometers, typically totalling less than 1 mK [25].

It is expected that any future changes in the temperature scale will be much smaller than the tolerances associated with current documentary standards for thermocouples and industrial platinum resistance thermometers used in legal metrology. Therefore, no requirement is anticipated for any future change in temperature scales to propagate to the documentary standards.

If the 2010 CODATA recommended value of the Boltzmann constant were taken to be exact and used to define the kelvin, the relative uncertainty in k, currently 0.91×10^{-6}, would be transferred to the thermodynamic temperature of the triple-point of water, TTPW. This means that if such a new definition were to be adopted today, our best estimate of the value of TTPW would still be 273.16 K, but instead of this value being exact as a result of the definition of the kelvin as is now the case, the standard uncertainty of TTPW would be 0.25 mK. In practice, the change in definition will only affect measurements made close to 0 °C because the uncertainties of the thermodynamic temperatures well away from this are very much larger than 0.25 mK. There is no experiment where the slightly increased uncertainties of thermodynamic temperatures would present a problem to metrology or the wider research community.

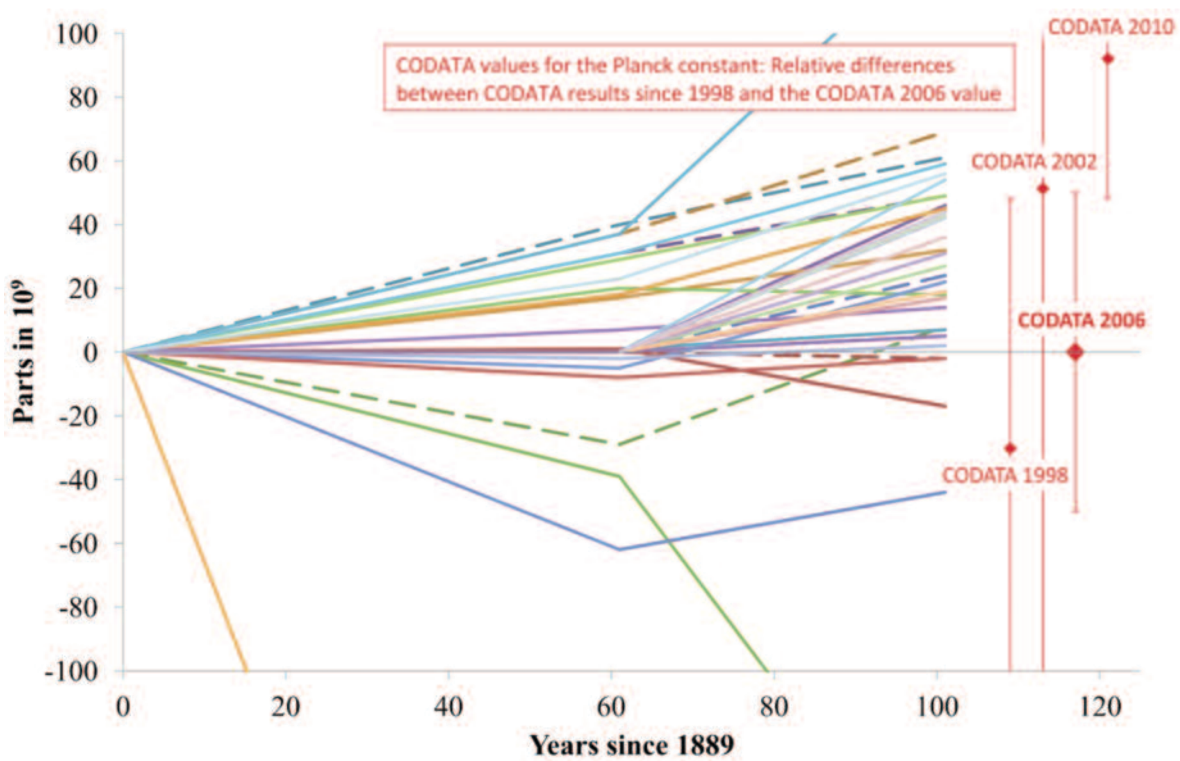

Fig. 8 Mass changes of the six official copies of the IPK (dashed lines) and national kilogram prototypes no. 2 through 55 against the IPK since 1889 [24], compared with relative changes of CODATA values for the Planck constant, h, since 1998, where the CODATA 2006 value was (arbitrarily) chosen as reference value.

Experts in thermometry are not aware of any new technology for a primary thermometer providing a significantly improved uncertainty at TTPW. Consequently, there will be no change of the assigned value of TTPW for the foreseeable future.

However, the ITS-90 will no longer be the only practical option for temperature measurement. The most immediate and beneficial consequence of the change is for temperatures above ~1 000 °C where primary thermometers may offer users a lower thermodynamic uncertainty than is currently available with ITS-90. Therefore, the *mise en pratique* for the kelvin will be expanded to describe recognized primary methods for measuring thermodynamic temperature, and the sources of uncertainty associated with the measurements [26].

In summary it is concluded that the legal metrology community in the field of thermometry welcomes the proposal for a new SI and seems to be well prepared for the new definition of the temperature unit kelvin.

5.4 Impact on the measurement of other SI quantities

The redefinition of the ampere, the unit of the electric current, will eliminate the need to use conventional electric units. It will rather allow electric measurements to be expressed in SI units, including measurements of electric voltage and resistance. This will practically not affect electrical measurements under legal control.

The situation is different for the mole, the unit of the amount of substance. Especially chemists are used to a definition of the mole that is closely linked to the kilogram, the unit of mass, where the mole is defined on the basis of (exactly) 0.012 kg of carbon 12 (^{12}C) and the molar mass constant is exactly 1 g per mol. In the new SI the mole will be defined in terms of the Avogadro constant, N_A, and thus independently of the new kilogram, defined in terms of the Planck constant, h. Although this will have practically no effect on routine measurements in chemistry, the respective community seems to be reluctant to accept the new definition, because the consequence will be that the new "molar mass constant" will no longer be exactly 1, and it will have an uncertainty.

The OIML, via the TC 2 Secretariat, will continue to cooperate with the Consultative Committee for Units (CCU) to achieve best consistency between the new kilogram and the new mole.

6 Summary and OIML statement

In response to Resolution 1 of the CGPM (2011) the following statement on the proposed "New SI" was approved by the CIML at its 47th meeting in 2012 (Resolution no. 23) [3]:

> *The OIML supports the CGPM's intention to revise the SI in order that it will continue to meet the needs of science, technology, and commerce in the 21st century. From the inquiry amongst the OIML Technical Committees TC 2, TC 9, TC9/SC 3 and TC 11, and the CIML Members, it is concluded that the new SI definitions are considered to have little to no impact on routine measurements of time, length, luminous intensity, electric current, temperature, amount of substance, and related derived SI quantities.*
>
> *A potential impact may be on accurate mass measurements using class E weights according to OIML R 111. The OIML considers the careful adherence to the 2010 recommendations of the CCM as fundamental for the redefinition of the kilogram in order to avoid potential negative impacts on routine mass measurements.*
>
> *The OIML supports the intention of the CGPM to further improve formulations for the definitions of the SI base units so that the new SI remains understandable to all those who need it.*

Finally it should be mentioned that, on the basis of Resolution 1 of the CGPM (2011) [1], members of "user communities" and the "general public", for instance, CIML Members, OIML Corresponding Members and representatives of OIML liaison organizations, may submit comments directly to the BIPM.

7 Acknowledgement

The support and valuable input of several CIML Members and the chairpersons of Technical Committees, especially Richard Goblirsch (TC 2), John Barton (TC 9), Michael Borys (TC 9/SC 3) and Joachim Fischer (TC 11) is highly appreciated. ■

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HISTORY OF SCALES

Part 5: Weights in ancient times

ING. WOLFGANG EULER, Hennef/Sieg and
HEINZ WEISSER, Balingen

Fig. 3: The carob tree with its seeds from the legume family

Measuring and weighing have been the basis of every kind of economic activity from time immemorial. There is virtually no area of human life in which weights do not play a crucial role. Today's knowledge about weights in ancient times comes from many different sources.

Fig. 1: The oldest weight which is also the most famous, the "resting duck"

Fig. 2: Babylonian verification weight made of basalt with cuneiform script

Archeologists have unearthed several fairly early standards which are now housed in museums. Basically, it is however certain that today – just as in the past – mechanical and electrical weighing instruments cannot be adjusted and checked (calibrated) without weights. Weights are thus a significant component for weighing instruments the world over. Without exact weights, the weighing technology in commercial exchanges is not conceivable and also an orderly economic cycle is not possible.

Many "old" units of measurement which deal with heaviness refer to seeds and grain. There were three reasons for this: firstly their surprisingly regular size, secondly the extraordinary smallness found in some plants (millet) and thirdly cereals were the product to be weighed on the original weighing instruments.

The oldest weight, which is also the most famous from around 2260 BC, is the "resting duck" which is kept in the Iraq Museum in Baghdad. The mass of this weight comes to 29 680 g and corresponded to the "light" or "common" talent which was later widely used by the Hebrews. The oldest weights were found in the ruins of Babylonian and Assyrian cities. Some of the weights bore dedications in cuneiform script, whereas the standard weights bore the name of the priestly official as the verification stamp. The origin of the art of weighing and measuring was thus located with the Sumerians in Babylonia and formed the basis for the development of metrology in Egypt and for the Hebrews in Israel.

Priests as the guardians of weights and measures

The Hebrew priests were responsible for the supervision of weights and measures. They kept their standard measures in the Temple in Jerusalem.

Measures arrived in Greece through the trading of the Phoenicians who lived on the eastern Mediterranean coast. The legislation of *Solon* in ancient Greece in around 600 BC also included metrology. The standard weights and measures were kept in the

Roman pottery weight (found at Cologne/Rhine). All the other weights are national state weights from Europe dating from before the production of weights in the EU in accordance with OIML R 111-1:2004

Equal-armed beam balance for trade, weighing coins and diamonds

Fig. 4: Weights, weighing instruments and weighing in the course of time – Permanent exhibition on display in Meys Fabrik (kleine Stadthalle) in the town of Hennef a. d. Sieg

Temple of Nemesis on the Acropolis, the monument dedicated to the gods above Athens. From Greece, weights came to Rome, where they formed the basis of the Romans' own weighing and measurement systems.

The Roman system of weights and measures, which was also holy, can be traced back to the Roman king Servius Tullius (578–534 BC). He created the Servian pound, the libra. The pound (Latin *pondus*, weight) is part of the Anglo-American measuring system (abbreviation lb – Latin *libra* – in the USA often used in the plural as lbs). Standard weights and standard measuring instruments were kept in the Capitol in a special building, the *Ponderarium*, in the Temple of Juno Moneta. The primary standard of the Romans, the *mensura*, was stored in the Temple of Jupiter and was thus also known as the *Capitolina*. The supervision of weights and measures was carried out by the *pensores* (weighers) and the *aediles* (Roman police officers) by order of the *praefectus urbis* (urban prefect). Note: *libra* (Latin) stands for scales/balance, pound: originally libra = stated mass.

The Germanic peoples, in turn, adopted the Roman measurement system. This standardization of weights and measures was necessary through the growth of trade in the Mediterranean and the expansion of the Roman Empire.

The dried seed of the carob tree *(Ceratonia siliqua)* from the Mediterranean also provided the name of the unit of weight the carat. In the Middle Ages one carat corresponded to the weight of three grains of barley or four grains of wheat. The metric carat was introduced in 1875 following the Metre Convention. 1 metric carat = 200 mg = 0.2 g (1 carob seed = 1 carat = 200 mg).

HISTORY OF SCALES

Part 6: Weights in the Modern Age

ING. WOLFGANG EULER, Hennef/Sieg and
HEINZ WEISSER, Balingen

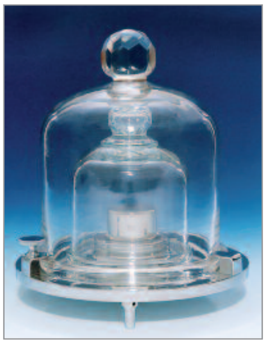

Figure 1: The national standard of the kilogram of the Federal Republic of Germany at the PTB (Braunschweig). It is made of a platinum-iridium alloy and is compared with the international prototype of the kilogram kept in Sèvres, near Paris, approximately every 10 years. Photo: PTB Braunschweig.

Until 2004, the different countries of the world, especially the Member States of the European Union, had weight standards that differed with regard to their design. Each country had the sovereign right to test and verify its own weight standards, i.e. in numerous European countries, each country tested the accuracy of its own weights itself. This was an expensive practice but had the considerable advantage of ensuring better consumer protection in Europe, since due to the different standards in the various countries, exchanged goods were tested several times in different countries that used their own national weights.

Meanwhile, harmonization has taken place in the whole of the EU. With regard to costs, this is of benefit both to the testing and verification authorities and to the consumers, but we, as the authors, do not want to conceal the fact that the large-scale spreading of harmonized weights throughout the EU Member States may also bring about considerable disadvantages.

Here, we will only present the weights used in EU laboratories and for trade, as well as their fabrication and accuracy. Our statements are based on a 1 kg sample weight.

The kilogram is the base unit of mass in the International System of Units (SI). Its mass is defined by that of the international prototype of the kilogram (also "prototype kilogram") – a cylinder made of a platinum-iridium alloy which is kept at the BIPM. The symbol of the unit "kilogram" is kg (see Table 1).

Table 1: The SI unit "kilogram"

Standard	International System of Units
Name of unit	kilogram
Symbol of unit	kg
Measurand described	Mass
Symbol of measurand	m
Dimension symbol	M
In SI units	SI base unit
In CGS units	1 kg = 10^3 g
Named after	Greek "Chilioi" = thousand and "Gramma" = letter

The unit name of the kilogram disagrees with the system used by the International System of Units due to the fact that it begins with an SI prefix ("kilo"). For this reason, decimal submultiples and multiples of the kilogram may not be based on the kilogram and completed with prefixes or prefix symbols; they are derived from the gram instead. Since the metre definition was updated in 1960, the kilogram has been the only SI base unit that is still defined by comparison with an artefact (the prototype – see Fig. 1).

In Figures 2 to 6, this contribution on the history of weighing instruments renders experience gained over the years by HAIGIS Gewichtefertigung GmbH in Albstadt.

The test and calibration weights, respectively, are manufactured in different designs, as shown in the picture, for example in stainless steel, nickel-plated brass, precision-turned brass or also in cast iron. In the case of test weights, there are also different classes of error limits (see Table 3) which depend on the weighing ranges und on the accuracies of the weighing instruments to be tested (calibrated).

"To calibrate" means to determine a deviation between the value indicated by the instrument and the correct value, hence, for a weighing instrument, it is the accuracy of its indication that is determined. During calibration, no intervention is made on the weighing instrument. The relevant OIML Recommentations lay down model-dependent characteristics (such as material, surface quality, markings, design, shape, etc.) for test standards. The Recommendations are recognized in numerous countries and influence national standards.

Figure 2: The weight blank is turned from a round steel bar

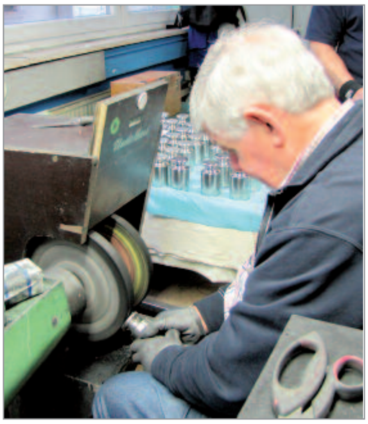

Figure 3: The weight blank for E_1/E_2 weights, for example (made with a small initial excess mass) is polished until the prescribed maximum permissible error on verification is obtained

Figure 4: Weight blanks M_1-M_3 (right) with auxiliary equipment prior to final adjustment/verification. Fine-precision and commercial weights (M_1, M_2, M_3) are usually manufactured with a slight underweight and equipped with an adjusting cavity. Small lead balls are filled into this cavity until the weight, including the fastening or the verification plate, complies with the prescribed maximum permissible error on verification

Figure 5: Filling the adjusting cavity

Figure 6: Finished commercial weight

Table 2: Fields of application of the test weight classes

Designation of non-automatic weighing instruments (NAWIs)	Accuracy classes of weighing instruments	Verification scale intervals "e"/resolution/digital increment*	Min. requirements for the error limit class of the test weight to be used (accuracy class)
Special accuracy Analytical balances	I	0 to >200 000	E_2/E_1
High accuracy weighing machines Analytical balances	II	up to 100 000	E_2/F_1
Medium accuracy	III	up to 10 000	M_1
Ordinary accuracy Industrial weighing instruments	IV	up to 1 000	M_3

* Number of verification scale intervals "e" / resolution / digital increment = weighing range divided by the digital increment "e"

Table 3: Extract from the Table of Maximum Permissible Errors on Verification for Weights pursuant to OIML R 111, and meaning of the abbreviations (E, F, M) – R: recommendation.

Nominal value	E_1	E_2	F_1	F_2	M_1	M_2	M_3
1 g	±0.010 mg	±0.03 mg	±0.10 mg	±0.3 mg	±1.0 mg	±3.0 mg	±10 mg
2 g	±0.012 mg	±0.04 mg	±0.12 mg	±0.4 mg	±1.2 mg	±4.0 mg	±12 mg
5 g	±0.016 mg	±0.05 mg	±0.16 mg	±0.5 mg	±1.6 mg	±5.0 mg	±16 mg
10 g	±0.020 mg	±0.06 mg	±0.20 mg	±0.6 mg	±2.0 mg	±6.0 mg	±20 mg
20 g	±0.025 mg	±0.08 mg	±0.25 mg	±0.8 mg	±2.5 mg	±8.0 mg	±25 mg
50 g	±0.03 mg	±0.10 mg	±0.3 mg	±1.0 mg	±3.0 mg	±10 mg	±30 mg
100 g	±0.05 mg	±0.16 mg	±0.5 mg	±1.6 mg	±5.0 mg	±16 mg	±50 mg
200 g	±0.10 mg	±0.3 mg	±1.0 mg	±3.0 mg	±10 mg	±30 mg	±100 mg
500 g	±0.25 mg	±0.8 mg	±2.5 mg	±8.0 mg	±25 mg	±80 mg	±250 mg
1 kg	±0.5 mg	±1.6 mg	±5.0 mg	±16 mg	±50 mg	±160 mg	±500 mg
2 kg	±1.0 mg	±3.0 mg	±10 mg	±30 mg	±100 mg	±300 mg	±1.0 g
5 kg	±2.5 mg	±8.0 mg	±25 mg	±80 mg	±250 mg	±800 mg	±2.5 g
10 kg	±5.0 mg	±16 mg	±50 mg	±160 mg	±500 mg	±1 600 mg	±5.0 g
20 kg	±10 mg	±30 mg	±100 mg	±300 mg	±1 000 mg	±3 000 mg	±10 g
50 kg	±25 mg	±80 mg	±250 mg	±800 mg	±2 500 mg	±8 000 mg	±25 g

Abbreviations	FR	GB	DE
E	Extra fine exactitude	Extra fine accuracy	Extra hohe Genauigkeit
F	Fine exactitude	Fine accuracy	Feine Genauigkeit
M	Moyenne exactitude	Medium accuracy	Mittlere Genauigkeit

Table 2 gives preliminary explanations about the fields of use of the different test weight classes.

Example: A weighing instrument with a max. weighing range of 60 kg and a verification scale interval (digital increment) "e" of 20 g has a resolution/number of verification scale intervals of 60 000 g/20 g = 3000 e. Hence, it belongs to Class III (up to 10 000). The test weights to be used are precision weights of the error limit class M_1 (see Fig. 7).

As mentioned at the beginning of this article, the weights are, thus, not only a significant element of weighing throughout the world, but they can even be considered as more important than the weighing instrument itself.

The quality and accuracy of the testing equipment "weights" are the absolute prerequisite for accurate balances!

Part 7 in this series will focus on load cells and strain gauge technology: how they were invented and how they work. After that, the universe of "electronic weighing technologies" will be explored.

Figure 7: M_1 weight set in hardwood case

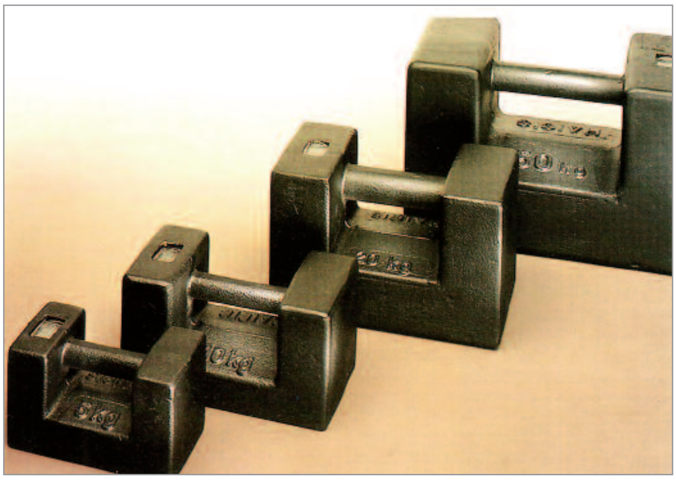

Figure 8: Standard commercial weights designed as blocks

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A note from the Authors

Dear Readers,

We believe that the series of articles on the history of scales we have published so far in the OIML Bulletin has provided a valuable introduction to this fascinating topic. In 2013 we are pleased to continue this series and will be focussing on strain-gauge load cells in weighing technology, followed by:

- non-automatic weighing instruments according to OIML R 76 (EN 45501),
- discontinuous totalizing automatic weighing instruments in accordance with OIML R 107,
- automatic gravimetric filling instruments according to OIML R 61,
- weigh feeders,
- automatic catchweighing instruments according to OIML R 51, and
- checkweighers as automatic weighing instruments for individual weighing with price labelling.

We would like to sincerely thank all those who have made it possible for us to produce this series on the history of scales and would like to wish all the readers of the OIML Bulletin a Happy New Year for 2013.

Best regards,

Wolfgang Euler and Heinz Weisser

BUCHAREST 2012

14th Conference
47th CIML Meeting
and Associated Events

Bucharest, Romania

1–5 October 2012

The following meetings took place at the Radisson Blu Hotel, Bucharest (Romania) from Monday 1 through Friday 5 October 2012:

- **14th International Conference on Legal Metrology**
- **47th Meeting of the International Committee of Legal Metrology**
- **Regional Legal Metrology Organization Round Table**

BUCHAREST 2012

14th Conference: Opening Speech

Mr. Daniel Chitoiu
Romanian Minister of Economy, Trade, Business and the Environment

(Note: Mr. Chitoiu was unable to deliver his Opening Speech in person; it was read by Prof. Fanel Iacobescu, CIML Member for Romania)

Dear Mr. President,
Dear Members and Guests,
Ladies and Gentlemen,

It is now my pleasure to welcome you, on behalf of the Romanian Government, to Bucharest, Romania, on the occasion of the 14th International Conference on Legal Metrology, the 47th Meeting of the International Committee of Legal Metrology and the associated events.

It is indeed an honor for Romania that the International Organization of Legal Metrology accepted our invitation to host these important events in Bucharest.

The establishment of the OIML in October 1955 in Paris represented an outstanding event initiating the process of crystallizing a global coordinating center aimed at promoting a harmonized approach of all the aspects of legal metrology. In the view of the Romanian authorities, the OIML, along with the Regional Legal Metrology Organizations, emerges as an important pillar of support for legal metrology - a patrimony belonging to all the countries that are today represented in Bucharest, in this conference hall.

I would note that the OIML did not emerge from nowhere, it was the outcome of a lengthy evolutionary process set in motion by the signing of the Metre Convention in Paris, in 1875. An important landmark along this road was the International Conference of Practical Metrology also held in Paris, in 1937 - the first conference having legal metrology as a main objective. On this occasion, the Provisional Committee of Legal Metrology was established in order to prepare the setting up of a permanent international body dedicated to legal metrology.

An honored place in the history of the International Organization of Legal Metrology is held by the name of our compatriot, Professor Constantin St tescu – who represented Romania at the International Conference of Practical Metrology in 1937.

Professor St tescu – an outstanding figure in legal metrology on a global level – is considered to be one of the founding fathers of the OIML.

Romania is proud to be ranked among the founding signatories of the Metre Convention and the Convention establishing the International Organization of Legal Metrology – the birth certificate of the OIML. ■

BUCHAREST 2012

14th Conference: Opening Speech

Prof. Fanel Iacobescu
CIML Member for Romania
Conference President

Mr. CIML President,
Dear Colleagues,
Ladies and Gentlemen,

It is a great honor for me to be elected President of this International Conference on Legal Metrology. I believe this election represents a recognition of the activity I have performed for twelve years as General Manager of the Romanian Bureau of Legal Metrology and as a Member of the International Committee of Legal Metrology. So I thank you all for your trust.

On this auspicious occasion, I would like to acknowledge that the Romanian Government is fully aware of the important role that metrology in general, and legal metrology in particular, play in the development of society, as well as of the contribution that metrology makes to bringing together people of different races, cultures, religious, and philosophical or political beliefs, to achieve global peace and stability. The proof of this contribution is your presence at this meeting.

Dear Colleagues, it is now my pleasure to welcome you on behalf of the Romanian Bureau of Legal Metrology. We are grateful that the International Organization of Legal Metrology has chosen Bucharest for this Conference. We enjoy it all the more because Romania is one of the founder Members of the OIML and this Conference is being held for the first time in my country. As you might be aware, we have a very long tradition with the use of metrology. Please allow me to recall two significant moments in our history:

On 15 September 1864 the Law on Weights and Measures, establishing the Metric System of Weights and Measures in Romania, was promulgated by our ruler Alexandru Ioan Cuza.

In 1887, shortly after gaining independence from the Ottoman Empire, Romania adhered to the International Metre Convention. The Central Service of Weights and Measures was established.

Today the Romanian Bureau of Legal Metrology is responsible for the central public administration of legal metrology and answers to the Ministry of Economy, Trade and Business Environment, which is in turn responsible for the coordination of the entire metrology activity at national level.

We have a good understanding of the role legal metrology plays in the economic development of society in general. I think it is necessary to act more dynamically at national and international levels in order to raise our visibility by promoting more stringent regulation in the field of legal metrology, which will ensure precision and confidence in measurements. Moreover, the Romanian Bureau of Legal Metrology now consistently considers measurements within the context of the national legislative framework.

The Romanian National Metrology body will remain dedicated to legal metrology, promoting its growth both nationally and internationally in a more intense activity in this wonderful family called “OIML”.

Thank you for your attention. I would like to wish all of you very interesting and successful meetings and I sincerely hope that you will enjoy your stay in Bucharest. I would also like to thank you, Mr. President of the CIML, for the excellent dinner yesterday. And now I hand the floor over to Mr. Klenovský. ■

14th Conference Agenda

Opening speeches
Roll call
Election of the Conference President and Vice-Presidents

1 Approval of the minutes of the 13th Conference

2 Report on the work of the CIML (2009-2012)
2.1 Report by the CIML President
2.2 The use of French and English
2.3 Dissolution of the position of "Facilitator on developing country matters"

3 Report on the work of the BIML (2009-2012)
3.1 Organization, management and staff of the BIML
3.2 Liaisons with other organizations
3.3 Technical work and management of OIML systems

4 Report on the 2009-2012 financial period
4.1 Developments during the reporting period
4.2 Revision of OIML B 8:2004 "OIML Financial regulations"
4.3 Surpluses

5 Approval of the accounts for 2008, 2009, 2010 & 2011

6 Sanctioning of OIML Recommendations

7 Strategy of the OIML - Sanctioning of OIML B 15:2011

8 Member States' contributory classes and the contributory share for 2013-2016

9 Budget for the 2013-2016 financial period
9.1 Member State contribution
9.2 Corresponding Member fee
9.3 Tariffs for services provided by the OIML
9.4 Proposed budget for the 2013-2016 financial period

10 Examination of the situation of Member States in arrears
10.1 Overview of Members in arrears and actions taken
10.2 Procedure related to resignation and readmission of Members

11 Interpretation of the OIML Convention
11.1 Article XV: Case where the position of first Vice-President becomes vacant
11.2 Article XVII: The meaning of the term "colleague"

12 Date and venue of the next Conference

Resolutions

14th Conference Resolutions

Resolution no. 1 [*Agenda item 2.2*]

The Conference,
Having regard to Article XI of the OIML Convention,
Noting Resolution no. 1 of the 44th CIML Meeting and Resolution no. 7 of the 46th CIML Meeting,
Considering that French is the official language of the Organization and that, in practice, English is the Organization's main working language,
Resolves:
(a) Conference invitations, agendas, working documents, minutes and resolutions, Committee resolutions, circulars to Committee Members, CIML President and BIML Director's reports to the Committee, OIML Recommendations, Documents and Basic Publications, and OIML budgets and financial reports shall be made available in French and in English;
(b) The OIML web site shall be available in both English and French versions;
(c) The OIML Bulletin shall be published in English with articles occasionally also published in French when appropriate;
(d) Other publications and communications shall be in English;
(e) The Bureau may make available translations of publications into other languages provided by the Member States, if it is clearly indicated that the OIML is not responsible for the translation;
(f) Conferences and meetings of the Committee shall have simultaneous interpretation from French to English and from English to French;
(g) On occasion, Conferences and meetings of the Committee may have interpretation to and from other languages, provided this is not funded from the Organization's regular budget;
(h) All other meetings shall be conducted in English without interpretation provided by the Organization.

Resolution no. 2 [*Agenda item 2.3*]

The Conference,
Having regard to Article IV, first paragraph (1), of the Convention,
Noting the discussions in the 46th CIML Meeting on the issue of the role of the "Facilitator on developing country matters",
Considering that assistance to developing countries is specifically addressed in the OIML Strategy (OIML B 15:2011) as being embedded in the regular activities of the Organization,
Resolves:
The position of "Facilitator for developing country matters" is dissolved.

Resolution no. 3 [*Agenda item 4.2*]

The Conference,
Having regard to Article XXVII of the Convention,
Noting Resolution no. 6 of the 47th CIML Meeting,
Resolves:
The revision of the OIML Financial Regulations (OIML B 8:2012) is sanctioned.

Resolution no. 4 [*Agenda item 4.3*]

The Conference,
Having regard to Article XXV, final paragraph, of the Convention,
Resolves:
The budget surpluses (net results) from the 2009–2012 financial period shall be kept in reserve.

Resolution no. 5 [*Agenda item 5*]

The Conference,
Having regard to Article XXV, penultimate paragraph, of the Convention,
Noting Resolutions no. 25 of the 45th CIML Meeting, no. 6 of the 46th CIML Meeting, and no. 5 of the 47th CIML Meeting,
Resolves:
The audited accounts for 2008, 2009, 2010 and 2011 are hereby approved. The CIML President and the BIML Director are finally discharged for their financial management during these years.

Resolution no. 6 [*Agenda item 6*]

The Conference,
Having regard to Article VIII, first and fifth paragraphs, of the Convention,
Noting the decisions taken by the Committee since the 13th Conference concerning the approval and withdrawal of OIML Recommendations and Documents,
Resolves:

(a) The following OIML Recommendations are hereby sanctioned. Member States are reminded of their obligation to implement these Recommendations as far as possible:
R 35-2:2011 *Material measures of length for general use*. Part 2: *Test methods*
R 35-3:2011 *Material measures of length for general use*. Part 3: *Test report format*
R 46-1 and R 46-2:2012 *Active electrical energy meters*
R 80-1:2009 *Road and rail tankers with level gauging*. Part 1: *Metrological and technical requirements*
R 106-1:2011 *Automatic rail-weighbridges*. Part 1: *Metrological and technical requirements - Tests*
R 106-2:2012 *Automatic rail-weighbridges*. Part 2: *Test report format*
R 120:2010 *Standard capacity measures for testing measuring systems for liquids other than water*
R 126:2012 *Evidential breath analyzers*
R 134-2:2009 *Automatic instruments for weighing road vehicles in motion and measuring axle loads*. Part 2: *Test report format*
R 137-1&2:2012 *Gas meters*. Part 1: *Metrological and technical requirements* and Part 2: *Metrological controls and performance tests*
Am R 138:2009 Amendment to R 138:2007 *Vessels for commercial transactions*
R 143:2009 *Instruments for the continuous measurement of SO_2 in stationary source emissions*

(b) The following OIML Documents are hereby sanctioned:
D 1:2012 *Considerations for a law on metrology*
D 16:2011 *Principles of assurance of metrological control*

(c) The withdrawal of the following OIML publications is hereby sanctioned:
R 70 *Determination of intrinsic and hysteresis errors of gas analyzers*
R 73 *Requirements concerning pure gases CO, CO_2, CH_4, H_2, O_2, N_2 and Ar intended for the preparation of reference gas mixtures*
D 7 *The evaluation of flow standards and facilities used for testing water meters*

Resolution no. 7 [*Agenda item 7*]

The Conference,
Having regard to Article IV, first paragraph (1), of the Convention,
Noting the approval by the Committee at its 46th Meeting of the OIML Strategy in the form of a revision of OIML B 15, and the subsequent publication of OIML B 15:2011,
Resolves:
The OIML Strategy as laid down in OIML B 15:2011 is hereby sanctioned. The Committee is instructed to implement this strategy taking into account the budgetary resources.

Resolution no. 8 [*Agenda item 8*]

The Conference,
Having regard to Article XXVI (1) of the Convention,
Recalling the decision of the 12th Conference in 2004, instructing the Committee to annually review the situation of those Member States that benefit from a lower contributory class,
Considering the procedure for the classification of Member States as decided by the Committee at its 40th Meeting in 2005,
Resolves:
The classification of Member States according to Article XXVI (1) of the Convention shall be reviewed in the final year of a financial period in order to determine the respective contributory shares of the Member States for the following financial period. The review shall be according to the method decided by the Committee at its 40th Meeting in 2005. However, any change in the classification of a Member State shall take effect from the second year of the following financial period.

Resolution no. 9 [*Agenda item 9*]

The Conference,

Having regard to Article XXIV, first paragraph, Article XXVI (1), and Article XXVIII, second paragraph, of the Convention,

Noting Resolutions no. 7 and no. 10 of the 47th CIML Meeting,

Considering that the total number of base contributory shares, taking into account the classification of Member States as reviewed in 2012, is 126 for the year 2013 and, after reclassification of some Member States, 138 for the remaining years of the 2013–2016 financial period,

Resolves:

(a) The overall amount of credits, necessary to cover the Organization's operating expenses shall be € 8 278 200 for the 2013–2016 financial period;

(b) The annual base contributory share for the 2013–2016 financial period is € 14 000. This results in an annual contribution for a Member State classified according to Article XXVI (1) of the Convention in Class 1, Class 2, Class 3 or Class 4 of € 14 000, € 28 000, € 56 000 or € 112 000, respectively,

(c) In case of admission of a Member State during the financial period, the overall amount of credits mentioned in (1) is increased with the contributory share of that Member State, calculated from its classification and the base contributory share, proportionate to the period from its admission to the expiry of the financial period,

(d) For the 2013–2016 financial period, newly admitted or readmitted Member States shall not pay an entry fee.

Resolution no. 10 [*Agenda item 10.2*]

The Conference,

Having regard to Article XXIX of the Convention,

Desiring to clarify Article XXIX, first paragraph, of the Convention with respect to Member States which have not fully paid their annual contribution,

Resolves:

(a) A Member State which has not paid its annual contribution for three consecutive years shall automatically be considered as having resigned, according to Article XXIX, first paragraph, of the Convention;

(b) A Member State which has not fully paid its annual contribution shall be automatically considered as having resigned when its accumulated arrears amount to the total of the last three years of contributions due;

(c) A Member State in arrears will receive a final written warning at least six months before the accumulation of the three-year amount mentioned in (1) or (2). The warning will include a request to pay the full amount;

(d) The provisions of (1), (2) and (3) apply accordingly to Corresponding Members with respect to annual Corresponding Member fees.

Resolution no. 11 [*Agenda item 10.2*]

The Conference,

Having regard to Article XXX of the Convention,

Desiring to clarify Article XXX, second paragraph, of the Convention with respect to the readmission of Member States which have officially been regarded as having resigned,

Resolves:

(a) A Member State which has officially been regarded as having resigned may be readmitted only after it has settled its unpaid contributions, the amount of which is calculated as the total contribution that the Member State would have had to pay over the last three years immediately prior to the year of readmission according to the classification of that Member State at the time of readmission;

(b) The provisions in (1) apply accordingly to Corresponding Members with respect to Corresponding Member fees.

Resolution no. 12 [*Agenda item 10.2*]

The Conference,

Having regard to Articles XXIX and XXX of the Convention,

Recalling its Resolutions no. 10 and no. 11, and Resolution no. 19 of the 13th Conference,

Noting Resolution no. 27 of the 46th CIML Meeting and Resolution no. 9 of the 47th CIML Meeting,

Considering that for some Member States, the OIML accounts show arrears in excess of three years of membership contribution, but that these should not have amounted to more than three years of membership contribution and that the accounts need to be adjusted to rectify this situation,

Resolves:

(a) Current Member States and Member States regarded as having resigned for which the OIML accounts show arrears in excess of three years of membership contribution, shall have their arrears reduced to three years of membership contribution;

(b) The reductions shall be accounted for in the 2012 accounts; any deficits resulting from these reductions shall be compensated by drawing from the reserve funds;

(c) The provisions of (1) and (2) apply accordingly to Corresponding Members.

Resolution no. 13 [Agenda item 11.1]

The Conference,
Having regard to Article XV of the Convention,
Noting the proposal from the CIML President following the discussions at the 45th CIML Meeting and Resolution no. 11 of the 45th CIML Meeting,
Resolves:
In the event of the absence, impediment, cessation of mandate, resignation or death of the first Vice-President, his duties shall be temporarily assumed by the second Vice-President.

Resolution no. 14 [Agenda item 11.2]

The Conference,
Having regard to Article XVII of the Convention,
Noting Resolution no. 26 of the 46th CIML Meeting,
Considering that the 1968 amendment of the Convention changed the membership of the Committee from twenty experts designated by the Conference to one representative per Member State,
Resolves:
A 'colleague' as mentioned in the first paragraph of Article XVII of the Convention may be: either another CIML Member or someone designated by the absent CIML Member to represent him/her. In the latter case, the representative shall be from the same government or administration as the absent CIML Member and may not represent other CIML Members, i.e. may not receive proxies from other CIML Members.

Resolution no. 15 [Agenda item 12]

The Conference,
Having regard to Article X of the Convention,
Considering the standing practice to organize a Conference once every four years,
Resolves:
The Committee is hereby charged to organize the 15th Conference in 2016, the venue and dates to be decided by the Committee.

Resolution no. 16

The Conference,
Having regard to Article XXIX, second paragraph, of the Convention,
Recalling its Resolution no. 8,
Noting the request by Greece, dated 29 August 2012, to be reclassified on the basis of the present financial difficulties and the size of its population, which Greece indicates dropped below 10 million in 2011,
Resolves:
(a) The basis for the classification of Member States is, and remains, the figures provided by the World Bank,
(b) The request from Greece is not considered to be supported with sufficient data to be able to examine the situation,
(c) The request for a remission is therefore not approved. ■

Visit to the Romanian Parliament

Download the 14th Conference and 47th CIML Meeting Resolutions at:

www.oiml.org/download

TC/SC NEWS

OIML TC 8/SC 5 - ISO TC 30/SC 7 - CEN/TC 92 Joint Working Group "Water meters for cold potable and hot water"

22–23 October 2012

British Standards Institution (BSI), London, UK

MORAYO AWOSOLA, OIML TC 8/SC 5 Secretariat

Participating countries/organisations:

Australia	Canada
P.R China	Czech Republic
France	Israel
Japan	Romania
United Republic of Tanzania	Turkey
United Kingdom	United States of America
BIML	ISO

The OIML TC 8/SC 5 - ISO TC 30/SC 7 - CEN/TC 92 Joint Working Group (JWG) "Water meters for cold potable and hot water" was established to finalise a harmonised international standard for water meters that will help to reduce the costs to manufacturers of obtaining water meter certification across the world.

Currently, water meters are the object of various international standards including EN 14154 *Water Meters*, ISO 4064 *Measurement of water flow in fully charged closed conduits - Meters for cold potable water and hot water*, and OIML R 49 *Water meters intended for the metering of cold potable water and hot water*.

The latest JWG meeting was held in London at the offices of the British Standards Institution (BSI). It was chaired by the Joint Working Group convenor Dr. Michael Reader-Harris of the National Engineering Laboratory (NEL), and assisted by the Secretary to ISO/TC 30/SC 7 Dr. David Michael together with the Secretary of OIML TC 8/SC 5, Mr. Morayo Awosola. The meeting was convened to discuss stakeholders' comments on the April 2012 consultation on the Third Committee Draft (3 CD) of OIML R 49 /EN ISO 4064 *Water meters*:

- Part 1 Metrological requirements
- Part 2 Test methods
- Part 3 Test report format
- Part 4 EN ISO 4064-4 Non-metrological requirements not covered in ISO 4064-1
- Part 5 EN ISO 4064-5 Installation requirements

The comments received on the 3 CD consultations were discussed in detail at the meeting and in most cases unanimously accepted for implementation into the draft Recommendation/Standard. The meeting acknowledged that since OIML R 49 Parts 1, 2 and 3 were now at Final Committee Draft status it was difficult to implement major technical amendments which could halt the revision process, and agreed instead to set up a working group to look at future amendments once the current revision process is completed and the Recommendation/Standard published.

In addition, members who had expressed concerns about the 3 CD (France, Japan, the UK and the USA) were to some extent content with the JWG decisions regarding their concerns.

Next steps in the harmonisation process

Mr. Luis Mussio (BIML) briefed the JWG on the structures and procedures for the development of OIML publications as specified in the OIML Directives B 6-1.The JWG aims to ballot and publish the harmonised drafts concurrently in the OIML, ISO and CEN. The OIML process would entail preparing and submitting the harmonised standard to CIML preliminary online ballot as soon as possible and in time for the 48th CIML meeting in October 2013. In the case of the ISO process, two months are needed for the ISO DIS 4064 translation and a further two months for the ISO FDIS ballot.

The JWG participants thanked BSI for hosting the meeting and NMO for sponsoring the buffet lunch. ■

TC/SC NEWS

OIML TC 6 Prepackages

22–26 October 2012

Tokyo, Japan

Willem Kool, BIML

A meeting of TC 6 was hosted by the National Metrology Institute of Japan (NMIJ) in the Bio-IT Research Building of the Institute of Advanced Industrial Science and Technology (AIST), Tokyo Waterfront. More than twenty experts from ten countries (all P-members of TC 6) and the BIML attended the meeting. Jaco Marneweck of NRCS (National Regulator for Compulsory Specifications) in South Africa, who is responsible for the TC 6 secretariat, chaired the meeting.

Because only ten of the 27 P-members were represented, the quorum for valid TC decisions was not achieved. As a consequence, any decisions of the meeting are subject to approval by the full TC.

The main topics on the agenda were the four projects that TC 6 currently has:

1 p1: OIML certificate for prepackaged goods;
2 p2: Revision of OIML R 79:1997 *Labeling requirements for prepackaged products;*
3 p3: Revision of OIML R 87:2004 *Quantity of product in prepackages*;
4 p4: Methods for determining the quantity of product in prepackages.

1 OIML certificate for prepackaged goods

TC 6 has discussed this subject for many years. In December 2011, the TC 6 secretariat circulated a third committee draft (3CD) for an OIML Basic Publication describing the framework for a voluntary certification system for the quantity of product in prepackages and associated labeling. The draft did not receive sufficient support, mainly because a number of countries are opposed to the OIML operating such a certification system. The secretariat, therefore, concluded they did not see possibilities to reconcile the opposing views by improving the draft. They reported to the BIML that they felt the project should be abandoned and the current draft be transformed into a guidance document. The guidance document would contain model system requirements for a certification system for the quantity of product in prepackages and associated labeling based on OIML R 87 and R 79. The guidance document could be used by countries wishing to set up a national certification system.

Considering these developments, the meeting agreed not to discuss the comments received on the 3CD.

Meanwhile, two proposals were submitted to the CIML for approval: one to abandon the current TC 6 project and one to open a new project for the development of a guidance document. The deadline for the online CIML votes is 30 January 2013.

2 Revision of R 79

The meeting discussed the comments received on the second committee draft (2CD) for the revision of R 79:1997 *Labeling of prepackaged products*. Some of the issues discussed are summarized below.

2.1 The title of R 79

It was resolved that the title should become: “Labeling requirements for prepackages”, to be consistent with the title of R 87. The simple argument is that, in general, it is the prepackage that is labeled, not the product.

2.2 The definition of ‘consumer’

The term ‘consumer prepackage’ is used to differentiate between a single prepackage intended for the final user of the product and a prepackage used in the distribution chain, containing multiple consumer prepackages. The labeling requirements may be different for both cases.

The meeting resolved not to define ‘consumer’. If necessary, national legislation should clarify what a ‘consumer’ is.

2.3 Labeling of prepackages not intended for sale

Many prepackages, such as packets of sugar in restaurants, or shampoo in hotels are provided as a service, free of charge. The meeting resolved that, in such cases, the prepackages need not be marked to indicate that they are not for sale.

2.4 Unit of measurement for aerosols

It was resolved once again that only units of mass should be permitted for declaring the quantity of aerosols because of the near impossibility of determining the density of the different components in the container (product and propellant) within the required uncertainty of measurement when the quantity is declared in units of volume. However, it was felt that if it proves possible to extract the product from the container, such as in the case of "bag-in-can" aerosols (where the propellant is kept separate from the product) and it is possible to accurately determine the density of the product, a declaration in units of volume could be considered.

Based on the comments received on the 2CD and the outcome of the discussions in the meeting, the secretariat will prepare a 3CD and circulate it to the members and liaisons of TC 6 for comment and vote.

3 Revision of R 87

Some years ago it had been observed that the sampling plans provided in R 87 to be used by an inspector, when assessing whether a lot of prepackages meets the requirements of R 87 for the quantity of product, do not fully comply with the requirements in R 87 for statistical sampling. Also, the current version of R 87 does not provide for sample sizes less than 50. In many instances, a sample of 50 is considered excessive when inspecting a batch of prepackages. In addition, the smallest inspection batch size in the sampling schemes provided in R 87 is 100 and it was considered necessary to recommend sampling plans for smaller batch sizes. These statistical issues were the main subjects of discussion in the meeting.

After several working documents on which the members of TC 6 could comment, the secretariat circulated a preliminary version of a first committee draft (1CD) for discussion at the meeting. It included the outcome of the work of a small ad-hoc working group of statisticians who had been requested to propose suitable sampling plans.

The meeting discussed a proposal from Japan to include alternative sampling plans which would allow for fewer prepackages to be tested in many cases. Furthermore, it was observed that it would be possible to reduce the number of sampling plans by grouping inspection batch sizes which have the same sample correction factor and number of prepackages permitted to have errors exceeding the tolerable deficiency, but not exceeding twice the tolerable deficiency. In addition, the meeting considered it desirable to include sampling plans for inspection batches of up to one million prepackages.

The statistical working group will be requested to draft a set of sampling plans based on these considerations.

The meeting confirmed that the scope of R 87 should be extended to include so called random packs, i.e. prepackages which do not have a constant nominal quantity. Typically, such prepackages are produced by automatic weighing instruments that weigh and label prepackages individually (catch weighers). It appears that the requirements of R 87 can easily be adapted to be applicable to random packs. The next meeting of TC 6 will further discuss this issue.

The secretariat will finalize the 1CD, taking into account the outcome of the discussions at the meeting and circulate it to the members and liaisons of TC 6 for comment.

4 Methods for determining the quantity of product in prepackages

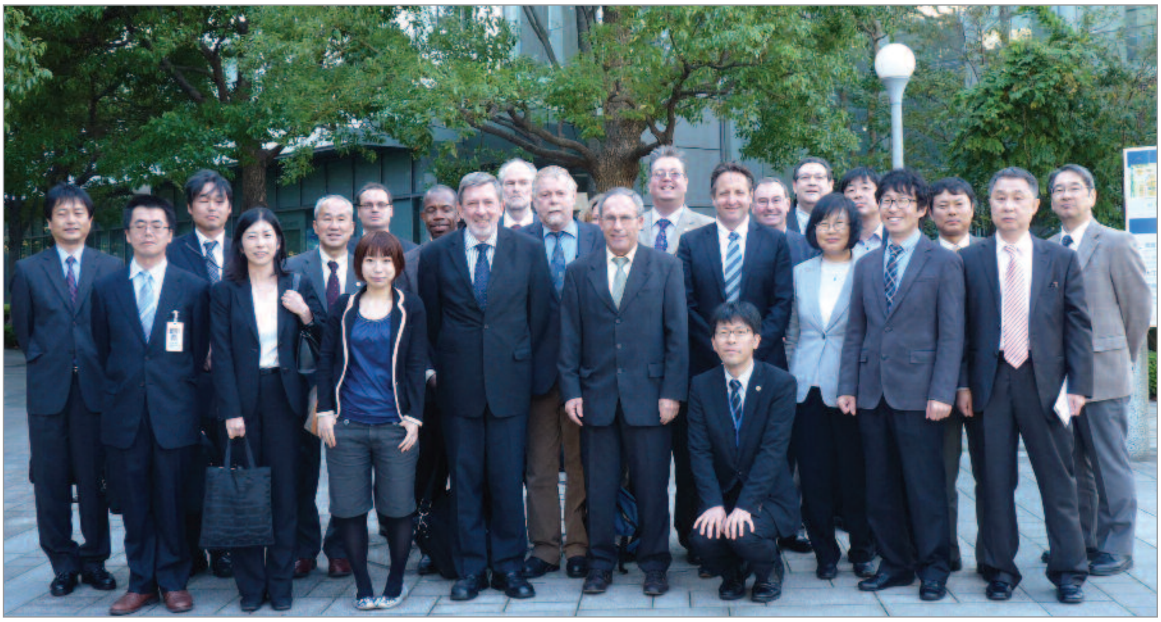
The current version of R 87 contains (informative) annexes with procedures to determine the drained quantity of product packed in a liquid medium and the actual quantity of frozen or glazed products. For the revision of these annexes, TC 6 set up a cooperation with WELMEC/WG 6 (Prepackages) who simultaneously were revising their Guide 6.8 "Guidance for the verification of drained weight, drained washed weight and deglazed weight". TC 6 has commented on subsequent versions of the draft revision of the WELMEC Guide and will consider whether the substance of that document, when finally published could be included in an annex to R 87 or be published as a separate OIML publication. The revised WELMEC Guide 6.8 is expected to be approved by the WELMEC Committee in May 2013.

Technical visit

The meeting hosts organized a technical visit to one of the plants of the company Lotte, a major manufacturer of chewing gum, chocolate, cookies, candy, ice cream, etc. The participants, after having been equipped with suitable protective clothing and having been submitted to several anti-dust procedures, were allowed to enter the special production area where different types of cookies were produced and packed, and observe the various quantity control systems included in the production lines.

Next meeting

Switzerland offered to host the next meeting of the TC at Metas in Bern and it was agreed to hold the next meeting in September 2013. ■



Participants in the TC 6 meeting

TC/SC NEWS

OIML TC 18/SC 1/p 1 and TC 18/SC 1/p 2 Blood pressure instruments

22–26 October 2012

Berlin, Germany

Ian Dunmill, BIML

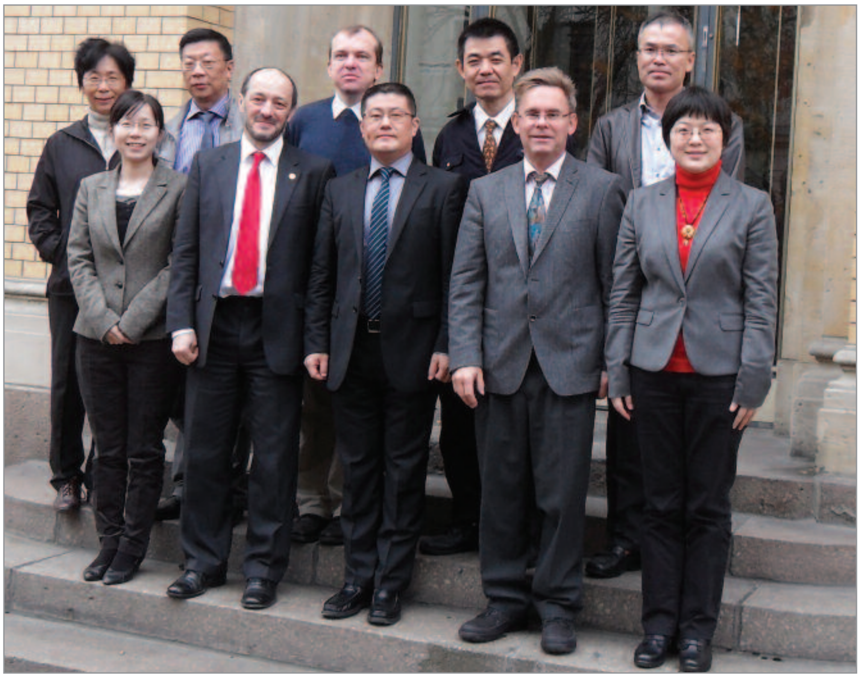
Although each of the two Project Groups concerned has eleven P-members, unfortunately only representatives from P.R. China (convener for both projects), Czech Republic, Germany and Japan attended these back-to-back meetings of TC 18/SC 1/p 1 and TC 18/SC 1/p 2. This meant that it was not possible to take any formal decisions at the meetings.

The two publications under discussion were the revisions of R 16-1 *Mechanical non-invasive sphygmomanometers* and R 16-2 *Non-invasive automated sphygmomanometers*. Both of these were based on European standards and were published in 2002. A decision to revise them was taken in 2009 following several requests in response to the review undertaken by the secretariat of TC 18/SC 1 (P.R. China). A first Committee Draft of R 16-1 and a first Working Draft of R 16-2 were circulated to members of TC 18/SC 1 in 2011, and several hundred comments were received on the two Drafts.

The aim of the meeting was to take into account as many comments as possible whilst avoiding conflict between the OIML requirements and those of other relevant international standards: ISO 81060-1:2007 for non-automatic sphygmomanometers, and IEC 80601-2-30:2009 for automatic sphygmomanometers. The latter is under revision during 2012/2013, and the latest draft was used during these meetings. Other more general standards which were also taken into account are IEC 60601-1 *General requirement for medical electrical devices - safety and performance* and IEC 81060-2 *Clinical investigation*. These standards are used in this field in the US and to some extent in Europe, but the existing OIML requirements are used as a basis for national regulations in Brazil, Japan and P.R. China.

The meeting was very successful, despite the small number of participants, and all the comments on the requirements and testing of both types of sphygmomanometers were considered. The convener agreed to take into account as many comments on the test reports as possible, whilst harmonising these with the agreed requirements and test procedures.

Following the meeting, the convener will quickly prepare a 2CD revision of R 16-1 and a 1CD revision of R 16-2 for circulation to members of TC 18/SC 1/p 1 and TC 18/SC 1/p 2 respectively for comment (and voting where applicable). This will hopefully enable the completion of both of these projects in the coming year. ■



TC/SC NEWS

OIML TC 8/SC 3 Dynamic volume and mass measurement (liquids other than water)

13–15 November 2012

Paris, France

Ralph Richter, TC 8/SC 3 Co-Secretariat

Introduction

A meeting of OIML TC 8/SC 3 *Dynamic volume and mass measurement for liquids other than water* was held on 13–15 November 2012. The meeting was hosted by the European Committee of Manufacturers of Petroleum Measuring Systems (CECOD) and the Syndicat de la Mesure at their Paris headquarters. The productive subcommittee meeting was attended by 31 participants, including official representatives from 15 countries and the TC 8/SC 3 BIML Contact Person.

The main purpose of the meeting was to discuss in detail several critical issues involved in the development of the OIML R 117 *Measuring systems for liquids other than water* series of documents.

Some TC 8/SC 3 and R 117 history

Several years ago, the decision was made to combine both R 86, concerning drum meters for alcohol, and R 105, concerning direct mass flow measuring systems for quantities of liquids, into a revised R 117 Recommendation. The decision was also made to merge TC 8/SC 3 and TC 8/SC 4 (then responsible for R 105) into a single subcommittee with Dr. Michael Rinker of PTB in Germany and Mr. Ralph Richter of NIST in the USA serving as co-secretariats.

After publication of OIML R 117-1 in 2008, an international project group (PG) was formed to develop a new R 117-2 *Dynamic measuring systems for liquids other than water*, Part 2: *Metrological controls and performance tests*. The United States serves as the convener of this PG.

Over the last four years, the PG met several times to develop R 117-2, including:

- April 2009 in Vienna, Austria;
- January 2010 in Boras, Sweden;
- May 2010 in Gaithersburg, USA;
- November 2010 in Paris, France; and
- November 2011 in Braunschweig, Germany.

In addition to the “in-person” meetings, the PG also held over 30 web-based meetings to continue to accelerate the work effort.

After the development of two working drafts of R 117-2, a first committee draft (1CD, 113 pages) was distributed in 2011.

Over 400 international comments on the 1CD of R 117-2 were received from participating members, observing members, and liaison members of TC 8/SC 3. Many of these comments were lengthy, technical, and thoughtful - often suggesting significant changes to entire sections of R 117-2.

In preparation for the November 2012 meeting in Paris, a questionnaire was sent to all P- and O-members of TC 8/SC 3 asking for information concerning their interest in being a P-member of the Project Group for the development of R 117 and their plans for participation in the Paris meeting.

The meeting

Working from the first committee draft of R 117-2 and draft responses to the over 400 international comments received, participants at the 13–15 November 2012 Paris meeting successfully completed a lengthy and detailed agenda designed to resolve several key issues on the document’s development. The meeting was coordinated and chaired by Mr. Ralph Richter.

In addition to the representatives from 15 P-members, several representatives of major manufacturers of these systems and liaison organizations actively participated in the meeting. These technical experts provided a depth of experience and technical expertise that proved highly valuable during the meeting.

Members of the PG were consulted before the meeting to help ensure that the most important R 117 issues were given adequate discussion time early in the meeting. The following are just a few of the key issues that were discussed:

- Endurance testing – this testing will now only be required for meters with moving parts;

- Software requirements – a new section is being developed;
- New initial verification requirements – only applicable for complete measuring systems;
- New Annexes for complete measuring systems:
  - fuel dispensers,
  - blend dispensers,
  - fuel dispensers for liquefied gases under pressure (LPG dispensers),
  - measuring systems on road tankers,
  - measuring systems for milk, beer, and other foaming potable liquids,
  - measuring systems on pipelines and systems for loading ships, and
  - measuring systems intended for the refueling of aircraft; and
- Two possible new annexes for bunker fuel measuring systems and for liquefied natural gas (LNG) measuring systems.

Many of the discussions were lively and were followed by the reaching of general consensus by the meeting participants.

Next steps

Some of the participants at the Paris meeting accepted assignments to draft proposals for new/improved text in particular sections of the document and its annexes.

Based on consensus decisions reached during the Paris meeting and responses to international comments received on the 1CD, the Project Group plans to send out the second committee draft of R 117-2 (2CD) for vote and comment in early 2013.

OIML R 117-2 TC 8/SC 3 Meeting
Paris, France
13–15 November 2012

From left to right:

Dr. Dumitru Dinu (Romanian Bureau of Legal Metrology), Wim Volmer (NMi, Netherlands), George Teunisse (Verispect BV, Netherlands), Stephen Bruce (National Measurement Office, UK), Marc Schmidt (NMi, Netherlands), Gavin Stones (National Measurement Office, UK), Michael Keilty (Endress+Hauser Flowtec AG, USA), Jens Simonsen (FMC Technologies, Germany), Rich Miller (FMC Technologies, USA), Gerhard Baubinder (BEV, Austria), Ralph Richter (NIST, USA, TC 8/SC 3 Co-Secretariat), Dr. Michael Rinker (PTB, Germany, TC8/SC3 Co-Secretariat), Yasuaki Fujimoto (National Institute of Advanced Industrial Science and Technology (AIST), Japan), Dr. Hiroaki Morinaka (National Metrology Institute of Japan (NMIJ)), Gilles Sauliere (Bureau de la Métrologie, France), Dr. Tsutomu Otaki (Tatsuno Corporation, Japan), Jonathan Whitten (Brodie International, USA), Alexandre Van der Linden (SPF Economy, Belgium), Brian Beard (National Regulator for Compulsory Specifications (NRCS) South Africa), Aart Pruysen (Emersion Process, Netherlands), Peter Škrovánek (Slovak Institute of Metrology), Christian Lachance (Measurement Canada), Milan Sochor (Czech Metrology Institute), Lars Parmo (FORCE Technology, Denmark), Philippe Cloutier (Tokheim, France), Stephen Patoray (BIML Director), Dmitri Karimov (Liquid Controls, USA), Luis Mussio (BIML Liaison).

Also participating in the meeting: Benjamin Dessaint (LNE, France), Ersan Gürlük (Ministry of Science, Industry and Technology, Turkey), Serkan Çelik (Ministry of Science, Industry and Technology Turkey).

OIML Systems

Basic and MAA Certificates registered 2012.09–2012.11

Information: www.oiml.org section "OIML Systems"

The OIML Basic Certificate System

The *OIML Basic Certificate System for Measuring Instruments* was introduced in 1991 to facilitate administrative procedures and lower the costs associated with the international trade of measuring instruments subject to legal requirements. The System, which was initially called "OIML Certificate System", is now called the "OIML Basic Certificate System". The aim is for "OIML Basic Certificates of Conformity" to be clearly distinguished from "OIML MAA Certificates".

The System provides the possibility for manufacturers to obtain an OIML Basic Certificate and an OIML Basic Evaluation Report (called "Test Report" in the appropriate OIML Recommendations) indicating that a given instrument type complies with the requirements of the relevant OIML International Recommendation.

An OIML Recommendation can automatically be included within the System as soon as all the parts - including the Evaluation Report Format - have been published. Consequently, OIML Issuing Authorities may issue OIML Certificates for the relevant category from the date on which the Evaluation Report Format was published; this date is now given in the column entitled "Uploaded" on the Publications Page.

Other information on the System, particularly concerning the rules and conditions for the application, issue, and use of OIML Certificates, may be found in OIML Publication B 3 *OIML Basic Certificate System for OIML Type Evaluation of Measuring Instruments* (Edition 2011) which may be downloaded from the Publications page of the OIML web site. ■

The OIML MAA

In addition to the Basic System, the OIML has developed a *Mutual Acceptance Arrangement* (MAA) which is related to OIML Type Evaluations. This Arrangement - and its framework - are defined in OIML B 10 (Edition 2011) *Framework for a Mutual Acceptance Arrangement on OIML Type Evaluations*.

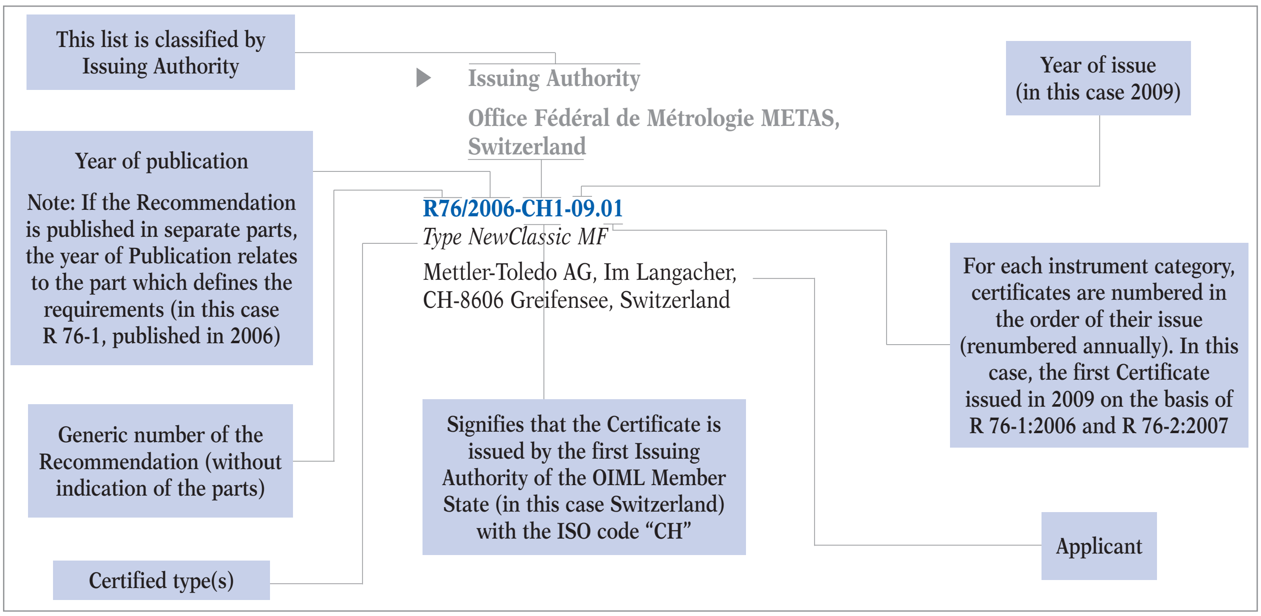
The OIML MAA is an additional tool to the OIML Basic Certificate System in particular to increase the existing mutual confidence through the System. It is still a voluntary system but with the following specific aspects:

- increase in confidence by setting up an evaluation of the Testing Laboratories involved in type testing,
- assistance to Member States who do not have their own test facilities,
- possibility to take into account (in a Declaration of Mutual Confidence, or DoMC) additional national requirements (to those of the relevant OIML Recommendation).

The aim of the MAA is for the participants to accept and utilize MAA Evaluation Reports validated by an OIML MAA Certificate of Conformity. To this end, participants in the MAA are either Issuing Participants or Utilizing Participants.

For manufacturers, it avoids duplication of tests for type approval in different countries.

Participants (Issuing and Utilizing) declare their participation by signing a Declaration of Mutual Confidence (Signed DoMCs). ■



INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Taximeters
Taximètres

R 21 (2007)

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R021/2007-NL1-2012.02
Electronic Taximeter - Type: MT9; MT12; MTMK
Microtek S.R.L., Via des Giavis, IT-33010 Pagnacco - UD, Italy

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Water meters intended for the metering of cold potable water and hot water
Compteurs d'eau destinés au mesurage de l'eau potable froide et de l'eau chaude

R 49 (2006)

▶ Issuing Authority / *Autorité de délivrance*

Laboratoire National de Métrologie et d'Essais, Certification Instruments de Mesure, France

R049/2006-FR2-2012.02 Rev. 0
Compteur d'eau ITRON - Type: WOLTEX (WE)
Itron France, 11, Boulevard Pasteur,
FR-67500 Haguenau, France

R049/2006-FR2-2012.03 Rev. 0
Compteur d'eau ITRON - Type: WSM/WSR
Itron France, 11, Boulevard Pasteur,
FR-67500 Haguenau, France

R049/2006-FR2-2012.04 Rev. 4
Compteur électronique d'eau destiné au mesurage de l'eau froide potable - Type: CZ 3000 (S/D) RI
Contazara S.A, Carretera Castellon km 5.5,
ES-50720 Sarragosse, Spain

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R049/2006-NL1-2012.01 Rev. 1
Waterflux 3070
Krohne Altometer, Kerkeplaat 12, NL-3313 LC Dordrecht, The Netherlands

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Continuous totalizing automatic weighing instruments
Instruments de pesage totalisateurs continus à fonctionnement automatique

R 50 (1997)

▶ Issuing Authority / *Autorité de délivrance*

Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R050/1997-DK3-2012.01
Continuous totalizing automatic weighing instrument - Type: M2200-B03-FB02
Marel ehf, Austurhraun 9, 210 Gardabaer, Iceland

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic catchweighing instruments
Instruments de pesage trieurs-étiqueteurs à fonctionnement automatique

R 51 (2006)

▶ Issuing Authority / *Autorité de délivrance*

National Measurement Office (NMO),
United Kingdom

R051/2006-GB1-2011.02 Rev. 1
HSC350
Nemesis srl, Via Giului Benassi 31, IT-41122 Modena, Italy

R051/2006-GB1-2012.01
LI-700E / CWL-700E
Digi Europe Ltd., Digi House, Rookwood Way, Haverhill, Suffolk CB9 8DG, United Kingdom

R051/2006-GB1-2012.02
WPL-AI-S Series
Ishida Co. Ltd., 44, Sanno-cho, Shogoin, Sakyo-ku, JP-606-8392 Kyoto, Japan

R051/2006-GB1-2012.03
HI-700 TR
Digi Europe Ltd., Digi House, Rookwood Way, Haverhill, Suffolk CB9 8DG, United Kingdom

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Metrological regulation for load cells (applicable to analog and/or digital load cells)
Réglementation métrologique des cellules de pesée (applicable aux cellules de pesée à affichage analogique et/ou numérique)

R 60 (2000)

Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office, National Metrology Institute of Japan (NMIJ) National Institute of Advanced Industrial Science and Technology (AIST), Japan

R060/2000-JP1-2010.14 Rev. 2 (MAA)
Beam (bending) load cell - Type: UB1-500, UB1-1T, UB1-2T, QUB1-500, QUB1-1T, QUB1-2T
Yamato Scale Co. Ltd., 5-22 Saenba-cho, JP-673-8688 Akashi, Hyogo, Japan

R060/2000-JP1-2012.04 Rev. 1 (MAA)
Compression load cell - Type: CC010-10T-C3, CC010-20T-C3, CC010-30T-C3, CC010-50T-C3,
Minebea Co. Ltd., 1-1-1 Katase Fujisawa-shi, JP-251-8531 Kanagawa-ken, Japan

R060/2000-JP1-2012.12 Rev. 2 (MAA)
Beam (shear) load cell - Type: CC1-H10T, CC1-H20T, CC1-H20T, CC1-H30T, CC1-H40T, CC1-H50T, CC1-H10T-IS, CC1-H120T-IS, CC1-H20T-IS, CC1-H30T-IS, CC1-H40T-IS, CC1-H50T-IS, CC2-10T, CC2-20T, CC2-25T.
Kubota Corporation, 1-2-47 Shikitsu-higashi, Naniwa-ku, JP-556-8601 Osaka, Japan

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R060/2000-NL1-2012.33 (MAA)
Universal load cell, with strain gauges - Type: 101BH, 101BS, 101NH, 101NS
Anyload Youngzon Transducer (Hangzhou) Co. Ltd., No. 160, South No. 11 Street, Hangzhou Economic & Technological Development Zone, CN-310018 Zhejiang, P.R. China

R060/2000-NL1-2012.40 (MAA)
Bending beam load cell, with strain gauges - Type: 0765
Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5, Middle HuaShan Road, Xinbei District, CN-213022 ChangZhou, Jiangsu, P.R. China

R060/2000-NL1-2012.41 (MAA)
Bending beam load cell, with strain gauges - Type: 0785
Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5, Middle HuaShan Road, Xinbei District, CN-213022 ChangZhou, Jiangsu, P.R. China

R060/2000-NL1-2012.42 (MAA)
Bending beam load cell, with strain gauges - Type: 0795
Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5, Middle HuaShan Road, Xinbei District, CN-213022 ChangZhou, Jiangsu, P.R. China

R060/2000-NL1-2012.43 (MAA)
Bending beam load cell, with strain gauges - Type: 0805
Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5, Middle HuaShan Road, Xinbei District, CN-213022 ChangZhou, Jiangsu, P.R. China

R060/2000-NL1-2012.44 (MAA)
Tension load cell - Type: SS300
SEWHACNM Co. Ltd., 301~302, 102 Dong, Ssangyong 3rd Bucheon Techno Park, 36-1 Samjeon-dong, Ojeong-gu, 153-801, Bucheon City, GyungGi-do, Korea (Rep.)

R060/2000-NL1-2012.45 (MAA)
Single point load cell, with strain gauges, tested as part of a weighing instrument - Type: PW29
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, DE-64293 Darmstadt, Germany

R060/2000-NL1-2012.46 (MAA)
Compression load cell, with strain gauges - Type: HM14H1-CX-XX-XX-XX series
Zhonghang Electronic Measuring Instruments Co. Ltd. (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN-723000 Hanzhong- ShaanXi, P.R. China

R060/2000-NL1-2012.47 (MAA)
Double ending shear beam load cell with strain gauges - Type: HM9J-CX-XX-XX-XX series

Zhonghang Electronic Measuring Instruments Co. Ltd. (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN-723000 Hanzhong- ShaanXi, P.R. China

R060/2000-NL1-2012.48 (MAA)
Compression load cell, with strain gauges - Type: H14A4-CX-XX-XX-XX series

Zhonghang Electronic Measuring Instruments Co. Ltd. (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN-723000 Hanzhong- ShaanXi, P.R. China

R060/2000-NL1-2012.49 (MAA)
Double ending shear beam load cell, with strain gauges. Type: H9D-CX-XX-XX-XX series

Zhonghang Electronic Measuring Instruments Co. Ltd. (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN-723000 Hanzhong- ShaanXi, P.R. China

R060/2000-NL1-2012.50 (MAA)
Shear beam load cell, with strain gauges - Type: SSH

Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5, Middle HuaShan Road, Xinbei District, CN-213022 ChangZhou, Jiangsu, P.R. China

▶ **Issuing Authority / *Autorité de délivrance***

Physikalisch-Technische Bundesanstalt (PTB), Germany

R060/2000-DE1-2012.01
Digital strain gauge compression load cell - Type: PR 6204

Sartorius Mechatronics T&H GmbH, Meiendorfer Strasse 205, DE-22145 Hambourg, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic gravimetric filling instruments
Doseuses pondérales à fonctionnement automatique

R 61 (2004)

▶ **Issuing Authority / *Autorité de délivrance***

National Measurement Office (NMO), United Kingdom

R061/2004-GB1-2012.01
SpeedAC NXT

Premier Tech, 1 avenue Premier, Rivière-du-Loup, CA-G5R 6C1 Quebec, Canada

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Nonautomatic weighing instruments
Instruments de pesage à fonctionnement non automatique

R 76-1 (1992), R 76-2 (1993)

▶ **Issuing Authority / *Autorité de délivrance***

National Measurement Office (NMO), United Kingdom

R076/1992-GB1-2012.01 Rev. 2 (MAA)
CT100 Series

CAS Corporation, #19, Ganap-Ri, Gwangjuk-Myoun, Yangju-Si, KR-482-841 Kyunggi-Do, Korea (Rep.)

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Non-automatic weighing instruments
Instruments de pesage à fonctionnement non automatique

R 76-1 (2006), R 76-2 (2007)

Issuing Authority / *Autorité de délivrance*

Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R076/2006-DK3-2012.03

Non automatic weighing instrument - Type PWI

ESIT Electronik Sistemler Imalat ve Ticaret Ltd. Sirketi, Nisantepe Mahallesi Handegul, Sokak No. 8, Cekmekoy, TR-34794 Istanbul, Turkey

Issuing Authority / *Autorité de délivrance*

Office Fédéral de Métrologie METAS, Switzerland

R076/2006-CH1-2012.01 (MAA)

Non automatic weighing instrument - Type: ME.../ TLE.../ JE.../ PHE ... (E-line)

Mettler-Toledo GmbH, Im Langacher 44, CH-8606 Greifensee, Switzerland

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R076/2006-NL1-2012.19 (MAA)

Non-automatic weighing instrument - Type: PS3X

Mettler-Toledo Inc., 1150 Dearborn Drive, Ohio 43085, Worthington, United States

R076/2006-NL1-2012.23 (MAA)

Non automatic weighing instrument - Type: LS2 / LS4 / CS2 / LH1 / LS6 / LS2S series

Xiamen Pinnacle Electrical Co. Ltd., 4F, Guangxia Building, North High-Tech Zone, Xiamen, CN-Fujian, P.R. China

R076/2006-NL1-2012.33

Non automatic weighing instrument - Type: DPS-5600

Teraoka Seiko Co. Ltd., 13-12 Kugahara, 5-Chome, Ohta-ku, JP-146-8580 Tokyo, Japan

R076/2006-NL1-2012.34 (MAA)

Non automatic weighing instrument - Type: Ariva

Mettler-Toledo (Changzhou) Measurement Technology Ltd., N° 111, West TaiHu Road, ChangZhou XinBei District, CN-213125 Jiangsu, P.R. China

R076/2006-NL1-2012.35 (MAA)

Non automatic weighing instrument - Type: DS-676(H)

Shanghai Teraoka Electronic Co. Ltd., Tinglin Industry Developmental Zone, Jinshan District, CN-201505 Shanghai, P.R. China

Issuing Authority / *Autorité de délivrance*

National Measurement Office (NMO), United Kingdom

R076/2006-GB1-2011.03 Rev. 1 (MAA)

CL5500 Series

CAS Corporation, #19, Ganap-Ri, Gwangjuk-Myoun, Yangju-Si, KR-482-841 Kyunggi-Do, Korea (Rep.)

R076/2006-GB1-2012.04 Rev. 1 (MAA)

ZM301, ZM303, ZQ375 Series

Avery Weigh-Tronix, Foundry Lane, Smethwick, West Midlands B66 2LP, United Kingdom

R076/2006-GB1-2012.05 Rev. 1 (MAA)

ZQ375 Checkweigher

Avery Weigh-Tronix, Foundry Lane, Smethwick, West Midlands, B66 2LP, United Kingdom

R076/2006-GB1-2012.06 Rev. 1 (MAA)

CL3500 Series

CAS Corporation, #19, Ganap-Ri, Gwangjuk-Myoun, Yangju-Si, KR-482-841 Kyunggi-Do, Korea (Rep.)

R076/2006-GB1-2012.07 (MAA)

FM or FMR indicator

Excell Precision Co. Ltd., 6F, No. 127, Lane 235, Pao-Chiao Road, Hsin Tien, TW-Taipei Hsien, Chinese Taipei

R076/2006-GB1-2012.08 (MAA)

WM-AI and IP-AI

Ishida Co. Ltd., 44, Sanno-cho, Shogoin, Sakyo-ku, JP-606-8392 Kyoto, Japan

R076/2006-GB1-2012.09 (MAA)

LI-700E

Digi Europe Ltd., Digi House, Rookwood Way, Haverhill, Suffolk CB9 8DG, United Kingdom

R076/2006-GB1-2012.10 (MAA)
A-Series and V-Series

Universal Weight Enterprise Co. Ltd., 2-5 Fl., No. 39 Pao Shing Road, TW-Hsin Tien City, Taipei Hsien 231, Chinese Taipei

Issuing Authority / *Autorité de délivrance*

SP Technical Research Institute of Sweden, Sweden

R076/2006-SE1-2012.01 (MAA)
Graduated, self indicating, single or multi-interval non-automatic weighing instrument - Type: UNI-3 L, UNI-3 L1EV, UNI-3 L2, UNI-3 L2EV, UNI-3 L2 H

Ishida Co. Ltd., 44, Sanno-cho, Shogoin, Sakyo-ku, JP-606-8392, Kyoto, Japan

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic level gauges for fixed storage tanks
Jaugeurs automatiques pour les réservoirs de stockage fixes

R 85 (2008)

Issuing Authority / *Autorité de délivrance*

Czech Metrology Institute (CMI), Czech Republic

R085/2008-CZ1-2012.04
Magnetostrictive level gauge - Type: Site Sentinel model SIIC (controller) / Smart Module Model SSEM (probe sensor controller)/ 924B (probe)

OPW Fuel Management Systems, 6900 Santa Fe Drive, IL60525 Hodgkins, Illinois, United States

R085/2008-CZ1-2012.05
Magnetostrictive level gauge - Type: SiteSentinel Integra (controller) / 924B (probe); SiteSentinel Integra/Vsmart (probe sensor controller) / 7100V (probe)

OPW Fuel Management Systems, 6900 Santa Fe Drive, IL60525 Hodgkins, Illinois, United States

R085/2008-CZ1-2012.06
Magnetostrictive level gauge - Type: SiteSentinel Integra (controller) / Vsmart (probe) / 924B (probe); SiteSentinel Integra/Vsmart (probe sensor controller) / 7100V (probe)

OPW Fuel Management Systems, 6900 Santa Fe Drive, IL60525 Hodgkins, Illinois, United States

R085/2008-CZ1-2012.07
Magnetostrictive level gauge - Type: Site Sentinel model SIII (controller) / Smart Module Model SSEM (probe sensor controller) / 924B (probe)

OPW Fuel Management Systems, 6900 Santa Fe Drive, IL60525 Hodgkins, Illinois, United States

R085/2008-CZ1-2012.08
Automatic level gauge - Type: Unimep tank probe MTL - 11 with Zenner barrier

MLB Petrol Cihazlari Marine Turizm Sanayi ve Ticaret A.S., 3, Organize Sanayi Bolgesi T, Ziyaeddin Caddessi No. 22, Konya, Turkey

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Fuel dispensers for motor vehicles
Distributeurs de carburant pour véhicules à moteur

R 117 (1995) + R 118 (1995)

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R117/1995-NL1-2009.01 Rev. 2
Fuel dispenser for motor vehicles - Type: Quantium XXXX

Tokheim Group S.A.S., Paris-Nord 2, 5 rue des Chardonnerets, BP 67040 Tremblay en France, FR-95971 Roissy Ch de Gaulle Cedex, France

R117/1995-NL1-2009.02 Rev. 2
Fuel dispenser for motor vehicles

Tokheim Group S.A.S., Paris-Nord 2, 5 rue des Chardonnerets, BP 67040 Tremblay en France, FR-95971 Roissy Ch de Gaulle Cedex, France

R117/1995-NL1-2012.01
Fuel dispenser for motor vehicles - Type: Global Century

Dresser Wayne Fuel Equipment (Shanghai) Co. Ltd., 51 Daxiu Road, Pudong, Shanghai, P.R. China

OIML CERTIFICATE SYSTEM

List of OIML Issuing Authorities

The list of OIML Issuing Authorities is published in each issue of the OIML Bulletin. For more details, please refer to our web site: www.oiml.org/certificates. Changes since the last issue of the Bulletin are marked in red.

		R 16	R 21	R 31	R 35	R 49	R 50	R 51	R 58	R 60	R 61	R 75	R 76	R 81	R 85	R 88	R 93	R 97	R 98	R 99	R 102	R 104	R 105	R 106	R 107	R 110	R 112	R 113	R 114	R 115	R 117/118	R 122	R 126	R 128	R 129	R 133	R 134	R 136
AT1	Bundesamt für Eich- und Vermessungswesen (BEV)						■	■	■		■		■		■	■		■	■		■	■		■	■	■			■	■	■							
AU1	National Measurement Institute (NMI)					■	■	■		■			■		■									■	■						■		■		■			
BE1	SPF Economie, PME, Classes Moyennes et Energie												■					■	■																			
BG1	State Agency for Metrology and Technical Surveillance (SAMTS)												■						■																			
BR1	Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (INMETRO)												■																									
CH1	Office Fédéral de Métrologie (METAS)	■		■		■	■	■		■	■		■					■	■				■	■	■						■						■	
CN1	General Administration of Quality Supervision, Inspection and Quarantine of P. R. China (AQSIQ)			■			■	■		■	■		■					■	■						■						■						■	
CZ1	Czech Metrology Institute (CMI)					■							■	■	■								■								■						■	
DE1	Physikalisch-Technische Bundesanstalt (PTB)	■		■	■	■	■	■	■	■	■		■		■	■		■	■	■	■	■	■	■	■	■			■	■	■		■	■	■	■		■
DK1	The Danish Accreditation and Metrology Fund (DANAK)						■	■		■	■		■						■				■	■	■						■				■		■	
DK2	FORCE Certification A/S					■																																
DK3	Dansk Elektronik, Lys & Akustik (DELTA)						■	■		■	■		■											■	■										■		■	
ES1	Centro Español de Metrología (CEM)					■		■		■	■		■					■	■														■					
FI1	Inspecta Oy						■	■		■	■		■		■									■	■						■							
FR1	Ministère de l'Economie, de l'Industrie et de l'Emploi (MEIE)	*All activities and responsibilities were transferred to FR2 in 2003*																																				
FR2	Laboratoire National de Métrologie et d'Essais (LNE)		■	■		■	■	■	■	■	■		■	■	■	■		■	■	■	■		■	■	■	■			■	■	■		■		■		■	
GB1	National Measurement Office (NMO) - Formerly NWML		■			■	■	■		■	■	■	■		■				■				■	■	■						■				■		■	
GB2	National Physical Laboratory (NPL)																	■																				
HU1	Hungarian Trade Licensing Office (MKEH)												■																									
JP1	National Metrology Institute of Japan / National Institute of Advanced Industrial Science and Technology (NMIJ / AIST)									■			■																	■	■							
KR1	Metrology and Measurement Division (KATS)												■																									
NL1	NMi Certin B.V.		■	■		■	■	■		■	■		■	■	■			■		■			■	■	■						■		■	■	■		■	
NL2	KIWA Nederland B.V.					■																																
NO1	Norwegian Metrology Service (Justervesenet)						■	■			■		■										■	■	■						■				■			
NZ1	Measurement and Product Safety Service (MAPSS Wellington)												■																									
PL1	Central Office of Measures (GUM)												■						■		■																	
RO1	Bureau Roumain de Métrologie Légale (B.R.M.L.)																	■	■							■			■	■								
RU1	Russian Research Institute for Metrological Service (VNIIMS)			■		■	■	■	■	■	■		■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
SE1	Swedish National Testing and Research Institute AB (S.P.)						■	■		■	■		■		■				■					■	■						■							
SI1	Metrology Institute of the Republic of Slovenia (MIRS)												■																									
SK1	Slovak Legal Metrology					■							■																		■							
US1	NCWM, Inc.									■			■																									
VN1	Directorate for Standards and Quality (STAMEQ)												■																									

The OIML is pleased to welcome the following new

CIML Member

- **Australia**
  Dr. Valérie Villière

Corresponding Member

- **Guinea**

OIML Meetings

23-27 September 2013

TC 6 (Prepackaged products)
METAS, Bern, Switzerland

6-11 October 2013

48th CIML Meeting
Hochiminh City, Vietnam

Committee Drafts

Received by the BIML, 2012.10 – 2012.11

None received

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RLMOs
Liaison Institutions
Manufacturers' Associations
Consumers' & Users' Groups, etc.

- Technical articles on legal metrology related subjects
- Features on metrology in your country
- Accounts of Seminars, Meetings, Conferences
- Announcements of forthcoming events, etc.

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- the paper originals of any relevant photos, illustrations, diagrams, etc.;
- a photograph of the author(s) suitable for publication together with full contact details: name, position, institution, address, telephone, fax and e-mail.

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