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Editorial by Eberhard Seiler

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Editorial

EBERHARD SEILER

OIML FACILITATOR ON DEVELOPING COUNTRY MATTERS

Organization and operation of metrology systems

This issue of the Bulletin contains the first in a series of articles on newly established or restructured legal metrology institutions and their services. They present numerous ideas on how to organize and operate metrology systems while making use of existing resources in the country and sharing the work with others.

At the same time, the articles propose solutions on how best to ensure correct measurements in areas of public interest (which is, of course, the objective of legal metrology) and to build up technical competence and maintain impartiality.

The example from the European country shows the dramatic shift of work from verification to metrological supervision and market surveillance. This is the consequence of holding manufacturers of measuring instruments and users responsible for complying with legal requirements. This approach of ensuring the marketing of legal measuring instruments and correct measurements needs an effective and efficient system of supervision activities. Different aspects of this activity are described by various technical terms such as market surveillance, inspection, conformity assessment, investigation and others. The fact that the borderline between some of these activities is fuzzy gives rise to different opinions and interpretations among legal metrology services and other authorities responsible for market surveillance.

Further clarification and harmonization of the terminology will therefore be necessary based on practical experience. And as one of the articles shows, experience with supervision activities is growing.

I am convinced that the content of the articles is of great interest to other legal metrology services. I can even imagine that some of the ideas and solutions are so attractive that others will adopt them. And indeed, this anticipation was one reason for me to encourage the authors to undertake the additional work of putting all the relevant information together and preparing the articles.

I would therefore like to thank the authors for their efforts and at the same time recommend a careful reading to check whether these contributions contain ideas and solutions worth taking into account for readers' own work. At the same time I would encourage all of you to report back on topics which might be of interest to the legal metrology community and which can contribute to equity in the market place and to establish and maintain confidence in measurements in fields of public interest. ■

WEIGHBRIDGES

An "a posteriori" control of weighbridges in self-certification schemes: a "Round Robin" approach

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Abstract

The cost of legal metrological surveillance of weighbridges is constantly increasing because of the need for large standard weights and other facilities such as trucks, and also the need for qualified personnel – all of which are not always available to Local Metrology Authorities.

In order to deter fraudulent actions by users, manufacturers and certified laboratories, Legal Metrology Authorities must plan alternative surveillance schemes that are at the same time both metrologically effective and cost effective.

In this paper the authors describe a surveillance procedure for weighbridge self-certification tested at the Local Metrology Authority of Naples (*Ufficio Metrico della Camera di Commercio, Industria, Artigianato e Agricoltura, Napoli*). In this scheme large standard weights and other facilities of the manufacturer are used under the control of the legal metrology officer.

With the Round Robin (RR) approach described below several weighbridges (up to 4–5 in a day over a small geographical area) can be verified in just a few hours and at a relatively low cost.

Introduction

In most European countries the tendency to allocate self-certification (or self-verification) activities to manufacturers of Non Automatic Weighing Instruments (NAWI) is increasing rapidly. In fact the New Approach on NAWI in the EC Directive 90/384 [1] allows manufacturers (with an adequate quality management system, also approved by a European Union Notified Body) to "self-certify" their own products as conforming to the essential requirements set out by the Directive itself.

As a consequence, Legal Metrology Authorities tend to also allocate self certification activities to manufacturers for subsequent verifications. Thus, those manufacturers whose own production and testing quality management system is favorably evaluated by a Notified Body can also be expected to correctly perform subsequent verifications (at the expiration of the validity verification period or after a major repair).

To accomplish this, manufacturers need to demonstrate that they are fully independent of businesses using this type of instrument (i.e. maintenance) and from their own production unit, and also that they maintain proper testing management systems in accordance with the main international standards so that they can verify and certify their own weighing instruments according to a subsequent verification scheme.

Typically a quality management system in testing and calibration can be considered as fit for self certification purposes when it meets the requirements of ISO 17025 [2]; the ISO 9001 scheme application, in fact, is not strictly sufficient to accomplish this aim.

In this scenario, the Legal Metrology Authorities need to adopt more efficient surveillance policies along with the constraint of keeping the costs of surveillance as low as possible. In fact the surveillance costs, especially on weighbridges, often rise because manufacturers allow their standards and facilities to be used by Legal Metrology Authorities. These costs are normally charged to the users and, practically, to the final customer, thus making the consumer protection action less effective.

In the Round Robin approach tested by the Local Metrology Authority of Naples and described in this paper, traceability is granted through:

- conformance to OIML R 111-1 [3];
- n.2 "first line" class M_1 large standard weights (i.e. 1 000 kg), calibrated with a frequency of 24 months according to procedural schemes recognized by the National Calibration Body (*Sistema Nazionale di Taratura – SNT*), or EA equivalent;
- metrological confirmation of working standard weights (up to 30 000 kg) by direct comparison with first line mass standards using a mechanical comparator, at intervals of 12 months (rather than the interval of 60 months laid down by law [4]).

The Weights and Measures Officer verifying the weighbridge on initial verification performs a fully legal verification of the instrument. A weighbridge verified in this way can then be assumed to be a reference instrument on which a mobile steady load (typically the truck loaded with the standard weight used for the verification) is weighed. Subsequently the previously weighed truck can itself be used as a transfer standard both for metrological confirmation (or for a "light" verification scheme) of neighboring weighbridges subject to the surveillance scheme and also for the surveillance conformity assessment of private laboratories certified for subsequent verification [4] or self-certified manufacturers.

The Round Robin (RR) approach

In order to enforce the surveillance on certified laboratories, a Round Robin approach has been conceived and tested by the Local Metrology Authority (LMA) of Naples [4] [5].

A NAWI that has been fully controlled for initial verification in the CE conformity acceptance scheme can be considered as a *"reference instrument"*. Then a transfer stable heavy mass (such as the truck itself loaded with 12–15 tons of standard weights) can be weighed on the reference instrument, thus obtaining a reference weight value which, considering the corrections due to the fuel consumption and also considering the uncertainty of the reference instrument, is compared with the indication of the other instruments verified by the certified laboratory under the surveillance assessment by the LMA.

The complete initial verification process of the reference weighing instrument can be detailed as follows:

- calibration by means of standard weights up to about 12.5 % maximum load capacity [6];
- further calibration using a substitution load up to 25 % maximum load capacity [10];
- evaluation of the *Best Straight Line Through Zero* (BSL-Z) [8] with the Least Squares Method.

	Ref. NAWI	NAWI #1	NAWI #2
Site	Casoria	Caivano	Caivano
Accuracy class	III	III	III
Minimum capacity (kg)	200	200	200
Maximum capacity (kg)	60 000	60 000	60 000
Verification scale interval, *e* (kg)	20	20	20
Actual scale interval, *d* (kg)	20	20	20
Number of divisions, *n*	3 000	3 000	3 000
Points of support	6	6	6
Range	single	single	single
Distance from the reference NAWI /km	-	12 km	17 km

Table 1 Technical data of the NAWIs under test

L_i (kg)	mpe (kg)	I (kg)	ΔL_i (kg)	P_i (kg)	E_i (kg)
I_{sub}					
$L_{sub} = I_{sub} + \frac{1}{2} \cdot e - E_5$					
$L_{sub}+L_5$ (kg)	*mpe* (kg)	I_i (kg)	ΔL_i (kg)	P_i (kg)	E_i (kg)

Table 2 Data Sheet Form for the reference NAWI

In this paper and in the annexed worked out example the authors present the results of the RR approach experimented in Casoria by the LMA of Naples with the initial verification of a NAWI using standard weights up to 2.5 %, 5 %, 7.5 %, 10 %, and 12.5 % of the maximum load capacity of the instrument.

Then, considering the previous NAWI as the reference, two further control inspections on self-certified instruments were performed in Caivano, at a distance of about 15 km, by using a transfer load previously weighed on the reference NAWI.

The main metrological data of the instruments [8] are shown in Table 1.

The total distance covered in order to return to the reference NAWI's site was 31 km.

After the application of the standard weights up to 12.5 % maximum load capacity, in steps of about 2.5 % of Max, for each point load, additional weights of 1/10 *e* were added in sequence until the indication of the instrument unambiguously increased by one scale interval ($I + e$). Furthermore, a substitution load usually represented by the truck itself, or part of it, or by any other steady load, was used to test the NAWI up to about 25 % of Max. This substitution load has to be approximately equal to the last load verified (i.e. 8 000 kg). In the measurements performed by the LMA of Naples this load was I_{sub} = 7 640 kg; so during operation one can achieve the weight value L_{sub} [8] given by:

$$L_{sub} = I_{sub} + \frac{1}{2} \cdot e - E_5 \qquad (1)$$

where E_5 is the previously estimated error of the NAWI at the 12.5 % Max load.

Table 2 shows the data sheet form used by the LMA of Naples for the initial verification performed on the reference NAWI.

Where [8]:

$$P_i = I_i + \frac{1}{2} \cdot e - \Delta L_i \qquad (2)$$
$$E_i = P_i - L_i$$

Then, one can assume a linear behavior of the instrument, even for a partial range of its capacity, say up to 30 ÷ 50 %. A simple model [9] can be used by which a linear relationship *"through zero"* [6] is assumed:

$$P = a \cdot L \qquad (3)$$

where P is the reference NAWI readout without the rounding error and L is the amount of the standard weights (i.e. the nominal value) on the deck of the reference NAWI.

The *a-factor* (span factor) can be estimated by means of the least squares method:

$$\bar{a} = \frac{\sum_i P_i \cdot L_i}{\sum_i L_i^2} \qquad (4)$$

In order to evaluate the real a-factor in the initial verification scheme the experimental data can be identified according to the data sheet form in Table 3.

Indicating as P_{TEST} the reading of the instrument when the mobile test load, L_{TEST}, is applied, the linear model gives its best estimation of L_{TEST} as follows:

$$P_{TEST} = \bar{a} \cdot L_{TEST} \qquad (5)$$

And thus the reference transfer load L_{TEST} to be used for the metrological confirmation of the weighbridges in the neighborhood, can be estimated as:

$$L_{TEST} = \frac{P_{TEST}}{\bar{a}} \qquad (6)$$

This situation is clearly shown in Figure 1, in which both the effective results and the linear fitting obtained by the least squares method application are plotted (see also Table 4).

Mobile test load uncertainty

The mobile test load standard uncertainty can be evaluated applying the rules of uncertainty estimation [11] to the linear model described above. Thus, the standard uncertainty of the mobile test load, $u(L)$, will be estimated as follows:

L_i (kg)	L_i^2 (kg^2)	P_i (kg)	$P_i \cdot L_i$ (kg^2)
$\sum_i L_i^2$		$\sum_i P_i \cdot L_i$	
$\bar{a} = \sum_i P_i \cdot L_i \Big/ \sum_i L_i^2$			

Table 3 Least squares method applied to the reference NAWI

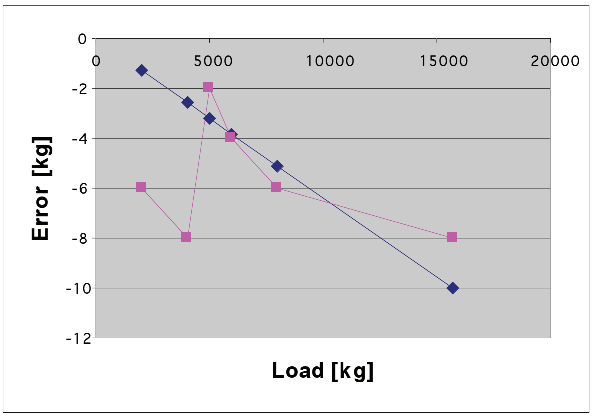

Figure 1 Experimental error and linear fitting on the reference NAWI

$$u^2(L_{TEST}) = \left(\frac{\partial L_{TEST}}{\partial P}\right)^2 \cdot u^2(P_{TEST}) + \left(\frac{\partial L_{TEST}}{\partial a}\right)^2 \cdot u^2(\bar{a}) = \frac{1}{\bar{a}^2} \cdot u^2(P_{TEST}) + \frac{P_{TEST}^2}{\bar{a}^4} \cdot u^2(\bar{a}) \qquad (7)$$

Since $\bar{a}$ is usually a value very close to the unity, P_{TEST} consequently tends to be equal to L_{TEST} and the equation above can therefore be written as:

$$u^2(L_{TEST}) \cong u^2(P_{TEST}) + L_{TEST}{}^2 \cdot u^2(\bar{a}) \qquad (8)$$

Thus, the standard uncertainty $u^2(P_{TEST})$ depends essentially on the formulas below, in which each contribution is calculated in relation to the experimental campaign performed by the LMA of Naples:

1 The standard uncertainty due to the fitting of the experimental data to the least squares straight line through zero, u_{PL}, can be evaluated as a type "A" uncertainty [11]:

$$u_{PL} = \sqrt{\frac{\sum_i \left(P_i - P_{lsm,i}\right)^2}{N-1}} \qquad (9)$$

where $P_{lsm,i}$ is the estimated weight value obtained from the least squares model, u_{PL}

2 The standard uncertainty due to the standard weights, u_W; it can be noticed [3] that the maximum permissible error, *mpe*, is approximately equal to $10^{-4} \cdot L_{nom}$ (i.e. for class M_{1-2} weights of 1 000 kg, suitable for legal verifications of class III weighing instruments with a number of divisions not exceeding 4 000) where L_{nom} represents the arithmetic sum of the weights used at the maximum load. Assuming a rectangular type statistical distribution for the probability over the whole load interval, $u_{W,}$ can be estimated as follows:

$$u_W = \frac{10^{-4}}{\sqrt{3}} \cdot L_{i,\max} \qquad (10)$$

3 The standard uncertainty due to the substitution loading process, u_{sub}; assuming a maximum indication scatter equal to 1/3 of the verification interval, *e*, of the weighing instrument under verification, the standard uncertainty due to the application of a single substitution load can be estimated as follows (if a type rectangular statistical distribution is also assumed for the probability):

$$u_{sub} = \frac{1/3 \cdot e}{\sqrt{3}} \qquad (11)$$

The standard uncertainty of the span factor, $u(\bar{a})$, can be estimated from equation (4), neglecting the uncertainty contributions of the effective mass of the standard weight; hence, this uncertainty contribution can be written as:

$$u(\bar{a}) = \frac{u(P_{TEST})}{\sqrt{\sum_i L_i^2}} \qquad (12)$$

The standard uncertainty $u(L_{TEST})$ can be evaluated as:

$$u(L_{TEST}) = u(P_{TEST}) \cdot \sqrt{1 + \frac{L^2}{\sum_i L_i^2}} = \left(\sqrt{u_{PL}^2 + u_W^2 + u_{sub}^2}\right)\sqrt{1 + \frac{L^2}{\sum_i L_i^2}} \qquad (13)$$

A further contribution to the overall estimation of the uncertainty of the mobile test load is represented by the instrument repeatability. For a normally operating instrument [9], one can assume that this contribution is approximately equal to:

$$u_{rep} = \frac{e}{2 \cdot \sqrt{3}} \qquad (14)$$

Thus, considering a coverage factor of k=2 corresponding to a statistical confidence level of about 95 %, the expanded uncertainty of the load, $U(L)$, with which the mobile test load is known, is:

$$U(L) = 2 \cdot \sqrt{u^2(L_{TEST}) + u_{rep}^2} \qquad (15)$$

The Round Robin (RR) test

Once the weight of the mobile load (i.e. the truck) has been measured by using the reference weighbridge, suitably verified with a full initial verification scheme, the truck itself has to be weighed on the neighboring weighbridges to be tested.

In order to take into account the accumulation of dirt and debris, as well as the fuel consumption, the distance covered to reach each point of measure from the reference weighing instrument is recorded according to the data sheet form in Table 5.

Instrument	Site	L_i (kg)		Distance
ref. NAWI	Casoria	$L_{TEST,1}$		---
NAWI #1	Caivano	L_1		$D_{0,1}$
NAWI #2	Caivano	L_2		$D_{0,2}$
ref. NAWI	Casoria	$L_{TEST,2}$		$D_{0,0}$

Table 5 Experimental data sheet form of the NAWIs under test

The difference between the two readings on the reference NAWI, provided that they can be regarded as representative of the mean weighing results, can be assumed for the correction due to the accumulation of dirt and debris and fuel consumption, ΔL_i, which is considered as being proportional to the distance:

$$L_{TEST,i} = L_{TEST,i-1} + \Delta L_i$$
$$\Delta L_i = \frac{L_{TEST,2} - L_{TEST,1}}{D_{0,0}} \cdot D_{i,y} \qquad (16)$$

where $D_{i,y}$ and $D_{0,0}$ are respectively the distance from the reference weighbridge of the *i*-th instrument and the total distance covered to be back to the reference NAWI at the end of operations. This is due to the fact that when using this method, the relationship between the repeatability and the reference NAWI drift was not taken into consideration (even though we do realize that it should have been taken into consideration). Furthermore, in order to definitively cancel the error contribution of the fuel consumption, one can completely fill the tank of the truck before weighing the truck itself on each NAWI.

Conclusions

In a legal metrology verification scheme, the acceptance criterion for the error of the *i*-th instrument is as follows:

$$E_{NAWI,i} = \left| L_i - (L_{TEST})_i \right| \le mpe + U(L) \quad (17)$$

where:

- $E_{NAWI,i}$ is the error of the *i*-th NAWI;
- L_i is the weight of the transfer reference load when measured on the *i*-th NAWI;
- L_{TESTi} is the mobile reference weight value corrected for the accumulation of debris and fuel consumption, if needed;
- *mpe* is the maximum permissible error at the test load L_{TEST};
- $U(L)$ is the expanded uncertainty of the test load.

At the reference site, the truck was weighed twice (at the beginning and at the end of the RR test), with the scheme as in Table 6.

At a load level of about 25 000 kg for both the NAWIs under RR test the *mpe* for a subsequent verification is $2 \cdot e = 40$ kg.

Thus both the NAWIs can be accepted as passing the test (see worked out example at the end of this paper).

Hence, a RR approach can be used to enforce the normal legal surveillance tasks for subsequent verifications of NAWIs. Obviously, the RR approach does not represent a scheme that is able to guarantee a full verification itself, but it can be a real opportunity for the LMA to carry out an assessment in the field of certified laboratories performing subsequent verifications on legal instruments.

The RR approach, in fact, provides for a mathematical model which extrapolates each weight value corresponding to about the 50 % of Max from the Best Straight Line Through Zero (BSL-Z) least squares fitted by means of a few experimental points achieved in a range from zero up to 25 % of Max.

In the event of negative outstanding results, it should be useful to carry out a full verification procedure scheme according to the relevant standard [10].

	start RR	end RR
$I_{TEST,i}$		
$\Delta L_{TEST,i}$		
$P_{TEST,i}$		
$L_{TEST,i} = P_{TEST,i} / \bar{a}$		

	P_i (kg)	$L_{TEST,i}$ (kg)	$D_{i,y}$ (km)	ΔL_i (kg)	$E_{NAWI,i}$ (kg)
Ref_1					
#1					
#2					
Ref_2					

Table 6 Data sheet form of the result of the RR test

Worked out example

	Ref. NAWI	NAWI #1	NAWI #2
Site	Casoria	Caivano	Caivano
Accuracy class	III	III	III
Minimum capacity (kg)	200	200	200
Maximum capacity (kg)	60 000	60 000	60 000
Verification scale interval, *e* (kg)	20	20	20
Actual scale interval, *d* (kg)	20	20	20
Number of divisions, *n*	3 000	3 000	3 000
Points of support	6	6	6
Range	single	single	single
Distance from the reference NAWI (km)	-	12 km	17 km

Table 1 Technical data of the NAWIs under test

L_i (kg)	*mpe* (kg)	I_i (kg)	ΔL_i (kg)	P_i (kg)	E_i (kg)
2 000	20	2 000	16	1 994	–6
4 000	20	4 000	18	3 992	–8
5 000	20	5 000	12	4 998	–2
6 000	20	6 000	14	5 996	–4
8 000	20	8 000	16	7 994	–6
I_{sub} = 7 640 kg					
$L_{sub} = I_{sub} + \frac{1}{2} \cdot e - E_5 = 7660\,kg$					
$L_{sub}+L_5$ (kg)	*mpe* (kg)	I_i (kg)	ΔL_i (kg)	P_i (kg)	E_i (kg)
15 656	20	15 660	2	15 652	–8

Table 2 Relevant results of the reference NAWI

L_i (kg)	L_i^2 (kg²)	P_i (kg)	$P_i \cdot L_i$ (kg²)
2 000	4.00E+06	1 994	3.99E+06
4 000	1.60E+07	3 992	1.60E+07
5 000	2.50E+07	4 998	2.50E+07
6 000	3.60E+07	5 996	3.60E+07
8 000	6.40E+07	7 994	6.40E+07
15 660	2.45E+08	15 652	2.45E+08
$\sum_i L_i^2 = 3{,}9024 \times 10^8$		$\sum_i P_i \cdot L_i = 3{,}8998 \times 10^8$	
$\bar{a} = \sum_i P_i \cdot L_i \Big/ \sum_i L_i^2 = 0{,}99936$			

Table 3 Least squares method applied to the reference NAWI

Mobile test load uncertainty

L_i (kg)	P_i (kg)	$P_{lsm,i} = a \cdot L_i$ (kg)	$(P_i - P_{lsm,i})^2/$ (kg^2)
2 000	1 994	1 998.7	22.09
4 000	3 992	3 997.3	28.30
5 000	4 998	4 996.7	1.82
6 000	5 996	5 995.6	0.16
8 000	7 994	7 994.6	0.36
15 660	15 652	15 649.5	6.25
		$\sum (P_i - P_{lsm,i})^2 =$	58.16

Table 4 Least Squares Method

$$u_{PL} = \sqrt{\frac{\sum_i (P_i - P_{lsm,i})^2}{N-1}} = 3.41\,kg$$

$$u_W = \frac{10^{-4}}{\sqrt{3}} \cdot L_{i,\max} = 0.90\,kg$$

$$u_{sub} = \frac{1/3 \cdot e}{\sqrt{3}} = 3.84\,kg$$

$$u(\bar{a}) = \frac{u(P_{TEST})}{\sqrt{\sum_i L_i^2}} = 0.03\%$$

$$u(L_{TEST}) = u(P_{TEST}) \cdot \sqrt{1 + \frac{L^2}{\sum_i L_i^2}} = 8.42\,kg$$

$$u_{rep} = \frac{e}{2 \cdot \sqrt{3}} = 5.77\,kg$$

$$U(L) = 2 \cdot \sqrt{u^2(L_{TEST}) + u_{rep}^2} = 20.42\,kg$$

Instrument	Site	L_i (kg)		Distance
ref. NAWI	Casoria	$L_{TEST,1}$	25 505	---
NAWI #1	Caivano	L_1	25 514	$D_{0,1}$ = 12 km
NAWI #2	Caivano	L_2	25 520	$D_{0,2}$ = 17 km
ref. NAWI	Casoria	$L_{TEST,2}$	25 500	$D_{0,0}$ = 31 km

Table 5 Experimental data of the NAWIs under test

	start RR	end RR
$I_{TEST,i}$	25 480	25 480
$\Delta L_{TEST,i}$	1	6
$P_{TEST,i}$	25 489	25 484
$L_{TEST,i} = P_{TEST,i} / \bar{a}$	25 505	25 500

	P_i (kg)	$L_{TEST,i}$ (kg)	$D_{i,y}$ (km)	ΔL_i (kg)	$E_{NAWI,i}$ (kg)
Ref$_1$	25 489	25 505	0	---	---
#1	25 514	---	12	–1.9	10.9
#2	25 520	---	17	–2.7	17.7
Ref$_2$	25 484	25 500	31 (tot)	---	---

Table 6 Results of the RR test

References

[1] European Directive 90/384/CEE, *Non Automatic Weighing Instruments*

[2] ISO 17025, *General requirements for the competence of testing and calibration laboratories*, 2005

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OIML CERTIFICATION

The modular concept for weighing instruments

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Introduction

Recent OIML Recommendations on weighing instruments, especially R 76-1:2006 and R 76-2:2007 *Non-automatic weighing instruments*, make use of the modular concept and even allow OIML Certificates of conformity to be issued for certain modules of these instruments. Also for certain automatic weighing instruments the modular concept offers advantages. This paper shows the background and explains the application of the modular concept for weighing instruments, and what has to be considered when an OIML Certificate of conformity is to be issued on the basis of modular tests.

1 History

The modular concept is not new, especially not for non-automatic weighing instruments (NAWIs). Already the first edition of OIML R 76, published in 1988 [1], embraced the modular approach. The corresponding paragraph in the second edition (1992) [2] took into account the fact that some kinds of electronic weighing instruments simply cannot be tested as a whole because of their dimensions, for example truck scales, hopper scales, etc.

Yet, testing bodies were expected to make sure that these instruments were sufficiently insensitive to influence factors, such as varying temperatures. Of course, these large instruments could neither be placed in a climatic chamber nor did it seem reasonable (with regard to the costs involved) to build test facilities that could contain such large instruments.

Thus, manufacturers and testing bodies recognized the necessity to find alternative ways to test huge or hard to handle instruments. The basic idea was to test metrologically relevant parts (modules) with reduced (partial) error limits defined by so-called "p_i factors". The quadratic sum of these partial error limits must be less than or equal to the maximum permissible error (mpe) for the complete instrument. This (or similar) concepts had already existed in some countries before 1988, e.g. when testing sliding poise devices separately.

In parallel, manufacturers of modules such as strain gauge load cells and indicators of electronic weighing instruments did not want to be obliged to sell complete weighing instruments but wanted their products to be merchandized independently from complete instruments. This was one more reason to foster the idea of separate testing of metrologically relevant parts or modules of a weighing instrument.

What was considered as a module that could be tested separately was laid down in the 1992 edition of R 76 for the first time. That edition distinguished three main modules: the load cell, the electronic indicator, and the connecting elements, where the fractions p_i for each module could be chosen in the range 0.3 ... 0.8. In Europe the modular concept required further enhancement soon after the publication of OIML R 76-1:1992 due to rapid technical developments and the increasing use of digital equipment, and because modular certificates were needed for European type approval certificates for NAWIs.

This enhanced modular concept was developed by WELMEC (European Cooperation in Legal Metrology) and was first published in 1997 [3]. In 2003 the OIML Certificate System for Measuring Instruments was extended to include modules and modular testing for all kinds of measuring instruments [4]. The latest edition of R 76-1, published in 2006 [5], takes into account both the technical evolution and the developments in modular testing and certification. Besides more detailed information concerning the definition of modules, the necessary tests for each module, and the conditions under which several modules can be combined to form a NAWI, the 2006 edition of R 76-1 provides an advanced modular concept, now allowing OIML Certificates of conformity to be issued and used for a number of modules such as indicators, data processing devices, weighing modules and digital displays provided that compatibility of modules can finally be established for the complete instrument.

With some delay the modular concept for NAWIs was - step by step - also introduced for automatic weighing instruments (AWIs), starting with the first edition of R 51 in 1996 [6].

2 Modular concept for non-automatic weighing instruments (NAWIs)

In the following we will refer to the 2006 edition of R 76-1 [5] if not otherwise indicated. This edition allows either a Certificate for a complete NAWI, or for certain modules of a NAWI to be issued. The preferred solution is to test a complete instrument comprising an indicator and a load receptor, and to issue a Certificate for a complete instrument. However, as mentioned above, for some instruments (e.g. high capacity weighbridges) this is practically impossible. Moreover, at the stage of OIML certification the manufacturer of, for example, an indicator often does not know about the load receptor which will be used later together with the indicator. Thus, the certification bodies (Issuing Authorities) had to create a concept that allows metrologically relevant parts to be tested separately, yet, with the final objective of certifying a complete weighing instrument which is supposed to fulfil all applicable requirements.

The upper part of Figure 1 shows the mechanical, electronic and digital components of a NAWI (numbered 1 to 7) and their functions. The NAWI can be supplemented by peripheral devices. The lower part of Fig. 1 contains the definition of typical modules of a NAWI. For the modules listed in the left column an OIML module Certificate can be issued. For analogue and digital load cells, of course, OIML R 60 [7] is applicable.

Basically, it is the choice of the manufacturer whether he applies for a module Certificate or for a Certificate for a complete instrument. The important difference is that with a Certificate for a complete instrument he will take over full responsibility for the NAWI, including the indicator, the load receptor, etc. With a module Certificate he will be responsible only for his own module, e.g. an indicator.

Thus, a manufacturer of components would normally apply for a module Certificate. In the case of indicators or analogue data processing devices, the tests would then be performed in accordance with 3.10.2 and Annex C, and a module Certificate would be issued providing - among other relevant information - the p_i factor that defines the applicable fraction of the maximum permissible error for the complete NAWI. Similarly, for digital data processing devices, terminals and digital displays, tests would be performed according to 3.10.2 and Annex D, whereas for weighing modules Annex E would apply. Load cells, under the modular concept, always require an OIML R 60 Certificate.

It is essential for the modular concept that finally the compatibility of all modules making up the complete NAWI is established. For that purpose Annex F was added to R 76-1; it explains - accompanied by some examples - how the relevant information that must be provided in the module Certificates (see 3.10.2.4) can be used to check and establish the compatibility. For modules with digital output, compatibility includes the correct communication and data transfer via the digital interface(s).

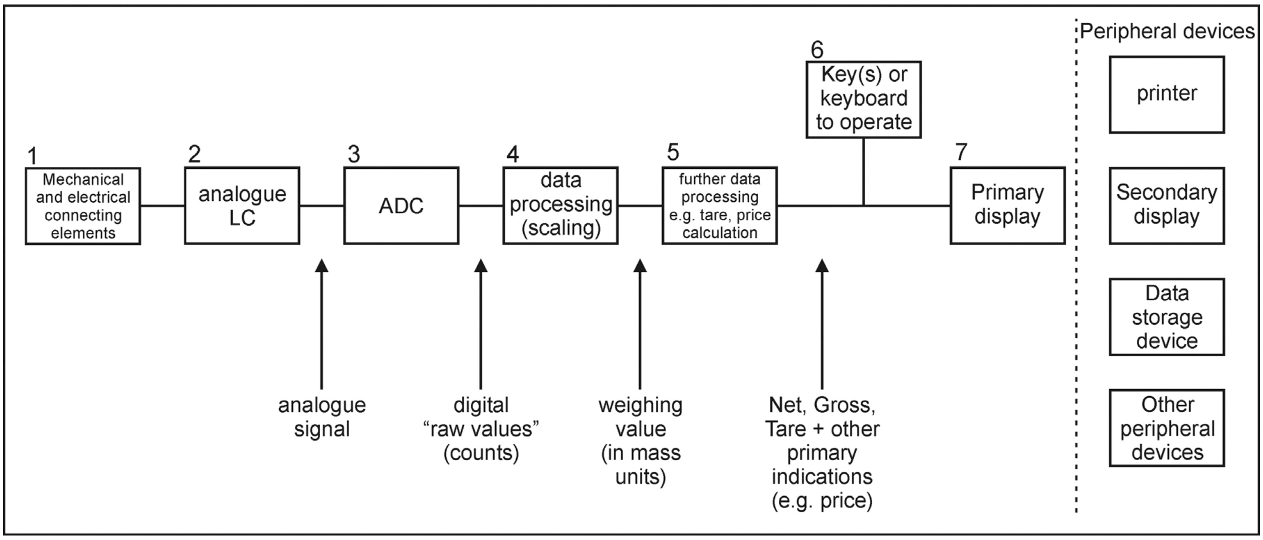
Normally there is an applicant (manufacturer) who finally wants to take over full responsibility and receive an OIML Certificate for a complete NAWI making use of existing module Certificates. In that case he will be responsible for checking and declaring the compatibility of modules according to 3.10.2.3 and Annex F. To avoid misunderstandings it is, however, mentioned that R 76 does not demand a Certificate for a complete NAWI to be issued at all times. If, for instance under the OIML MAA [8], a manufacturer applies for a national type approval certificate for a complete NAWI in a country which has signed the Declaration of Mutual Confidence (DoMC) for R 60 and R 76, and he is able to provide the necessary module Certificates according to Annex C, or D, or E and R 60, he will not be obliged to apply for an OIML Certificate for the complete instrument as a prerequisite to obtain the national type approval certificate. He is, of course, responsible for checking and declaring the compatibility of modules according to Annex F as explained above.

It should be mentioned that under the modular approach, i.e. if an OIML Certificate does not (yet) exist for the complete NAWI, the responsible authority may require a representative complete instrument to be submitted for testing of correct functioning and check of compatibility if this is considered necessary. This may include filling in the checklist form according to R 76-2 [9].

On the other hand - as was common practice in many OIML Member States in the past - R 76 still provides the option that an OIML Certificate of conformity may be issued for a complete NAWI on the basis of indicator tests plus "certain conditions" for load receptors. As this option has often led to discussions in the past we shall try to explain the situation referring to R 76-1, 3.10.2.1 ("Acceptable solution"):

> *"For mechanical structures such as weighbridges, load transmitting devices and mechanical or electrical connecting elements evidently designed and manufactured according to sound engineering practice, an overall fraction p_i = 0.5 may be applied* ***without any test****, e.g. when levers are made of the same material and when the chain of levers has two planes of symmetry (longitudinal and transversal), or when the stability characteristics of electrical connecting elements are appropriate for the signals transmitted, such as load cell output, impedance, etc."*

This means that if mechanical structures such as weighbridges, load transmitting devices and mechanical or electrical connecting elements are evidently designed and manufactured according to sound engineering practice, they need not be tested and can be treated as a module with a p_i factor of 0.5. In fact this component ("Mechanical and electrical connecting elements") is meant under no. 1 in Figure 1, upper part.



Part or component of the NAWI → Modules of a NAWI ↓	1	2	3	4	5	6	7
analogue load cell		●					
digital load cell		●	●	○			
Indicator			○	●	○	○	●
analogue data processing device			●	●	○	○	
digital data processing device				○	●	○	
Terminal					○	●	●
primary display							●
weighing module	●	●	●	●	○	○	

Fig. 1 Typical parts, components and modules of a NAWI as defined in R 76-1 (T.2.2).

Upper part: mechanical, electronic and digital components of a NAWI (numbered 1 to 7) and their functions.

Lower part: definition of typical modules (other combinations are possible):
● part or component always present
○ optionally present

Now, there remains the question of whether everybody has the same understanding and interpretation of what has been *"evidently designed and manufactured according to sound engineering practice"*. To be clear, the interpretation is and will remain the responsibility of the certification body (Issuing Authority). It should be mentioned, however, that in the European Union one has tried to arrive at a common understanding of "generally acceptable constructions of load transmissions and load receptors" as laid down in a WELMEC Guide [10]. These constructions are shown in the Annex to this paper (Tables 1 to 4). It is proposed that these Tables and Figures can (voluntarily) be used by OIML Issuing Authorities if they issue an OIML Certificate for a complete instrument on the basis of indicator tests. In this case the four Tables and Figures should be an inherent part of (or annex to) the OIML Certificate issued.

The advantage for a manufacturer is that he need not deliver specific drawings of load receptors and load transmission elements. At the verification stage the person in charge (verification officer or field inspector) could check whether the load receptor and the load transmissions conform to the examples given in the drawings and sketches listed in the OIML Certificate or national type approval certificate, respectively. In addition, of course, the manufacturer has to duly fill in the compatibility form according to Annex F as explained above.

Let us consider a truck scale as an example to illustrate the situation. Let the truck scale consist of two weighbridges and an electronic indicator, and let the weighbridges be equipped with compression strain gauge load cells for which an OIML R 60 Certificate exists. Let the indicator be tested separately, too, and have an OIML module Certificate. The manufacturer has applied for a "complete instrument Certificate" and has submitted - among other documentation - the drawings of the weighbridges, and of the load transmission elements for the load cells, and the compatibility check and declaration according to 3.10.2.3. Now, the certification body (the Issuing Authority) rechecks the compatibility of all data, also using the compatibility checklist in Annex F. If everything conforms to R 76, an OIML Certificate for the truck scale can be issued without any repeated testing.

Alternatively, the applicant may provide no drawings of the mechanical design at all. Even then an OIML Certificate could be issued for the complete truck scale if the certification body fixes the mechanical structures of the weighbridges and load transmitting devices according to Tables 1 to 4 in the Annex to this paper. In that case, it is important that the Tables and Figures are copied into or annexed to the OIML Certificate for the complete instrument.

3 Modular concept for automatic weighing instruments (AWIs)

To a large extent the reflections in chapter 2 apply to a number of AWIs as well.

The modular approach in OIML Recommendations for AWIs can be found in R 51 [11] (catchweighers), R 61 [12] (filling instruments) and R 107 [13] (totalizing hopper weighers). It is easily applicable to these instruments because they can be regarded as automated NAWIs as long as they do not weigh dynamically (e.g. catchweigher, checkweighers), that is, the load is ***not*** in relative movement to the load receptor when being weighed. This being the case, the modular approach can be used to the same extent as with NAWIs, using the same p_i factors as with NAWIs, see also [14].

Rail-weighbridges as per OIML R 106 [15] and road vehicles weighers as per R 134 [16] can, due to their dimensions and maximum loads, be tested according to the modular approach only, yet a test of a complete instrument (in-situ test) must supplement the laboratory tests in any case. The type of instruments on which the modular approach can be least applied is belt weighers as per OIML R 50 [17]. Consequently, apportioning of errors with regard to modules (sometimes called parts in older OIML Recommendations) is not mentioned in the present edition of R 50:1997 in contrast to the other OIML Recommendations for AWIs. However, the latest draft revision of R 50:2008 introduces the modular concept to the same extent as, for instance, in R 51. Yet, R 50 will still require testing of a "complete" instrument (i.e. simulation setup consisting of load receptor, indicator and displacement transducer). Furthermore, with these belt weighers, special attention should be paid to the zero drift of load cells since the requirements of R 50 on the stability of zero indication exceed the corresponding requirements of R 76.

Notwithstanding the reflections above, module Certificates for AWIs can, of course, not be issued so far. This possibility should be discussed in the responsible Technical Committee (TC 9/SC 2).

As mentioned above, some AWIs can hardly be tested as a whole nor in automatic mode in test laboratories because these instruments are far too large, for example, for any climatic chamber. Typical types of instruments of this category are totalizing hopper weighers (weighing bulk material), catchweighers, designed as hopper weighers (concrete ready mix plants), automatic gravimetric filling instruments (selective combination weighers, consisting of even more than a dozen separate weighing instruments) and, of course, rail weighbridges.

The results of laboratory tests are evaluated according to the special requirements of AWIs (e.g. weighing performance under different temperatures;

stability, drift and check of zero). This leads to theoretical accuracy classes which are based on the error regime as defined in R 51, R 61, R 106, R 107 and R 134.

Thus, in addition to the laboratory tests of modules - using similar procedures as for NAWIs - these instruments must always undergo a practical test of the complete instrument in-situ. The results of the in-situ tests must be added to the test report documenting the laboratory tests. Since the results of the in-situ tests very much depend on the special conditions of the individual site, they are not crucial for fixing the accuracy class as stated in the OIML Certificate. Filling machines tested on site using sticky and adhesive materials (e.g. flour) may produce worse results than machines weighing free-flowing materials, such as plastic granules. A rail weigh-bridge installed within a critical part of a track (poor grounding due to bad track bed, bad sleepers, uneven rails) may be far from attaining the accuracy class stated in the Certificate. But on another site it may (by chance) achieve an even better accuracy class than that obtained under laboratory conditions. Bearing in mind, however, that influence factors such as temperature always affect an instrument on site more than under laboratory conditions, the accuracy class determined during an in-situ test can never be better than that determined in the laboratory.

4 Summary

For many years the modular concept has been well established not only for NAWIs under R 76 but also for AWIs, especially under R 51, R 61, R 106 and R 107.

The possibility to issue OIML Certificates for complete weighing instruments on the basis of modular tests has well proved its worth. With the new edition of R 76-1:2006 the modular concept for NAWIs has been further clarified and improved, adapted to recent progress in technology - to include e.g. digital components and devices - and extended to allow OIML Certificates to be issued for a number of typical modules of NAWIs such as indicators, data processing devices, terminals and weighing modules.

For that purpose R 76-1:2006 has been supplemented by several specific Annexes. This is a new and certainly interesting option especially for component manufacturers. It is essential for the successful application of this “open” modular concept that the compatibility check be established properly according to the provisions and explanations in R 76-1:2006.

This new “open” modular concept can in principle also be applied to all AWIs that work as “automated NAWIs” in the static weighing mode, i.e. to instruments that operate with a stable equilibrium based measuring system. This is not possible so far, but should be discussed in the responsible Technical Committee (TC 9/SC 2). For all other AWIs, modular testing and certification makes sense and is necessary, too, but an OIML Certificate covering the complete instrument seems to be indispensable.

Acknowledgement

The authors would like to thank Mrs. Corinne Lagauterie (France) for valuable suggestions and information, especially concerning the history of the modular concept for weighing instruments (chapter 1).

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Annex: Constructions of weighbridges, load transmitting devices and load cells that are considered generally acceptable according to OIML R 76-1:2006, 3.10.2.1

Table 1: Types of NAWIs, load receptors and load cells considered generally acceptable

Type of NAWI	Load receptor Type		Load Cell Type	load transmission
scales with lever system				
	all load receptors with lever system according to No. 6.3 EN 45 501		compression tension beam	co- 1-7-8 te- 1-2 be- 1-4-5-6
scales without lever system				
weighbridge	1 or more platforms multiple platform with joint	*in floor* *over floor* *in floor* *over floor*	compression tension beam double ended beam	co- 2-3-4-5-6 te- 1-2 be- 2-3-7-8-9-10-11 de- 1-2-3
platform scale	1 or more platforms multiple platform with joint	*in floor* *over floor* *in floor* *over floor*	compression " tension beam double ended beam	co- 2-3-4-5-6 co- 7-8 te- 1-2 be- 1-2-3-4-5-6-7-8 9-10-11 de- 1-2-3
	platform maximum dimensions if necessary		single point	direct
hopper scale	hopper suspended hopper supported		compression " tension beam double ended beam	co- 2-3-4-5-6 co- 7-8 te- 1-2 be- 1-2-3-4-5-6-7-8 9-10-11 de- 1-2-3
	hopper, by unsymmetric loading maximum dimensions if necessary		single point	direct
crane scale	crab double crab hoist		compression tension beam double ended beam	co- 2-3-4-5-6 te- 1-2 be- 2-3-7-8-10-11 de- 1-2-3
	hook		compression tension beam	co- 7-8 te- 2 be- 4
overhead track scale	rail (for combinations with platforms see „platform scale")		tension beam	te- 1-2 be- 1-2-3-4-5-6-7-8 9-10-11
	rail maximum linear length if necessary		single point	direct

Abbreviations used:

co compression load cell
te tension load cell
be beam load cell, either double bending or shear beam, but not single bending beam
sp single point load cell
de double ended beam load cell

Table 2: Schematic drawings of generally acceptable compression and tension load cells

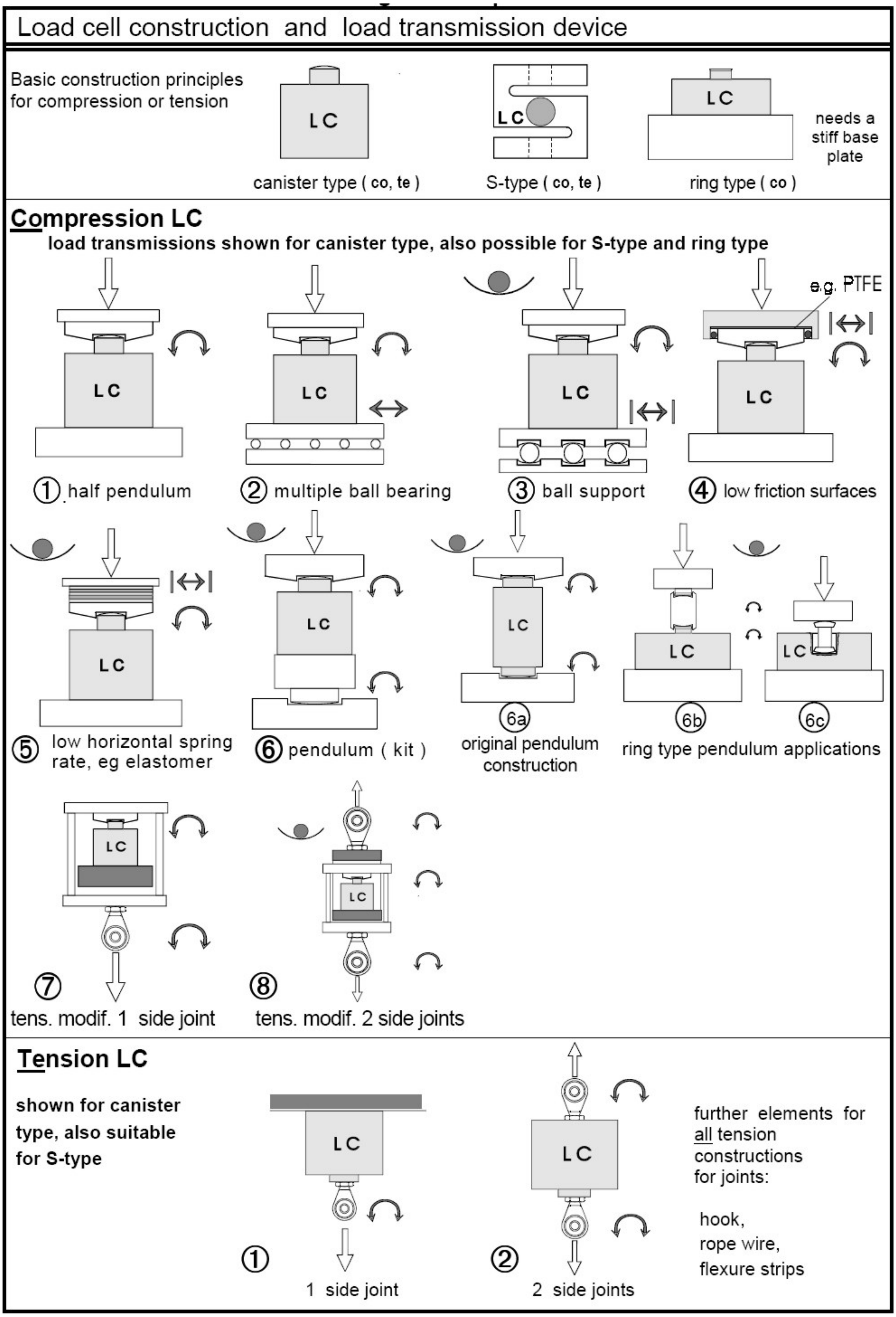


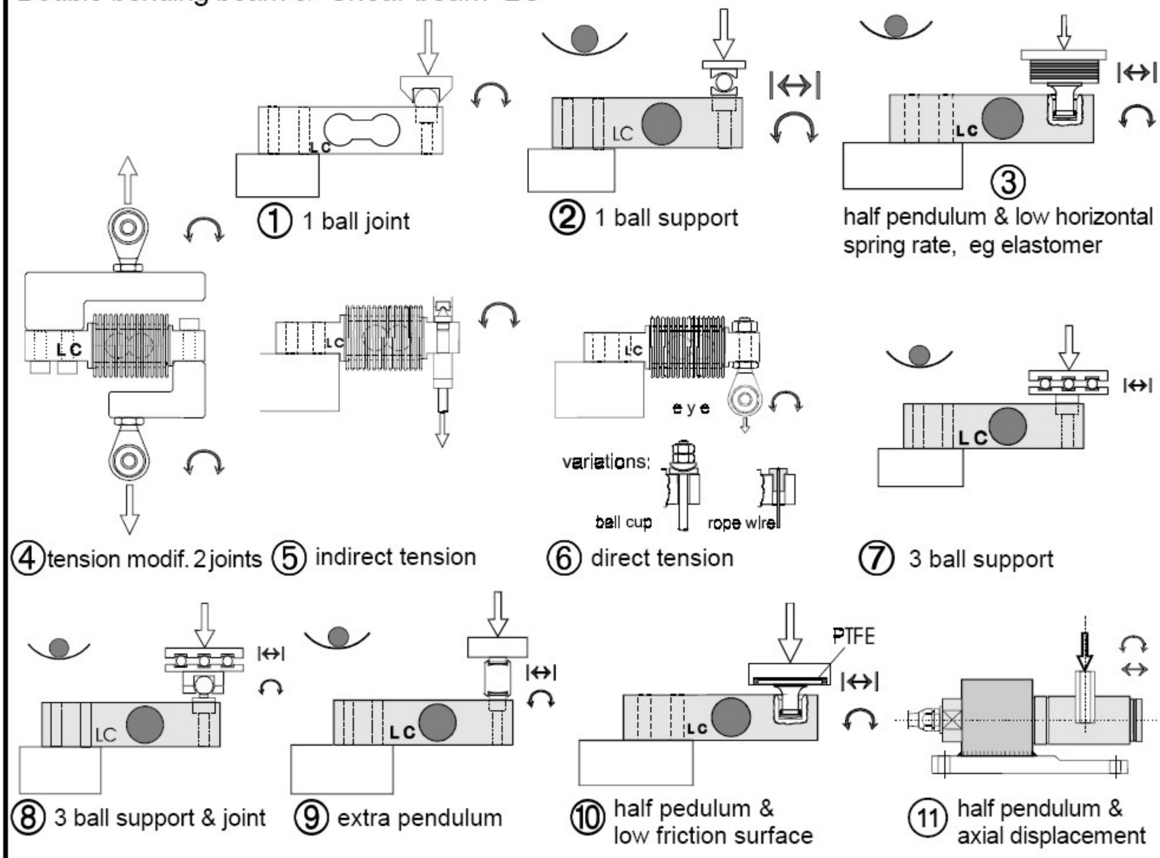
Table 3: Schematic drawings of generally acceptable beam load cells

Load cell construction and load transmission device

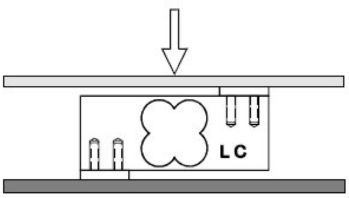
The load transmission device is independent of the encapsulation, potting or housing and the mounting at the fixed end shown below

Beam LC - Cantilever beam

Double bending beam & Shear beam LC



Single point LC

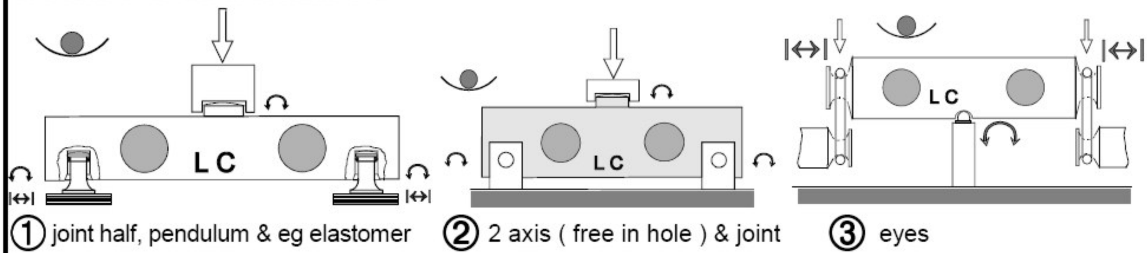


The single point LC has no degree of freedom for horizontal displacement or inclination, using more than one LC in a load receptor discoupling elements are necessary.

The load transmissions 1 to 10 for the beam LCs may be applied.

Max. platform dimensions may be mentioned in the TC or the TAC.

Double ended beam LC



Constructions with fixed clamping at the two ends need for minimum displacement and inclination some elasticity of the supporting construction.

Table 4: Schematic drawings of common, generally acceptable load receptors

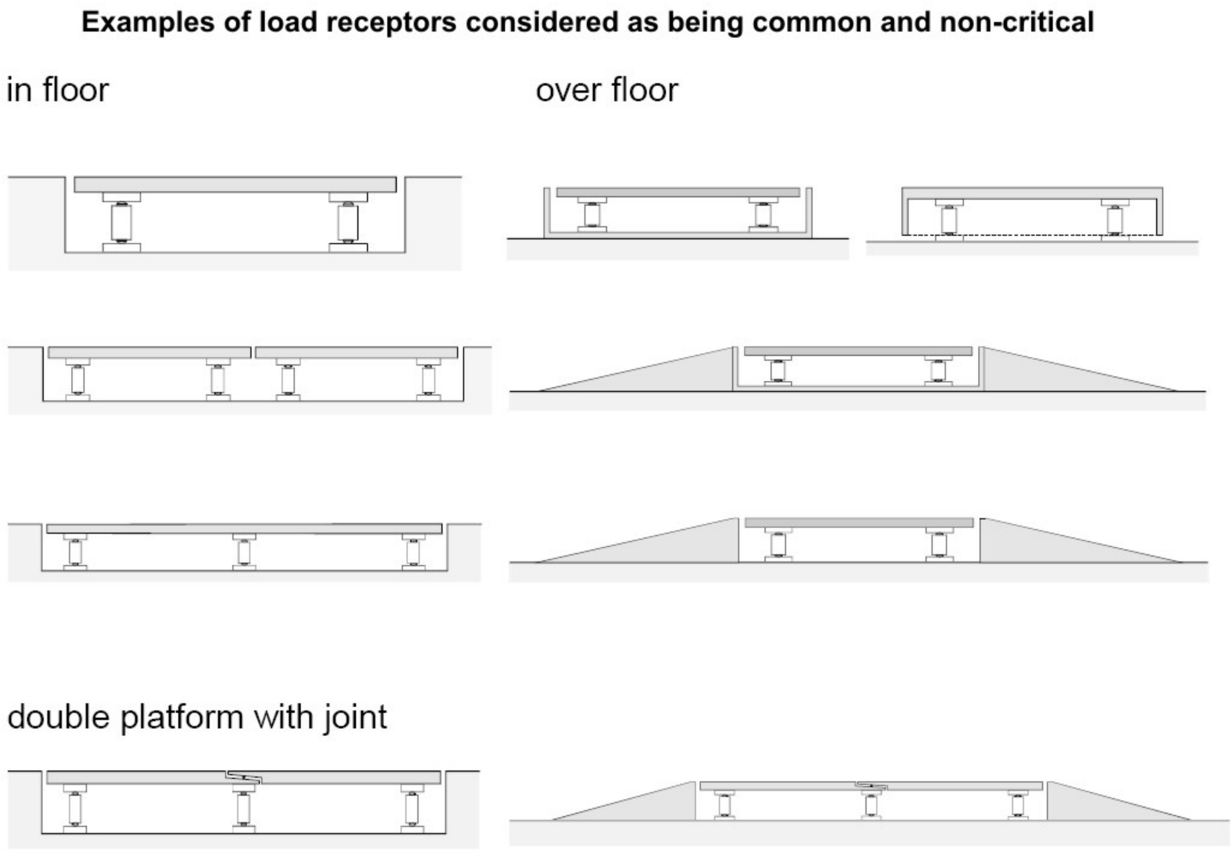
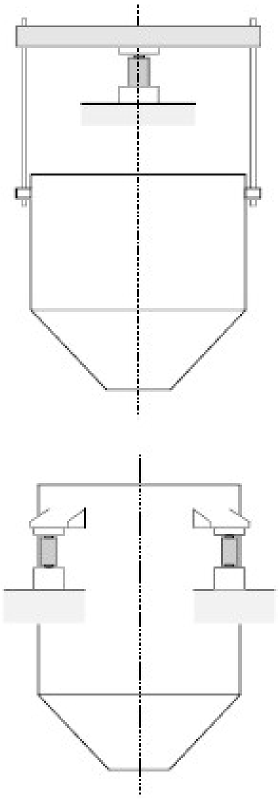
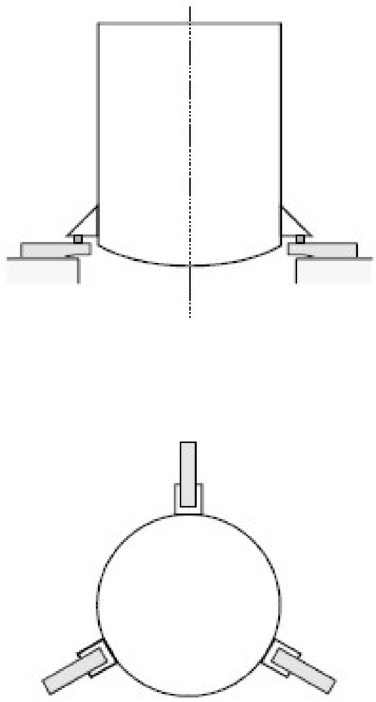


Table 4 (continued)

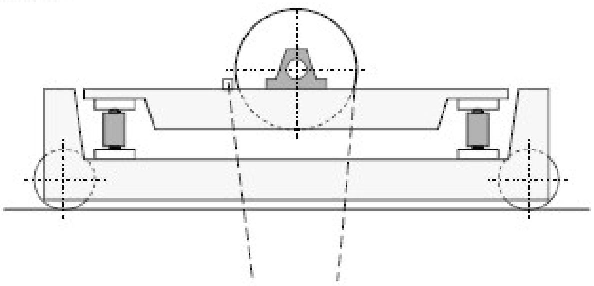
hopper suspended



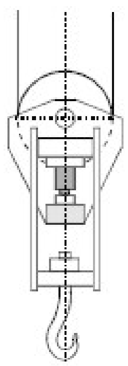
hopper supported



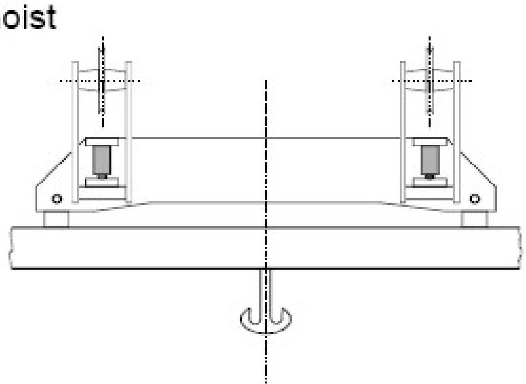
crab



hook



hoist



INFRASTRUCTURES

Slovenian experiences in establishing a modern system of legal metrology

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1 Introduction

This paper addresses one of the most important elements of legal metrology in Slovenia, namely the system and experiences in the area of verifications.

Before June 1991, when Slovenia gained its independence, the metrology system was established and directed from the former federal level. The scope of legal metrology was very broad, containing more than 300 regulations for practically all measuring instruments which were subject to mandatory type approval and verification. The system was highly over-regulated, which was common practice in the region in that period. The procedures for all type approvals, initial and subsequent verifications and in-service metrological inspection were centralized and performed by the Federal Institute for Measures and Precious Metals, which had its verification offices dispersed around the country.

Following the independence in 1991, the Standards and Metrology Institute (SMIS), also responsible for standardization and accreditation, was established in Slovenia as a central body responsible for the development and maintenance of the metrological system. SMIS was organized as part of the Ministry for Science and Technology. In 2001 SMIS was transformed into a single entity, the Metrology Institute of the Republic of Slovenia, MIRS, responsible for legal, scientific and industrial metrology only, while the previous standardization and accreditation responsibilities were taken over by two newly established organizations, Slovenian Accreditation, SA, and the Standards Institute of Slovenia, SIST.

2 Facing new challenges

As SIMS inherited the legal metrology system from a much larger country (Slovenia having a population of 2 millions, while the former Yugoslavia had a population of 22 millions), it was faced with several challenges. The inherited legislation on legal metrology was very broad, regulating practically all of the measuring instruments in use. Mandatory type approvals and verifications were now the responsibility of SMIS, being the only authorized body in this field. As the scope of legal metrology was too extensive, SMIS faced the problem that it did not have adequate resources (financial, equipment, personnel, knowledge) to enable it to carry out all the verification activities.

Being a small Central European country with the ambition to become a member of the European Union, Slovenia was also interested in implementing the harmonized European legal metrology legislation and it saw the opportunity to do so within the process of developing new national regulations.

With regard to these emerging challenges Slovenia developed a national strategy in the field of legal metrology with the objective of obtaining an effective and efficient national legal metrology system. The main strategic decision was to review the existing legislation in order to limit the scope of legal metrology solely to those areas were there were identified national needs for verification, adequate national capabilities and international requirements. All the existing metrological regulations were studied from different points of view such as risk assessment, the number of verifications performed, the system in other EU countries, etc. As a rule only those regulations that were based on EU Directives or OIML Recommendations were kept in force [1].

The development of the national legal metrology strategy was based on three concepts: the role of legal metrology in modern society, national requirements, and national capabilities.

Legal metrology is the responsibility of the public authorities and has a long historical tradition. From the traditional areas (taxation, consumer protection) legal metrology is widening its scope to also cover health care and the environment. Thus, legal metrology is an important horizontal activity, covering in principle environmental protection, health care, trade, agriculture, internal affairs, taxation activities, judicial affairs, etc.

The national requirements for the legal metrology system were identified as:

- adequate support to the national economy;
- requirements from the private sector (adequate assistance of relevant conformity assessment bodies, removing technical barriers to trade);

- public sector requirements (quality of life, consumer protection, judicial and administrative actions);
- appropriate infrastructure for regular and extra-ordinary verifications; and
- effective metrological supervision.

Based on the assessment of national capabilities it was concluded that the national metrology infrastructure is a very expensive system and that all available human and material resources should be employed in building up an adequate metrology system. Closer interrelations between scientific/industrial and legal metrology were almost inevitable - resulting in much smaller overall infrastructural costs and increased effectiveness of the system.

3 The national Law on Metrology

The national strategy later resulted in the first Slovenian Law on Metrology [2], which was adopted in 1995. One of the important documents which served as a reference for the new law was OIML Document D 1 [3], *Elements for a Law on Metrology*. The national Law on Metrology covers all the basic issues of national importance in metrology, among which vital topics such as the system of units (SI), measuring instruments under legal control, and metrological supervision.

The intended use of the measuring instrument was defined as the main criterion for deciding whether it falls under the scope of legal metrology. The scope of the Law on Metrology covers four areas of intended use:

- protection of human and animal health (e.g. blood pressure meters);
- protection of the environment, and general technical safety (e.g. automatic instruments for weighing road vehicles, instruments for measuring vehicle exhaust emissions, tire pressure gauges);
- transactions in goods and services (e.g. utility meters (water, gas, heat and electricity meters), non-automatic weighing instruments, fuel dispensers, taximeters, fixed storage tanks); and
- proceedings of the administrative and judicial authorities (e.g. breath analyzers, fixed storage tanks, radar equipment for the measurement of the speed of vehicles).

A list of the measuring instruments which were no longer required to be maintained under the scope of legal metrology was drawn up. This list included instruments such as photo-electrical instruments for measuring luminosity, measuring instruments for free-flowing substances, metrological requirements for road and rail tankers, and humidity meters for cereal grains and seed of oil plants. The regulations for these instruments were repealed because they did not fit into any of the areas of intended use mentioned above (they were mostly used in an industrial environment and subject to internal calibrations) or because their function could be taken over by other types of legally controlled instruments. Most of these instruments were rarely used, and for most of them there was no international standard or OIML Recommendation available.

Instruments which were not included in the above areas of intended use were no longer subject to legal regulations in terms of mandatory type approvals and verifications.

Therefore, a clear distinction had to be made between mandatory verifications and voluntary calibrations. SMIS was promoting regular calibration of measuring instruments to ensure traceability to measurement standards of higher order while only certain categories of measuring instruments should be treated as part of legal metrology with mandatory type approval and verification.

Since in former times verification had been mandatory by default, a change of culture was needed because the users of instruments used in non regulated areas were still requesting SMIS to perform verifications. A campaign was needed to raise the level of public awareness to understand that owners of non regulated instruments should themselves take care of calibrations to ensure correct and reliable measurements. On the other hand a lot of users and consumers were looking only for verification marks without being aware of what technical procedures were required before applying the marks. We had to explain that the marks themselves do not ensure correct measurement results if there is no appropriate procedure behind them. Also, it had to be communicated that keeping the measuring instruments in good working condition is the responsibility of their users, not that of SMIS, whereas type approvals and verifications are preventive actions to ensure the prerequisites for correct measurements in areas of public interest.

Users of measuring instruments who were used to requesting verifications by SMIS had to be informed about the importance of regular calibration of their instruments and also about the calibration capabilities in the country. SMIS did not organize the national calibration service directly but facilitated and ensured traceability to the SI units and the dissemination from higher level measurement standards to lower levels through the system of national and reference measurement standards to ensure adequate calibration activities at all hierarchical levels. This procedure was the legal basis for granting partial financial support to the laboratories whose needs to ensure measurement traceability through the calibration of their reference standards to the international level were recognized at the national level.

As a rule, SMIS financially supported laboratories which proved their competence by being accredited according to ISO/IEC 17025. The importance of accreditation as the best tool for proving competence also in legal metrology activities was promoted. SMIS was accredited for most of its activities and had its quality system certified according to ISO 9001.

4 Distributed metrological system

Due to EU requirements, in 2001 SMIS was transformed into three new entities: the Slovenian Institute for Standardization (SIST), the Accreditation Service (SA) and the Metrology Institute of the Republic of Slovenia (MIRS). Because of the numerous tasks in the area of legal metrology, as well as in the field of scientific metrology, MIRS realized the importance of trying to utilize all potentially available resources in Slovenia, thus creating a distributed metrology system, complemented by an effective coordination policy [4].

In addition to the above issues, the national Law on Metrology provided the legal basis for outsourcing verifications from MIRS to competent private and public bodies designated [5] by MIRS after proving their competence by an accreditation according to ISO/IEC 17020 as inspection bodies. This means that MIRS relies on the competence and experience of the Slovenian Accreditation Service which was engaged in the assessment of bodies seeking designation for verification activities. Before designation, MIRS performs an additional assessment of the already accredited bodies to check their knowledge of regulations and specific technical issues, not covered by accreditation, for the measuring instruments under the scope of their designation.

MIRS was among the few national metrology authorities that have insisted from the beginning on laboratory accreditation (except for the transition periods, so as not to generate legal problems) in order to optimize the metrological quality. There have been a number of associated problems, however, emerging from all parties involved, but it can be said that the decision to ask for accreditation as such was well founded [6].

At present there are 32 designated bodies in Slovenia for the verification of measuring instruments, in the following domains (some are designated in several domains):

- measurement of mass (8 designations);
- measurement of volume and flow (13 designations);
- measurement of electrical quantities (6 designations);
- measurement of pressure (6 designations);
- measurement of exhaust gases (2 designations);
- measurement of length (2 designations);
- measurement of roller brake testing equipment (2 designations); and
- measurement of traffic speed (2 designations).

The fees charged by the designated bodies for their services are not regulated by MIRS nor by the government. They are at the discretion of the designated bodies which define them according to the functioning of the market. In fact, it should be taken into account that verification is a market activity for which interest in its performance exists only if the economic benefits are clearly defined as well.

MIRS regularly surveys the work of the designated bodies to ensure their continuing competence and compliance with the regulations. Designated bodies pay annual fees for the surveying activities to MIRS. The fees

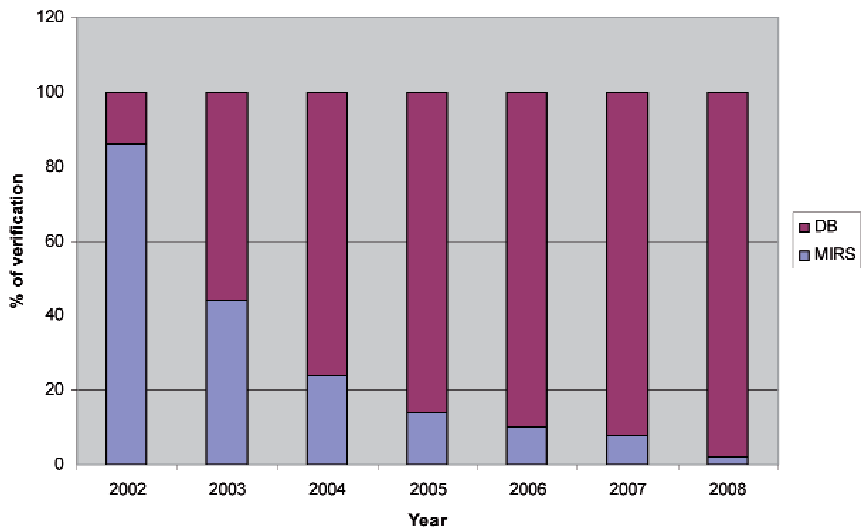

Figure 1 Share of verifications between MIRS and designated bodies (DB)

to a certain degree depend on the number of verifications.

Figure 1 illustrates the change in the number of verifications since the adoption of the system of designated bodies in 2002.

MIRS still performs some of the verifications, mostly in domains where there is not enough economic interest for verifications, where there are no other competent entities, or where a high degree of independence and impartiality is needed.

Besides the designated bodies, a system of authorized manufacturers with an approved quality system has been established. This means that such manufacturers are authorized to perform initial verifications of the measuring instruments from their own production. At the moment we have six manufacturers with an approved quality system in Slovenia.

Finally, MIRS retained its responsibility for the metrology system, being in charge of legislation and surveillance of designated entities and of measuring instruments on the market and in use. Also, type approval responsibility remains within MIRS. For type approval activities MIRS may use other test laboratories which comply with the requirements of ISO/IEC 17025. MIRS acts as an OIML Issuing Authority for non-automatic weighing instruments (OIML R 76). Due to the new European internal market legislative package, containing the principle of mutual recognition [7], and which was adopted in 2008, MIRS accepts type approvals and verifications in non-harmonized areas, originating from other EU Member States and EFTA countries.

The national legal metrology system is thus based on the participation of all competent bodies where MIRS has a central role as the national body responsible for:

- drafting and executing the strategy;
- enhancing good metrology practice; and
- adaptation to technical progress.

The crucial point of MIRS activities is metrological supervision which includes market surveillance, supervision of instruments in service and monitoring the work of designated bodies in the field of legal metrology. In this respect MIRS has invested significant human and other resources over the last years, but as the number of verifications performed by MIRS has dropped dramatically, a reorganization of MIRS resulted in the transfer of verification officers from the verification department to the market surveillance unit. The basic task of the Department for Metrological Supervision with 11 authorized officials (inspectors and metrological supervisors) is to perform supervision of:

- the measuring instruments (MI) in use and on the market;
- the correct use of the units of measurement;
- the quantity of prepackaged products (PPI); and
- articles on the market containing precious metals (PMA).

In the event that any irregularities are brought to evidence, the authorized officials may impose the withdrawal of the measuring instrument from the market or service. A warning or fine may be imposed as well - see Figure 2.

The number of irregularities appears to be rather high but the fact that inspection activities are concentrated around a small number of more frequent offenders should be taken into account.

For the training of the designated bodies, MIRS organizes an annual meeting at the end of the year, presenting the main activities and results related to verifications over the past year. The proposed plan of activities for the next year is discussed as well. For each field of verification activities separate meetings or seminars are organized by MIRS or by MIRS and other relevant expert institutions especially in the areas where MIRS only has a coordinating role (and no adequate laboratory facilities).

5 Harmonization in the EU – NAWI, Welmec and the MID

In 1999 Slovenia became an Associate Member of WELMEC (European Cooperation in Legal Metrology) which enabled MIRS to participate in its activities. One of the main objectives of WELMEC is to assist its members in the harmonized implementation and

Estimated number of all customers		Number of inspections/number of violations						
		2002	2003	2004	2005	2006	2007	2008
MI	40.000	94/32	136/110	809/283	1095/670	1338/278	1330/245	1359/324
PPI	700	111/91	113/60	118/90	178/116	191/107	195/130	210/161
PMA	500	79/32	109/42	148/69	120/43	142/55	196/120	159/79

Figure 2 Number of inspections in relation to irregularities (violations) brought to evidence in the period from 2002 to 2008

enforcement of metrology regulations. In this respect, WELMEC offered the needed expertise to MIRS in the process of Slovenia's accession to the European Union.

Through participation in WELMEC, the Slovenian experts were able to take part in joint activities including the preparation of guidelines, technical visits, exchange of information, intercomparisons, etc. which all resulted in the confidence in and acceptance of the Slovenian (legal) metrology system by other WELMEC and EU members. In particular, proficiency testing by laboratory intercomparisons has been conducted intensively in Slovenia, not only in the area of calibration laboratories, but in the legal metrology area as well. In this respect, Slovenia is a good example in the entire region of South East Europe, where it stimulated and conducted a number of laboratory intercomparisons, all related to the implementation of European legislation [8].

In 2004, when Slovenia became an EU Member, MIRS started to operate as a notified body for non-automatic weighing instruments (NAWI).

Since the EU Measuring Instruments Directive (MID) came into full operation, WELMEC has issued several Guides [9] dealing with:

- certain aspects related to measuring instruments regulated under the MID;
- the application of different conformity assessment modules of the MID;
- the assessment and operation of notified bodies performing conformity assessment in the field of the MID; and
- comparison tables between the essential requirements of the MID and relevant OIML Recommendations, which are recognized by the European Commission as Normative Documents.

Participation in WELMEC gave MIRS the necessary means to achieve the required expertise in order to operate, among others, as a notified body for the MID.

MIRS became a notified body in the areas where the need of Slovenian manufacturers to be provided with conformity assessment activities was identified as a national priority. At present, MIRS is a notified body for the MID in the fields of automatic weighing instruments, capacity serving measures, active electrical energy meters, measuring systems for the continuous and dynamic measurements of quantities of liquids other than water, material measures of length, dimensional measuring instruments and taximeters.

6 Conclusion

Over the past 18 years, the Slovenian system of legal metrology has gone through very significant developments which have resulted in setting up a modern system that is well suited to an EU Member State.

MIRS (then called SMIS) was established after Slovenia became independent, with the inclusion of all available resources in the country in order to build up an adequate (legal) metrology system within the framework of given financial resources. Because of all these requirements and restrictions, a distributed system appeared to be the only viable solution.

The work was organized under MIRS as an umbrella institution responsible for the entire national metrology system. Any institution demonstrating adequate competence - and above all a genuine interest in metrology work - was included. Legal metrology activities in MIRS, either performed within MIRS or distributed, proved to benefit from being accredited. Another important feature is that MIRS also maintains and coordinates the area of national measurement standards, therefore facilitating the calibration requirements for legal metrology as well.

In conclusion, it can be stated that over the last 18 years the Slovenian legal metrology system has undergone a considerable transition from an over-regulated legal metrology system to a modern system in line with EU legislation in terms of metrology related directives, accreditation policy, notification procedures and market surveillance.

In addition, active participation in WELMEC is of utmost importance for the proper implementation and full harmonization of legal metrology directives. Participation in WELMEC and OIML activities is based on a clear identification and prioritization of national needs.

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About the Authors

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INFRASTRUCTURES

Jordanian Metrology System: Reality and aspirations

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1 Abstract

This article discusses the organizational structure of the Jordanian Metrology System (JMS), as an example of a developing country facing many challenges; limited resources, a small number of industries, limited metrology knowledge and limited testing, calibration and verification equipment. JMS is a self-sustaining system that generates the necessary financial resources from the services it provides to society. The money generated from the mandatory and voluntary services is used to run and to develop the metrology system. The key issue behind the success of the JMS was the sincere exerted efforts by all parties working in the field of metrology, taking into account the future needs of society and international commitments. The JMS legislative structure, and the tasks and responsibilities of each component are also discussed.

2 Background

Jordan gained its independence in 1946. It is situated in the Middle East, north west of Saudi Arabia (see Figure 1). The surface area of Jordan is 92,300 km^2 and the population is about 6.2 million (of which 32 % is less than 14 years old) [Ref. World fact book 2008].

The labor force in Jordan is 1.615 million, 5 % is employed in agriculture, 12.5 % in industry, and 82.5 % in the services sector. Jordan's fundamental problem is lack of natural resources, especially water and oil. The country is divided into three districts; each having four administrative sub-divisions [Ref. World fact book 2008].

Jordan acceded to the World Trade Organization in 2000, and began to participate in the European Free Trade Association in 2001.

The history of metrology goes back 3000 years, when the prophet Shoa'aib, who was living in Jordan, asked his people not to use double weighing standards (one for selling, and another for buying). Islam asks Muslims to fill the volume measures up to the top and to use only correct and accurate scales. 1400 years ago the prophet Mohammad declared the volume standard of El-Madinah and the mass standard of Mecca as the Islamic reference standards.

Although the Islamic empire has made much progress in all aspects of life including metrology, unfortunately, things did not go well in the last centuries due to economical and political issues, not to mention the problem of most Arab countries being occupied at various times.

3 Jordan Institution for Standards and Metrology (JISM)

The Jordan Institution for Standards and Metrology (JISM) is an administratively and financially independent institution. JISM was established in 1995 (Law 15/1994) to replace its predecessor "The Jordan Directorate for Standards", founded in 1972. Standards and Metrology Law No. 22 (2000) declares JISM as the sole authority in Jordan for all matters relating to standards, metrology and the Jordanian Quality Mark. Figure 2 shows JISM 's new building in Amman.

JISM's logo, shown in Figure 3, consists of two black lines representing the path of the products from the

Figure 1 Map of Jordan (Source: World Fact Book 2008)

Figure 2 JISM's new building in Amman

Figure 3 JISM logo

producer to the consumer. The role of JISM is to ensure that only safe and good quality products (represented by the green circle), enter the market. Bad quality and dangerous products (represented by the red and irregular shapes) are totally prohibited.

JISM is connected directly to the prime minister's office and is managed by a Board of Directors chaired by the Minister of Trade and Industry. JISM has a number of technical departments: Standardization Department, Metrology Department, Precious Metal Department, Certification Department, Market Surveillance Department and the Accreditation Unit. To fulfill international obligations and to be able to sign the ILAC MRA, the Accreditation unit will be separated from JISM in the near future.

According to article 4 of JISM law No. 22 (2000), JISM's objectives are to:

- maintain a national system for standardization and metrology based upon internationally recognized practices,
- keep up with scientific developments in the fields of standards, metrology, conformity assessment and laboratory accreditation activities,
- protect the health and safety and the environment for all citizens by ensuring that products are in compliance with the technical regulations adopted by the Institution,
- ensure the quality of local products through the adoption of suitable Jordanian Standards, which enable such products to compete in local and international markets and, hence, support the national economy.

To achieve the above objectives with respect to metrology, JISM shall undertake the following functions and powers:

- prepare, approve, revise, amend and monitor the implementation of standards and technical regulations,
- establish a national metrology system and supervise its implementation,
- verify legally controlled measuring instruments,
- approve the national measurement standards,
- control the quality of precious metals, stones and jewelry according to the legally defined purity criteria, test the precious metals and jewelry and stamp them,
- accredit testing and calibration laboratories,
- utilize local facilities of government bodies and scientific institutions in order to enable JISM to achieve its objectives and carry out its functions and powers,
- support and promote studies and research in the fields relevant to standards, metrology, quality management and conformity assessment, and organize training courses in the relevant areas,
- cooperate and coordinate with the regional and international organizations and bodies active in the fields of standardization, metrology, quality, conformity assessment and accreditation,
- accept and adopt, as appropriate, the standards, technical regulations, guides, Recommendations or any other documents of regional and international organizations, provided that they are issued in Arabic or English.

4 Main components of the Jordanian Metrology System (JSM)

The Jordanian Metrology System is the technical and organizational infrastructure which ensures a consistent and internationally recognized basis for measurements in Jordan. The main objectives of JMS are to:

- ensure unified national measurements that are accepted internationally,
- ensure that the measuring instruments subjected to legal control comply with the mandatory requirements and are used correctly,
- enable individuals and organizations in Jordan to make measurements competently and accurately and to demonstrate the validity of such measurements,
- coordinate and cooperate with the metrology systems in other countries.

JMS's structure is shown in Figure 4 and consists of the following main components, taking into account international developments and the national resources of Jordan:

- the Metrology Department (MD) monitors, controls and develops the whole metrology system. Besides that, MD coordinates with JISM's branch offices in the other two districts of Jordan to ensure the harmonized implementation of the system. The organizational structure and the main objectives of MD are discussed in section 5,
- the Jordan National Metrology Institute (JNMI), which maintains the national measurement standards, ensures their traceability to international and primary standards and also provides the calibration services to testing, calibration and verification laboratories. Tasks and responsibilities of JNMI are discussed in section 11,
- to ensure compliance with international obligations, JISM is a member of the following regional and international metrology organizations:
  - Corresponding Member of the OIML,
  - Full Member of the Euro Mediterranean Legal Metrology Forum (EMLMF) since 2006. In November 2008, the secretariat of EMLMF was moved from France to Jordan,
  - Associated Member of the Asia Pacific Metrology Program (APMP) since 2006,
  - it is expected that JNMI will sign the CIPM-MRA as an Associated Member of the General Conference on Weights and Measures (CGPM) soon,
- participation of all parties concerned with metrology is ensured through the national metrology board, working groups and the steering committee of the JNMI,
- the Jordanian Accreditation System (JAS) aims to ensure the competency and integrity of the metrology system.

5 Metrology Department

The need for legal metrology originates from the need to ensure fair trade. The main objective of legal metrology is to protect citizens from the consequences of false measurements in official and commercial transactions, labor environments, health and safety.

The Metrology department consists of five divisions, as shown in Figure 5, namely: Prepackage Division, Taximeter Division, Fuel and Volume Division, Mass and Balances Division and Length-Temperature-Pressure Division. Responsibility for the control of other legally controlled measuring instruments is assigned directly to the most competent metrologist. For example: water and electricity meters are under the responsibility of the head of the Length-Temperature-Pressure Division. Gas meters are under the responsibility of the head of the Fuel and Volume Division.

Each division is in charge of all the tasks related to the measuring instrument for which it is responsible. For example: the Taxi Meter Division is in charge of type approval for all new instruments, initial verification, periodical verification, unannounced verification, approval of workshops working in the installation and repair of taxi meters, conducting training and awareness seminars. Figure 6 shows the general verification chart of all types of measuring instruments.

The main tasks and responsibilities of the Metrology Department are to:

a check the legally controlled measuring instruments that will be placed on the market or put into use for the first time,

b carry out initial, periodical and after maintenance verification for some types of legally controlled measuring instruments, such as taxi meters, fuel meters and weighing instruments, to ensure their compliance with the legal requirements,

c prevent the use of instruments that exceed the maximum permissible error, carry out market surveillance to ensure the correct use of the instruments, license the workshops for legally controlled measuring instruments, license the verification laboratories, license the verification officers to ensure their competence, monitor the verification offices working under the umbrella of other verification authorities, such as the verification centers for water and electricity meters, monitor and control the repairers and installers of legally controlled measuring instruments, and monitor the implementation of metrology legislation, regulations and instructions in all Jordanian districts,

d offer technical advice to the government in the area of legal metrology,

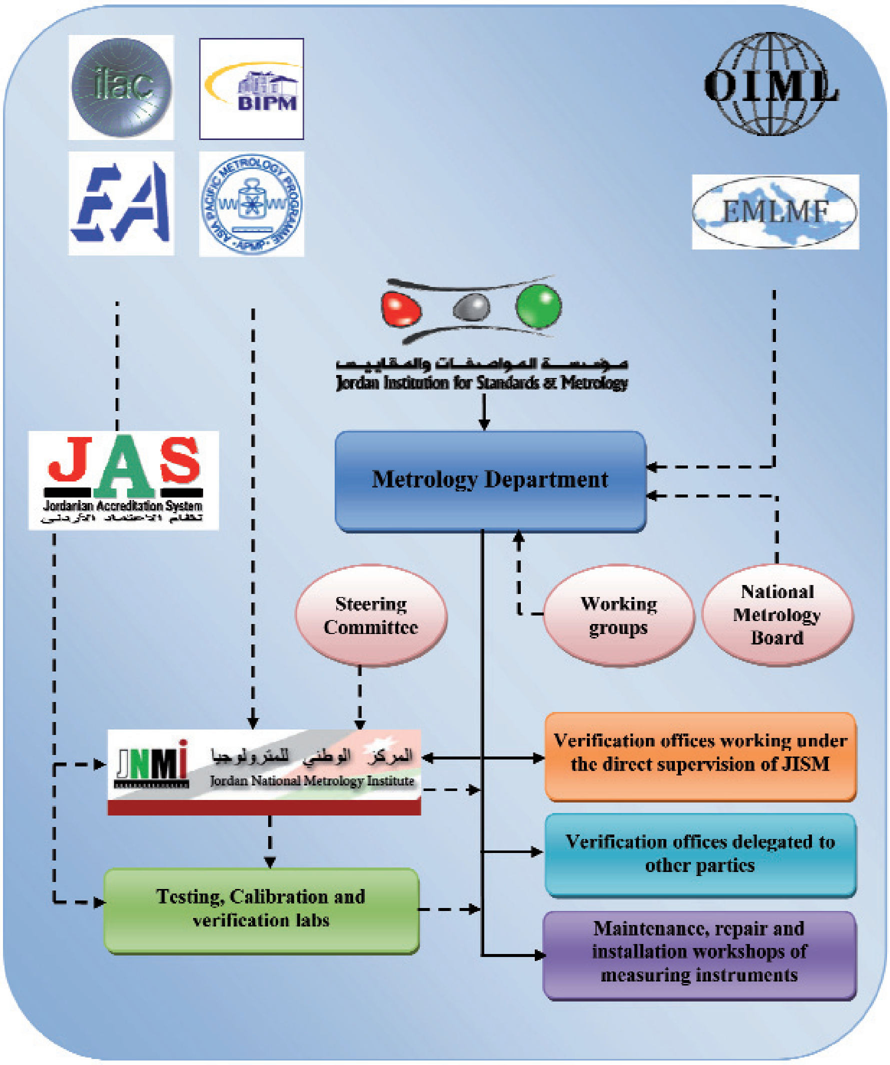

Figure 4 Organizational structure of the Jordanian Metrology System

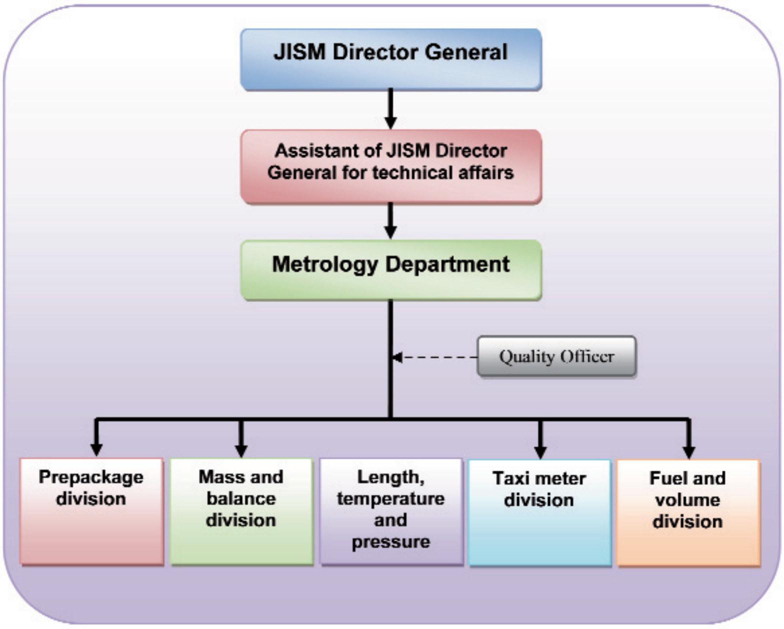

Figure 5 Organizational structure of the Metrology Department

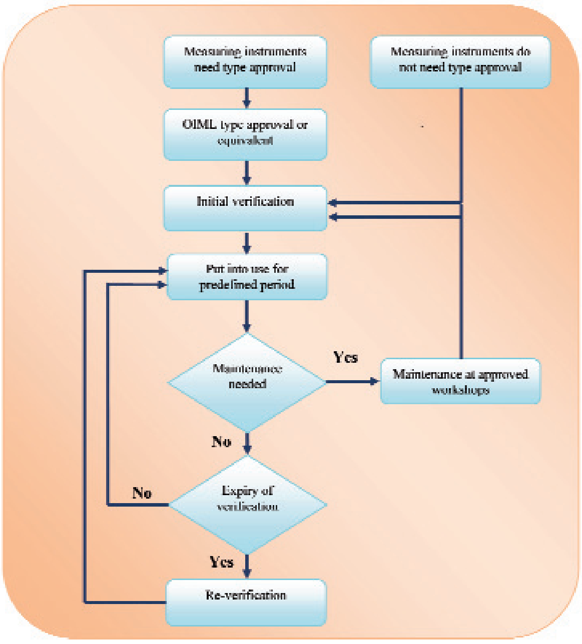

Figure 6 Verification cycle of measuring instruments

Figure 7 Vehicle and telescopic crane provided with 20 T of dead weight for the verification of weighbridges

- e follow up on the activities of the regional and international organizations in the field of metrology,
- f conduct training courses and awareness seminars,
- g keep and maintain reference standards for verification activities,
- h prepare, propose, revise, or amend the metrology laws, regulations and instructions to be approved by the relevant body (the Parliament, the Cabinet of Ministers or the JISM Board of Directors),
- i keep up with scientific developments in the field of metrology.

6 Resources available at the Metrology Department

To achieve its objective, the Metrology Department has the following basic infrastructure and resources:

- Mass and Balances Division:

- a 3 employees including the Head of Division,
- b 1 set of weights, class E_2, 1 mg – 20 kg, as reference standards,
- c 2 sets of weights, class F_1, 1 mg – 20 kg, as working standards to verify class II scales,
- d reference standard mass, 500 kg, F_2,
- e set of working standard weights, class M_1, 1 mg – 5 kg, to verify class III scales,
- f set of working standard weights, 120 pieces of 20 kg, class M_1, for the verification of scales class III,
- g set of working standard weights, 20 pieces of 10 kg, class M_1, for the verification of scales class III,
- h set of working standard weights, 20 pieces of 5 kg, class M_1, for the verification of scales class III,
- i set of working standard weights, 80 pieces of 500 kg, class M_1, for the verification of scales class III,
- j 3 mass comparators, 0 – 600 kg, class II,
- k 3 mass comparators, 0 – 1.2 kg, class I,
- l truck with a telescopic crane, shown in Figure 7, equipped with 20 T of working standard weights,
- m vehicle for field calibration and verification equipped with 1500 kg working standard weights.

- Prepackage Division:

- a 2 employees including the head of the division,
- b a balance (6 kg), class II,
- c 3 balances (0 kg – 150 kg), class III,
- d a set of glass ware (flasks, graduated cylinders), a tape measure, (20 m), resolution 0.5 mm,
- e a density meter.

- Taximeter Division:

The main task of the Taxi Meter Division is to verify about 16000 taxi meters annually. This job is carried out by special arrangement between JISM and the licensed taxi meter workshops owned by the Association of Taxi Owners and other workshops involved in the repair and installation of taxi meters. Figure 9 shows some of these workshops. The role of the Metrology Department in this issue is to supervise these licensed workshops with seven JISM inspectors. Taxi drivers are obliged to come to the verification offices to get a verification certificate for their taxi meter as a prerequisite for the annual renewal of the taxi license issued by the Public Security Department.

Figure 8 Mobile master flow meter used for unannounced verification of road fuel tankers

- Length-Temperature-Pressure Division:

a 2 employees,
b a set of tape measures (20 m),
c a water bath with heater and temperature controller,
d set of mercury in glass thermometers, 0 °C – 45 °C, resolution 0.01 °C, used for the verification of clinical thermometers, centrifugal machine for the mercury in glass clinical thermometers, reference pressure calibrator 0 – 300 mmHg, working pressure calibrator for verifying blood pressure sphygmomanometer.

- Fuel and Volume Division:

a 7 employees including the Head of Division, set of glass reference standards (automatic pipette), 0.1, 0.5, 1, 2, 5, 20 L, accuracy 0.02 %, set of stainless steel working volume standards 2, 5, 10, 20, 50, 100, 200, 500, 2000 L, accuracy 0.01 %, mobile master flow meter, shown in Figure 8, used for unannounced verification of fuel road tankers, mobile volume standard car (Figure 10) equipped with working volume standard 2, 5, 10, 20, 50, 100, 200 L for verifying fuel dispensers,
b Drivers of road fuel tankers are obliged to come to the verification offices to obtain a verification certificate for their fuel meter as a prerequisite for the annual renewal of the fuel road tanker license issued by the Public Security Department,

- JISM's North Branch has about 3 employees working only in basic metrological control, such as verification of taxi meters, fuel gauges, trade balances and jewelry balances,

- JISM South Branch has about 3 employees working only in the basic metrological control, such as verification of taxi meters, fuel gauges, trade balances and jewelry balances.

7 Work carried out by the Metrology Department

The work carried out by the Metrology Department during the period 2005 to 2008 is summarized in Table 1. The big increase in the work load in 2008 was due to the huge fluctuation in fuel prices. The income generated from the metrology activities is used to cover the expenses of the Metrology Department including the market surveillance activities and the expenses of maintaining the national measurement standards.

8 Ongoing projects

JISM is working now on establishing a centralized office to verify taxi meters, road fuel tankers, volume measures, LPG road tankers and heavy weights for the middle district, with an estimated budget of 3 million Euro. The engineering model of this office is shown in Figure 11.

Figure 9 Some licensed taxi meter workshops, supervised by JISM inspectors

Figure 10 Mobile working volume standards 1, 2, 5, 10, 20, 50, 100, 200 L for verifying fuel dispensers

Type of legal measuring instrument	No. of verified items in			
	2005	2006	2007	2008
Taxi meters	28495	26376	21619	46519
Balances for general trades	1430	1208	971	1600
Jewelry balances	375	355	319	529
Weighbridges	120	99	140	191
Fuel meters at gas stations	6157	9126	11304	38844
Fuel meters for road tankers	466	912	791	969
Mechanical non-invasive sphygmomanometers	181	2180	1789	1555
Clinical thermometers	1117	2668	5894	6090

Table 1 The work load of the Metrology Department during the period 2005–2008

To overcome the problem of the huge fluctuations in fuel prices and the need to change the tariff in the taxi meters frequently, JISM cooperated with a Jordanian research and development company to develop an attachment to the taxi meter that can be adjusted remotely using the available mobile network. This will enable JISM to change the tariff of all taxi meters in less than one hour instead of more than 4 months using the traditional procedure.

To improve the services provided by the medical laboratories in Jordan, JISM cooperated with the PTB to run a 3-year project funded by Germany with the cooperation of the Ministry of Health, the Royal Medical Center, the Jordan National Metrology Institute and the private sector. The main objectives of this project are to establish a National Reference Laboratory, improve the quality of the medical test results and ensure that some of the high priority selected instruments with measuring functions comply with the mandatory requirements.

9 Agreements for better use of national capabilities

To make use of the Jordanian capabilities, JISM signed many agreements with various parties to use their

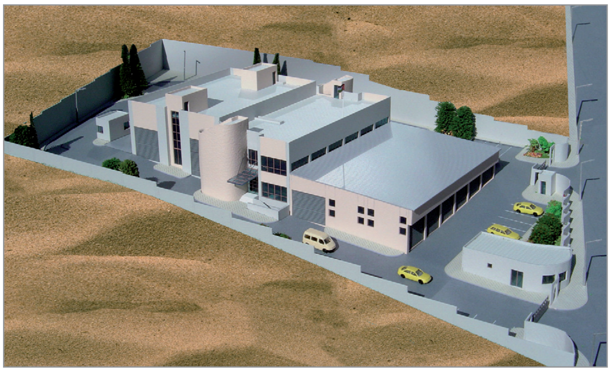

Figure 11 Engineering model of the new verification office for the middle district

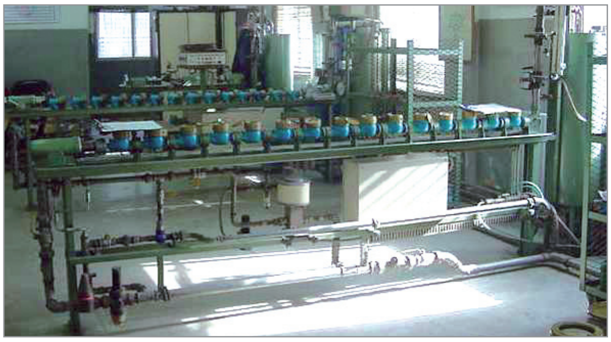

Figure 12 Some testing facilities available at the water meter center

infrastructure and to avoid duplications. This approach aims at avoiding duplication of investments by the government for establishing additional testing and verification centers that are already available in Jordan. JISM will concentrate on organizing the system and ensuring its operation according to international standards. All agreements were tailored on the bases of a win-win arrangement. Some of these agreements are:

- An agreement with the Royal Scientific Society (RSS) to establish and run the Jordan National Metrology Institute, which saved about 5 million Euro from the governmental budget. More details about this agreement are described in section 11. Besides that, JISM singed another agreement with RSS to carry out a long list of tests needed to ensure the quality of imported and locally manufactured products. Based on this agreement, RSS transfers 5 % of its income generated from this agreement, to be used by JISM to buy product samples from the market and to cover the cost of market surveillance,
- JISM signed an agreement with the Jordan Petroleum Refinery Company (JPRC) to use their calibration facility to verify and calibrate fuel road tankers,
- JISM has special arrangements with the Association of Taxi Owners and other private workshops to use their workshops as verification offices for taxi meters,
- For the time being, JISM is using the facilities of the Water Meter Center owned by the Ministry of water. JISM will sign an agreement with them to organize the work between the two parties. Figure 12 shows some of the available facilities in the water meter center.

Figure 13 Some testing facilities available at the electricity meter center

- In addition to the above mentioned agreements, JISM is working on another agreement to delegate the verification activities of the electricity meters to the Center of Testing Electricity Meters owned by the Jordanian Electricity Company Ltd., because it has a fully equipped laboratory with competent staff and traceable measurement standards. Figure 13 shows some of the available facilities in the Electricity Meter Center.

10 Measuring instruments under legal control

According to articles 10 and 11 of the instructions No. 2 (2002) "Instructions of Organizing the Measurement and Calibration Activities in Jordan", which was issued pursuant to article 5 of the regulation of National Measurement System No. 31 (2001), the measuring instruments shown in Table 2 are subjected to legal metrological control.

No.	Instrument	National Standards (JS)	International reference	Type approval	Initial verification	Periodical verification (year)
1-	Material measures of length for general use	449:1986	OIML R 35:1976	Yes	Yes	---
2-	Weights of classes E_1, E_2, F_1, F_2, M_1, M_{1-2}, M_2, M_{2-3}, M_3	127:1997	OIML R 111:1994	Yes	Yes	2
3-	Hexagonal weights	453:1986	OIML R 52:1980	Yes	Yes	2
4-	Non-automatic weighing instruments (NAWI)	911:1992, 873:1998	OIML R 76	Yes	Yes	2
5-	Standard capacity measures for testing measuring systems or liquids other than water	1:1998	Egyptian 212:1962 (will be replaced by OIML R 120:1996)	Yes	Yes	1
6-	Fuel dispensers (gasoline, kerosene, diesel, aftor)	1199:1998	OIML R 117:1995, R 118:1995	Yes	Yes	1
7-	Cold water meters for residential use	11:	OIML R 49:2003/4	Yes	Yes	10
8-	Active electric energy meters for residential use	1620:2004, 1621:2004	EN 62052-11:2003 EN 62053-11:2003	Yes	Yes	15
9-	Taximeters	28:1999	OIML R 21:1975	Yes	Yes	1
10-	Non-invasive sphygmomanometers - Mechanical	1188-1,2:1997	EN 1060-1, 2:1995	Yes	Yes	2
11-	Non-invasive sphygmomanometers - Electrical	1188-1,2:1997	EN 1060-1, 2:1995	Yes	Yes	2
12-	Clinical thermometers, mercury-in-glass with maximum device	859:1992	OIML R 7	Yes	Yes	---
13-	Clinical electrical thermometers for continuous measurement	1186:1997	OIML R 114:1995	Yes	Yes	Not defined yet
14-	Clinical electrical thermometers with maximum device	1187:1997	OIML R 115:1995	Yes	Yes	Not defined yet
15-	Prepackage	Instruction 4:2008	OIML R 87, OIML R 79, EEC 211:1976, EEC 106:1975, EEC 232:1980	---	Yes	2

Table 2 Measuring instruments under legal control

Since the Director General of JISM is empowered to add or cancel any measuring instrument shown in Table 2, the following measuring instruments will be soon added to the list of legal measuring instruments:

- tire pressure gauges,
- thermometers and temperature recorders used for food preservation,
- force measuring systems of uniaxial material testing machines.

11 Jordan National Metrology Institute (JNMI)

Due to the lack of resources, JISM decided to depend on existing national facilities to improve industrial metrology. In March 2006, JISM signed an agreement with the Royal Scientific Society (RSS) to establish and manage the Jordan National Metrology Institute (JNMI).

Based on this agreement, JISM agreed to appoint the calibration laboratory of RSS, as the Jordan National Metrology Institute (JNMI), in order to maintain, keep, develop and ensure traceability of the national standards to the international and primary standards. JNMI is supervised by JISM and monitored by a steering committee that consists of 9 representatives from the private and public sectors.

The agreement was drafted on a win-win basis. JISM saved the capital cost of establishing JNMI, which is more than 5 million Euro, in addition to 0.25 million as the running cost of the JNMI. In return, JISM bears the cost of the traceability of the national standards, the cost of participation in the regional metrology organization, the fees of national and international accreditation and the cost of participation in the inter-comparison programs. JISM also provides a training course for JNMI staff through the international assistance provided to the Jordanian government. The annual total amount that JISM pays to JNMI is about 50 000 Euro.

The JISM/RSS agreement identifies the tasks of JNMI as follows:

- Keep and maintain the related national standards, and keep them traceable to international standards, provide calibration services to the testing, calibration and verification laboratories, follow up on scientific development concerning the SI Units, their implementation and dissemination, represent Jordan in activities related to national, regional and international metrology activities, carry out interlaboratory comparisons with other NMIs, provide calibration services in such a way that they do not constitute any unfair competition with those services offered by accredited calibration providers, maintain a quality system consistent with the international standards, develop new measurement techniques, procedures and equipment, carry out metrology research, conduct training courses, offer technical advice for the government in the area of metrology.

The Steering Committee was created to represent all concerned parties from the public and private sectors. The Steering Committee consists of the following members:

- JISM Director General – Chairman,
- Director of the Metrology Department in JISM,
- two representatives from RSS,
- one representative from the Royal Jordanian Air Force (RJAF),
- one representative from the Higher Counsel for Science and Technology (HCST),
- one representative from the Chamber of Industry,
- one representative from the Chamber of Commerce.

The tasks of the Steering Committee may be summarized as follows:

- Monitor the tasks and activities of the JNMI, approve the regulations of the JNMI, approve the strategy and the public policy of the JNMI, decide which regional and international institutions JNMI should join, approve the fees paid by customers, approve national standards, approve the JNMI budget, approve the staff responsible directly for keeping the national standards, seek funds for the JNMI, sign regional and international agreements in the area of metrology (e.g. Meter Convention) by the steering committee chairman (JISM Director General).

For the time being JNMI maintains 14 national standards in the fields of pressure, mass, length, temperature, humidity, frequency and time, DC voltage, AC voltage, DC current, AC current, resistance, electrical capacitance, electrical inductance and force. Table 3 summarizes the ranges and the traceability of the national measurement standards.

The agreement keeps the door open for JISM to approve other national measurement standards that cannot be offered by JNMI and can be maintained by other Jordanian institutions or organizations, such as the Calibration Unit at the Royal Jordanian Air Force (RJAF).

As Jordan is not an industrial country and there is no need for a high level of measurement accuracy, JNMI does not need to have national standards which require great expense and strict environmental conditions to maintain them. As shown in Figure 14, JNMI obtains the traceability for the national measurement standards through some of the best NMIs in the world.

Because there is no metrology organization at the regional level, JNMI is currently an Associated Member of the Asia Pacific Metrology Program APMP. It is expected that JNMI will sign the CIPM-MRA as an Associated Member of the General Conference on Weights and Measures (CGPM) in 2009.

To shorten the time period necessary to obtain international recognition, JNMI obtained accreditation for most of the national standards through DKD, the German accreditation body. Figure 15 shows the DKD accreditation certificate for JNMI in the field of electrical quantities.

12 Metrology Law and technical regulations

Based on law No. 22 (2000) JISM issued, approved and implemented the following instructions:

- Instruction 5:2007 “Metrological Terms and definitions”,
- Instruction 6:2007 “Legal measurement units”,

No.	National Standard	Range	Traceability
1	Pressure	Gas system (8 kPa – 0.35 kPa) Oil system (2.5 MPa – 70 MPa)	NIST
2	Mass	1 mg – 10 kg	METAS
3	Length	0.5 mm – 500 mm	NMIJ
4	Temperature	-200 °C – 1084.62 °C	NPL
5	Relative humidity	10 % RH – 95 % RH	NIST
6	Frequency & time	0.1 Hz – 300 MHz	NIST
7	Direct voltage	Measuring : 10 mV – 1000 V Source : 10 mV – 1000 V	PTB
8	Alternating voltage	Measuring : 100 mV – 1000 V 40 Hz – 1 kHz Source : 10 mV – 700 V 40 Hz – 1 kHz	PTB
9	Direct current	Measuring : 10 µA – 11 A Source : 10 nA – 11 A	PTB
10	Alternating current	Measuring : 10 mA – 11 A 40 Hz – 1 kHz Source : 1 mA – 11 A 40 Hz – 1 kHz	PTB
11	Resistance	Measuring : 1 Ω – 100 MΩ Source : 1 Ω – 1 GΩ	PTB, NIST
12	Capacitance	Measuring : 1 pF – 1 mF Source : 1 pF – 1 mF	NIST
13	Inductance	Measuring : 100 µH - 10 H Source : 100 µH - 10 H	NIST
14	Force (Comp. & tension)	100 N – 2 MN	PTB

Table 3 Range and traceability of national measurement

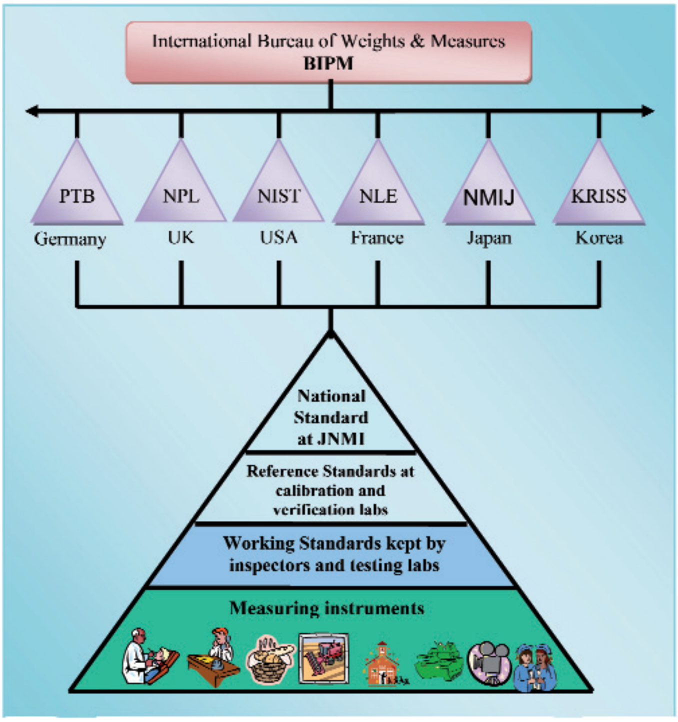

Figure 14 Traceability chart for the Jordanian National Measurement Standard


Deutscher Kalibrierdienst (DKD)
Accreditation Body at
Physikalisch-Technische Bundesanstalt (PTB)
represented in the

Deutscher AkkreditierungsRat

Accreditation

The Accreditation Body of the **Deutscher Kalibrierdienst (DKD)** hereby accredits the calibration laboratory with

Jordan National Metrology Institute JNMI
Royal Scientific Society RSS
P.O. Box 1438
Al-Jubaiha 11941
Amman
JORDAN

as calibration laboratory according to DIN EN ISO/IEC 17025 for calibrations of:

DC voltage, DC current, DC resistance, AC voltage, AC current

Part of the certificate is: Annex 04 (2 pages), 2006-09-08

DAR registration number: DKD-K-20301
DKD accredited since: 1998-06-02

Braunschweig, 2006-09-08

Dr.-Ing. Wolfgang Bosch
Head of DKD Accreditation Body

Figure 15 DKD accreditation certificate for electrical national standards

- Instruction 7:2007 "Metrological Fees",
- Instruction 4:2008 "Prepackage",
- Instruction 5:2008 "Organizing Metrological Activities in Jordan".

The full versions of these instructions are available in Arabic at the JISM web site, www.jism.gov.jo. JISM is currently working on the transposition of the Measuring Instrument Directive (MID), and some OIML Recommendations into national regulations. ■

13 References

1 JISM law No. 22 of 2000,

2 Regulation No. 31 of 2001, "National Measurement System",

3 Metrology Instructions No. 5 of 2008, "Instructions for Organizing the Metrological Activities in Jordan",

4 Metrology – In short, 2nd edition, Dec. 2003, EUROMET project 673,

5 Review of the Rationale for and Economic Benefit of the UK National Measurement System, Department of Trade and Industry National Measurement System Policy Unit, 15 November 1999,

6 The World Fact Book 2008. Web site of the USA-Central Intelligence Agency.

The Author

Osama Melhem
Director of the Metrology Department,
Jordan Institution
for Standards and Metrology,
Jordan

MoU

Revision of a 42 year-old Agreement:

The Memorandum of Understanding between ISO and the OIML

SAMUEL JUST, Project Leader, BIML

Introduction

Since its establishment in 1955, the International Organization of Legal Metrology has always endeavored to conclude agreements with other international organizations whenever necessary, with a view to strengthening collaboration and international harmonization. To this end, the International Organization for Standardization (ISO) and the OIML signed a first Memorandum of Understanding on 10 June 1966, some 42 years ago.

Recent developments in both Organizations, for instance the OIML Mutual Acceptance Arrangement (MAA) or certain OIML/ISO joint Publications such as OIML R 99/ISO 3930, led to the necessity to revise this MoU. Therefore ISO, represented by its (former) Secretary General Mr. Alan Bryden and the OIML, represented by the President of the International Committee of Legal Metrology Mr. Alan Johnston, signed a revised Memorandum of Understanding on 9 December 2008.

Background

The background to this new MoU is the formalization of the growing cooperation between ISO and the OIML. Further to the statement that the OIML and ISO are considered as standardizing bodies in the sense of the Technical Barriers to Trade Agreement of the World Trade Organization (WTO TBT), this MoU is a formal technical agreement between the two Organizations which recognizes the specificity of legal metrology and the legitimacy of the OIML to draw up documents addressing legal metrology equipment and issues, including guidance documents for conformity assessment procedures.

A new toolbox

The MoU provides tools to be utilized in the day to day activities of both Organizations, and its revision has given rise to the necessity for the OIML to review existing technical liaisons with ISO and their status for each OIML TC/SC and to permit the establishment of new liaisons between ISO and OIML TCs and SCs.

From an administrative point of view, the OIML is a Category 'A' Liaison Organization for the Technical Committees concerned, which means that OIML TCs/SCs can make effective contributions to the work of their ISO counterparts.

The BIML contact person for each OIML TC/SC (see the table summarizing the liaisons) is responsible for managing the detailed liaisons which enable the OIML and ISO to exchange information and to comment on each other's projects with a view to harmonizing their technical work.

Jointly developed Publications

Close relations between the two Organizations can lead to joint working groups being set up; meetings of ISO and OIML TCs and SCs may be co-located, during which the stakeholders of both Organizations can participate in the drawing up of "Jointly Developed Publications", which are identical in content but which are published by both Organizations under their own individual rules. The Forewords identify the corresponding ISO and OIML Publications, and reiterate the fact that they are in fact identical. Obviously, "Jointly Developed Publications" that are published by the OIML remain downloadable from the OIML web site Publications page and are distributed free of charge in the same way as all other OIML Publications.

ISO Fast-track Procedure

Another tool formalized by the OIML/ISO MoU is the utilization of the ISO Fast-track Procedure. For instance, at its 43rd Meeting in Sydney (October 2008), the CIML decided to disband OIML TC 10/SC 5 *Hardness standardizing blocks and hardness testing machines* (Resolution 26) and to withdraw all the remaining Publications of this OIML Subcommittee (Resolution 24), meaning nine Publications in total:

V 3 *Hardness testing dictionary (quadrilingual)*;
R 9 *Verification and calibration of Brinell hardness standardized blocks*;
R 10 *Verification and calibration of Vickers hardness standardized blocks*;
R 11 *Verification and calibration of Rockwell B hardness standardized blocks*;
R 12 *Verification and calibration of Rockwell C hardness standardized blocks*;
R 36 *Verification of indenters for hardness testing machines*;
R 37 *Verification of hardness testing machines (Brinell system)*;
R 38 *Verification of hardness testing machines (Vickers system)*;
R 39 *Rockwell hardness machines*.

Without the signature of the MoU, this would have led to a loss of information since withdrawn publications are not available for download on the OIML web site. Applying the ISO Fast-track Procedure to these Publications will allow their responsibility to be transferred from OIML TC 10/SC 5 to the relevant ISO TC or SC.

In the case of OIML TC 10/SC 5 Publications, it could be expected that ISO TC 164 or TC 164/SC 3 will become responsible for these nine Publications. After this transfer of responsibility it will be possible for ISO to publish (and sell) these "ex-OIML" Publications as ISO Standards, under ISO rules. The foreword of such an ISO Standard includes an indication of the OIML Publication as the source, with its equivalent OIML designation.

It should be noted that the ISO Fast-track Procedure does not automatically convert an OIML Publication into an ISO Standard. The relevance of the OIML Publication is analyzed during the procedure, and it may be concluded that the Publication is not relevant and should in fact not be published by ISO.

Conclusion

Even though this revised MoU was only signed recently, it has already been applied when publishing the new OIML R 99. A second direct application is the revision of OIML R 49, carried out in collaboration with ISO which is also revising its ISO 4064 Standard in order to arrive at a new "Jointly Developed Publication".

OIML TCs and SCs are therefore invited to strengthen their relations with the relevant ISO TCs/SCs with which they enjoy liaisons, via the respective BIML contact persons. ■

Alan Johnston

Alan Bryden

OIML TCs/SCs		ISO TCs/SCs		BIML Contact
BIML		CASCO	Committee on conformity assessment	Régine Gaucher
BIML		REMCO	Committee on reference materials	Samuel Just
TC 2	Units of measurement	TC 12	Quantities, units, symbols, conversion factors	Willem Kool
TC 3/SC	Application of statistical methods	TC 69	Applications of statistical methods	Willem Kool
TC 3/SC 3	Reference materials	TC 158	Analysis of gases	Régine Gaucher
TC 3/SC 4	Application of statistical methods	TC 69/SC 1	Terminology and symbols	Willem Kool
		TC 69/SC 4	Applications of statistical methods in process management	Willem Kool
		TC 69/SC 5	Acceptance sampling	Willem Kool
		TC 69/SC 6	Measurement methods and results	Willem Kool
TC 3/SC 5	Conformity assessment	TC 176/SC 1	Concepts and terminology	Régine Gaucher
		TC 176/SC 2	Quality systems	Régine Gaucher
		TC 176/SC 3	Supporting technologies	Régine Gaucher
TC 6	Pre-packaged products	TC 122	Packaging	Willem Kool
TC 7	Measuring instruments for length and associated quantities	TC 172	Optics and photonics	Ian Dunmill
		TC 172/SC 6	Geodetic and surveying instruments	Ian Dunmill
		TC 213	Dimensional and geometrical product specifications and verification	Ian Dunmill
TC 8	Measurement of quantities of fluids	TC 48/SC 6	Laboratory and volumetric ware	Samuel Just
		TC 63	Glass containers	Samuel Just
TC 8/SC 1	Static volume measurement	TC 28/SC 1	Terminology	Régine Gaucher
		TC 28/SC 5	Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels	Samuel Just
TC 8/SC 3	Dynamic volume measurement	TC 28/SC 1	Terminology	Régine Gaucher
		TC 28/SC 2	Dynamic petroleum measurement	Régine Gaucher
		TC 28/SC 5	Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels	Samuel Just
		TC 30	Measurement of fluid flow in closed conduits	Régine Gaucher
		TC 30/SC 2	Pressure differential devices	Régine Gaucher
		TC 30/SC 5	Velocity and mass methods	Régine Gaucher
		TC 30/SC 7	Volume methods including water meters	Samuel Just
		TC 197	Hydrogen technologies	Régine Gaucher

OIML TCs/SCs		ISO TCs/SCs		BIML Contact
TC 8/SC 5	Water meters	TC 30	Measurement of fluid flow in closed conduits	Régine Gaucher
		TC 30/SC 7	Volume methods including water meters	Samuel Just
TC 8/SC 6	Measurement of cryogenic liquids	TC 28/SC 1	Terminology	Régine Gaucher
		TC 28/SC 2	Dynamic petroleum measurement	Régine Gaucher
		TC 28/SC 5	Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels	Samuel Just
		TC 30	Measurement of fluid flow in closed conduits	Régine Gaucher
		TC 30/SC 2	Pressure differential devices	Régine Gaucher
		TC 30/SC 5	Velocity and mass methods	Régine Gaucher
		TC 30/SC 7	Volume methods including water meters	Samuel Just
TC 8/SC 7	Gas metering	TC 30	Measurement of fluid flow in closed conduits	Régine Gaucher
		TC 30/SC 2	Pressure differential devices	Régine Gaucher
		TC 30/SC 5	Velocity and mass methods	Régine Gaucher
		TC 193	Natural gas	Régine Gaucher
		TC 193/SC 1	Analysis of natural gas	Régine Gaucher
TC 8/SC 8	Gas meters	TC 30	Measurement of fluid flow in closed conduits	Régine Gaucher
		TC 30/SC 2	Pressure differential devices	Régine Gaucher
		TC 30/SC 5	Velocity and mass methods	Régine Gaucher
		TC 193	Natural gas	Régine Gaucher
		TC 193/SC 1	Analysis of natural gas	Régine Gaucher
TC 9/SC 4	Densities	TC 34/SC 4	Cereals and pulses	Régine Gaucher
		TC 48/SC 4	Density measuring instruments	Ian Dunmill
TC 10/SC 4	Material testing machines	TC 164	Mechanical testing of metals	Ian Dunmill
		TC 164/SC 1	Uniaxial testing	Ian Dunmill
TC 10/SC 5 1)	Hardness standardized blocks and hardness testing machines	TC 164	Mechanical testing of metals	Ian Dunmill
		TC 164/SC 3	Hardness testing	Ian Dunmill
TC 11	Instruments for measuring temperature and associated quantities	TC 163/SC 1	Test and measurement methods	Samuel Just
TC 11/SC 1	Resistance thermometers	TC 48/SC 3	Thermometers	Samuel Just
TC 11/SC 2	Contact thermometers	TC 48/SC 3	Thermometers	Samuel Just
TC 11/SC 3	Radiation thermometers	TC 48/SC 3	Thermometers	Samuel Just

OIML TCs/SCs		ISO TCs/SCs		BIML Contact
TC 13	Measuring instruments for acoustics and vibration	TC 43	Acoustics	Ian Dunmill
		TC 43/SC 1	Noise	Ian Dunmill
TC 14	Measuring instruments used for optics	TC 172	Optics and photonics	Ian Dunmill
		TC 172/SC 3	Optical materials and components	Ian Dunmill
		TC 172/SC 7	Ophthalmic optics and instruments	Ian Dunmill
TC 15	Measuring instruments for ionizing radiations	TC 85	Nuclear energy	Ian Dunmill
		TC 85/SC 2	Radiation protection	Ian Dunmill
TC 16/SC 1	Air pollution	TC 22/SC 5	Engine tests	Régine Gaucher
TC 16/SC 2	Water pollution	TC 147/SC 1	Terminology	Ian Dunmill
TC 16/SC 3	Pesticides and other toxic substances pollutants	TC 190	Soil quality	Ian Dunmill
		TC 190/SC 3	Chemical methods and soil characteristics	Ian Dunmill
TC 16/SC 4	Field measurements of hazardous (toxic) pollutants	TC 158	Analysis of gases	Régine Gaucher
TC 17/SC 1	Humidity	TC 34/SC 4	Cereals and pulses	Régine Gaucher
TC 17/SC 2	Saccharimetry	TC 93	Starch (including derivatives and by-products)	Samuel Just
TC 17/SC 6	Gas analysis	TC 158	Analysis of gases	Régine Gaucher
		TC 193	Natural gas	Régine Gaucher
		TC 193/SC 1	Analysis of natural gas	Régine Gaucher
TC 17/SC 8	Instruments for quality analysis of agricultural products	TC 34/SC 4	Cereals and pulses	Régine Gaucher
TC 18	Medical measuring instruments	TC 172	Optics and photonics	Ian Dunmill
		TC 172/SC 7	Ophthalmic optics and instruments	Ian Dunmill

[1)] OIML TC 10/SC 5 Hardness standardized blocks and hardness testing machines was disbanded during the last CIML Meeting.

MoU

New cooperation agreement on metrology to combat technical barriers to trade and spur economic growth

Ian Dunmill
Assistant Director, BIML

On 3 December 2008, the OIML, the International Bureau of Weights and Measure (BIPM), and the United Nations Industrial Development Organization (UNIDO) agreed to establish a strategic partnership on metrology by signing a Memorandum of Understanding (MoU).

The aim of the partnership is to enhance the impact of industrial development on economic growth and to minimize technical barriers to trade (TBT) which are still a major obstacle to exports from developing countries and countries with economies in transition.

The MoU was signed by UNIDO's Director-General, Kandeh Yumkella, CIML President Alan Johnston and BIPM Director Andrew Wallard. The new partners agreed to join forces to help developing countries integrate more beneficially into the global economy. During the signature event, concrete technical areas of cooperation were discussed. These areas – such as the establishment of training guides to assist developing countries overcome metrology, and legal metrology issues at the laboratory level – will provide the springboard to launch the cooperation.

The MoU will ensure that:

- the OIML's worldwide technical structure which provides its Members with metrological guidelines for the development of national and regional requirements concerning the assessment and use of measuring instruments in legal metrology applications;
- the BIPM's expertise in scientific metrology which provides the basis for a single, coherent system of measurements throughout the world, traceable to the International System of Units (SI); and
- UNIDO's significant experience and a large portfolio of ongoing projects in the area of standards, metrology, testing, certification and accreditation

are used in the best way possible to ensure the better implementation of capacity building activities in standards and conformity, as well as compliance with sanitary and phytosanitary (SPS) measures. It will also optimize UNIDO's delivery of trade capacity building technical assistance in metrology. This is of great importance due to UNIDO's position as a key agency for the implementation of projects related to TBT and SPS issues and standards and conformity capacity building.

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DEVELOPING COUNTRIES

Announcing the OIML Award for Excellent contributions from Developing Countries to legal metrology

Eberhard Seiler and Ian Dunmill

Background

The operation of a Legal Metrology System contributes significantly to economic and social development through the facilitation of fair trade and the protection of citizens from harmful effects of wrong measurements. The efficient operation of a Legal Metrology System is also proof of good government which is visible to the public.

However, many Developing Countries suffer from a lack of resources for the operation of such a system. Although these resources cannot be provided by the OIML, the Organization is willing to support initiatives for the development of legal metrology.

To highlight the importance of metrology activities in Developing Countries, and to provide an incentive for their improvement, the OIML has established an Award for "*Excellent contributions from Developing Countries to legal metrology*".

This Award is intended to raise the awareness of, and create a more favourable environment for legal metrology and to promote the work of the OIML.

The Award intends:

> *"to acknowledge and honor new and outstanding activities achieved by individuals, national services or regional legal metrology organizations contributing significantly to legal metrology objectives on national or regional levels."*

How can candidates be proposed?

The aim is for the nomination procedure to be as open as possible. Proposals should be sent to the OIML Facilitator on Developing Country Matters and may be made by:

- CIML Members,
- Regional Legal Metrology Organizations;
- Individuals concerned with legal metrology;
- The Facilitator on Developing Country Matters;
- The BIML.

Proposals may be made by the individual or organization seeking the Award and should contain facts, documents and arguments why the candidate deserves the Award. As they are received, the Facilitator will record these nominations and forward them to the BIML. The closing date is 1 July of each year.

Selection procedure

Each year, The Facilitator on developing country matters will validate the nominations received and prepare a list of candidates highlighting the importance of the achievements, and will rank the applications.

The Award winner will be selected by the CIML President and announced at the following CIML Meeting.

Selection criteria

The criteria which will be used to assess the Award candidates will include:

- The significance and importance of the contribution or achievement;
- The novelty of the contribution or achievement;
- The attractiveness and adaptability of the contribution or achievement for other legal metrology services.

The OIML Award

The Award will consist of:

- A Certificate of Appreciation signed by the CIML President;
- A token of appreciation, e.g. an invitation to present the Award winning achievement at the next CIML Meeting or OIML Conference at the OIML's expense.

Further information

For more details, or to present candidacies for the Award, please contact:

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TC/SC NEWS

OIML TC 9 SC 2 Meeting

4–5 February 2009

NWML, Teddington, UK

IAN DUNMILL
Assistant Director, BIML

The Secretariat of OIML TC 9/SC 2 *Automatic weighing instruments* hosted a meeting of this Subcommittee on 4 and 5 February 2009 at the NWML, Teddington, UK.

Peter Mason, NWML's Chief Executive welcomed participants and underlined the UK's commitment to the work of the OIML. Expressing his support for the work of TC 9/SC 2, he noted that this was the first time the group had met for four years.

Despite the fact that the meeting was taking place in the week in which the UK experienced the worst snow it had seen for 18 years, twelve P-members were present: Australia, Austria, Brazil, Czech Republic, Denmark, France, The Netherlands, South Africa, Sweden, Switzerland, UK and the USA. Ian Dunmill was also present representing the BIML.

Morayo Awosola of the TC 9/SC 2 Secretariat introduced the comments which members had made on the First Committee Draft revision of R 50-1 *Continuous totalizing automatic weighing instruments (belt weighers). Part 1: Metrological and technical requirements* - *Tests* and the meeting proceeded to consider questions raised by these comments. Some of the main subjects of discussion were:

New accuracy class 0.2

It was decided to allow this new class to allow for technological advances since the last edition of R 50.

New device: "Belt profile correction device"

Following a proposal from Australia, the principle of adding this new device was approved. This is a new facility which stores in memory a profile of the belt, thus permitting inconsistencies in belt thickness to be compensated for at any point in a belt revolution.

Security and sealing

There is to be a complete review of the structure of these sections after identifying what needs to be secured and what form of securing is needed.

Durability testing

Proposals from Australia, Denmark, France, The Netherlands, Poland and the USA were discussed.

A Working Group was set up to look at the subject, consisting of Australia (chair), the USA and Sweden, which will develop a proposal by 15 March. This will then be distributed to P-members for comment and vote. The outcome of this vote will be then be included in the Second Committee Draft (2CD).

Families/modules of instruments

The USA wanted to add these concept to the Recommendation in line with the requirements of the OIML Certificate System. A Working Group was set up consisting of the USA (chair), The Netherlands and Denmark, which will develop a proposal by the end of March. This will then be distributed to P-members for comment and vote. The outcome of this vote will be then be included in the second Committee Draft.

Terminology and references

The Secretariat will attempt to update and harmonize references to standards and severity levels for EMC tests, etc. It will also correct references to the *International vocabulary of basic and general terms in metrology* (VIM), the use of symbols, etc. and add an index of terms defined in the Recommendations (as already exists in OIML R 76).

The Second Committee Draft will be circulated later this year. ■

OIML Certificate System:

Certificates registered 2008.11–2009.02

Up to date information (including B 3): www.oiml.org

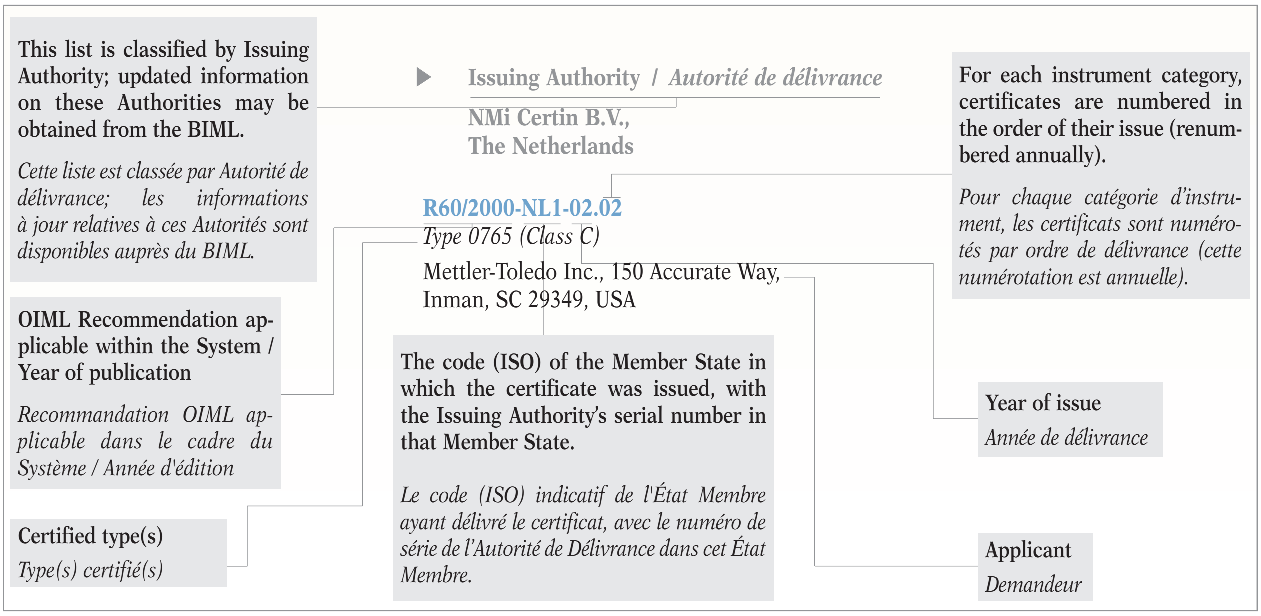
The *OIML Certificate System for Measuring Instruments* was introduced in 1991 to facilitate administrative procedures and lower costs associated with the international trade of measuring instruments subject to legal requirements.

The System provides the possibility for a manufacturer to obtain an OIML Certificate and a test report indicating that a given instrument type complies with the requirements of relevant OIML International Recommendations.

Certificates are delivered by OIML Member States that have established one or several Issuing Authorities responsible for processing applications by manufacturers wishing to have their instrument types certified.

The rules and conditions for the application, issuing and use of OIML Certificates are included in the 2003 edition of OIML B 3 *OIML Certificate System for Measuring Instruments.*

OIML Certificates are accepted by national metrology services on a voluntary basis, and as the climate for mutual confidence and recognition of test results develops between OIML Members, the OIML Certificate System serves to simplify the type approval process for manufacturers and metrology authorities by eliminating costly duplication of application and test procedures.



Système de Certificats OIML:

Certificats enregistrés 2008.11–2009.02

Informations à jour (y compris le B 3): www.oiml.org

Le *Système de Certificats OIML pour les Instruments de Mesure* a été introduit en 1991 afin de faciliter les procédures administratives et d'abaisser les coûts liés au commerce international des instruments de mesure soumis aux exigences légales.

Le Système permet à un constructeur d'obtenir un certificat OIML et un rapport d'essai indiquant qu'un type d'instrument satisfait aux exigences des Recommandations OIML applicables.

Les certificats sont délivrés par les États Membres de l'OIML, qui ont établi une ou plusieurs autorités de délivrance responsables du traitement des demandes présentées par des constructeurs souhaitant voir certifier leurs types d'instruments.

Les règles et conditions pour la demande, la délivrance et l'utilisation de Certificats OIML sont définies dans l'édition 2003 de la Publication B 3 *Système de Certificats OIML pour les Instruments de Mesure.*

Les services nationaux de métrologie légale peuvent accepter les certificats sur une base volontaire; avec le développement entre Membres OIML d'un climat de confiance mutuelle et de reconnaissance des résultats d'essais, le Système simplifie les processus d'approbation de type pour les constructeurs et les autorités métrologiques par l'élimination des répétitions coûteuses dans les procédures de demande et d'essai.

INSTRUCTIONS CATEGORY

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

R 49 (2006)

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

Office Fédéral de Métrologie METAS, Switzerland

R049/2006-CH1-2008.04
Ultrasonic water meter intended for the metering of cold water (T30) - Type: UW50
Landis + Gyr GmbH, Humboldstrasse 64, D-90459 Nürnberg, Germany

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

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

R049/2006-FR2-2008.02 Rev. 3
Electronic cold potable water meter - Type: CZ 3000 S or D
Contazara S.A, Carretera Castellon km 5.5, E-50720 Sarragosse, Spain

R049/2006-FR2-2008.05 Rev. 1
Electronic water meter Contazara - Type: CZ-SJ intended for the metering of cold potable water
Contazara S.A, Carretera Castellon km 5.5, E-50720 Sarragosse, Spain

R049/2006-FR2-2009.01
Compteurs d'eau type 171 A
Hydrometer GmbH, Industriestrasse 13, D-91522 Ansbach, Germany

R049/2006-FR2-2009.06
Single jet water meter ACTARIS - Type: TU1M DN25, 32
Actaris, 11, Boulevard Pasteur, F-67500 Haguenau, France

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

National Weights and Measures Laboratory (NWML), United Kingdom

R049/2006-GB1-2008.01
V100, V110, V200 cold water meters
Elster Metering Ltd., Pondwicks Road, Luton LU1 3LJ, Bedfordshire, United Kingdom

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 Weights and Measures Laboratory (NWML), United Kingdom

R051/1996-GB1-2008.02
LI-700 (weight/weight-price labeller) - CWL-700 (checkweigher)
Digi Europe Limited, Digi House, Rookwood Way, Haverhill CB9 8DG, Suffolk, United Kingdom

R051/2006-GB1-2008.01 Rev. 2
CW3 Checkweigher
Loma Systems Group and ITW Group, Southwood GU14 0NY, Farnborough, Hampshire, United Kingdom

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

NMi Certin B.V., The Netherlands

R051/2006-NL1-2008.01
Automatic catchweighing instrument - Type: AW-4600CPR-...
Teraoka Seiko Co., Ltd., 13-12 Kugahara, 5-Chome, Ohta-ku 146-8580, Tokyo, Japan

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

Physikalisch-Technische Bundesanstalt (PTB), Germany

R051/2006-DE1-2008.04
Automatic catchweigher mounted on a vehicle (e.g. front end loader, fork lifter) - Type: pSeries
Pfreundt GmbH & Co. KG, Ramsdorfer Straße 10, D-46354 Südlohn, Germany

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*

NMi Certin B.V.,
The Netherlands

R060/2000-NL1-2003.09 Rev. 1
Type: 1242 - Fraction: $P_i = 0.7$ *- Temperature range –10 °C/40 °C*
Vishay-Transducers, 5 Hazoran Street, New Industrial, IL-42506 Netanya, Israel

R060/2000-NL1-2006.09 Rev. 1
Type: DC 285 and CPFN-A - Fraction: $P_i = 0.8$ *- Temperature range –10 °C/+40 °C*
ARPEGE MASTER-K, 38 Avenue des Frères Montgolfier, BP 186, F-69686 Chassieu Cedex, France

R060/2000-NL1-2008.04
A bending beam load cell - Type: SP4
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, D-64293 Darmstadt, Germany

R060/2000-NL1-2008.05
A bending beam load cell - Type: P..I
Laumas Elettronica S.r.l., Via Primo Maggio n.6, I-43030 Basiicanova Parma, Italy

R060/2000-NL1-2008.11
A single point load cell - Type: MT1022-....
Mettler-Toledo (Changzhou) Precision Instruments Ltd., 5 Middel HuaShan Road, Sanjing Industrial Park, ChangZhou, Jiangsu, P.R. China

Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R060/2000-DE1-2005.02 Rev. 1
Strain gauge shear beam load cell - Type: TS5...
Gicam S.N.C Di Carrara Danilo & Co., L.go C. Battisti, 9, Piazza XI Febbraio, 2, I-22015 Gravedona (CO), Italy

R060/2000-DE1-2008.01
Strain gauge single point load cell - Type: PW4...
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, D-64293 Darmstadt, Germany

R060/2000-DE1-2008.04
Load cell. Strain gauge double bending beam load cell - Type: Z6F..
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, D-64293 Darmstadt, Germany

R060/2000-DE1-2008.05
Load cell. Strain gauge single point load cell - Type: HLCA...; HLCB...; HLCF...
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, D-64293 Darmstadt, Germany

R060/2000-DE1-2008.11
Load cell. Strain gauge compression load cell for weighbridges - Type: PR6221/..
Sartorius Mechatronics T&H GmbH, Meiendorfer Strasse 205, D-22145 Hambourg, Germany

R060/2000-DE1-2008.12
Load cell. Strain gauge single point load cell - Type: PC60
Flintec GmbH, Bemannsbruch 9, D-74909 Meckesheim, Germany

R060/2000-DE1-2008.14
Load Cell - Digital strain gauge weighbridge load cell
Sartorius Mechatronics T&H GmbH, Meiendorfer Strasse 205, D-22145 Hambourg, Germany

Issuing Authority / *Autorité de délivrance*

DANAK The Danish Accreditation and Metrology Fund, Denmark

R060/2000-DK1-2008.01 Rev. 1
Single point, strain gauge load cell - Type: SSP
ESIT Electronik Sistemler Imalat ve Ticaret Ltd. Sirketi, Nisantepe Mah. Fabrikalar Sk. N°:8, Alemdag, Umraniye, TR-3494 Istanbul, Turkey

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic gravimetric filling instruments
Doseuses pondérales à fonctionnement automatique

R 61 (1996)

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R061/1996-DE1-2004.03 Rev. 2
Automatic gravimetric filling instrument - Type: SIWAREX FTA-...
Siemens AG, Östliche Rheinbrücken Strasse 50, D-76187 Karlsruhe, Germany

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 Weights and Measures Laboratory (NWML), United Kingdom

R076/1992-GB1-2004.07 Rev. 1
IX series
Avery Berkel, Foundry Lane, West Midlands B66 2LP, Smethwick, Warley, United Kingdom

R076/1992-GB1-2004.11 Rev. 2
Avery Berkel M2 1xx series
Avery Berkel, Foundry Lane, West Midlands B66 2LP, Smethwick, Warley, United Kingdom

R076/1992-GB1-2007.07 Rev. 1
Huntleigh Healthcare Enterprise 9000 or Enterprise 9100 hospital bed with weighing facility
Huntleigh Healthcare Ltd., Unit 3 - Trident Drive, Britannia Park - Wednesbury WS10 7XB, West Midlands, United Kingdom

R076/1992-GB1-2008.07
Non-automatic weighing instrument comprising the Torrey PI & WI Electronic weight indicators connected to a compatible R60 load cell.
Fabricantes De Basculas Torrey S.A. De C.V., Los Andes 605, Col. Coyoacan, Monterrey, N.L., C.P. 64510 Mexico, Mexico

R076/1992-GB1-2008.09
LI-700 (weight/weight-price labeller)
Digi Europe Limited, Digi House, Rookwood Way, Haverhill CB9 8DG, Suffolk, United Kingdom

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R076/1992-NL1-2008.07
Non-automatic weighing instrument - Type: UHRS
Grupo Epelsa, S.L., Ctra. Sta. Cruz de Calafell, 35 km. 9,400, Sant Boi de Llobregat, E-08830 Sant Boi de Llobregat - Barcelona, Spain

R076/1992-NL1-2008.11
Non-automatic weighing instrument - Family of type: LP-25..
Dibal S.A., Astinze Kalea, 24 Pol. Ind. Neinver, E-48160 Derio (Bilbao-Vizcaya), Spain

R076/1992-NL1-2008.12
Non-automatic weighing instrument - Type: BBK4... and VIPER...
Mettler-Toledo (Albstadt) GmbH, Unter dem Malesfelden 34, D-72458 Albstadt, Germany

R076/1992-NL1-2008.19
Non-automatic weighing instrument - Type: AP-...
Snowrex International Co., Ltd., 2F No. 9, Lane 50, Sec. 3, Nan-Kang Road, Taipei, Chinese Taipei

R076/1992-NL1-2008.36
Non-automatic weighing instrument - Type: FPM-PL60, FPM-PL61, FPM-PL62,
Fook Tin Technologies Ltd., 4/F Eastern Center, 1065 King's Road, Quarry Bay, Hong Kong, Hong Kong

R076/1992-NL1-2008.37
Non-automatic weighing instrument - Type: CBS-1000/CS-1000
Dibal S.A., Astinze Kalea, 24 Pol. Ind. Neinver, E-48160 Derio (Bilbao-Vizcaya), Spain

R076/1992-NL1-2008.38
Non-automatic weighing instrument - Type: DS-781, DS-782
Shanghai Teraoka Electronic Co., Ltd., Tinglin Industry Developmental Zone, Jin Shan District, 201505 Shanghai, P.R. China

R076/1992-NL1-2008.39
Non-automatic weighing instrument - Type: DS-671(II)(H)
Shanghai Teraoka Electronic Co., Ltd., Tinglin Industry Developmental Zone, Jin Shan District, 201505 Shanghai, P.R. China

R076/1992-NL1-2008.40
Non-automatic weighing instrument - Type: DS-520(II).../DS-530(II)...
Shanghai Teraoka Electronic Co., Ltd., Tinglin Industry Developmental Zone, Jin Shan District, 201505 Shanghai, P.R. China

R076/1992-NL1-2008.41
Non-automatic weighing instrument - Family of type: CL5000 Series
CAS Corporation, # 19 Kanap-ri, Gwangjuk-Myoun, Yangju-Si, 482-841 Gyeonggi-Do, Korea (R.)

R076/1992-NL1-2008.42
Non-automatic weighing instrument - Type: WBW ..M / WBZ ..
Adam Equipment Co. Ltd., Bond Avenue, Denbigh East Industrial Estate, Milton Keynes MK1 1SW, United Kingdom

R076/1992-NL1-2008.43
Non-automatic weighing instrument - Type: DS-781, DS-782
Shanghai Teraoka Electronic Co., Ltd., Tinglin Industry Developmental Zone, Jin Shan District, 201505 Shanghai, P.R. China

R076/1992-NL1-2008.44
Non-automatic weighing instrument - Type: DS-620
Shanghai Teraoka Electronic Co., Ltd., Tinglin Industry Developmental Zone, Jin Shan District, 201505 Shanghai, P.R. China

R076/1992-NL1-2008.45
Non-automatic weighing instrument - Type: WX series
Mettler-Toledo GmbH, Im Langacher, CH-8606 Greifensee, Switzerland

R076/1992-NL1-2008.46
Non-automatic weighing instrument - Type: 8442-F610
Mettler-Toledo (Changzhou) Measurement Technology Ltd., N° 111, West Tai Hu Road, ChangZhou XinBei District, CN-213125 Jiangsu, P.R. China

▶ **Issuing Authority / *Autorité de délivrance***
DANAK The Danish Accreditation and Metrology Fund, Denmark

R076/1992-DK1-2008.02
Non-automatic weighing instrument - Type: 225
Cardinal Scale Manufacturing Co., 203 East Daugherty St., P.O. Box 151, MO 64870 Missouri, Webb City, Missouri, United States

R076/1992-DK1-2008.03
Non-automatic weighing instrument - Type: 825
Cardinal Scale Manufacturing Co., 203 East Daugherty St., P.O. Box 151, MO 64870 Missouri, Webb City, Missouri, United States

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***
NMi Certin B.V., The Netherlands

R076/2006-NL1-2009.02
Non-automatic weighing instrument - Type: 752KG, 753KG, 559KG or 597KG
Transcell Technology Inc., 975 Deerfield, Park Way, 60089 Illinois, Buffalo Grove, United States

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R076/2006-DE1-2008.04
Nonautomatic electromechanical weighing instrument with or without lever system also as a multi-interval or as a multiple range instrument

Sartorius A.G., Weender Landstraße 94-108, D-37075 Göttingen, Germany

R076/2006-DE1-2008.05
Nonautomatic electromechanical weighing instrument for direct sales to the public - Type: K...

Bizerba GmbH & Co. KG, Wilhelm-Kraut-Straße 65, D-72336 Balingen, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Discontinuous totalizing automatic weighing instruments
Instruments de pesage totalisateurs discontinus à fonctionnement automatique

R 107 (1997)

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R107/1997-DE1-2004.02 Rev. 2
Automatic discontinuous totalising weighing instrument - Type: SIWAREX FTA

Siemens AG, Östliche Rheinbrücken Strasse 50, D-76187 Karlsruhe, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Multi-dimensional measuring instruments
Instruments de mesure multidimensionnels

R 129 (2000)

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R129/2000-DE1-2009.01
Multi-dimensional measuring instrument - Type: VIPAC D1-BCLS

Vitronic Dr.-Ing. Stein Bildverarbeitungssysteme GmbH, Hasengartenstrasse 14, D-65189 Wiesbaden, Germany

R129/2000-DE1-2009.02
Multi-dimensional measuring instrument - Type: VIPAC D2-BNLS

Vitronic Dr.-Ing. Stein Bildverarbeitungssysteme GmbH, Hasengartenstrasse 14, D-65189 Wiesbaden, Germany

OIML Certificates, Issuing Authorities, Categories, Recipients:

www.oiml.org

OIML CERTIFICATE SYSTEM

List of OIML Issuing Authorities (by Country)

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 January 2009 issue of the Bulletin are marked in red.

AUSTRALIA

AU1 - National Measurement Institute	R 49	R 50	R 51	R 60	R 76	R 85
	R 106	R 107	R 117/118	R 126	R 129	

AUSTRIA

AT1 - Bundesamt für Eich- und Vermessungswesen	R 50	R 51	R 58	R 61	R 76	R 85
	R 88	R 97	R 98	R 102	R 104	R 106
	R 107	R 110	R 114	R 115	R 117/118	

BELGIUM

BE1 - Metrology Division	R 76	R 97	R 98

BRAZIL

BR1 - Instituto Nacional de Metrologia, Normalização e Qualidade Industrial	R 76

BULGARIA

BG1 - State Agency for Metrology and Technical Surveillance	R 76	R 98

CHINA

CN1 - State General Administration for Quality Supervision and Inspection and Quarantine	R 60	R 76	R 97	R 98

CZECH REPUBLIC

CZ1 - Czech Metrology Institute	R 49	R 76	R 81	R 85	R 105	R 117/118

DENMARK

DK1 - The Danish Accreditation and Metrology Fund	R 50	R 51	R 60	R 61	R 76	R 98
	R 105	R 106	R 107	R 117/118	R 129	
DK2 - FORCE Technology, FORCE-Dantest CERT	R 49					

FINLAND

FI1 - Inspecta Oy	R 50	R 51	R 60	R 61	R 76	R 85
	R 106	R 107	R 117/118			

FRANCE

FR1 - Bureau de la Métrologie	*All activities and responsibilities were transferred to FR2 in 2003*				
FR2 - Laboratoire National de Métrologie et d'Essais	R 31	R 49	R 50	R 51	R 58
	R 60	R 61	R 76	R 85	R 88
	R 97	R 98	R 102	R 105	R 106
	R 107	R 110	R 114	R 115	R 117/118
	R 126	R 129			

GERMANY

DE1 - Physikalisch-Technische Bundesanstalt (PTB)	R 16	R 31	R 49	R 50	R 51
	R 58	R 60	R 61	R 76	**R 85**
	R 88	R 97	R 98	**R 99**	R 102
	R 104	R 105	R 106	R 107	R 110
	R 114	R 115	R 117/118	R 126	R 128
	R 129	R 133	R 136		

HUNGARY

HU1 - Országos Mérésügyi Hivatal	R 76

JAPAN

JP1 - National Metrology Institute of Japan	R 60	R 76	R 115	R 117/118

KOREA (R.)

KR1 - Korean Agency for Technology and Standards	R 76

THE NETHERLANDS

NL1 - NMi Certin B.V.	R 21	R 31	R 49	R 50	R 51
	R 60	R 61	R 76	R 81	R 85
	R 97	R 105	R 106	R 107	R 117/118
	R 126	R 129	R 134		

NEW ZEALAND

NZ1 - Ministry of Consumer Affairs, Measurement and Product Safety Service	R 76

NORWAY

NO1 - Norwegian Metrology Service	R 50	R 51	R 61	R 76	R 105
	R 106	R 107	R 117/118	R 129	

POLAND

PL1 - Central Office of Measures	R 76	R 98	R 102

ROMANIA

RO1 - Romanian Bureau of Legal Metrology	R 97	R 98	R 110	R 114	R 115

RUSSIAN FEDERATION

RU1 - Russian Research Institute for Metrological Service	R 31	R 50	R 51	R 58	R 60
	R 61	R 76	R 85	R 88	R 93
	R 97	R 98	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	

SLOVAKIA

SK1 - Slovak Legal Metrology (Banska Bystrica)	R 49	R 76	R 117/118

SLOVENIA

SI1 - Metrology Institute of the Republic of Slovenia	R 76

SPAIN

ES1 - Centro Español de Metrología	R 51	R 60	R 61	R 76	R 97
	R 98	R 126			

SWEDEN

SE1 - Swedish National Testing and Research Institute AB	R 50	R 51	R 60	R 61	R 76
	R 85	R 98	R 106	R 107	R 117/118

SWITZERLAND

CH1 - Federal Office of Metrology METAS	R 16	R 31	R 49	R 50	R 51
	R 60	R 61	R 76	R 97	R 98
	R 105	R 106	R 107	R 117/118	

UNITED KINGDOM

GB1 - National Weights and Measures Laboratory	R 49	R 50	R 51	R 60	R 61
	R 76	R 85	R 98	R 105	R 106
	R 107	R 117/118	R 129	R 134	
GB2 - National Physical Laboratory	R 97				

UNITED STATES

US1 - NCWM, Inc.	R 60	R 76

VIETNAM

VN1 - Directorate for Standards and Quality (STAMEQ)	R 76

OIML Seminar

Smart meters

2–5 June 2009, Brijuni, Croatia

In many economies over the past ten years or so, utility companies and the authorities have considered the introduction of so-called "smart meters". In a number of cases trials have been set up and decisions have been made to roll-out smart meters in whole networks and sometimes even nationwide.

Such decisions vary from stakeholder to stakeholder: the authorities are under the obligation to ensure that energy consumption is reduced, and utility companies are constantly looking for ways to improve efficiency, reduce costs and increase their competitiveness.

Business cases underpinning the decisions to roll-out smart meters take account of costs and benefits for both the utility companies and the consumers, and generally mention issues such as the price of new meters, the cost of replacing existing meters, the benefits of employing new technologies, etc.

The authorities are trying to deal with these developments by implementing regulations that take into account the additional functionalities offered by such new technologies.

In many countries, utility meters are traditionally under legal metrological control. The OIML has published Recommendations for water meters, heat meters, gas meters and electricity meters that serve as international standards (model regulations) for national legislation. The OIML has developed a horizontal document on *"General requirements for software controlled measuring instruments"* (OIML D 31:2008).

The BIML is organizing a Seminar to bring together all those involved in the legal metrological aspects of smart metering: manufacturers, users (utility companies and consumers), national and regional authorities, and conformity assessment bodies, plus of course the Secretariats of the relevant OIML Technical Committees and Subcommittees.

The purpose of the Seminar is to take note of recent developments in smart metering (technologies and regulations, experience and lessons learned) and to investigate the impact on the international harmonization of legal metrological requirements for utility meters.

As well as offering a very diversified series of presentations, the aim of the Seminar is also to produce:

- draft terms and definitions relevant to smart meters and smart metering, for use in legal metrology;
- a list of additional functionalities that should be subject to harmonized legal requirements;
- suggestions for the inclusion of new requirements in existing or new OIML publications; and
- a draft action plan for the relevant OIML Technical Committees and Subcommittees.

The BIML has set up a dedicated web site on which participants will find details of the Seminar program, registration information and background information prior to the Seminar. Presentations given and the results of discussions will also be published on the site after the Seminar has taken place.

Further information: Willem Kool (willem.kool@oiml.org)

Registration now open

www.oiml.org/updates/smart_meters.html

14TH INTERNATIONAL CONGRESS OF METROLOGY

22–25 June 2009

14EME CONGRES INTERNATIONAL DE METROLOGIE

22–25 juin 2009

Paris, France

www.metrologie2009.com

Messtechnik …

Full programme and information:

www.metrologie2009.com/index_en.php

info@cfmetrologie.com

Information et programme complet :

www.metrologie2009.com

Full Programme available now!

What if the time had come to think differently in today's crisis?

What if the measurement tool was one of the answers for any decision-maker in terms of quality, time and cost issues?

From June 22–25, **Paris** will have the great pleasure to host the 14th International Congress of Metrology, a **unique international event in Europe in the measurement field.**

In today's environment, the question of **measurement as a potential leverage** more than ever deserves the full attention of professionals in companies, laboratories and bodies, measuring instrument manufacturers and users, quality officers, managers, teachers, researchers, etc.

This major world metrology forum is the opportunity for participants to find **new practical solutions** that are easy to implement within their organizations and that meet the needs of their production and research processes.

In addition to the 180 conferences and the technical visits to companies, six industry round tables will focus on the following issues:

- What is at stake for metrology in the health field,
- Metrology and the reduction of greenhouse effect gas emissions,
- Metrology and industrial performance,
- Industrial temperatures and new materials,
- Accreditation, economic and strategic issues,
- Wireless measurements in the industrial environment.

Two leading companies are major sponsors of the event: **Stork Intermes** – provider of calibration and materials testing services and **Hexagon Metrology** – world leader in high performance products and instruments.

The trade exhibition, which will show the latest technical advances with about 90 exhibitors, is already 60 % booked up. Among the exhibitors are Alicona Imaging, E+E elektronik, Endress & Hauser, Isotech, Krohne, Mettler Toledo, Nikon, Renishaw, Sartorius, Testo Industrials Service,

Final reminder

Dernier rappel

Le Programme est en ligne !

Et s'il était temps de penser différemment pendant la crise ?

Et si l'outil de mesure constituait pour les décideurs une des solutions en terme de gain de qualité, de temps et de coûts ?

C'est cet indispensable débat qui est ouvert à l'occasion de ce Congrès, plus que jamais le lieu pour progresser : un carrefour d'échanges entre des professionnels confrontés à la maîtrise de la mesure en entreprise ou laboratoire, des constructeurs et utilisateurs d'appareils de mesures, des responsables qualité, des managers et décideurs, des enseignants.

Cette manifestation à vocation industrielle et technique sera ainsi l'occasion pour chacun de trouver des solutions concrètes, adaptées à ses préoccupations et faciles à mettre en place.

Car une métrologie intelligente et pratique, pensée en amont de la production, s'avère rapidement essentielle à la performance des entreprises.

Des conférences et des visites techniques en entreprise sont programmées, ainsi que six tables rondes industrielles sur les préoccupations suivantes :

- Enjeux de la métrologie pour la santé,
- Métrologie et réduction des émissions de gaz à effet de serre,
- Métrologie et performances de l'entreprise,
- Températures industrielles et nouveaux matériaux,
- Accréditation, enjeux économiques et stratégiques,
- Perspectives des mesures sans fils en milieu industriel.

Seule manifestation de cette envergure en Europe, le Congrès est organisé par le Collège Français de Métrologie en partenariat avec EA, Euramet, le BIPM, l'OIML et le NPL pour l'ouverture internationale et des utilisateurs et centres de compétences techniques : Eurocopter-Groupe EADS, Renault, Acac, BEA Métrologie, Cetiat, Cetim, IMQ, INSA de Lyon, LNE.

Le Congrès 2009 est soutenu par des industriels de premier rang du secteur : **Stork Intermes**, prestataire de services en étalonnage et essais de matériaux, et **Hexagon Metrology**, leader mondial sur le marché des produits et instrumentations de hautes performances. Endress & Hauser et Trescal contribuent aussi à l'événement.

L'exposition présente des nouveautés techniques autour de 90 stands dont près de 60 % sont déjà réservés. Parmi les exposants : Alicona Imaging, AOIP, Delta Mu, E+E elektronik, Endress & Hauser, Felix Informatique, Isotech, Krohne, MB Electronique, Mettler Toledo, Nikon, Renishaw, Sartorius, Symétrie, Testo Industrial Service, Trescal, Werth

The OIML is pleased to welcome the following new

CIML Members

- **Republic of Kenya:**
  Mr. Salesio Paul Njiru
- **Republic of Korea:**
  Mr. Iksoo Kim
- **Monaco:**
  Mr. Philippe Antognelli
- **Turkey:**
  Mr. Mustafa Kasal

OIML Meetings

5–8 May 2009, Douai, France

TC/SC Secretariat Training - Second Session

11–15 May 2009, Ottawa, Canada

OIML TC 8/SC 5 - ISO TC 30/SC 7

2–5 June 2009, Veliki Brijun Island, Croatia

OIML Seminar on smart meters

17, 18 and 19 June 2009, METAS, Switzerland

Combined R 49/R 60/R 76 CPR Meeting

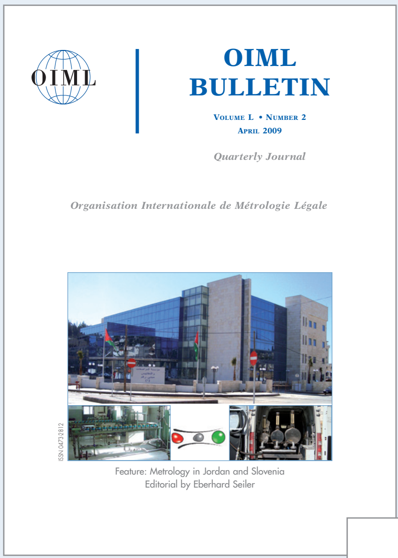
Committee Drafts

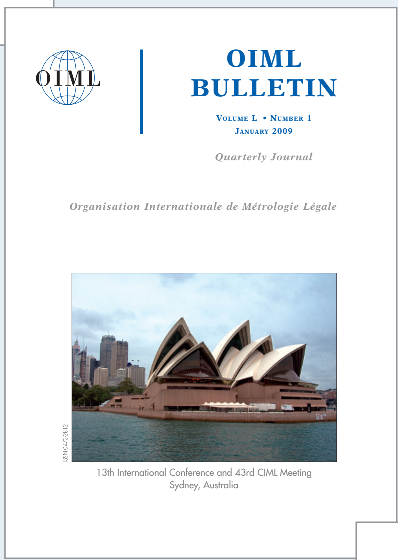
Received by the BIML, 2008.11 – 2009.03

Revision D 16: Principles of assurance of metrological control	E	3 CD	TC 3/SC 2	CZ
Revision R 126: Breath alcohol analyzers	E	5 CD	TC 17/SC 7	FR
Revision R 59: Moisture meters for cereal grains and oilseeds	E	5 CD	TC 17/SC 1	CN+US

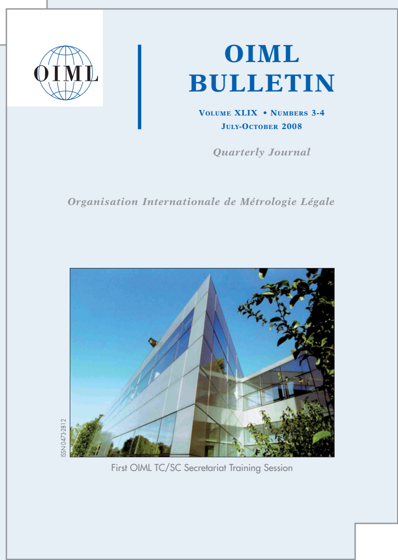
Call for papers

OIML Members
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.



The **OIML Bulletin** is a forum for the publication of technical papers and diverse articles addressing metrological advances in trade, health, the environment and safety - fields in which the credibility of measurement remains a challenging priority. The Editors of the Bulletin encourage the submission of articles covering topics such as national, regional and international activities in legal metrology and related fields, evaluation procedures, accreditation and certification, and measuring techniques and instrumentation. Authors are requested to submit:

- a titled, typed manuscript in Word or WordPerfect either on disk or (preferably) by e-mail;
- 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.

Note: Electronic images should be minimum 150 dpi, preferably 300 dpi.

Papers selected for publication will be remunerated at the rate of 23 € per printed page, provided that they have not already been published in other journals. The Editors reserve the right to edit contributions for style, space and linguistic reasons and author approval is always obtained prior to publication. The Editors decline responsibility for any claims made in articles, which are the sole responsibility of the authors concerned. Please send submissions to:

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