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Peter Mason's final report to the CIML before stepping down as President

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EDITOR: Chris Pulham

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8 RUE ROBERT SCHUMAN
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11 RUE TURGOT – 75009 PARIS – FRANCE
TEL: 33 (0)1 4878 1282
FAX: 33 (0)1 4282 1727
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■ Editorial

PETER MASON
PAST CIML PRESIDENT

My time as CIML President

I have been very aware over the past year that it was to be my last as CIML President. However, rather than spending my time looking back over the past seven years since I was elected in 2010, I mostly found myself heavily engaged in various projects, all of which concerned the future development of our Organisation and all of which finally came to a conclusion at the CIML meeting held in Colombia earlier this month.

The consensus that the OIML Certification System will come into force on 1 January 2018 is a really significant step forward for the OIML. We now have a well-structured system for supporting our many Member States who want to introduce modern type approval controls but do not have the facilities to conduct their own testing.

The agreement reached on the revised B 6-1 *Directives for OIML Technical Work* is also important because it brings the rules for preparing and revising our Recommendations and Documents into line with the web-based technology we now have, allowing work to be conducted more quickly and broadening participation. Finally, the adoption of the new Basic Publication B 19 has formalised both the Advisory Group on matters relating to Countries and Economies with Emerging Metrology Systems (CEEMS), and the work programme of items of interest to the CEEMS community.

All of these activities are part of a programme of work which will continue after the end of my term as President, and indeed we will mostly see the benefits over future years.

It is, however, inevitable that I have also spent some time looking back at what has been achieved in the seven years since my election as CIML President. The first few years were devoted to stabilising the financial position, in particular dealing with the potential burden of the pension arrangements, modernising the way in which the Bureau staff were managed, and safeguarding the value of our building in Paris, our principal asset. In the process we were also able to modernise our systems and improve our efficiency, enabling the Bureau to cope with fewer staff while at the same time expanding its role. That efficiency is also becoming evident in the speed with which our technical work is being completed, although there is still a lot more that we can do to improve this.

The strategic approach set out in the revised B 15 *OIML Strategy* has, I believe, also been a success. I feel that our standing among other international organisations has been enhanced and we are now in a much better position to take advantage of the opportunities for co-operation. The place of the Certification System is now much better understood and the radical changes we are about to introduce will further change the way our Organisation is seen.

Finally, I think we have seen really significant changes in how we meet the needs of our Members – including our Corresponding Members – with emerging metrology systems. As a result I am confident that our Organisation can remain relevant in a world which is increasingly globalised and where the resources available to public authorities are under pressure everywhere.

As I said in my final report to the CIML, my time as President was the most satisfying of the 44 years I have been a public servant. I would like to thank everyone in the Legal Metrology community who helped make it so. ■

SPHYGMOMANOMETERS

A more effective approach to the legal metrological control of sphygmo-manometers

Célio H. M. Fraga and Rafael F. Farias
Legal Metrology Directorate
National Institute of Metrology, Quality and Technology (Inmetro), Brazil

1 Introduction

Like any public service, legal metrological control should be capable of resolving clearly identified problems in society, i.e. it must be effective [1].

When this condition is applied to medical measuring instruments, legal metrological control shall contain requirements to prohibit access to instruments whose measurement results can lead to misdiagnoses.

This paper presents a new approach to OIML R 16:2002 *Sphygmomanometers* in order to render it more effective. This subject is very important at the time of writing this article because R 16 is currently under revision.

2 OIML R 16:2002 analysis

OIML R 16 covers those sphygmomanometers that are capable of estimating values of systolic and diastolic blood pressure without human intervention during the measurement process. It presents two types of requirements that must be met: metrological and technical requirements [2].

In the metrological requirements, there are two types of maximum permissible measurement error:

- the first type has a value of ±3 mmHg and is determined by comparing the indication of the sphygmomanometer with the indication of a reference manometer. In this situation, the pressure measured by the sphygmomanometer is termed the static pressure;
- the second error covers the systolic and diastolic estimates performed by the instrument (dynamic pressure) and is determined by clinical investigation. In this situation, the sphygmomanometer must comply with the maximum mean error of ±5 mmHg and an experimental standard deviation of 8 mmHg [2].

The technical requirements define the characteristics that the power supply and the pneumatic system must comply with, and also the aging effects that the sphygmomanometer must comply with [2].

The process to evaluate a new type of sphygmomanometer consists of submitting three samples to the tests described in Annex A of R 16-2 to verify that the instrument fulfills both types of requirements. If one of the three samples fails just one test, then the sphygmomanometer type is not approved [2].

At this point, we note that R 16 does not present a reason for these maximum permissible measurement error values. There is also no information on the relationship between the two types of errors or how they affect the hypertension diagnosis. In the authors' opinion, this lack of information makes it difficult to revise R 16 in line with the real needs of society.

In addition, submitting samples for "pass/fail" tests may result in a chain reaction in the sphygmomanometer measurement error. For example, suppose that for a given reference pressure, a particular instrument has an error of 3 mmHg according to A.2 of R 16-2 and an error of 3 mmHg according to A.12, it would be approved but the measurement error would reach a total of 6 mmHg.

3 New approach to OIML R 16

In order for legal metrological control be effective, it is necessary to first understand how the indication presented by the measuring instrument is actually used. In the case of sphygmomanometers, the main objective is to identify and monitor patients who are diagnosed with hypertension. Basically this process consists of measuring the blood pressure and classifying the result in one of the classes presented in Table 1 [3] (see page 6).

That is, the use of the sphygmomanometer is equivalent to a process of conformity assessment with the following steps:

a) Measurement of a quantity (blood pressure);

b) Comparison of the measurement result with requirements (Table 1);

c) Decision on the action to be taken (medical decision).

Table 1: Blood pressure classification (Values in mmHg)

Class	Systolic	Diastolic
Normal	< 120	< 80
Prehypertension	120 – 139	80 – 89
Hypertension Stage 1	140 – 159	90 – 99
Hypertension Stage 2	≥ 160	≥ 100

Since this process of conformity assessment uses the results of measurements made by an instrument, it is important to consider the influence of the measurement uncertainty in order to render the decision making more effective. The most common way to do this is through the binary decision rule, which consists of establishing a safety margin within each class of Table 1, as shown in Figure 1 [4].

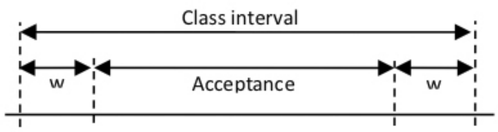


Figure 1: Acceptance interval

Based on industrial practice, the value of the expanded uncertainty, U, associated with the measurement made by the sphygmomanometer, has been adopted as the safety margin, w.

However, in legal metrology it cannot be guaranteed that instrument owners will apply the necessary correction to compensate for the systematic component of a measurement error. Therefore, it is proposed to consider that the safety margin is the sum of U with the highest modulus of the measurement bias (B_{max}), as shown in equation 1:

$$U + |B_{max}| \leq w \tag{1}$$

In conformity assessment, it is considered reasonable that the safety margin has a value less than or equal to 30 % of the span of the tolerance interval. In Table 1, the maximum permissible value for w would be 30 % of the class having the smallest interval [4].

That is, the maximum permissible error for the legal metrological control of sphygmomanometers would be equal to 2.7 mmHg, since it corresponds to 30 % of the difference between the maximum and minimum values of diastolic pressure of the prehypertension class of Table 1.

At this point the first advantage of this proposal can be noted: the direct and clear linking of legal metrological control with the needs of society. Once the international medical community changes the values in Table 1, the maximum permissible measurement error should also be changed. As a consequence, the medical community, which is the main user of the measurement results of a sphygmomanometer, becomes an important player in the elaboration or revision of the Recommendation.

With this in mind, the rest of the Recommendation should present the steps to determine the values of U and B_{max}.

3.1 Determination of *U*

According to most recent good practice, a patient's assessment should be started based on the mean value obtained from at least two blood pressure measurements taken at intervals of 1 to 2 minutes [3]. Thus, the value of U can be obtained from equation 2 [5]:

$$U = k\frac{u}{\sqrt{n}} \tag{2}$$

where u is the combined uncertainty, n is the number of measurements performed and k is the coverage factor. Because the algorithm used by sphygmomanometers to estimate blood pressure is generally not provided to users by the manufacturer, the measurement model becomes unavailable. In this case, the uncertainty u can be determined by equation 3 [6]:

$$u^2 = u_{ref}^2 + s_r^2 + s_L^2 \tag{3}$$

where u_{ref} is the uncertainty obtained from the calibration certificate of the reference, s_r is the repeatability obtained according to ISO 5725-2, and s_L is the result of the combination of several intermediate precisions [7]. Each intermediate precision is represented by an experimental standard deviation that quantifies the influence that only one source exerts on the measurement result of the sphygmomanometer [8].

Thus, the tests defined in R 16-2 are no longer "pass/fail" but experiments whose objective is to determine the intermediate precision linked to each factor that influences the measurement result. This means that carrying out all the tests becomes necessary in order to calculate the value of U. This leads to the second advantage of this proposal: compliance with the Recommendation becomes more flexible, since manufacturers can compensate for the influence of one source of uncertainty by the improvement of another source, so that the final result meets the maximum permissible error. Thus, at the end of the evaluation each approved model would have an estimated maximum error, allowing them to be specified by class, as is currently the case for industrial manometers. For example, approved sphygmomanometer models with a maximum error lower than 2 mmHg would be assessed as class B and those with a maximum error less than 1 mmHg, class A.

3.2 Determination of B_{max}

Since there is still no standard that provides a reference blood pressure [9], the B_{max} value can be determined from the mean error of measurement determined in the clinical investigation. In this case, the value of u_{ref} described in equation 3 becomes a combination of the uncertainty of the standard used in the tests and the uncertainty determined from the standard deviation of the error calculated in the clinical investigation.

With this, the result of the clinical investigation is directly related to the other requirements of the Recommendation, which is the third advantage of this proposal. However, during the clinical investigation, the influence quantities already evaluated in the type evaluation must be minimized in order to avoid any redundancy of uncertainties.

3.3 Full model

Based on these considerations, the complete model that this proposal presents to evaluate sphygmomanometers can be represented by equation 4:

$$|B_{IC}|_{max} + k\sqrt{\frac{u_{IC}^2 + u_{ref}^2 + s_L^2 + s_r^2}{n}} \leq 2.7 \qquad (4)$$

where B_{IC} and u_{IC} are, respectively, the mean error and the uncertainty determined from the clinical investigation.

4 Current technical situation

What would be the impact of this new proposal on approved models of sphygmomanometer?

To answer this question, it is necessary to apply the model of equation 4 to sphygmomanometers that have passed all the R 16 requirements. However, most of the requirements of R 16 are a function of the static pressure, by measuring the indication error while the instrument is subjected to influence quantities and, therefore, this component must be added into equation 4. In order to transform this component of the indication error (static pressure) into a blood pressure error (dynamic pressure) an experiment was carried out in which each sphygmomanometer was tested with the arrangement shown in Figure 2. The test consists in introducing a residual static pressure in the instrument during zero adjustment and then obtaining the indication of the arterial pressure using a blood pressure simulator. Using linear regression, the relation between the static and dynamic pressures can be determined.

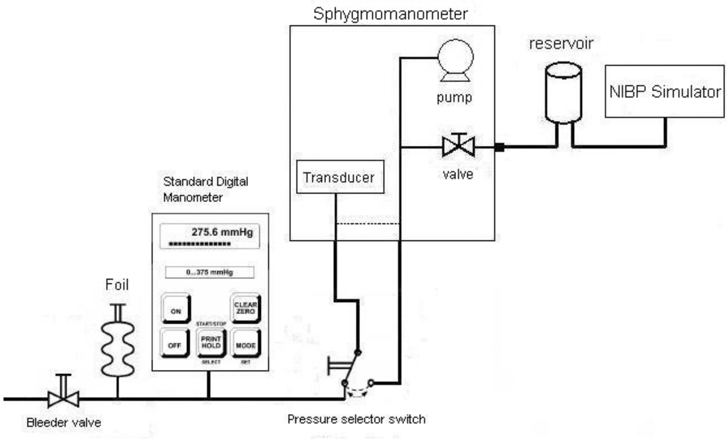


Figure 2: Block diagram of the experiment to determinate the relationship between static and dynamic errors

Equation 5 shows the insertion of this component into equation 4:

$$|B_{IC} + \Delta B_{AM}|_{max} + k\sqrt{\frac{u_{IC}^2 + u_{ref}^2 + s_L^2 + s_r^2}{n}} \leq 2.7 \qquad (5)$$

Thus, the data from the test records of 10 sphygmomanometer models that were type approved by Inmetro were used to calculate equation 5 (with n = 2), generating the results presented in Table 2. The models identified by P1 to P7 refer to models with the cuff applied to the wrist and the models identified by A1 to A4 refer to those with the cuff applied to the arm. The table does not display the P3 data because it was not possible to determine its B_{AM} value. Through the failure of this model it was possible to conclude that it did not perform the zero adjustment when it was switched on, but only in the manometer mode, which indicates that the current procedure should be changed in order to evaluate the zero adjustment before blood pressure measurement. Also with regard to the zero adjustment, it was observed that the A1 model presented a –3 mmHg error over the entire measurement range, which suggests that the transducer is nonlinear in the region close to zero (Figure 3). Since the measuring instrument performs the zero adjustment when it is switched on, there is no point in its measuring interval starting at values greater than zero and be non-linear between zero and this value, resulting in the introduction of a systematic error throughout the range. This problem can be corrected by requiring manufacturers to always start the measuring interval at 0 mmHg.

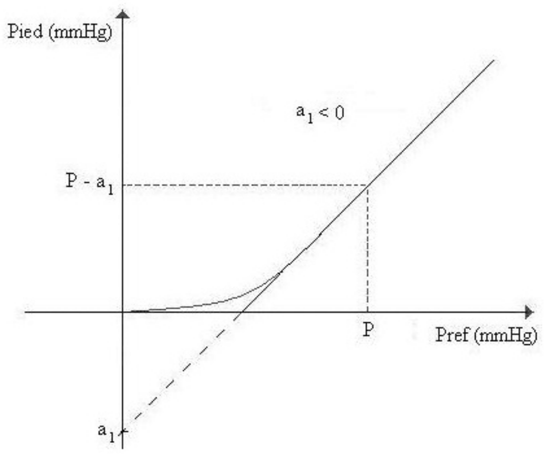


Figure 3: Pressure line indicated by the sphygmomanometer (P_{ied}) versus the pressure indicated by the pressure standard (P_{ref}) with non-linearity in the region close to zero.

Table 2: Implementation of the new approach on approved sphygmomanometers

ID	Systolic / mmHg			Diastolic / mmHg		
	B_{Sys}	U_{sys}	E_{Sys}	B_{Dia}	U_{Dia}	E_{Dia}
P1	–6.75	1.41	**8.2**	–3.71	1.56	**5.3**
P2	–0.79	1.84	**2.6**	2.31	1.84	**4.1**
P4	1.92	1.56	**3.5**	–3.40	1.41	**4.8**
P5	0.09	1.56	**1.6**	–1.74	1.41	**3.2**
P6	0.54	1.48	**2.0**	–3.16	1.48	**4.6**
P7	–2.04	1.70	**3.7**	–3.67	1.98	**5.6**
A1	1.09	2.12	**3.2**	–3.54	1.98	**5.5**
A2	0.16	1.48	**1.6**	0.44	1.56	**2.0**
A3	1.36	1.27	**2.6**	1.96	1.20	**3.2**
A4	–1.56	1.91	**3.5**	–1.97	2.26	**4.2**

Since the sphygmomanometer provides the value of two quantities (systolic and diastolic pressure), it is necessary to apply equation 5 for each one separately. Thus, B_{Sys} and B_{Dia} refer only to the systematic component of equation 5, U_{Sys} and U_{Dia} refer to the aleatory component and E_{Sys} and E_{Dia} refer to the sum of the two components, in the module.

Since the sphygmomanometer should be considered as approved if it meets the criterion of equation 5 for systolic and diastolic pressure simultaneously, it can be seen from Table 2 that only the A2 model would be approved. The other models would be rejected mainly because of the error component (B). This value is influenced by systematic effects and can be reduced if manufacturers revise the sphygmomanometer algorithm with the results of clinical investigation and perform a better adjustment of the calibration curve. To reduce the uncertainty component (U), the main contribution would be to improve the resolution of the display device, currently equal to 1 mmHg.

Thus, the measurement error would comply with the maximum permissible measurement error, because the random components have low values, which corroborates the reputation that this type of sphygmomanometer has when it presents good reproducibility and, therefore, be the most suitable for use in the diagnosis of hypertension [3].

5 Conclusion

This paper presents a new approach to OIML Recommendation R 16 with the objective of making a clear and direct link between its requirements and the use of sphygmomanometers in the diagnosis and treatment of hypertension. The evaluation of the current technology used in this type of instrument indicates that this proposal requires the implementation of improvements in the models but does not establish unreachable requirements. ■

6 References

[1] CONMETRO. Guia de Boas Práticas de Regulamentação.

[2] OIML R 16:2002, *Sphygmomanometers*.

[3] M.A Weber, *et al*. Clinical Practice Guidelines for the Management of Hypertension in the Community A Statement by the American Society of Hypertension and the International Society of Hypertension. Journal of Clinical Hypertension 2014:17, 14-26.

[4] OIML G 1-106:2012, Evaluation of measurement data – The role of measurement uncertainty in conformity assessment.

[5] ISO 10576-1:2003 Statistical methods – Guidelines for the evaluation of conformity with specified requirements – Part 1: General principles

[6] ISO 21748:2010 Guidance for the use of repeatability, reproducibility and trueness estimates in measurement uncertainty estimation.

[7] ISO 5725-2:1994 Accuracy (trueness and precision) of measurement method and results – Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method.

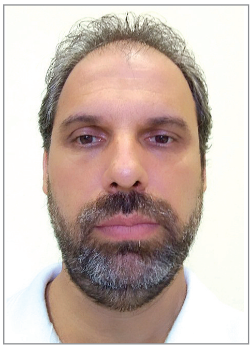
[8] ISO 5725-3:1994 Accuracy (trueness and precision) of measurement method and results – Part 3: Intermediate measures of the precision of a standard measurement method.

[9] J.N Amoore. Oscillometric sphygmomanometers: a critical appraisal of current technology. Blood Pressure Monitoring, v.17, p80-88, 2012.

Note: This paper is the result of the Master Degree dissertations of the two authors, carried out at the National Institute of Metrology, Quality and Technology (Inmetro).

7 The Authors

Célio Henrique de Mattos Fraga



Electronic engineer with experience in biomedical equipment maintenance. Currently working as a researcher for Inmetro.
chfraga@inmetro.gov.br

Rafael Feldmann Farias

Electronic engineer with experience in projects and development of sphygmomanometers. Currently working as a researcher for Inmetro and expert in IEC TC62/SC 62D/JWG7 (sphygmomanometer).
rffarias@inmetro.gov.br

WATER METERS

Investigation of domestic water meters with regard to their measuring stability during installation in communal water supply networks

GUDRUN WENDT, HENNING SCHONLAU, THILO OLDÖRP, DANIEL SCHUMANN, TORSTEN JAHN

PTB, Germany

1 Introduction

Statistical methods are increasingly related to issues of legal metrology. Under OIML TC 3 *Metrological control*, OIML TC 3/SC 4 *Application of statistical methods* has produced a new Draft Document *Surveillance of utility meters in service on the basis of sampling inspections* which at the time of writing this paper has just passed the CIML Preliminary ballot stage. In this context, this article gives some detailed and interesting information about the real measurement behavior of water meters in service.

In Germany, sampling inspections for an extension of the verification period of utility meters have been carried out since 1994. Concerning water meters for instance, more than 7.5 million devices could thus remain in the water supply networks for another (shortened) verification period without being dis-assembled. The basis for the relevant rules had already been stipulated in the middle of the 1980s. Household equipment as well as consumer habits have changed and so currently, a considerable number of water meters (for instance hot water meters, meters in sub-distributions, cartridge meters) are not covered by the existing sampling rules. That is why special investigations, notably of the water meter types excluded up to now, were initiated with the aim of showing whether these types also fulfil the preconditions for an application of sampling inspections.

2 Initial situation

Information on the behavior of a water meter depending on the type, service life, water consumption, water quality and the way water is drawn off is of great interest, both for water utilities and for their customers. Stability of measurement of the installed meters is particularly important because the volume displayed is used as the basis for billing the water. Making generally valid statements in this respect usually requires extensive – and thus expensive – investigations in order to ensure that the results are statistically sound.

In Germany, metrological reliability for the customer is achieved, among other things, by subjecting water meters to mandatory verification [1, 2]. The verification period is currently 6 years for cold water meters and 5 years for hot water meters. After this period has expired, each meter must be removed and replaced by a new one. This represents a considerable overall economic effort which is an additional burden not only for the end-user (as it is added onto the costs of the water consumed), but also for the environment [3]. Although an extension of the verification period is already possible for some of the installed water meters by carrying out special random sampling procedures, this method requires a critical review from today's point of view.

Metrological tests on water meters which were removed from the supply network after their regular verification period had expired were last carried out between 1982 and 1986, based on the Technical Guidelines W20 of PTB [4]. More than 30,000 water meters were then subjected to an accuracy test by state-approved test centers. In accordance with the guidelines, these tests, however, had only been applied to domestic water meters for cold water with maximal flowrates between 3 m^3/h and 20 m^3/h.

In the meantime, not only has the state of the art of water meters been technically enhanced, but the consumption behavior of the users and the technical equipment in households have changed. The overall water consumption of potable water decreases whereas the prices increase. The trend is towards more water meters of smaller sizes and an expansion of sub-distribution measurements. At the same time, numerous new and effective examination methods are available to investigate the measurement behavior of the meters.

A further issue is that a considerable proportion of the meters in the water supply network in Germany was not covered by the former investigations at all. This concerns, in particular, meters in sub-distributions, hot water meters and cartridge meters which have consequently been excluded from sampling inspections up to now. It can be assumed that this is currently the case for more than 20 million meters.

3 Investigation program

Within the scope of a PTB research project together with the water company *Hamburg Wasser GmbH*, a large-scale test was carried out. This test consisted in examining domestic water meters which had been removed from the communal water supply network after their legal verification period had expired. The tests concerned 1,775 meters for cold water installed in "main" water pipes for the supply of houses, 3,588 meters for cold and 2,064 meters for hot water in sub-distributions for individual flats – a total of 7,427 water meters.

This was the first time that statistically exploitable data have been available for water meters in sub-distributions, i.e. including also cartridge meters and hot water meters.

For the tests performed within the scope of this *Hamburg Wasser* large-scale test, meters were selected in areas (see Figure 1) with different potable water qualities which, however, remained stable in those areas over time. Mixed water areas were excluded from the investigations so that it was possible to assign the measurement results to a specific water quality, whose parameters can be retrieved from the potable water analyses that must be carried out on a regular basis.

Contrary to the "usual" test algorithms (such as those applying to verification or already existing sampling inspections of water meters), both the number of test points and the test sequence were altered:

Test flowrates for the large-scale test:

"Upstream": Q_{min}, the lowest flow rate at which the meter is to operate within the maximum permissible errors,

Q_t, the flow rate between the permanent flow rate and the minimum flow rate,

Q_n, the nominal flow rate, and

Q_{max}, the highest flow rate at which the meter is to operate for a short period of time;

"Downstream": Q_{max}, Q_n, Q_t and Q_{min}.

Note: All water meters included in the investigations are characterized by their "old" meter sizes because they had these designations at the moment of their putting into use. Since the measurement series start at Q_{min}, the meter is tested in its "most sensitive" state and the premature flushing out of potential suspended particles is prevented.

The investigations were carried out at the water meter test rigs of the PTB and of the state-approved test center of *Hamburg Wasser*.

Figure 1: Areas of Hamburg's water supply network selected for the large-scale test and warranting constant water qualities over time

4 Investigation results

4.1 Measurement deviations after expiry of the verification period

The measurement deviations determined after the regular verification period had expired were compared with the corresponding maximum permissible errors on verification and in service.

- MPE_{ver}: maximum permissible error on verification

  in the range $Q_t \leq Q \leq Q_{max}$: 2 % for cold water meters and 3 % for hot water meters;

  in the range $Q_{min} \leq Q < Q_t$: 5 % for both types of meters;

- MPE_{serv}: maximum permissible error in service

  in the range $Q_t \leq Q \leq Q_{max}$: 4 % for cold water meters and 6 % for hot water meters;

  in the range $Q_{min} \leq Q < Q_t$: 10 % for both types of meters

All the results are summarized in Tables 1 through 4 (see next page). For additional information, the tables also state the number of meters which stopped during the investigations on the test rig. For these meters, nothing had hinted at any blockages before they were removed from the network. Based on experience, it can be assumed that these blockages were probably caused

Table 1: Cold water meters installed in "main" water pipes for the supply of houses, i.e. water meters which only have been previously admitted to sampling inspections.

Number of meters examined: 1775.

Removed from: Hamburg water supply network; different, but constant over time water qualities; from various manufacturers

	Within MPE_{ver}		Within MPE_{serv}		Outside MPE_{serv}, to the customer's disadvantage	
Test flowrates and test sequence	Q_{min}, Q_t, Q_n, Q_{max}		Q_n, Q_t, Q_{min}		Q_n, Q_t, Q_{min}	
Q_n 2.5: 1667 meters	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	1379	82.7	1620	97.2	5	0.3
Blocked meters	31	1.9	28	1.7		
Q_n 6: 62 meters	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	58	93.5	61	98.4	0	0
Blocked meters	1	1.6	1	1.6		
Q_n 10: 46 meters	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	34	73.9	42	92.3	0	0
Blocked meters	4	8.7	2	4.3		

Table 2: Cold water meters installed in sub-distributions for individual flats.

Number of meters examined: 3631.

Meter size and type: multi-jet cartridge meters Q_n 1.5 from various manufacturers.

Removed from: Hamburg water supply network; different, but constant over time water qualities

	Within MPE_{ver}		Within MPE_{serv}		Outside MPE_{serv}, to the customer's disadvantage	
Test flowrates and test sequence	Q_{min}, Q_t, Q_n, Q_{max}		Q_n, Q_t, Q_{min}		Q_n, Q_t, Q_{min}	
	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	3548	97.7	3605	99.3	0	0
Blocked meters	23	0.6	14	0.4		

Table 3: Hot water meters installed in sub-distributions for individual flats

Number of meters examined: 2064

Meter size and type: multi-jet cartridge meters Q_n 1.5 from various manufacturers

Removed from: Hamburg water supply network; different, but constant over time water qualities

	Within MPE_{ver}		Within MPE_{serv}		Outside MPE_{serv}, to the customer's disadvantage	
Test flowrates and test sequence	Q_{min}, Q_t, Q_n, Q_{max}		Q_n, Q_t, Q_{min}		Q_n, Q_t, Q_{min}	
	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	2041	98.9	2056	99.6	0	0
Blocked meters	11	0.5	5	0.2		

Table 4: Cold water meters installed in sub-distributions for individual flats

Number of meters examined: 112

Meter size and type: multi-jet cartridge meters Q_n 1.5 from various manufacturers

Removed from: Water supply network of the city of XX; different water qualities

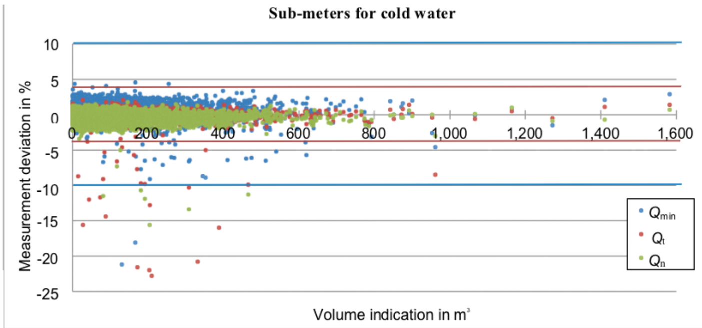
	Within MPE$_{ver}$		Within MPE$_{serv}$		Outside MPE$_{serv}$, to the customer's disadvantage	
Test flowrates and test sequence	Q_{min}, Q_t, Q_n, Q_{max}		Q_n, Q_t, Q_{min}		Q_n, Q_t, Q_{min}	
	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	105	93.8	112	100	0	0
Blocked meters	0	0	0	0		

by incrustations, impurities or other foreign substances which only became loose when the meters were dismantled or transported. As a matter of course, these "blocked" meters are also included in the rows above.

In order to verify the results which, to date, have only been available for the catchment area of *Hamburg Wasser*, the investigations are currently being extended to meters of other suppliers with other water qualities. The initial results obtained in this context confirm the statements to the fullest extent, as the example below shows.

A total of more than 5800 water meters from sub-distributions for individual flats which had previously been excluded from sampling inspections were subjected to the afore-mentioned examinations. Of these meters, 99.4 % still comply with the maximum permissible in-service errors after the verification period has expired. Even when they were outside the maximum permissible in-service errors, none of these meters indicated values which would have been to the end-user's disadvantage.

Because the main objective of the investigations was to find out whether the sampling inspection can be extended to water meters in sub-distributions including, in particular, also hot water and cartridge meters, the following descriptions will concentrate on the results of these types and sizes of water meters called, for convenience only, sub-meters.



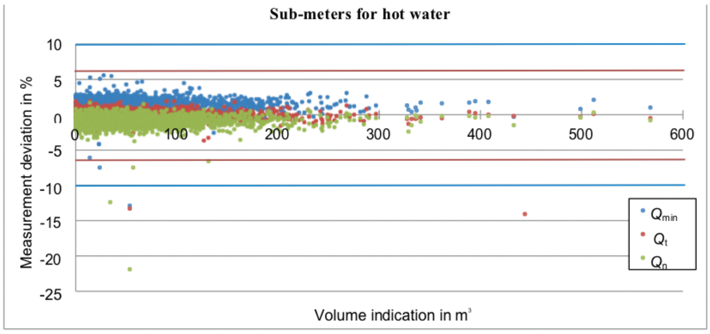


Figure 2: Measurement deviations of the examined meters at the three test flowrates Q_{min}, Q_t and Q_n as a function of the total volume measured during the meter's service life in the network (without "blocked" meters with a measurement deviation of –100 %)

a) for cold water sub-meters

b) for hot water sub-meters

with the maximum permissible in-service errors marked in blue for Q_{min} and in red for Q_t and Q_n

4.2 Measurement behavior depending on the total consumption during the service life of the meter

In addition, the measurement deviations were also analyzed with regard to the reading of each meter after it had been removed from the network. The mean consumption per sub-meter was around 31.5 m^3/year for cold water and 14.0 m^3/year for hot water. A dependence of the measurement behavior on the individual total consumption over the total service life of the meters in the network was not found (as can be seen in Figures 2a and 2b, above).

Table 5: Cold water sub-meters tested in horizontal position
Number of examined meters: 100
Meter size and type: multi-jet cartridge meters Q_n 1.5
Removed from: Water supply network of the city of XX; different water qualities

	Within MPE_{ver}		Within MPE_{serv}		Outside MPE_{serv}, to the customer's disadvantage	
Test flowrates and test sequence	Q_{min}, Q_t, Q_n, Q_{max}		Q_n, Q_t, Q_{min}		Q_n, Q_t, Q_{min}	
	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	93	93	100	100	0	0
Blocked meters	2	2	0	0		

Table 6: Cold water sub-meters tested in vertical position (same meters as in Table 5)
Number of examined meters: 100
Meter size and type: multi-jet cartridge meters Q_n 1.5
Removed from: Water supply network of the city of XX; different water qualities

	Within MPE_{ver}		Within MPE_{serv}		Outside MPE_{serv}, to the customer's disadvantage	
Test flowrates and test sequence	Q_{min}, Q_t, Q_n, Q_{max}		Q_n, Q_t, Q_{min}		Q_n, Q_t, Q_{min}	
	Number	Percentage	Number	Percentage	Number	Percentage
Of all meters	87	87	100	100	0	0
Blocked meters	3	3	0	0		

4.3 Investigation of the differences in the behavior of the meters depending on whether they were fitted horizontally or vertically

A special investigation dealt with the determination of any possible differences in the measurement behavior of the meters depending on whether they were mounted vertically or horizontally. For this purpose, 100 additional meters were used which had been removed with indications between 0 m³ and 3600 m³. They were subjected to the same test sequence as described in Section 2 in both mounting positions – horizontal and vertical. The results are shown in Tables 5 and 6.

Differences in the behavior of the meters in the two mounting positions were only found in the test series beginning with test point Q_{min}. The readouts of all "conspicuous" meters were in the negative range and this was the case only at low flowrates, which suggests sluggishness in the starting range of the meters. Both meters which were blocked when they were mounted horizontally were also blocked when they were mounted vertically.

When the measurements were carried out in the usual test sequence (i.e. not beginning with Q_{min}), all meter readouts were within the maximum permissible **verification** errors.

No significant differences in the measurement results were found between the meters which were mounted vertically and those which were mounted horizontally.

4.4 Additional endurance tests under special measurement conditions

In addition, selected types of meters were subjected to special endurance tests at the PTB's test rig. One of these meters was a multi-jet cartridge water meter Q_n 1.5 which was operated at nearly Q_n over a period of 7 months in total. All the error curves were recorded at regular intervals; the results for Q_{min}, Q_t, Q_n and Q_{max} are compiled in Figure 3 as a function of the total flowrate indicated. A total of 6430 m³ flowed through the meter – which corresponds to more than 200 times

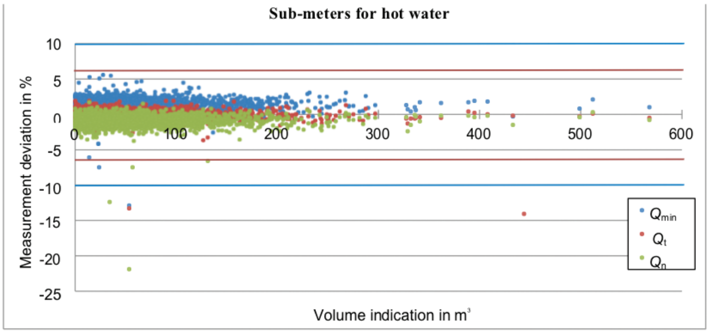


Figure 3: Measurement deviations of a multi-jet cartridge meter Q_n 1.5 as a function of the volume of water flowing through it for two different water qualities, with the maximum permissible in-service errors marked in blue for Q_{min} and in red for Q_t and Q_n

the average consumption determined for Hamburg. Significant tendencies suggesting that the meter behavior has been altered have not been observed for any of the test flowrates considered.

The test conditions were exacerbated after 3720 m^3 by switching from conventional potable water to distilled (i.e. soft) water (water hardness: 0 °dH). The analyses of the large-scale test in Hamburg had led to the assumption that if influences of the water quality on the measurement behavior were to be observed at all, this could be the case with soft water. However, these tendencies were not observed either in Hamburg nor in the tests carried out at the PTB – a dependence of water meters of the investigated types on the quality of **potable** water could not be found.

5 Results from other research projects

To assess the measurement behavior of domestic water meters under practical operational conditions, the results obtained within the scope of another research project, which focused especially on the issue of cartridge meters and was carried out from January 2008 until 2012, should at any rate be taken into account. The reason for this project was the necessity of ensuring that cartridge water meters (which represent the major type of domestic water meters in sub-distributions by far) are considered as water meters, also by the European Measuring Instruments Directive MID [5] and can, thus, still be used as such. The completed measurement program included exhaustive investigations of single- and multi-jet measuring cartridge meters with regard to their behavior under real conditions of use. It was possible to demonstrate that, from a metrological point of view, using this type of meter does not bring about any disadvantages. On the contrary, it was shown that cartridge water meters are nearly insensitive to impurities and deposits of any kind due to their specific design [6].

6 Summary

Given the previous remarks, there are no metrological reasons to exclude domestic water meters installed in sub-distributions (including hot water and cartridge meters) from the sampling inspections as they have been practiced to date for the extension of the verification period. In principle, the procedure laid down in *PTB-Mitteilungen* [7] for the sampling and testing of cold water meters can also be used without changes for hot water and cartridge meters.

While the technical and metrological requirements as well as the conditions of putting into use of water meters are regulated at European level by the MID [5], all questions of verification, verification periods and, in this connection, also of the opportunity of using sampling inspections for an extension of these verification periods are under national responsibility. In Germany, the responsibility for the verification of water meters lies in the hands of the verification authorities of the federal states.

As a result of the comprehensive investigations described, Verification Directorate North approved the application and *Hamburg Wasser* successfully passed first sampling inspections also for sub-meters for cold and hot water and of the cartridge type.

In general, even though the verification of water meters is not regulated at the international level, profound recommendations concerning, for instance, reasonable lifetimes of water meters in communal water supply networks may derive sustainable benefits for water consumers, water meter manufacturers and the environment. ■

7 References

[1] Act concerning the placement and provision of measuring instruments on the market, their use and verification, and also on prepackages (Measures and Verification Act [Mess- und Eichgesetz – MessEG]) dated 25.07.2013 (Federal Law Gazette. I p. 2722)

[2] Ordinance concerning the placement and provision of measuring instruments on the market, their use and verification (Measures and Verification Ordinance – MessEV) dated 11.12.2014 (Federal Law Gazette I, No. 58, pp. 2010, 2011);

[3] H. Schonlau, H. Rubach: Wasserzähler auf dem Prüfstand – Sind die vorgeschriebenen Eichfristen noch zeitgemäß? gwf Wasser/Abwasser, 2014

[4] Technische Richtlinie W20 der PTB: Prüfungen an gebrauchten Hauswasserzählern, PTB 01/82

Other publications on the results of the W20 investigations:

- W. Schulz: Richtigkeitsprüfungen an Kaltwasserzählern nach Ablauf der Eichgültigkeitsdauer. PTB-Mitt. **95** (1985), pp.102-108
- Prüfungen an gebrauchten Hauswasserzählern. PTB-Mitteilungen **95** (1985), p. 345 and **96** (1986), p. 348
- G. Wendt et al.: Transfernormale für strömendes Wasser. PTB Report **MA-82**, 2007, pp. 8-9

[5] Directive 2014/32/EC of the European Parliament and of the Council of 26 February 2014 on measuring instruments (MID) (OJ L 96, p. 149

[6] G. Wendt et al.: Untersuchung und Entwicklung strömungsprofilunempfindlicher Wasser- und Wärmezähler und deren mechanischer Schnittstellen. PTB Report **MA-90**, 2012

[7] Verfahren zur Stichprobenprüfung von Kaltwasserzählern. PTB-Mitteilungen **102** 4/92, pp. 295-296

OIML Systems

Basic and MAA Certificates registered 2017.06–2017.08

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

The OIML Basic Certificate System

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

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

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

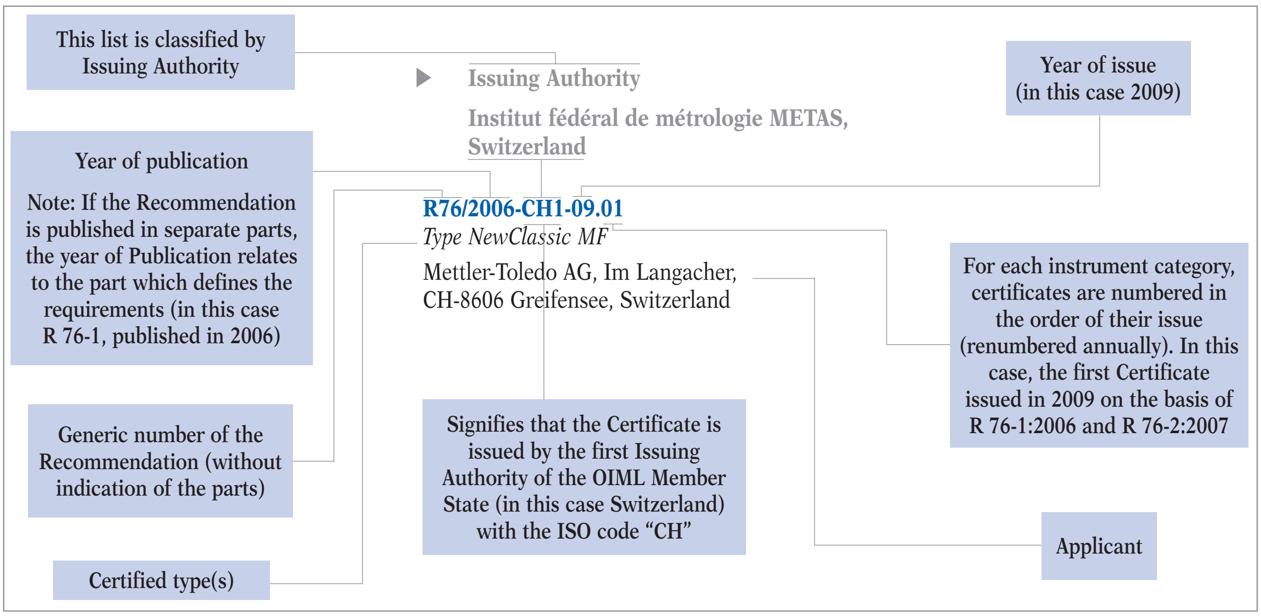
The OIML MAA is an additional tool to the OIML Basic Certificate System in particular to increase the existing mutual confidence through the System. It is still a voluntary system but with the following specific aspects:

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

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

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

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



INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Taximeters
Taximètres

R 21 (2007)

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R021/2007-NL1-2017.01
Taximeter - Type: TXD70
Interfacom S.A., Carrer del Perú, 104,
ES-08018 Barcelona, Spain

Issuing Authority / *Autorité de délivrance*

NMRO Certification Services (NMRO),
United Kingdom

R021/2007-GB1-2017.02
Type: F4 Plus & F4 Slim
Italtax S.r.l., Via dell'Industria, 16,
IT-62017 Porto Recanati (MC), Italy

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Active electrical energy meters
Compteurs actifs d'énergie électrique

R 46 (2012)

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R046/2012-NL1-2017.01
Active electrical energy meters - Type: 83334-3
Networked Energy Services, 5215 Hellyer Avenue,
Suite 150, CA 95138 San Jose, California, United States

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Water meters for cold potable water and hot water
Compteurs d'eau potable froide et d'eau chaude

R 49 (2013)

Issuing Authority / *Autorité de délivrance*

Czech Metrology Institute (CMI),
Czech Republic

R049/2013-CZ1-2015.01 Rev. 3
Water meter - Type: 280W-. . .
Spire Metering Technology, 249 Cedar Hill Street,
MA 01752 Marlborough, Massachusetts, United States

R049/2013-CZ1-2016.01 Rev. 2
Water meter - Type: MUT2200EL/MC608A
Euromag International S.r.l., Via Torino 3,
IT-35035 Mestrino (PD), Italy

R049/2013-CZ1-2016.03 Rev. 1
Water meter - Type: MAGB1
Arkon Flow Systems, s.r.o., Berkova 534/92,
CZ-612 00 Brno, Czech Republic

R049/2013-CZ1-2017.03
Water meter - Type: PD97TRP
Lianyungang Lianli - First Meter Co. Ltd., 9# Yuzhou South Road, Haizhou Development Zone, Jiansu,
P.R. China

Issuing Authority / *Autorité de délivrance*

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

R049/2013-FR2-2015.01 Rev. 3
Water meter ITRON - Type: WOLTEX (WE)
Itron France, 11, Boulevard Pasteur, FR-67500 Haguenau,
France

R049/2013-FR2-2016.02 Rev. 1
Water meters - Types: TU1 40F, TU1 50, TU1 65, TU1 80, TU1 100 and TU1 150.
Itron France, 11, Boulevard Pasteur, FR-67500 Haguenau,
France

R049/2013-FR2-2017.01
Electromagnetic water meter FINETEK - Type: EPD3X
FINETEK Co. Ltd., No. 16 Tzuchiang St.,
Tucheng Industrial, 236, New Taipei City, Chinese Taipei

R049/2013-FR2-2017.03 Rev. 1
Water meter ITRON - Type: X61
Itron France, 9 rue Ampère, FR-71031 Macon, France

▶ Issuing Authority / *Autorité de délivrance*
NMi Certin B.V.,
The Netherlands

R049/2013-NL1-2017.02
Ultrasonic water meter - Type: U-WR series
Viewshine Metering Ltd., Building 6, Moganshan Road 1418-41, Hangzhou, P.R. China

R049/2013-NL1-2017.03
Electromagnetic water meter - Type: WF11x / WF12x
Toshiba corporation Fuchu Complex, 1, Toshiba-Cho, Fuchu-Shi, 183-8511 Tokyo, Japan

▶ Issuing Authority / *Autorité de délivrance*
NMRO Certification Services (NMRO),
United Kingdom

R049/2013-GB1-2017.01
Family of cold-water meters, designated Octave, utilizing an ultrasonic measuring element and having a rated flowrate Q3 between 40 m³/h and 1000 m³/h
Arat Ltd., Dalia - Ramot Menashe, POB19239, Dalia, Israel

▶ Issuing Authority / *Autorité de délivrance*
Slovak Legal Metrology (Banska Bystrica),
Slovakia

R049/2013-SK1-2014.02 Rev. 2
Mechanical mult-jet dry dial water meter type for metering of cold and hot water - Type: MD-A, MD-AP
Ningbo Aimei Meter Manufacture Co. Ltd., 68, West Town Road, Shangtian Town, CN-315511 Zhejiang, P.R. China

R049/2013-SK1-2016.03 Rev. 1
Mechanical single-jet dry dial water meter type for metering hot and cold water - Type: SD-A, SD-AP
Ningbo Aimei Meter Manufacture Co. Ltd., 68, West Town Road, Shangtian Town, CN-315511 Zhejiang, P.R. China

R049/2013-SK1-2017.01
Mechanical mult-jet dry dial water meter type for metering of cold water - Type: MD-C
Ningbo Aimei Meter Manufacture Co. Ltd., 68, West Town Road, Shangtian Town, CN-315511 Zhejiang, P.R. China

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

R 51 (2006)

▶ Issuing Authority / *Autorité de délivrance*
NMi Certin B.V.,
The Netherlands

R051/2006-NL1-2017.03
Automatic catchweighing instrument - Type: TLW330 or RTSPKG
Mettler-Toledo AG, Im Langacher 44, CH-8606 Greifensee, Switzerland

▶ Issuing Authority / *Autorité de délivrance*
NMRO Certification Services (NMRO),
United Kingdom

R051/2006-GB1-2009.07 Rev. 1
Type: Venus 300 checkweigher / weight or weight-price labeller
Societa Cooperativa Bilanciai Campogalliano a.r.l, Via S. Ferrari, 16, IT-41011 Campogalliano (Modena), Italy

R051/2006-GB1-2013.01 Rev. 4
Type: L-Series 2180
Trimble Navigation New Zealand Limited, 11 Birmingham Drive, Riccarton, 8440 Christchurch, New Zealand

R051/2006-GB1-2017.01 Rev. 1
Type 420 Series
Sparc Systems Ltd., Merebrook Industrial Estate, Hanley Road, Worcester WR13 6NP, United Kingdom

R051/2006-GB1-2017.02
Type: CWS Loadpin
Strainstall UK Limited, 9-10 Mariners Way, Cowes PO31 8PD, Isle of Wight, United Kingdom

R051/2006-GB1-2017.03
CWS (diaphragm load cell based)
Strainstall UK Limited, 9-10 Mariners Way, Cowes PO31 8PD, Isle of Wight, United Kingdom

R051/2006-GB1-2017.04
Type: DACS-GN-SE012 and DACS-GN-SE050
Ishida Europe Ltd., 11 Kettles Wood Drive, Woodgate Business Park, Birmingham B32 3DB, United Kingdom

R051/2006-GB1-2017.09 Rev. 3
VersaWeigh, VersaGP, Versa RxC, Versa RxM, Teorema, VersaFlex and VersaFlex GP Checkweighers
Thermo Ramsey Italia S.R.L., Strada Rivoltana km 6/7, IT-20090 Rodano (MI), Italy

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

R 60 (2000)

▶ Issuing Authority / *Autorité de délivrance*

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

R060/2000-JP1-2012.04 Rev. 2 (MAA)
Compression load cell - Type: CC010-10T-C3, CC010-20T-C3, CC010-30T-C3, CC010-50T-C3
MinebeaMitsumi Inc., 1-1-1 Katase Fujisawa-shi, JP-251-853 Kanagawa-ken, Japan

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R060/2000-NL1-2013.01 Rev. 1 (MAA)
Compression load cell, with strain gauges. Type: CP-1
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2013.02 Rev. 1 (MAA)
Compression load cell, with strain gauges. Type: CP-11
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2013.04 Rev. 1 (MAA)
Shear beam load cell, with strain gauges - Type: GX-1SH
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.15 Rev. 1 (MAA)
Tension load cell, with strain gauges - Type: MS-6
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.16 Rev. 1 (MAA)
Compression load cell, with strain gauges. Type: CP-2
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.17 Rev. 1 (MAA)
Double ended shear beam load cell, with strain gauges - type: GF-4
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.18 Rev. 1 (MAA)
Double ended shear beam load cell, with strain gauges - type: GF-5
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.19 Rev. 1 (MAA)
Shear beam load cell, with strain gauges - Type: PE-5
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.20 Rev. 1 (MAA)
Bending beam load cell, with strain gauges - Type: PE-7
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.21 Rev. 1 (MAA)
Compression load cell, with strain gauges. Type: GY-7
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2014.22 Rev. 1 (MAA)
Compression load cell, with strain gauges. Type: CP-15
Aerospace South-Ocean (Zhejiang) Science and Technology Co. Ltd., No. 58 Nanyang Road, Qianyuan Town, Deqing County, Zhejiang Province, P.R. China

R060/2000-NL1-2015.11 Rev. 1 (MAA)
Compression load cell, with strain gauges, equipped with electronics -Type: DSC2
Vishay Precision Transducer India Ltd., OZ-22, Hi-Tech SEZ, 602105 Tamil Nadu, India

R060/2000-NL1-2017.31 (MAA)
Bending beam load cell, with strain gauges - Type: L6P1-Cx-xx-xx-xx Series
Zhonghang Electronic Measuring Instruments Co. Ltd (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN- 723000 Hanzhong-ShaanXi, P.R. China

R060/2000-NL1-2017.39 (MAA)
Bending beam load cell, with strain gauges - Type: XD6-H
Changzhou Newton Force Weighing System Co. Ltd., No 228 Jinshen East Road, Jintan Economic Development Area, CN-213200 Jiansu, Changzhou, P.R. China

R060/2000-NL1-2017.40 Rev. 1 (MAA)
Bending beam load cell, with strain gauges - Type: M070 or PR53
MinebeaMitsumi Inc., 1-1-1 Katase Fujisawa-shi, JP-251-853 Kanagawa-ken, Japan

R060/2000-NL1-2017.41 (MAA)
Compression load cell, with strain gauges. Type: PR 6261
Minebea Intec GmbH, Meiendorfer Strasse 205 A, DE-22145 Hamburg, Germany

R060/2000-NL1-2017.42 (MAA)
Single point load cell, with strain gauges - Type: SPZ
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Missouri, Webb City, United States

R060/2000-NL1-2017.42 Rev. 1 (MAA)
Single point load cell, with strain gauges - Type: SPZ
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Missouri, Webb City, United States

R060/2000-NL1-2017.43 (MAA)
Bending beam load cell, with strain gauges - Type: AS 130(S), AS133, AS137, AS203, SS130(S), SS133, SS137, SS203.
Changzhou Hongli Weighing Equipment Co. Ltd., No. 21 Longhui Road, Wujin High-tech Development District, Changzhou, P.R. China

R060/2000-NL1-2017.44 (MAA)
Single point load cell, with strain gauges - Type: PC3H
Flintec UK Ltd., W4/5 Capital Point, Capital Business Park, Cardiff CF3 2PW, United Kingdom

R060/2000-NL1-2017.45 (MAA)
Single point load cell, with strain gauges - Type: M030 or PR54
MinebeaMitsumi Inc., 1-1-1 Katase Fujisawa-shi, JP-251-853 Kanagawa-ken, Japan

R060/2000-NL1-2017.46 (MAA)
Compression load cell, with strain gauges - Type: ASC2
Vishay Precision Transducer India Ltd., OZ-22, Hi-Tech SEZ, 602105 Tamil Nadu, India

R060/2000-NL1-2017.47 (MAA)
Bending beam load cell, with strain gauges - Type: PA08R, PA08G and PA08L.
Networked Energy Services, 5215 Hellyer Avenue, Suite 150, CA 95138 San Jose, California, United States

R060/2000-NL1-2017.48 (MAA)
Compression load cell, with strain gauges - Type: 120A
Vishay Precision Transducer India Ltd., OZ-22, Hi-Tech SEZ, 602105 Tamil Nadu, India

R060/2000-NL1-2017.49 (MAA)
Compression load cell, with strain gauges, equipped with electronics -Type: 120D
Vishay Precision Transducer India Ltd., OZ-22, Hi-Tech SEZ, 602105 Tamil Nadu, India

R060/2000-NL1-2017.50 (MAA)
Compression load cell, with strain gauges - Type: 121A
Vishay Precision Transducer India Ltd., OZ-22, Hi-Tech SEZ, 602105 Tamil Nadu, India

R060/2000-NL1-2017.51 (MAA)
Compression load cell, with strain gauges - Type: 121D
Vishay Precision Transducer India Ltd., OZ-22, Hi-Tech SEZ, 602105, Tamil Nadu, India

R060/2000-NL1-2017.52 (MAA)
Single point load cell, with strain gauges, equipped with electronics, tested as a part of a weighing instrument - Type: IS78N
Mettler-Toledo AG, Im Langacher 44, CH-8606 Greifensee, Switzerland

R060/2000-NL1-2017.54 (MAA)
Single point load cell, with strain gauges - Type: PC7H
Flintec UK Ltd., W4/5 Capital Point, Capital Business Park, Cardiff CF3 2PW, United Kingdom

Issuing Authority / *Autorité de délivrance*
NMRO Certification Services (NMRO), United Kingdom

R060/2000-GB1-2017.07
Diaphragm stainless compression digital load cell
Strainstall UK Limited, 9-10 Mariners Way, Cowes PO31 8PD, Isle of Wight, United Kingdom

R060/2000-GB1-2017.09
VESTA stainless steel compression load cell
Scalacell Load Technology, S.L., c/ Victor Catala 8, Pineda de Mar, Barcelona, Spain

R060/2000-GB1-2017.10
RL5426 stainless steel compression load cell
Rice Lake Weighing Systems Europe B.V., Weiland 11, NL-6666 MH Heteren, Netherlands

R060/2000-GB1-2017.12 (MAA)
TPB 75, 150 and 375 kg Planar Beam load cell
Transcell Technology Inc., 975 Deerfield Park Way, 60089 Buffalo Grove, United States

R060/2000-GB1-2017.13
Type: SSPW
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Missouri, Webb City, United States

R060/2000-GB1-2017.14
Type: HSB
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Missouri, Webb City, United States

R060/2000-GB1-2017.15
Type: TVN-INT
Precia SA, BP 106, FR-07001 Privas Cedex, France

R060/2000-GB1-2017.16
Type: BBL-INT
Precia SA, BP 106, FR-07001 Privas Cedex, France

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*
NMi Certin B.V., The Netherlands

R076/1992-NL1-2017.35 Rev. 1
Non-automatic weighing instrument - Type: iForks . . . M / Hyperforks . . . M
Ravas Europe B.V., Toepadweg 7, NL-5201 KA Zaltbommel, Netherlands

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

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

Issuing Authority / *Autorité de délivrance*
Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R076/2006-DK3-2017.03
Non-automatic weighing instrument - Type: PT252 / PT253 / PT272
PT Limited, 2/7 Marken Place, Glenfield, Auckland, New Zealand

R076/2006-DK3-2017.04
Non-automatic weighing instrument - Type: PT200 / PT210 / PT321 / PT322
PT Limited, 2/7 Marken Place, Glenfield, Auckland, New Zealand

R076/2006-DK3-2017.05
Non-automatic weighing instrument - Type: BWM-S1000 / BWM-S1100 / BWM-S1200 / BWM-S2000 / BWM-S3000 / BWM-S4000 / BWM-S5000 / BWM-6000 / BWM-S8000
Shandong New Beiyang Information Technology Co. Ltd., 169 Huoju Road, HDZ, Weihai, CN-264209 Shandong, P.R. China

R076/2006-DK3-2017.07
Non-automatic price computing weighing instrument - Type: BBG MARKET
BBG Colombia SAS., Carrera 23#, 12 b 58, Bogota, Colombia

Issuing Authority / *Autorité de délivrance*
Institut fédéral de métrologie METAS, Switzerland

R076/2006-CH1-2017.01 (MAA)
Non-automatic weighing instrument - Type: NewClassic MF
Mettler-Toledo Instrument (Shanghai) Co. Ltd., 589 GuiPing Road, CN-200233 Shanghai, P.R. China

R076/2006-CH1-2017.02 (MAA)
Non-automatic wheel and axle weighing instrument - Type: WL108
HAENNI Instruments AG, Industrie Neuhof 66, CH-3422 Kirchberg, Switzerland

Issuing Authority / *Autorité de délivrance*

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

R076/2006-JP1-2017.01 (MAA)
Non-automatic weighing instrument - Type: HV-C/HV-CP Series
A&D Company Ltd., 3-23-14 Higashi-Ikebukuro, Toshima-Ku, JP-170-001 Tokyo, Japan

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R076/2006-NL1-2015.49 Rev. 1 (MAA)
Indicator - Type: IND245/IND246
Mettler-Toledo (Changzhou) Measurement Technology Ltd., N° 111, West TaiHu Road, ChangZhou XinBei District, CN-213125 Jiangsu, P.R. China

R076/2006-NL1-2015.49 Rev. 2 (MAA)
Indicator - Type: IND245/IND246
Mettler-Toledo (Changzhou) Measurement Technology Ltd., N° 111, West TaiHu Road, ChangZhou XinBei District, CN-213125 Jiangsu, P.R. China

R076/2006-NL1-2017.04 Rev. 1 (MAA)
Non-automatic weighing instrument - Type: Rider 8000 RX81
Ohaus Corporation, 7, Campus Drive, Suite 310, NJ 0705 Parsippany, United States

R076/2006-NL1-2017.19 (MAA)
Non-automatic weighing instrument - Type: S51, S71
Ohaus Corporation, 7, Campus Drive, Suite 310, NJ 0705 Parsippany, United States

R076/2006-NL1-2017.21 (MAA)
Indicator- Type: DP-4400
Charder Electronic Co. Ltd., No. 103, Guozhong Road, Dali District, 412, Taichung City, Chinese Taipei

R076/2006-NL1-2017.25 (MAA)
Indicator- Type: DIX-2001
Shanghai Teraoka Electronic Co. Ltd., Ting Lin Industry Development Zone, Jin Shan District, CN-201505 Shanghai, P.R. China

R076/2006-NL1-2017.26 (MAA)
Indicator - Type: AEx-IN, OPx-IN, ASx-IN, EQx-IN, EXx-IN,SEx-IN, SSx-IN, WDx-IN or WSx-IN (the x can be the letter P, W, C and can be followed by X, L, L-M, L-E)
Kingship Weighing Machine Corp., 739, Renhua Road, Dali City, TW-Taichun, Taiwan R.O.C, Chinese Taipei

R076/2006-NL1-2017.27 (MAA)
Non-automatic weighing instrument - Type: AEx, ASx, BEx, EQx, ESx, SEx, SSx, WDx, AMx, APx, ABPL, QEx, QSx (the x can be the letter P, W or C, and be followed by X, L, L-M, or L-E)
Kingship Weighing Machine Corp., 739, Renhua Road, Dali City, TW-Taichun, Taiwan R.O.C, Chinese Taipei

R076/2006-NL1-2017.28 Rev. 1
Non-automatic weighing instrument - Type: SM-5000, SM-5300, SM-5300L, SM-5300H, SM-5400, SM-5500, SM-5500H, SM-5500M.
Digi Singapore PTE Ltd., 4 Leng Kee Road, #05-03/04/05 & 11, SIS Building, 159088 Singapore

R076/2006-NL1-2017.29 (MAA)
Non-automatic weighing instrument - Type: KS-400
Precia SA, BP 106, FR-07001 Privas Cedex, France

R076/2006-NL1-2017.30 (MAA)
Non-automatic weighing instrument - Type: PCSK
Grupo Epelsa S.L., c/Punto Net, 3, Polígono Industrial Tecnoalcalá, ES-28805 Alcalá de Henares (Madrid), Spain

R076/2006-NL1-2017.31
Non-automatic weighing instrument - Type: PCS
Grupo Epelsa S.L., c/Punto Net, 3, Polígono Industrial Tecnoalcalá, ES-28805 Alcalá de Henares (Madrid), Spain

R076/2006-NL1-2017.32
Non-automatic weighing instrument - Type: UHRS
Grupo Epelsa S.L., c/Punto Net, 3, Polígono Industrial Tecnoalcalá, ES-28805 Alcalá de Henares (Madrid), Spain

R076/2006-NL1-2017.33 (MAA)
Indicator - Type: D70ES
Societa Cooperativa Bilanciai Campogalliano a.r.l, Via S. Ferrari, 16, IT-41011 Campogalliano (Modena), Italy

R076/2006-NL1-2017.35
Non-automatic weighing instrument - Type: iForks . . . M / Hyperforks . . . M
Ravas Europe B.V., Toepadweg 7, NL-5201 KA Zaltbommel, Netherlands

R076/2006-NL1-2017.36 (MAA)
Non-automatic weighing instrument - Type: DIX-2001
Teraoka Seiko Co. Ltd., 13-12 Kugahara, 5-Chome, Ohta-ku, JP-146-858 Tokyo, Japan

R076/2006-NL1-2017.37 (MAA)
Indicator - Type: AD-4329A
A&D Instruments Ltd., 24 Blacklands Way, Abingdon Business Park, Abingdon OX14 1D, United Kingdom

R076/2006-NL1-2017.38 (MAA)
Non-automatic weighing instrument - Type: SM-710V4
Digi Singapore PTE Ltd., 4 Leng Kee Road, #05-03/04/05 & 11, SIS Building, 159088 Singapore

R076/2006-NL1-2017.39 (MAA)
Non-automatic weighing instrument - Type: FreshBase. . . /FB . . .
Mettler-Toledo AG, Im Langacher 44, CH-8606 Greifensee, Switzerland

R076/2006-NL1-2017.40
Non-automatic weighing instrument - Type: DP-4400, MS-2xxx, MS-3xxx, MS-4xxx, MS-5xxx, MS-6xxx, MS-7xxx, MBF-6xxx, MS21-NEOxx, MHS-2xxx (x=0. . .9)
Charder Electronic Co. Ltd., No. 103, Guozhong Road, Dali District, 412, Taichung City, Chinese Taipei

R076/2006-NL1-2017.41 (MAA)
Non-automatic weighing instrument - Type: Rider 8000 RX81. . .
Ohaus Corporation, 7, Campus Drive, Suite 310, NJ 0705 Parsippany, United States

R076/2006-NL1-2017.42 Rev. 1 (MAA)
Indicator - Type: PUE HX5.EX
Radwag Wagi Elektroniczne Witold Lewandowski, ul. Bracka 28, 26-600 Radom, Poland

R076/2006-NL1-2017.44 (MAA)
Terminal / Indicator - Type: IND890-1
Mettler-Toledo (Albstadt) GmbH, Unter dem Malesfelden 34, DE-72458 Albstadt, Germany

R076/2006-NL1-2017.45
Indicator or Digital data processing device - Type: IND560 / IND560X
Mettler-Toledo (Changzhou) Measurement Technology Ltd., N° 111, West TaiHu Road, ChangZhou XinBei District, CN-213125 Jiangsu, P.R. China

R076/2006-NL1-2017.46 (MAA)
Non-automatic weighing instrument - Type ESW Plus, ELW Plus, YSW Plus . . . (see certificate)
Excell Precision Co. Ltd., 6F, No. 127, Lane 235, Pao-Chiao Road, Hsin Tien, TW-Taipei Hsien, Chinese Taipei

R076/2006-NL1-2017.47 (MAA)
Non-automatic weighing instrument - Type: RM-5800
Shanghai Teraoka Electronic Co. Ltd., Ting Lin Industry Development Zone, Jin Shan District, CN-201505 Shanghai, P.R. China

Issuing Authority / *Autorité de délivrance*
NMRO Certification Services (NMRO), United Kingdom

R076/2006-GB1-2014.08 Rev. 1 (MAA)
Type: DD700, DD700IC, DD700I
Societa Cooperativa Bilanciai Campogalliano a.r.l, Via S. Ferrari, 16, IT-41011 Campogalliano (Modena), Italy

R076/2006-GB1-2015.02 Rev. 2 (MAA)
XS Series
Avery Berkel, Foundry Lane, Smethwick B66 2LP, United Kingdom

R076/2006-GB1-2017.05 (MAA)
SWIFT family of indicators
Tecnicas de Electronica Y Automatismos, S.A., C/Espronceda 176, Barcel, Spain

R076/2006-GB1-2017.06 (MAA)
Type: MP701X1 & MP70X2
Zebra Technologies, 1 Zebra Plaza, 11742-1300 Holtsville, NY, United States

R076/2006-GB1-2017.07 (MAA)
Huntleigh Healthcare Enterprise 9000, Enterprise 9100, 9000X, Citadel and Citadel Plus hospital beds with weighing facility
ArjoHuntleigh AB, Hans Michelsensgatan 10, SE-211 20 Malmö, Sweden

R076/2006-GB1-2017.08 (MAA)
Type: CL7200-D Series
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

R076/2006-GB1-2017.08 Rev. 1 (MAA)
Type: WM-AI and IP-AI
Ishida Co. Ltd., 44, Sanno-cho, Shogoin, Sakyo-ku, JP-606-839 Kyoto, Japan

R076/2006-GB1-2017.09 (MAA)
Type: CL3000 Series
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

R076/2006-GB1-2017.12 (MAA)
Thames Side Sensors ST family of indicators
Thames Side Sensors, Ltd., Unit 10 - io Trade Center, Deacon Way, Reading RG30 6AZ, United Kingdom

R076/2006-GB1-2017.13 (MAA)
Type: SW Series
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

R076/2006-GB1-2017.14 (MAA)
Type: Dolphin Series
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

▶ Issuing Authority / *Autorité de délivrance*
Physikalisch-Technische Bundesanstalt (PTB), Germany

R076/2006-DE1-2009.01 Rev. 5
Non-automatic electromechanical weighing instrument - Type: MSX
Sartorius Lab Instruments GmbH & Co., Otto-Brenner-Str. 20., DE-37079 Gottingen, Germany

R076/2006-DE1-2012.02 Rev. 2
Non-automatic electromechanical price-computing weighing instrument for direct sales to public- Type: XC. . .
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Strasse 65, DE-72336 Balingen, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

R 85 (2008)

▶ Issuing Authority / *Autorité de délivrance*
Czech Metrology Institute (CMI), Czech Republic

R085/2008-CZ1-2012.01 Rev. 1
Automatic level gauge - Type: OptiLevel HLS 6010 (probe) / OptiLevel Supply (console / LS. barrier)
Hectronic GmbH, Allmendstrasse 15, DE-79848 Bonndorf, Germany

▶ Issuing Authority / *Autorité de délivrance*
NMi Certin B.V., The Netherlands

R085/2008-NL1-2017.02
Calculating and indicating device, intended for use as part of liquid level gauge - Type: NRF81
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.02 Rev. 1
Calculating and indicating device, intended for use as part of a liquid level gauge - Type: NRF81
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.02 Rev. 2
Calculating and indicating device, intended for use as part of a liquid level gauge - Type: NRF81
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.03
Automatic level gauge - Type: NMR8x
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.03 Rev. 1
Automatic level gauge - Type: NMR8x
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.03 Rev. 2
Automatic level gauge - Type: NMR8x
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.04 Rev. 1
Automatic level gauge - Type: NMS8x
Endress + Hauser Japan Co. Ltd., 862-1 Mitsukunugi Sakaigawa-cho, Fuefuki-shi, Yamanashi, Japan

R085/2008-NL1-2017.04 Rev. 2
Automatic level gauge - Type: NMS8x
Endress + Hauser Japan Co. Ltd., 862-1 Mitsukunugi Sakaigawa-cho, Fuefuki-shi, Yamanashi, Japan

R085/2008-NL1-2017.04 Rev. 3
Automatic level gauge - Type: NMS8x
Endress + Hauser GmbH + Co., KG, Haupstrasse 1, DE-79689 Maulburg, Germany

R085/2008-NL1-2017.05
Automatic level gauge for measuring the level of liquid in stationary storage tanks - Type: Smartradar Flexline XP and Smartradar Flexiline HP
Enraf B.V., Delftechpark 39, NL-2628 XJ Delft, Netherlands

R085/2008-NL1-2017.05 Rev. 1
Automatic level gauge for measuring the level of liquid in stationary storage tanks - Type: (see certificate)
Enraf B.V., Delftechpark 39, NL-2628 XJ Delft, Netherlands

R085/2008-NL1-2017.05 Rev. 2
Automatic level gauge for measuring the level of liquid in stationary storage tanks - Type: (see certificate)
Enraf B.V., Delftechpark 39, NL-2628 XJ Delft, Netherlands

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

R 117 (1995) + R 118 (1995)

▶ Issuing Authority / *Autorité de délivrance*

Russian Research Institute for Metrological Service (VNIIMS)

R117/1995-RU1-2017.03
Measuring system for unloading of road tankers - Tank Lorry Unloading System
Tatsuno India Private Limited, B-31 and B-32 MIDC Industrial Area, Taloja, 410208 Maharashtra, India

▶ Issuing Authority / *Autorité de délivrance*

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

R117/1995-JP1-2011.01 Rev. 5
Fuel dispenser for motor vehicles, A series
Hitachi Automotive Systems Measurement, Ltd., 3-9-27 Tsurumi Chuo, Tsurumi-ku, Kanagawa, Yokohama City, Kanagawa, Japan

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R117/1995-NL1-2012.01 Rev. 2
Fuel dispenser for Motor Vehicles - Type: Global Century
Dresser Wayne Fuel Equipment (Shanghai-Puxi Branch Office) Co. Ltd., F1, Building 2, No. 511, Shanlian Road, Baoshan Shanghai, P.R. China

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Dynamic measuring systems for liquids other than water
Ensembles de mesurage dynamique de liquides autres que l'eau

R 117 (2007) + R 118 (1995)

▶ Issuing Authority / *Autorité de délivrance*

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

R117/2007-FR2-2017.01
Turbines meters ALMA type ADRIANE DN 50-30 GPL, DN 50-40, DN 50-50, DN 80-80, DN 100-80, DN 100-150 and DN 150-600
ALMA, 4A Boulevard de la Gare, Porte 1, FR-94470 Boissy Saint Leger, France

R117/2007-FR2-2017.02
Calculator-indicator device and conversion device ALMA - Type: MICROCOPT
ALMA, 4A Boulevard de la Gare, Porte 1, FR-94470 Boissy Saint Leger, France

▶ Issuing Authority / *Autorité de délivrance*

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

R117/2007-JP1-2017.01
Fuel dispenser for motor vehicles, Tatsuno Sunny-GL series
Tatsuno Corporation, 3-2-6, Mita, Minato-ku, JP-108-8520, Tokio, Japan

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R117/2007-NL1-2016.05 Rev. 1
Measurement transducer - Type: Promass Q 300 DNxxx
Endress + Hauser Flowtec AG, Kagenstrasse 7, CH-4153 Reinach BL 1, Switzerland

R117/2007-NL1-2016.05 Rev. 2
Measurement transducer - Type: Promass Q 300 DNxxx
Endress + Hauser Flowtec AG, Kagenstrasse 7, CH-4153 Reinach BL 1, Switzerland

R117/2007-NL1-2017.03
Density sensor - Type: DIMF 1.3 PV
Bopp & Reuther Messtechnik GmbH,
Am neuen Rheinhafen 4, DE-67346 Speyer, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Multi-dimensional measuring instruments
Instruments de mesure multidimensionnels

R 129 (2000)

► Issuing Authority / *Autorité de délivrance*

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

R129/2000-FR2-2017.01 Rev. 0
Tridimensional measuring instrument AutoCube 8200-1
Intermec STC by Honeywell, 94 rue du Lac,
Immeuble Les Allées du Lac A, FR-31670 Labège, France

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic instruments for weighing road vehicles in motion and measuring axle loads
Instruments à fonctionnement automatique pour le pesage des véhicules routiers en mouvement et le mesurage des charges à l'essieu

R 134 (2006)

► Issuing Authority / *Autorité de délivrance*

Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R134/2006-DK3-2011.02 Rev. 1
Automatic instrument for weighing road vehicles in motion - Type: AR-WIM
ESIT Elektronik Sistemler Imalat ve Ticaret Limited
Sirketi, Nisantepe Mahallesi Handegul, Gelincicegi Sokak
N° 8, TR-34794 Istanbul, Turkey

► Issuing Authority / *Autorité de délivrance*

Institut fédéral de métrologie METAS, Switzerland

R134/2006-CH1-2017.01
Automatic instruments for weighing road vehicles in motion and measuring axle loads - Type: WIM-DSP 32 I TMCS-U
Traffic Data Systems GmbH, Notkestrasse 13,
DE-22607 Hamburg, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Gas meters
Compteurs de gaz

R 137 (2012)

► Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R137/2012-NL1-2016.09 Rev. 2
Diaphragm gas meter - Type: JK/G2.5 & JK/G1.6
GoldCard Smart Group Co. Ltd., No 158, Jinqiao Street, Economic and Technology Development Zone, Hangzou City, P.R. China

R137/2012-NL1-2016.09 Rev. 3
Diaphragm gas meter - Type: JK/G2.5 & JK/G1.6
GoldCard Smart Group Co. Ltd., No 158, Jinqiao Street, Economic and Technology Development Zone, Hangzou City, P.R. China

R137/2012-NL1-2017.01
Turbine gas meter - Type: EMT-L, EMT-S, EMT-Lx and EMT-Dc
ELGAS s.r.o., Semtinska 211, Pardubice, Czech Republic

R137/2012-NL1-2017.02
Rotary piston gas meter - Type: EMR and EMR-Dual
ELGAS s.r.o., Semtinska 211, Pardubice, Czech Republic

R137/2012-NL1-2017.04
Thermal mass meter - Type: x485xxx
MeteRsit, Viale dell'Industria 31, IT-35129 Padova, Italy

R137/2012-NL1-2017.05
Electronic Thermal Gas Meter - Type: JGM. . .S-G/JGM. . .S-R

GoldCard Smart Group Co. Ltd., No 158, Jinqiao Street, Economic and Technology development Zone, Hangzou City, P.R. China

R137/2012-NL1-2017.06
Ultrasonic Gas Meter - Type: UIM-4F

Transus Instruments B.V., Duikerweg 37, NL-3897 LM Zeewolde, Netherlands

R137/2012-NL1-2017.09 Rev. 3
Ultrasonic Gas Meter - Type: 3414 / 3415 / 3416 / 3417 Senior Sonic

Emerson Automation Solutions, 11100 Brittmoore Park Drive, 77041 Houston, Texas, United States

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Gas measuring systems
Ensembles de mesurage de gaz

R 139 (2014)

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

NMi Certin B.V., The Netherlands

R139/2014-NL1-2017.01
Measuring device (Coriolis), for the measurement of Compressed Natural Gas (CNG) - Type: CNGmass

Endress + Hauser Flowtec AG, Kagenstrasse 7, CH-4153 Reinach BL 1, Switzerland

R139/2014-NL1-2017.02
Measuring device (Coriolis), for the measurement of Compressed Natural Gas (CNG)

Emerson Process Management Flow B.V., Neonstraat 1, NL-6718 WX Ede, Netherlands

OIML CERTIFICATE SYSTEM

List of OIML Issuing Authorities

The list of OIML Issuing Authorities is published in each issue of the OIML Bulletin. For more details, please refer to our web site: www.oiml.org

		R 16	R 21	R 31	R 35	R 46	R 49	R 50	R 51	R 58	R 60	R 61	R 75	R 76	R 81	R 85	R 88	R 93	R 97	R 98	R 99	R 102	R 104	R 105	R 106	R 107	R 110	R 112	R 113	R 114	R 115	R 117/118	R 122	R 126	R 128	R 129	R 133	R 134	R 136	R 137	R 139
AT1	Bundesamt für Eich- und Vermessungswesen (BEV)							■	■	■		■		■		■	■		■	■		■	■		■	■	■			■	■	■									
AU1	National Measurement Institute (NMI)						■	■	■		■			■		■									■	■						■		■		■					
BE1	SPF Economie, PME, Classes Moyennes et Energie													■					■	■																					
BG1	State Agency for Metrology and Technical Surveillance (SAMTS)													■						■																					
BR1	Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (INMETRO)													■																											
CH1	Institut fédéral de métrologie METAS	■		■			■	■	■		■	■		■					■	■				■	■	■						■						■			
CN1	General Administration of Quality Supervision, Inspection and Quarantine of P. R. China (AQSIQ)			■		■		■	■		■	■		■					■	■						■						■						■			
CZ1	Czech Metrology Institute (CMI)						■							■	■	■								■								■						■			■
DE1	Physikalisch-Technische Bundesanstalt (PTB)				■		■	■	■		■	■		■		■				■	■				■	■						■		■		■			■	■	
DK1	The Danish Accreditation and Metrology Fund (DANAK)							■	■		■	■		■						■				■	■	■						■				■		■			
DK2	FORCE Certification A/S						■																																		
DK3	Dansk Elektronik, Lys & Akustik (DELTA)							■	■		■	■		■											■	■										■		■			
ES1	Centro Español de Metrología (CEM)						■		■		■	■		■					■	■														■							
FI1	Inspecta Oy							■	■		■	■		■		■									■	■						■									
FR2	Laboratoire National de Métrologie et d'Essais (LNE)		■	■			■	■	■	■	■	■		■	■	■	■		■	■	■	■		■	■	■	■			■	■	■		■		■		■		■	■
GB1	NMRO Certification Services (NMRO)		■		■		■	■	■		■	■	■	■		■				■				■	■	■						■				■		■			
HU1	Hungarian Trade Licensing Office (MKEH)													■																											
IT1	Ministero dello sviluppo economico - Direzione generale mercato, concorrenza, consumatori, vigilanza e normativa tecnica						■																																		
JP1	National Metrology Institute of Japan / National Institute of Advanced Industrial Science and Technology (NMIJ / AIST)						■				■			■																	■	■									
KR1	Metrology and Measurement Division (KATS)													■																											
NL1	NMi Certin B.V.		■		■	■	■	■	■		■	■	■	■	■	■					■			■	■	■						■		■		■		■		■	■
NL2	KIWA Nederland B.V.						■																																		
NO1	Norwegian Metrology Service (Justervesenet)							■	■			■		■										■	■	■						■				■					
NZ1	Measurement and Product Safety Service (MAPSS Wellington)													■																											
PL1	Central Office of Measures (GUM)													■						■		■																			
RO1	Bureau Roumain de Métrologie Légale (B.R.M.L.)																		■	■							■			■	■										
RU1	Russian Research Institute for Metrological Service (VNIIMS)			■			■	■	■	■	■	■		■		■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	
SE1	RISE Research Institutes of Sweden AB							■	■		■	■		■		■				■					■	■						■									
SI1	Metrology Institute of the Republic of Slovenia (MIRS)													■																											
SK1	Slovak Legal Metrology						■							■																		■									
US1	NCWM, Inc.										■			■																											
VN1	Directorate for Standards and Quality (STAMEQ)													■																											

LIAISON ACTIVITIES

ISO CASCO WG 44 6th Meeting Revision of ISO/IEC 17025

10–12 July 2017 Geneva, Switzerland

Kai Stoll-Malke, PTB
Paul Dixon, BIML

Introduction

ISO CASCO WG 44 is responsible for the revision of ISO/IEC 17025 *General requirements for the competence of testing and calibration laboratories*. As an A-Liaison in ISO CASCO, the OIML is a member of WG 44 since testing and calibration is linked to OIML technical work, in particular in the following areas:

- OIML TC 3, which is responsible for metrological control; and
- OIML TC 4, which is responsible for measurement standards and calibration and verification devices.

ISO/IEC 17025 is referred to in OIML B 3 *OIML Basic Certificate System for OIML Type Evaluation of Measuring Instruments* and OIML B 10-1 *Framework for a Mutual Acceptance Arrangement on OIML Type Evaluations* as a tool for Issuing Authorities and Issuing Participants respectively to demonstrate their competence. Reference to ISO/IEC 17025 is also made in OIML B 18 *Framework for the OIML Certification System (OIML-CS)* as the basis for testing laboratories to demonstrate their competence. This is significant considering the OIML-CS is due to come into operation in January 2018.

The ISO CASCO WG 44 meeting was held in Geneva, Switzerland

OIML D 30 *Guide for the application of ISO/IEC 17025 to the assessment of Testing Laboratories involved in legal metrology* gives guidance for the application of ISO/IEC 17025 to the assessment of Testing Laboratories involved in legal metrology and will be affected by the revision of ISO/IEC 17025.

The meeting

The ISO CASCO WG 44 held its sixth, and final, meeting in Geneva on 10–12 July 2017. The aim of the meeting was to discuss the comments received on the Draft International Standard (DIS) that the WG 44 Drafting Group had been unable to resolve. WG 44 also had to consider whether the revised standard could then proceed directly to publication or whether a Final Draft International Standard (FDIS) would be issued for ballot.

The OIML had submitted comments on the DIS ISO/IEC 17025 which were a compilation of those received from members of the OIML mirror committee.

As mentioned in the article in the January 2017 edition of the Bulletin, major changes in the revised standard will be the new structure as a consequence of the CASCO document QS-CAS-PROC/33 *Common elements in ISO/CASCO standards*. This structure is similar to other recent ISO/CASCO standards, (e.g. ISO/IEC 17065:2013) and will facilitate the integration of different CASCO standards in one Management System. The revised standard will also integrate the principles of the new ISO 9001:2015. Examples of modernization in the revised standard are:

- a stronger process orientation;
- a stronger focus on information technology;
- a section on risk-based thinking;
- an updated terminology including several new definitions, and
- requirements for a clearly defined decision rule, with an appropriate inclusion of measurement uncertainty, in case the laboratory provides a statement of conformity (e.g. pass/fail, in-tolerance/out-of-tolerance) in a test or calibration report.

Furthermore, the revised standard will contain an informative Annex A on metrological traceability.

Seventy ISO CASCO WG 44 members participated in the meeting, with representatives from Standardization Bodies, Liaison Organizations, Accreditation Bodies, Testing Laboratories and Calibration Laboratories (including Federations of Testing and Calibration Laboratories).

Even though 91 % of ISO CASCO Members and 85 % of IEC P-members voted in favor of the DIS, a significant number of comments were received. The WG 44 Drafting Group met in April 2017 and had addressed the majority of the comments so only those comments that had not been addressed by the WG 44 Drafting Group were discussed.

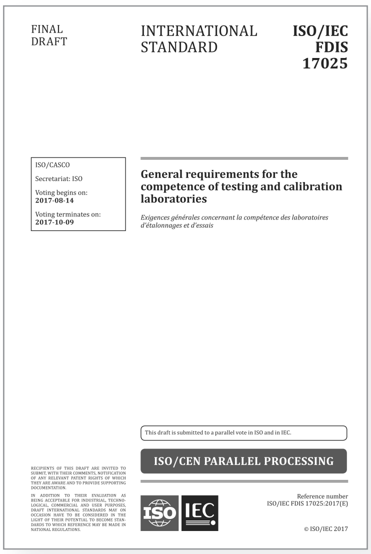
Following three days of discussion WG 44 determined that a number of technical changes had been made and so decided to advance to the next step in the standardization process and to issue the Final Draft International Standard (FDIS) ISO/IEC 17025. At the FDIS stage only comments related to mistakes and editorial changes are permitted.

FDIS ballot

The ballot on the FDIS started in August 2017 and closed on 09 October 2017. The result of the FDIS ballot of ISO/IEC 17025 was positive, with the FDIS approved by 99 % of the P-Members who voted in ISO and by 100 % of the P-Members who voted in the IEC.

Next steps

Following the positive result of the FDIS ballot, it is anticipated that the revised standard ISO/IEC 17025 will be published by the end of November 2017. Once the revised standard is published, OIML project TC 3/SC 5/p 12 will recommence with the aim of revising OIML D 30 to reflect the requirements of the revised version of ISO/IEC 17025. ■


FINAL DRAFT

INTERNATIONAL STANDARD

ISO/IEC FDIS 17025

ISO/CASCO

Secretariat: ISO

Voting begins on: **2017-08-14**

Voting terminates on: **2017-10-09**

General requirements for the competence of testing and calibration laboratories

Exigences générales concernant la compétence des laboratoires d'étalonnages et d'essais

This draft is submitted to a parallel vote in ISO and in IEC.

ISO/CEN PARALLEL PROCESSING

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

Reference number
ISO/IEC FDIS 17025:2017(E)

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LIAISON ACTIVITIES

ISO CASCO WG 49
Revision of ISO/IEC 17000

26–28 June and 18–20 September 2017 Geneva, Switzerland

Paul Dixon, BIML

Introduction

A New Work Item Proposal (NWIP) to revise ISO/IEC 17000 *Conformity assessment – Vocabulary and general principles* was approved by ISO/CASCO P-members and IEC P-members in March 2017. ISO/CASCO WG 49 has been established to develop the revision of ISO/IEC 17000.

As an A-Liaison in ISO/CASCO, the OIML is a member of WG 49 as conformity assessment vocabulary is linked to OIML technical work, in particular in the following areas:

- OIML TC 1, which is responsible for terminology;
- OIML TC 3/SC 5, which is responsible for conformity assessment; and
- OIML Certification System (OIML-CS).

ISO/IEC 17000 is referred to in a number of OIML publications including OIML V 1 *International vocabulary of terms in legal metrology (VIML)*, OIML B 3 *OIML Basic Certificate System for OIML Type Evaluation of Measuring Instruments* and OIML B 10-1 *Framework for a Mutual Acceptance Arrangement on OIML Type Evaluations*. The revision of OIML B 18 *Framework for the OIML Certification System (OIML-CS)* that has been submitted for CIML approval also references, and uses terms and definitions from ISO/IEC 17000.

In addition, ISO/IEC 17000 is referenced in the range of ISO/CASCO standards that are used by the OIML, including ISO/IEC 17025 *General requirements for the competence of testing and calibration laboratories* and ISO/IEC 17065 Conformity *assessment - Requirements for bodies certifying products, processes and services*.

The revision of ISO/IEC 17000 will directly impact on a number of OIML publications, most notably OIML V 1, including the online vocabulary (http://viml.oiml.info/en/index.html), and OIML B 18. ▶▶

ISO/CASCO NWIP

The NWIP has a very specific scope because ISO/IEC 17000 is a terminology that adheres to the principles in ISO 704 *Terminology work – Principles and methods*. Per ISO 704, the terms and definitions in ISO/IEC 17000 are based on a *concept system* that establishes concepts in the field of conformity assessment and their relationship to one another in the terminology. All ISO/CASCO standards that reference ISO/IEC 17000 are based on this concept system so altering the concept system would require the review and possible revision of all standards in the ISO CASCO Toolbox.

Consequently, the NWIP does not permit changes or deletions to the current ISO/IEC 17000 concept system, including the terms used for each concept. However, all of the definition text in ISO/IEC 17000 is open for revision so long as the revised definition text does not alter the concept. Additions to the ISO/IEC 17000 concept system, in adherence with ISO 704, are also permitted.

The purpose of the NWIP is therefore to update the existing definition text in the standard and to add any needed concepts, terms and definitions without altering the underlying concept system or current terms in order to take into account:

- updated terminology reflected in ISO 9000:2015, Annex SL of the ISO/IEC directives (high level structure), and other conformity assessment standards (e.g. ISO/IEC 17027);
- development of new conformity assessment standards that have added new terms that need to be added to 17000;
- technological advances that may result in new terms and/or change existing definition text;
- discussions reflecting recent developments in the ISO CASCO toolbox resulting in new terms or changes in definition text;
- changing modes of business operations in the conformity assessment sector; and
- address terms that have different meanings for different circumstances.

Meetings

The ISO/CASCO WG 49 held its first meeting in Geneva on 26–28 June 2017. As this was the first meeting of a new CASCO WG, the meeting addressed the following:

- reviewing the WG 49 terms of reference and membership;
- introducing the CASCO WG rules and processes;
- reviewing the NWIP and the ballot result;
- determining the way forward and the work plan;
- reviewing relevant background documents; and
- reviewing the ISO/IEC 17000 concept system, terms and definitions.

The review of the ISO/IEC 17000 concept system, terms and definitions accounted for the vast majority of the activity at the first meeting. During this activity the members of the WG split into three task groups to focus on different aspects of the concept system and the grouping of terms and definitions. The key discussion points and outcomes from each task group were captured.

A second meeting of WG 49 was held in Geneva on 18–20 September 2017. The second meeting focused on reviewing and confirming the key discussion points and outcomes from the first meeting, and resulted in the development of the text of WD1 ISO/IEC 17000.

Next steps

With the text of WD1 ISO/IEC 17000 developed at the second meeting, the time schedule for ISO CASCO WG 49 is as follows:

- October to November 2017: WD1 circulated among WG 49 members for consultation;
- 12–14 February 2018: third WG 49 meeting to develop CD1;
- March to April 2018: CD1 circulated among ISO CASCO Members for a two-month ballot;
- May to June 2018: Tentative Drafting Group meeting to review comments on CD1;
- September to October 2018: fourth WG 49 meeting to review the CD1 comments and prepare the DIS;
- November 2018 to March 2019: DIS out for translation and ballot;
- May 2019: handle DIS comments and prepare draft for FDIS or publication;
- If an FDIS is required then publication is planned for November 2019;
- If no FDIS is required then publication is planned for July 2019.

A YEAR ON FROM STRASBOURG

Extract from Peter Mason's report to the 52nd CIML Meeting

PETER MASON, CIML Past President

Peter Mason delivers his last report at the 52nd CIML Meeting

In this, my final year as CIML President, I have found myself heavily engaged in various projects, all of which concern the future development of our Organisation. As usual this work involves a mix of inputs, both from the staff at the Bureau and the personal contribution of many colleagues in our Member States. As a result I am pleased to say that this year I have quite a lot to report!

It gave me great pleasure when Cambodia joined us as our sixty-second Member State. In addition, we welcome Bolivia, Ecuador and the Philippines as OIML Corresponding Members. Although Kirghizstan has unfortunately been de-listed, that still means we now have sixty-six Corresponding Members. I think I can safely say that interest in the work of the OIML across the globe has never been greater and we can all be proud of this fact.

The financial position of the Organisation, in the technical accounting sense of the term, continues to be a healthy one. Indeed, following the discussions at the 15th International Conference on the best way to use the surplus which built up over the last four-year accounting period, a lot of thought has gone into how this surplus can be used to benefit the whole of our membership without embarking on new activities which might not be sustainable in the long run. Training in the use of the new rules and the new technology available to us for conducting our technical work is an extremely good use of such funds and reports will be made during the CIML meeting on the steps that have already been taken to roll out such training.

The BIML Director will provide detailed financial information during our meeting. I would like to emphasise, however, that in addition to the overall financial position, it is necessary to keep a close watch on the cash position, and in particular the cash flow, if the Organisation is to continue to function smoothly. Our reliance on subscriptions from Member States as the principal source of income means that we are very dependent on timely payments coming in from our Members, in particular the larger ones.

Within the Bureau, the temporary staffing arrangements adopted following the untimely passing of BIML Assistant Director Willem Kool have continued to operate throughout the year. Although this is undoubtedly less effective than running the Bureau at full strength from the office in Paris, I am pleased to say that the dedicated efforts made by the other staff in the Bureau, the continued support we have received from many CIML Members and their colleagues, and of course the contribution made by Paul Dixon and Gilles Vinet, have together enabled us to continue to make excellent progress on the ambitious agenda set at previous CIML meetings. Hopefully once the vacant Assistant Director position has been filled we will be able to see an even greater level of pace in the delivery of that agenda.

Discussions on staffing within the Bureau are likely to be an important topic during our meeting, as we will need to start the process of recruiting a successor to Stephen Patoray. Stephen's term continues to the end of 2018, but as this is my last report to the CIML I would like to take this opportunity to pay tribute to the skills and dedication he has brought in his role as Director. A key feature of his approach has been the emphasis on teamwork within the Bureau and the success of that has been evident in the way we have been able to carry on in the difficult circumstances experienced since the beginning of 2016.

It is a relief to me personally, and no doubt even more so to those who work in the Bureau, that these annual reports no longer detail the various challenges of building work or indeed major changes to the Organisation's IT and communication systems. The process of improvement is a continuous one, however, so it was good to see the adoption of a new email system which has made remote working a lot more efficient. In addition, there have been many other improvements during the year which may not be visible to colleagues outside the Bureau but which have greatly improved the system's resilience. For most of our Members, the really important aspect is the working of the interactive elements of the OIML website, in particular the possibilities provided by the "PG Workspace" facility.

After the pause which was made necessary by last year's reprioritisation, it is good that we were able to recommence the programme of training sessions so that secretariats and conveners in particular are able to make use of these tools which are designed to render the conduct of technical work quicker and more effective. As I have said before, however, there is an important role for CIML Members themselves in making sure we understand what is possible and how to make the best use of it. One of the advantages of the number of projects we have had over the past few years to produce or revise Basic Publications is that it has greatly increased the familiarity with the new systems which many CIML Members – myself included – are able to develop. A key feature of the training programme we are rolling out is that it is available to CIML Members and I would definitely encourage you to take advantage of this.

Of the Projects for producing or revising Basic Publications, the one of most direct personal interest to me is the review of the *Directives for OIML technical work* (OIML Basic Publication B 6) in which I acted as the Project Group convenor. In many ways this Basic Publication, alongside the Convention itself, represents the "instruction manual" for how we conduct our core activity of technical work. Although the review agreed in 2015 was deliberately limited, it became clear that even within those carefully defined terms of reference there was a need for significant changes to ensure a shared understanding of how we should carry out our technical work with the new facilities we now have. I am pleased to say that although it was not possible to keep to the ambitious timetable we set at the 50th CIML Meeting, the Project Group was able to reach a high degree of agreement on all of the major issues. As a result, I am confident that we now have a well-crafted revised B 6 presented to CIML for adoption at our meeting. I would like to thank all my colleagues in the CIML who have contributed to this work. I would also like to express my appreciation of the significant contribution made by a number of others, notably Ian Dunmill and Gilles Vinet from the Bureau and Morayo Awosola, Regina Kluess, Ralph Richter and George Teunisse from the UK, Germany, USA and the Netherlands respectively.

As I have mentioned before, the revisions of B 6 and the development of better communication tools are not ends in themselves. They are the means by which we improve the efficiency of our technical work and ensure that our Recommendations and Documents remain relevant. Last year saw a significant increase in the number of Projects approved by the CIML – probably a record in the period since the approval process has been finalised. It is not to be expected that we will see such numbers every year – there is a limit to the resources Member States can make available to carry out technical work – but I believe the modernisation of the way we conduct our technical work was an important factor in this increase. Moreover, another feature of the new systems is that they make it easier for a much wider range of countries to participate in our technical work. One of the things I find most encouraging is the interest we are seeing from some of our smaller or newer Members in participating in projects relevant to them.

At the same time, it is important that when resources are under pressure we apply them where they can be of most benefit. The Presidential Council, through its review of the technical work programme, has an important part to play in this and I am pleased to say that our meeting in March saw further developments in the tools we have available for identifying areas in which there may be a need to change priorities.

In terms of the future shape of our Organisation, possibly the most important development of all will be the introduction of the new single, integrated OIML Certification System. The approval last year of Basic Publication B 18:2016 *Framework for the OIML Certification System* was a very important milestone, but a lot more work has had to be completed since then.

The provisional Management Committee (prMC) was established last year to undertake the necessary actions to ensure that the OIML-CS can come into operation in January 2018. Two successful meetings of the prMC were held in 2017; the first in Berlin in February and the second in Shanghai in June. In association with the prMC meeting in Shanghai, AQSIQ organised a very successful seminar on the OIML-CS – attended by over 400 people – which provided an excellent opportunity to promote the OIML-CS to key stakeholders. A final meeting of the CPRs under the MAA also took place in Shanghai to support the transition of existing Issuing Participants from the MAA to the OIML-CS.

The prMC has undertaken a wide range of tasks during the year, including the identification of improvements to B 18 – a revision is presented to this meeting for approval – and the development and publication of the range of Operational and Procedural Documents that underpin the Framework. The prMC has also developed a number of recommendations regarding the implementation of the OIML-CS for consideration at this meeting. Among the important decisions we will have to take this week is the appointment of the Management Committee Chairperson and Deputy, and the Board of Appeal Chairperson and Members. I would like once again to express my appreciation of the work which has been put in by CIML First Vice-President Dr Roman Schwartz, Paul Dixon and Luis Mussio, supported by a large number of colleagues across the Organisation.

In recent years it has often seemed that we have approached what many now speak of as "the CEEMS Agenda" as a separate area of activity, to be prioritised as a third area alongside improvements in our Technical Work and the introduction of the new Certification System. I am not always sure that this is a helpful way of looking at things – the most significant thing about "the CEEMS Agenda" is that it touches activities right across our Organisation. A major benefit of the changes we have introduced into the way we carry out our technical work is that it makes it easier for members of the CEEMS community to participate in that work and thus ensure that it is relevant to their needs. One of the major advantages of the new Certification System is that it will be easier to understand and thus be easier for CEEMS administrations to see how it can be used to make their approach to regulation both simpler and more effective.

Nevertheless, I believe there is a need to bring together the various strands of our CEEMS-related activities, as we did for instance when we adopted CIML Resolution no. 2015/10 in Arcachon two years ago. The Advisory Group on matters relating to countries and economies with emerging metrology systems (abbreviated to the "CEEMS Advisory Group" or even "the AG" these days) has a key role to play here. I was greatly encouraged by the agreement last year to put the AG onto a more formal basis by drawing up a Basic Publication setting out its purpose and the way it is expected to carry out this work. Adoption of this Draft Basic Publication is one of the matters we need to consider at this, our 51st meeting. A significant advantage of putting the Advisory Group on a more formal basis is the opportunity it offers to introduce a strategic approach to planning the work that is important to the CEEMS Community, and as a result of the meeting of the Advisory Group which took place yesterday, I am pleased to say that we have a work plan which can guide activities over the next few years. I would like to acknowledge once again the contribution of the AG Chair, Mr Pu Changcheng and his colleagues in China, most particularly Mr Guo Su, for the support they have offered to this work. I have also worked closely with the BIML Web Team to expand and improve the section on the OIML website dedicated to these activities and I encourage you to view the information that is available there.

Within the expected items of the work plan, there are two in particular that I would like to comment on.

The first is the continued development of the Training Centre concept. We know from the initial Pilot Training Centres in China last year that this is a concept which has proved valuable and which is generating growing interest. I was really pleased to see that plans are now being made for a Centre in Kenya, and I hope this in turn stimulates interest in promoting similar initiatives in other parts of the world. One of the key features of the Training Centre approach is the role of individual Member States in providing support; I would like to take this opportunity to give my thanks to colleagues in China and now in Germany for the essential role they are playing. I hope their example will be followed by more of our Member States!

The second item in the CEEMS work plan I would like to mention is the proposed revision of International Document D 1:2012 *Considerations for a Law on Metrology*, which the CIML will be asked to approve as a project later this week. I know from several projects which I have been involved in from the UK how significant this Document can be for countries which want to modernise their metrology legislation. However, we are increasingly seeing such modernisation taking place within the wider concept of a "Quality Infrastructure" which includes standards development, accreditation and conformity assessment. Looking again at D 1 in the light of these developments gives us the opportunity to place metrology securely in this wider landscape. When we do so I believe it is important that we work closely with the BIPM, because the arrangements which Governments put in place require close co-operation between legal metrology and scientific metrology institutions. I was very pleased, therefore, that the BIPM has agreed that if the D 1 revision project is approved they will work with us with the aim of the revised Document becoming a joint publication.

Such collaboration is part of a wider pattern of co-operation among international organisations, particularly those that operate in the fields of standardisation, accreditation and metrology. The increased interest in the "Quality Infrastructure" approach has led to the DCMAS Network, a group of ten organisations concerned with metrology, accreditation, standardisation, conformity assessment and infrastructure development in developing countries, becoming more active again, and the OIML has played an important part in this. The BIML completed an overhaul of the DCMAS website this year, and we have agreed to continue to hold the secretariat of the network for a further year to improve the continuity of the work. The OIML has also taken the lead, in collaboration with UNIDO, in ongoing work to re-orientate this network to cover more effectively the subject of quality infrastructure, and has piloted the agreement of a definition of the terms "quality infrastructure" and "quality policy" between DCMAS members. Many of the organisations in DCMAS are also part of a wider network of international organisations brought together by the OECD, which I have mentioned in previous reports. The OIML was one of the case studies published in November last year, and following this we expect that our involvement in this network will reduce somewhat. I will however continue to be personally involved in the follow-up work because I have agreed with the OECD to act as the facilitator of the network, which has now been put on a permanent basis, after I retire from the UK government service.

The other aspect of international co-operation that is very important is the links with the Regional Legal Metrology Organisations. I was fortunate to be able to attend the annual meetings of WELMEC in Madrid in May and AFRIMETS in Pretoria in August and the annual SIM meeting in San Salvador last week. In all cases there were also accompanying seminars or conferences which provided an opportunity to explain the OIML's work to a wider audience. The spirit of co-operation is now very strong, with a good understanding of how work at both the global and regional levels can provide mutual support. One other engagement I undertook in my OIML capacity was to speak at the World Metrology Day event organised in Cairo in May.

As I have said, all this activity is part of a programme of work which will of course continue after the end of my term as President, and indeed we will mostly see the benefits over future years.

When I finally retire at the end of November, it will mark the end of a career as a public servant that has lasted over forty-four years. I can safely say that being your President has been the most satisfying time I have spent during that career. I am grateful to have had this opportunity. I am also grateful for the kindness and support I have received from the two Vice-Presidents, other members of the Presidential Council, many other CIML Members, the BIML Director and all the Bureau staff during what have been quite a difficult few years. I look forward to saying thank you to many of you personally during this week's meetings. ■

Call for candidates – BIML Director

At its 52nd Meeting on October 9, 2017, the International Committee of Legal Metrology (CIML) discussed the conclusion of the term of the current BIML Director Mr. Stephen Patoray and passed the following resolution:

> "The Committee decides that the vacant position of the BIML Director be advertised at the conclusion of the 52nd CIML Meeting, following the respective regulations set out in OIML B 7:2013 *BIML Staff regulations*, and OIML B 13:2004 *Procedure for the appointment of the BIML Director and Assistant Director*,
>
> with a view that a new BIML Director be appointed at the 53rd CIML Meeting which will be held in Hamburg, Germany from October 8–12, 2018".

Information about the OIML, the BIML, and the position of Director is available on the OIML website at:

https://www.oiml.org/en/structure/biml/jobs-and-opportunities

Submissions **must** include a detailed CV, a certified diploma, certified transcripts, two references and a personalized letter of motivation, and should be sent directly to the CIML President no later than **February 1st, 2018**. Incomplete submissions will not be considered. ■

Appel à candidats – Directeur du BIML

Lors de sa 52ème Réunion le 9 octobre 2017, le Comité International de Métrologie Légale (CIML) a évoqué la fin du contrat du Directeur actuel du BIML, M. Stephen Patoray et a approuvé la résolution suivante :

> "Le Comité décide que le poste vacant de Directeur du BIML sera publié à l'issue de la 52ème Réunion du CIML, suivant les règles stipulées respectivement dans la publication OIML B 7:2013 *Statuts du Personnel du BIML*, et dans la publication OIML B 13:2004 *Procédure pour la désignation du Directeur et des Adjoints au Directeur du BIML*,
>
> en vue de la nomination d'un nouveau Directeur du BIML lors de la 53ème Réunion du CIML qui se tiendra à Hambourg, Allemagne, du 8 au 12 octobre 2018".

Des informations sur l'OIML, sur le BIML, et sur le poste de Directeur sont disponibles sur le site OIML à l'adresse suivante :

https://www.oiml.org/fr/structure/biml/vacances-de-poste

Toute candidature **doit** inclure un CV détaillé, un diplôme certifié, des transcriptions certifiées, deux références et une lettre de motivation personnalisée, et doit être envoyé directement au Président du CIML au plus tard le **1er février 2018**. Toute candidature incomplète ne sera pas retenue. ■

STIG ÅKE THULIN

In Remembrance of Stig Åke Thulin (1927–2017)

Bernard Athané Former BIML Director

Stig Åke Thulin naquit en 1927 en Suède, où il fit ses études qu'il compléta ultérieurement par un doctorat obtenu en France.

Son activité professionnelle se déroula tout d'abord dans diverses sociétés industrielles ainsi qu'au Bureau International des Poids et Mesures ou il développa en particulier une méthode de mesure de l'accélération de la pesanteur (*g*) à l'aide d'une règle chutant dans le vide et dont la position était enregistrée toutes les microsecondes par une caméra (1958).

Il travailla ensuite comme expert auprès de l'UNESCO, notamment en Iran ou il contribua au développement du service de métrologie.

Désireux de terminer sa carrière en France (il avait épousé une française), il rejoignit le Bureau International de Métrologie Légale en octobre 1978, pour s'occuper principalement des problèmes de développement, en tant qu'Adjoint au Directeur.

Il établit ainsi de nombreux et fructueux contacts entre le Conseil de Développement de l'OIML et diverses instances internationales et régionales (ISO/DEVCO, Agences des Nations-Unies, ASMO, SIM, etc.) avant de prendre sa retraite en septembre 1992.

Il eut la douleur de perdre son épouse, Josette Thulin née Claudinot, en 2012, avant de s'éteindre en septembre 2017.

Le BIML et son ancien Directeur, Bernard Athané, présentent aux enfants et petits-enfants de Stig Åke et Josette Thulin et à toute leur famille, leurs très sincères condoléances. ■

Stig Åke Thulin was born in 1927 in Sweden, where he did his studies; he later went on to obtain a doctorate degree in France.

His professional career led him to work in various industrial firms and also at the International Bureau of Weights and Measures, where he notably developed a method for measuring the acceleration of gravity (*g*) by using a ruler falling in a vacuum whose position was recorded every microsecond by a camera (1958).

He then worked as an expert with UNESCO, notably in Iran where he contributed to the development of their metrology service.

He very much wanted to end his career in France (he had married a French lady) and joined the International Bureau of Legal Metrology in October 1978, mainly to look after development issues as Assistant Director.

He established a large number of very fruitful contacts between the OIML Development Council and various international and regional bodies (ISO/DEVCO, United Nations Agencies, ASMO, SIM, etc.) before retiring in September 1992.

He suffered the pain of losing his wife, Josette Thulin née Claudinot in 2012, and passed away himself in September 2017.

The BIML, together with its past Director Bernard Athané, present their sincere condolences to the children and grandchildren of Stig Åke and Josette Thulin, and also to their whole family. ■

WOLFGANG EULER

In Remembrance of Wolfgang Euler - A Life for Metrology

BERND ZINKE, Friend and Colleague

On 1 July 2017, at the age of 74, our friend Wolfgang Euler passed away.

Ever since he gained his apprenticeship as an electrical engineer in 1957, Wolfgang Euler worked for 48 years at Chronos-Werke in Hennef / Sieg (Germany). He worked as a design engineer, Sales Manager, product manager, head of Assembly, as well as from 1988 in legal metrology. During this time the company went through multiple changes of ownership – and indeed the name of the traditional company founded in 1881 as the "Hennefer Maschinen-Fabrik C. Reuther & Reisert" changed several times. In 1938 the company became a limited partnership and in 1950 it was renamed "Chronos Werk: Reuther und Reisert KG". In 1972 it was taken over by the American Howe Richardson and renamed "Chronos Richardson GmbH". In 1990 the company was again taken over, this time by the British Staveley Industries and integrated into the "Weighing & Systems Group", which also included Salter and Weigh-Tronix. The management buyout in 1998 ended in 2002 with the sale to the Canadian Premier Tech.

After the insolvency of Chronos Richardson GmbH in 2004, Wolfgang Euler became an independent consultant and founded "METAP Ltd. Inhaber Wolfgang Euler Metrology" in 2005.

Since 1988, Wolfgang spent much time researching the Chronos scales history and their inventors, Carl Reuther and Eduard Reisert, and collected documents and exhibits of all kinds. In 1991 he authored his publication "The Chronos-Weigher, the first automatic scales in the world", which he expanded and developed until 2005, entitled "Weights, Scales and Weighing in Changing Times: The Chronos Scale, the first automatic scale in the world".

Over the period during which he was responsible for design approvals at Chronos Richardson GmbH, Wolfgang visited many countries. From 1988 to 2007 he led working groups in the Arbeitsgemeinschaft Waagen - AWA of the German weighing industry (later called Fachverband Waagen in the VDMA) and from 1999 to 2007 he worked within the Legal Metrology Group of the European Weighing Association CECIP on the revision of OIML R 61 and R 107. Because of his joyous nature, just for fun his metrology colleagues created the (unofficial) metrological unit for humor, the "EULER"!

Wolfgang continued his work for metrology even after he retired. In 2007, a scouting trail with 22 stations was inaugurated, initiated by him in his hometown of Hennef and set up together with the local Tourist Information Office, as well as a permanent scales exhibition at the Meys factory. In the following years, Wolfgang himself personally guided countless walks and tours and conveyed the history of the scales in his own, dedicated and intuitive way. He never tired of emphasizing that the Chronos scale was the first fully automatic scale in the world, which was approved by the Kaiserische Normal-Aichungs-Commission in Berlin on 12 April 1883.

Together with a group of co-authors of companies and authorities, Wolfgang Euler wrote the twenty-part series of articles "History of Scales", which (among others) was also published over numerous editions of the OIML Bulletin. Until the end, he combined scientific material and prepared new publications.

And so it is not surprising that the family memorial is decorated by a beautiful two-armed bar scales.

Dear Wolfgang, we will talk about you for a long time and you will always have a place amongst us, just as you had during your life. ■

Wolfgang Euler recently worked closely with Mühle+Mischfutter and with the OIML to co-author a fascinating series of articles published in the OIML Bulletin entitled "The History of Scales". He will be greatly missed and the OIML extends our deepest sympathy to his family and friends.

info

The OIML is pleased to welcome the following new

Corresponding Member

- Bolivia

CIML Members

- **Denmark:** Mr. Robert Bonde Christensen
- **Indonesia:** Mr. Rusmin Amin
- **Kazakhstan:** Mr. Galymzhan Dugalov
- **Netherlands:** Mr. Robert Lambregts
- **Portugal:** Dr. Isabel Godinho
- **Slovak Republic:** Ing. Pavol Pavlis
- **Switzerland:** Dr. Bobjoseph Mathew

Bulletin online

Download the OIML Bulletin free of charge

oiml.org/en/publications/bulletin

OIML meetings

February 2018

OIML TC 17/ SC 7/p 3

PG meeting to discuss the revision of OIML R 126:2012
Evidential breath analyzers

14-16 February 2018
GUM, Warsaw, Poland

OIML TC 8/SC 1

Progress review by the SC on all ongoing projects (Revisions of R 71, R 85 and R 125).

The Netherlands
Dates and venue not yet announced

March 2018

OIML TC 9/SC 2/p 9

PG meeting to discuss New Recommendation: Continuous totalizing automatic weighing instruments of the arched chute type

13-14 March 2018 (Tentative dates)
Teddington, UK

October 2018

53rd CIML Meeting and Associated Events

8–12 October 2017

Hamburg, Germany

Committee Drafts

Received by the BIML, 2017.07 – 2017.08

None

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.

Technical articles 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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