Editorial

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Software in legal metrology

A number of presentations given at the Seminar held in Paris on 30 September and 1 October 1999 on *Software in legal metrology* will be published in the OIML Bulletin, starting in this issue.

Computerized systems and software in legal metrology raise new problems that the OIML must take into account in our regulations. For example, how can we make sure that:

- results provided by a computerized system emanate from validated hardware and software?
- other connected hardware or software installed does not interact negatively with the elements subject to legal control?
- data and parameters cannot be corrupted by users or hackers?
- data are not damaged by memory overflows and by input/output conflicts?
- identification of the measurand and of the destination of the measured products has been correctly carried out by the instruments?

Legal metrology authorities and manufacturers present at the Seminar gave examples and compared approaches to these problems. Two key activities must now be undertaken by the OIML.

1 Development of an OIML Document on software and computerized instruments

This task has been undertaken by the new TC 5/SC 2 under the joint secretariat of France and Germany, using the existing WELMEC Documents 2.3 and 2.5 as the basis. In the same way as D 11 defines the general rules applicable to electronic instruments, an OIML Document will deal with the aspects related to computerized instruments and their software.

Some fundamental questions will have to be discussed. For example, computerized instruments should not be examined as "black boxes". But can we regulate the software design process to ensure the conformity of instruments and systems to legal metrology requirements?

2 Training of legal metrology specialists

These problems require new skills in software design and in software reliability and security. Training courses exist in different countries on these matters, but probably need to be adapted to the specific needs of legal metrology. In the future, most type evaluation specialists should have received such training.

It would then be an important task for the OIML to encourage the development of training on these matters for legal metrology engineers. ■

Les logiciels en métrologie légale

Plusieurs conférences présentées lors du Séminaire tenu à Paris les 30 septembre et 1er octobre 1999 sur les *Logiciels en métrologie légale* seront publiées dans le Bulletin de l'OIML, en commençant par ce numéro.

Les systèmes informatisés et logiciels en métrologie légale soulèvent de nouveaux problèmes que l'OIML devra prendre en compte dans nos réglementations. Par exemple, comment s'assurer que:

- les résultats fournis par un système informatisé proviennent d'équipements et de logiciels validés?
- d'autres équipements connectés et logiciels installés n'interagissent pas négativement avec les éléments soumis au contrôle légal?
- les données et les paramètres ne sont pas altérés par les utilisateurs ou par des pirates?
- les données ne sont pas altérées par des dépassements de capacité de mémoire ou par des conflits d'entrée/sortie?
- l'identification de l'objet mesuré et de la destination des produits mesurés a été faite correctement par les instruments?

Les autorités de métrologie légale et les fabricants présents au Séminaire ont donné des exemples et comparé des approches à ces problèmes. Deux activités clés doivent donc être menées par l'OIML.

1 Élaboration d'un Document OIML sur les logiciels et sur les instruments informatisés

Cette tâche a été entreprise par le nouveau TC 5/SC 2 sous le secrétariat conjoint de la France et de l'Allemagne, en utilisant comme base les Documents WELMEC 2.3 et 2.5 existants. De même que le D 11 définit les règles générales applicables aux instruments électroniques, un Document de l'OIML traitera des aspects relatifs aux instruments informatisés et à leurs logiciels.

Des questions fondamentales devront être discutées. Par exemple, les instruments informatisés ne devraient pas être examinés comme des "boîtes noires". Mais pouvons-nous réglementer le processus de développement des logiciels pour assurer la conformité des instruments et des systèmes aux exigences de la métrologie légale?

2 Formation de spécialistes en métrologie légale

Ces problèmes exigent de nouvelles compétences relatives au développement, à la fiabilité et la sécurité des logiciels. Des formations existent dans différents pays sur ces sujets, mais devraient probablement être adaptées aux besoins spécifiques de la métrologie légale. Dans le futur, la plupart des spécialistes de l'évaluation des modèles devraient avoir reçu de telles formations.

Une tâche importante pour l'OIML serait donc de favoriser le développement de formations sur ces sujets pour les ingénieurs en métrologie légale. ■

FUEL DISPENSERS

Practical hints for the verification of fuel dispensers

W. Gögge and E. Schäfer, Verification Authority of Rhineland-Palatinate, Bad Kreuznach, Germany

Introduction

Measuring equipment for gas stations has to be verified, since firstly customers have no means of checking whether they really receive the quantity shown on the fuel dispenser indicator, and secondly gas station owners cannot control whether they receive the correct sales revenue for the quantity of fuel delivered. So both the former and the latter must be able to trust the fuel dispensers concerned to function correctly within a predefined maximum permissible error; incorrect or inaccurate functioning can lead to a significant advantage or disadvantage for either trading partner.

Testing and verification

Prior to being installed in the field, fuel dispensers should undergo a pattern approval test, i.e. every type of fuel dispenser has to be tested if both the accuracy and durability of measurements are to be guaranteed. Only after having received such a pattern approval certificate by a competent authority should the manufacturer begin batch production.

It is also reasonable to expect that new fuel dispensers first undergo in-house preliminary testing by the manufacturer - this guarantees that the units basically meet the requirements for mechanical construction and for their electronic components.

Following this, a practically-orientated initial verification is carried out at the place of installation. This is necessary because the on-site characteristics of a product such as its viscosity and its flow rates may influence the measurement results. Past experience has shown that a large number of fuel dispensers, despite having been initially verified at the manufacturers' premises, no longer operate within the maximum permissible errors when actually installed at a gas station; such fuel dispensers therefore first have to be repaired and adjusted, even though they have not yet actually been used.

Over time, the measuring qualities of fuel dispensers can change: for example a gasket in the measuring unit of a reciprocating pump can suffer from wear and tear. Therefore the instruments have to be subsequently verified and an interval of two years for this operation has proved to be appropriate. However, fuel dispensers are often adjusted or repaired before the end of the two-year period, the intention being to keep the measurement error as low as possible, i.e. close to zero. In Germany, these adjustments and repairs are carried out by assigned repair firms, who affix a repair mark to the instrument after each intervention. This mark identifies both the firm and the date of repair. However the repair, even thus certified, does not imply premature expiry of the verification validity and the repair firm or owner still has to immediately inform the verification authority which supervises the work by carrying out subsequent verifications. Afterwards the repair mark is replaced by the verification mark.

Testing equipment

This paper gives details of proven metrological equipment for the testing of fuel dispensers and tests are always performed, at least in Germany, by volume standards. The authors are not aware of any procedure which would allow on-site testing that could be performed by a gravimetric method or by using master meters or pipe provers. Since the measurement deviation of a fuel dispenser is not constant at least three tests at low, medium and high flow have to be carried out.

Classical volume measuring provers are cylindrical with a tight neck and have a scale that indicates the volume. After all the measurement procedures have been carried out, the provers have to be transported and

emptied into the storage tanks of the gas station which are most often located underground. Discharging them usually involves heavy physical work and perhaps even inhaling toxic gases. It is easy to understand that verification office inspectors have tried to improve their working conditions by transporting the provers on a cart, which is sometimes even equipped with a tipper to ease the discharge.

When working with volume standards, damage is sometimes inevitable (for example bulges which reduce the volume). But if this damage is not noticed, a fuel dispenser might appear to measure wrong, therefore other procedures have proved to be a viable alternative.

Practical testing issues

The provers are firmly mounted on a vehicle (Fig. 1) or on a small cart, which can be unloaded off the car with the help of a ramp or lifting device (Figs. 2 and 3); both these procedures protect the provers from damage. In order to conduct the tests in as rational a manner as possible it is advisable to provide a storage tank in which the test fluid can be discharged. In this way multiple consecutive tests can be performed without the need to empty the test fluid into the gas station storage tank after each individual test.

Fig. 1 Built-in testing facility in a car. While filling, the verification officer stands on the grating which is fixed to the tailboard. There is no intermediate storage of the product to be measured.

Fig. 2 Vehicle with loaded testing facility.

Fig. 3 Testing facility which can be taken out of the vehicle for filling.

One disadvantage of standards being permanently installed in a vehicle is that this vehicle has to be maneuvered onto the gas station forecourt, whereas the smaller cart (Fig. 4) has the advantage of being easily movable by hand.

The volume standards themselves do not always have to be cylindrical, they can also be rectangular - in fact they can be of any shape. The important principles are that they can be entirely filled, that they do not in-

Fig. 4 Wheeled testing facility with storage tank container underneath the provers. The pump on the left is for emptying the container if discharge by gravity is not possible (see dark hose, bottom left).

Fig. 5 Testing facility, normally mounted in a car for filling. Note the horizontally placed cylindrical provers made of stainless steel and the intermediate large storage tank lying on the ground.

clude air, that they have a scale from which the content can be read and that they can be completely emptied.

In the past provers used to be made from steel, brass or copper; nowadays they are increasingly manufactured using stainless steel (Fig. 5). A manufacturer in Ireland produces volume standards made out of a special plastic (with carbon fiber); they were featured in the July 1995 OIML Bulletin (Fig. 6). Provers of this type have been intensively tested by the Rhineland-Palatinate Verification Authority, with good results. They have an excellent volume stability even when changing temperature. Furthermore they all have a special feature: they are all provided with a vertical mounted pipe with a separation edge connected to the inside of the tight neck. When the tank has been filled up to this edge the remaining fluid to be measured is drained off automatically into this pipe with almost the same height as the prover. It is thus possible to read off exactly how much volume has been filled.

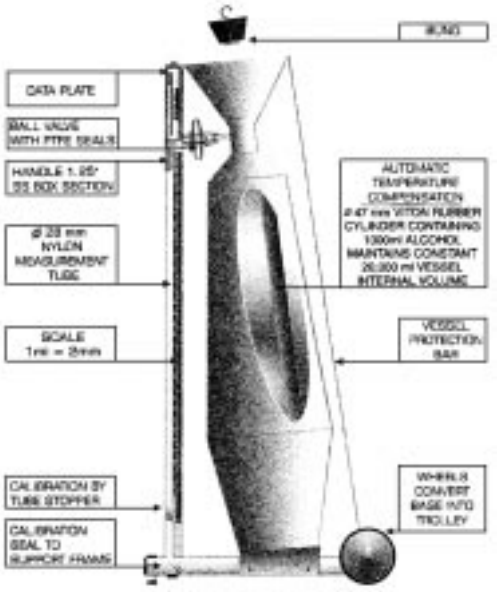

Fig. 6 Schematic description of an integrated measure.

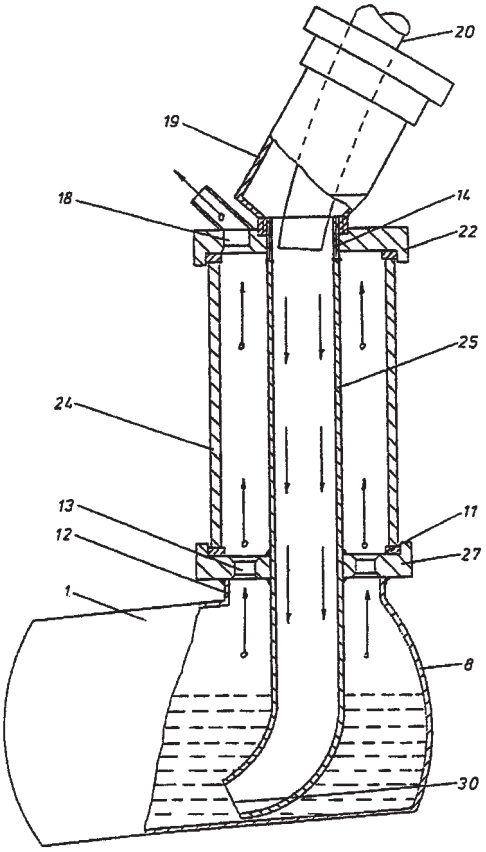

Fig. 7 Part of a patented testing facility with an outlet for the gas close to the bottom of the prover. The displaced air gas mixture escapes through openings nos. 13 and 18 in a folding receptacle (also see Fig. 8). Pipe no. 24 is made of glass, so that the filling height can be read off a scale (not on the sketch).

Another aspect should also be considered concerning the filling of provers: the fuel or diesel oil will be dumped into the provers from the top, from where air will be displaced. The air will become partially saturated with fuel and comes back out of the volume standard. Therefore, a small proportion of the filled fuel will not be measured inside the flask. Experts are in disagreement as to how much fuel evaporates in the form of gas. A quantity of 0.15 % is estimated depending on the form of the prover. This effect can be reduced by using built-in filling pipes, which are firmly affixed to the inner side of the prover, fastened to the neck and the end of the pipe is situated close to the bottom of the prover (Fig. 7). In this way the mixture of gas and air will be less than in the case when fuel "falls freely" into the prover.

Fig. 8 Testing facility with folded receptacle. When filling the prover, this receptacle collects the escaping gas and air.

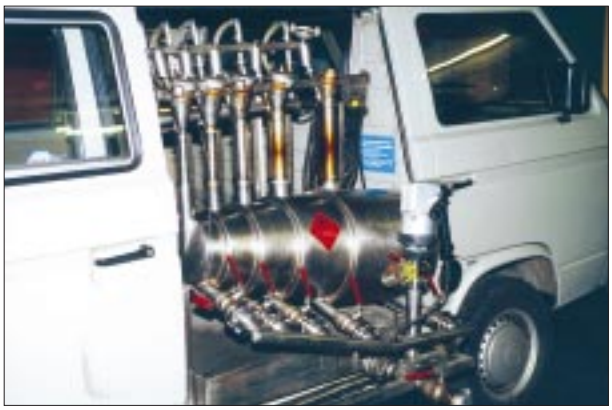

Fig. 9 Space-saving test facility.

In any case, escaping gas and air should be sucked off by hoses in order to avoid the operator breathing in this air when filling the flasks.

An inspector of the Baden-Württemberg Verification Authority has developed a patented procedure by which the escaping air does not go outside. Instead, the gas and air is collected by a plastic receptacle (Fig. 8). When the measurement has been made and the liquid medium leaves the flask, the mixture of gas and air leaving the plastic receptacle is forced back into the volume standard. Therefore, and because of the existing saturation, fresh air can be prevented from always becoming concentrated with fuel. Although this test facility saves a considerable amount of space - each test container is close to the others - it is because of the aforementioned plastic receptacle that this test facility has to be installed in the vehicle, even if it can be pulled out of the car slightly (Fig. 9).

Fuel dispenser manipulations (to the customer's disadvantage) were recently detected in one of the EU member states. It is assumed that the fuel dispensers were manipulated by remote control in such a way that (for instance) they did not deliver enough fuel to certain customers at certain times of certain days. Therefore it would be an advantage if the verification officers could control whether manipulations have occurred or not by means of a neutral test facility.

Unfortunately, in Germany the Verification Authorities' vehicles are still clearly identifiable as such, which eliminates the element of surprise and makes catching offenders very difficult.

A built-in flow meter inside the pipe close to the filler neck of a neutral passenger car could be very useful in order to highlight such manipulations.

Finally the authors wish to point out once again that even though test facilities have been in use for many decades, it has still not been ascertained:

- what percentage of the fuel mixes with the air as it escapes from the volume standard;
- whether there are other economically justifiable procedures compared to measuring using a volume standard.

In the event that any solutions or additional information to the above-mentioned points are known to readers, appropriate details would be appreciated. ■

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TAXIMETERS

Taximeters - solutions to combat fraud

CLAUDE RICARD, Gleike Inc. (USA) and MICHEL LE FAOU, ATA (France)

Introduction

In any major city, the words "taxi" and "taximeter" conjure up a variety of preconceptions. The taxi driver is unfortunately renowned for defrauding - sometimes accusations are exaggerated, but often the fraud is underestimated.

The fight against taximeter fraud is an international concern and both domestic and foreign customers must be protected, especially as the latter may form an initially negative opinion of a country on arrival if they experience over-charging by a taxi.

In the field, two kinds of fraud flourish:

- visible fraud (for example the application of a higher tariff), against which the domestic consumer can be on his guard; and
- invisible fraud (for example injection of extra distance pulses), which first appeared with the advent of electronic taximeters and the most recent generations of vehicles. Here, the consumer is defenseless. This second type is in fact impossible to detect and any omission in the applicable standard, regulation or type approval may have severe consequences since it is difficult (if not impossible) to remedy this kind of situation in the aftermath.

In this paper, the authors describe various types of fraud observed in the field (thousands of inaccurate taximeters are already in use on the market), especially those that concern the injection of abnormal signals. They will show that efficient solutions do exist to detect this problem.

The electronic taximeter

The taximeter is an instrument installed on public hire vehicles (taxis) which calculates and indicates the fare to be paid on the basis of distance traveled and journey duration.

A sensor (either one installed by the vehicle manufacturer for other purposes, or one especially installed for the taximeter) provides distance pulses and an internal clock gives time information.

In some countries, the meter also controls an illuminated unit mounted on the vehicle's roof which displays externally the tariff being applied.

The meter casing is generally mechanically sealed but neither the sensor nor the cable feeding the meter are protected, which is an issue for concern.

Main types of fraud that can be found in the field

The traditional targets for taximeter fraud are firstly the domestic customer who is not aware of local regulations and secondly the foreigner who is unfamiliar with the fares typically applied in the country he is visiting. The following can be noted:

- *use of a higher tariff*: particularly frequent in those countries in which the driver can manually modify the tariff position;
- *the meter starts counting before the journey begins*: it is not easy to differentiate between the official initial fare and another amount displayed; and
- *display of wrong data*: for instance a totalizer is displayed instead of the fare.

Table 1 gives an idea of the extent of each kind of fraud and the difficulty in detecting them. The solutions (generally) instigated to combat them are also presented.

But there is a more insidious and more serious form of fraud which concerns the taximeter system (taximeter device, sensor, peripherals, wiring) and the customer may not even imagine that a sealed instrument can be a

Table 1 Fraud detectable by the customer

Fraud	Extent	Detection difficulty	Solution
Wrong data displayed	Low	Easy	• Type approval: data displayed (totalizers, internal information) must be clearly and unambiguously identified
Meter starts counting before trip begins	Medium	Easy	• Display of the applied tariff on roof for police control; • Printed receipt mandatory
Use of a higher tariff	High	Easy	• Display of the applied tariff on roof for police control; • Tariff simplification and automatic changes; • Printed receipt mandatory; • Consumer information

potential source of cheating. This form of fraud consists in modifying the taximeter system to artificially increase the measurement of the journey distance (see Table 2). The following can be observed:

- injecting extra pulses into the sensor line by means of a small device called a "zapper" (also known as a "sugar" in the United Kingdom);
- changing the tires, which is an easy way to add extra meters to the actual journey distance; and
- modifying the taximeter itself by altering the software, using software available in another country, or changing the tariff table or the *k* constant.

The zapper

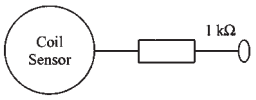
On a "parallel market", several kinds of zappers can be bought at prices varying from 50 to 500 Euros. Due to their small size (~ 2 cm^3), they can easily be concealed and are normally activated by a hidden switch situated near the driver, though some models are located behind the dashboard and controlled by a magnet.

Due to the large variety of sensors that exist on the market, many of which differ in impedance and in signal shape, the most widely-used anti-zapper may or may not function efficiently depending on the model of car and on the distance sensor installed in the vehicle. The authors have observed that defrauders tend to buy and use those models of cars on which it is easy to commit fraud.

To better understand how it is possible to "mislead" a taximeter, it is important to understand what kinds of signals the sensors and zappers generate.

The main features of the sensor line are the signal shape (square or sine) and the impedance level (low or high). Accordingly, one can group the sensor generators into three families:

1 Alternator type (**coil**) providing alternative or positive sine pulses. The signal amplitude depends on the rotation speed of the magnet facing the coil. Sensor impedance is roughly 1 kΩ, the same value for the high and low levels:



2 Hall effect sensor type, with open collector output (**HE/opc**) providing square pulses. The low level can vary from 0 V to 1.5 V and the high level from 5 V to 12 V. The sensor impedance is around 100 Ω (low level) and 10 kΩ (high level):

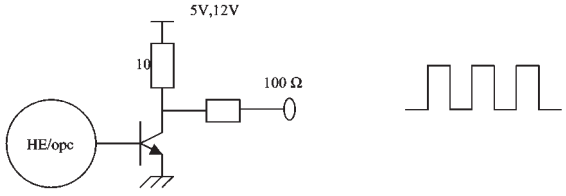
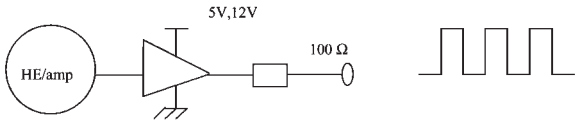


Table 2 Fraud not detectable by the customer

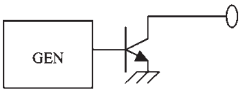
Fraud	Extent	Detection difficulty	Solution
Change of tires	Low	Easy	• Controls in the field; • Printed receipt mandatory
Internal modification of the taximeter (program memory, parameters change);	Low	Not very easy	• Mechanical and electronic sealing; • Software protections
Taximeter programming not compliant with regulation	Low	(Very) difficult	• Agreement and control of installers and meter shops
Injection of abnormal pulses	High	(Very) difficult	• Security device inside the meter able to detect any fraudulent injection; • Distance sensor devoted to the taximeter

3 Hall effect sensor with amplifier and current protection type (**HE/amp**) providing square pulses. The low level can vary from 0 V to 1.5 V and the high level from 5 V to 12 V. The sensor impedance is around 100 Ω for high and low levels:

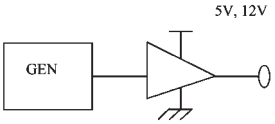


The zapper generators can be grouped into five types:

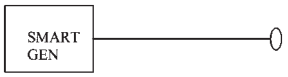
Zapper type 1: Fixed frequency generator with open collector output:



Zapper type 2: Fixed frequency generator with analog amplifier output:

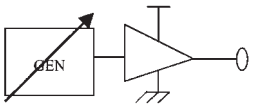


Zapper type 3: Smart zapper that generates 1 pulse (high level) every *n* pulses:



Zapper type 4: Smart zapper that generates 1 pulse (low level) every *n* pulses:

Zapper type 5: Smooth on frequency generator with open collector output:



It can be observed that a zapper is generally able to inject signals on the line due to the difference in impedance between the two generators (the sensor does generally not have a very low output impedance due to current protection).

The first security devices designed only verified whether the distance signal seemed to be perturbed. But very rapidly new zappers came onto the market with technology capable of taking control of the sensor line by injecting pulses with the same shape, at a very low impedance, and providing a smooth acceleration after

power-up. This kind of zapper is difficult to detect using rudimentary techniques.

This zapper (type 5 - see page 11) comes into action either when the speed of the car is low or when the car has stopped. Generally equipped with an amplifier output, it generates pulses at a frequency that increases until a fixed or adjustable medium speed is reached, at which time the frequency is stabilized at a predetermined speed or decreased slowly. The latest techniques designed by ATA are able to detect such zappers.

Anti-zapper solutions available: the Gleike Mini Generation

The Gleike Mini Generation is the first product line on the market which integrates a maximum number of powerful solutions to fight the zappers, basically through software signal and data processing. Its efficiency has been proved on over 15 000 instruments in the field.

The solutions implemented are based on the consideration that when a fraudulent signal is injected, this injection leads to the modification of various features of the sensor line or the sensor signal such as pulse width, amplitude modulation, impedance modification, frequency jump, etc.

The strategy can be resumed as follows:

- during the installation, the meter "takes a photograph" of the sensor line and the pulse characteristics and memorizes them;
- when running and periodically, the meter verifies that the measured characteristics fit with the initial ones;
- when abnormal characteristics are detected, the meter stops the price calculation based on distance, and stops working at the end of the trip, displaying an error message; and
- the meter has to be re-programmed (i.e. returned to the supplier).

To take a decision, the meter analyses the following criteria:

- the line impedance variation at the low and high signal levels (comparison with initial impedance);
- the amplitude modulation (comparison with average amplitude);
- the signal duty cycle variation (comparison with initial duty cycle);
- whether the speed limit is exceeded;
- whether the acceleration is too high for the car;
- sudden speed changes; and
- any abnormal stability of the speed.

The processor designed for the Gleike Mini Generation is able to detect a zapper in under 24 seconds. According to an average duration of 20 minutes for a trip, that duration represents less than 2 % of an average trip.

Note: The solutions presented here can be applied to other classes of instruments, especially any instrument that receives pulse signals from a sensor, such as industrial counters, fuel pumps, chronotachographs, etc.

Methodology used by ATA to accept or reject an anti-zapper system

The tests have to take into account the following parameters:

- diversity of sensor technologies (grouped into 3 families);
- diversity of zapper technologies (grouped into 5 families - today at least!); and
- speed of the car.

A practical way is to check all the possible combinations of sensor and zapper families, for three speeds:

- vehicle has stopped;
- low speed (the speed must be increased slowly from 0 to 20 km/h); and
- high speed (the speed must be increased slowly from 0 to 100 km/h).

When the vehicle has been stopped, two tables have to be checked:

- sensor output is low level; and
- sensor output is high level.

It is important to note that during the test the speed must be increased smoothly, as in an actual vehicle. Abnormal acceleration would be detected by the common acceleration process and would distort the test results. However, the fifth zapper is not detected by the acceleration control.

Speed =	Zapper 1	Zapper 2	Zapper 3	Zapper 4	Zapper 5
Coil	×	×	×	×	×
HE/opc	×	×	×	×	×
HE/amp	×	×	×	×	×
Sensor					

Consequently 4 × 15 tests have to be performed. For each square, the result is "OK" if the zapper has been detected after less than the target time (24 s for the Gleike Mini Generation) (see Annex: Examples of sensor line disturbances, pages 13 and 14).

Examples of legal clauses relative to fraud protection

- ***France: Decree of 17 February 1988 - art. 11 (extract and translation):***

The taximeter has to be supplied with an automatic control of the distance pulses enabling it to ensure that only the pulses corresponding to the effective traveled distance are taken into account.

- ***The proposal for a European Directive on measuring instruments, in the annex MI-007 (Taximeters) offers the following article:***

A taximeter and its installation instructions specified by the manufacturer shall be such that, if installed according to the manufacturer's instructions, fraudulent alterations of the measurement signal representing the distance traveled are impossible.

The European Directive is interesting because the requirement is expressed in terms of global result instead of imposed solution. This global result guarantees the consumer against "invisible" fraud and defines goals for the manufacturer - and therefore for the installer. Actually the installation operation is fundamental. In France, it happened that some instruments, 100 % compliant with the regulation, were installed in such a way that actually permitted fraud.

Conclusions

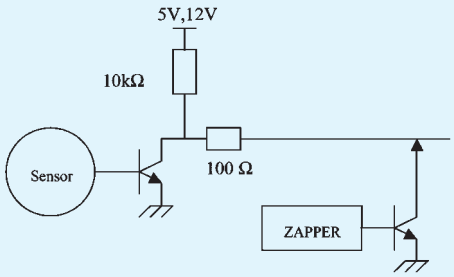
The alteration of the metrology chain (distance sensor - meter) is prevalent, invisible and pernicious. The injection of extra distance pulses is an easy operation using readily available technology (kits are available around the world in electronics shops). Controls in the field are inoperative due to the zapper's small size and because it can be plugged in anywhere along the sensor cable.

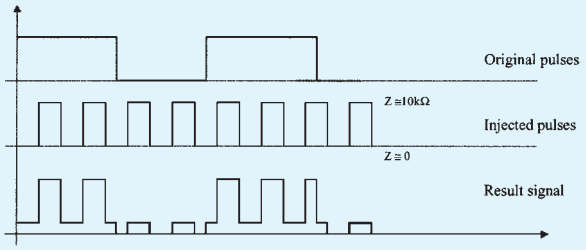
According to the metrology viewpoint, it is difficult to admit that the sensor that measures the distance for the purpose of price calculation can remain unprotected. It is also difficult to admit that the consumer is likely to be confronted with an instrument that has been tampered with.

Only security devices integrated within the instrument are able to effectively fight "invisible" fraud. The technology to accomplish this is available and manufacturers do have appropriate and cost-effective solutions. When implemented, such solutions lead to actual results

Annex: Examples of sensor line disturbances

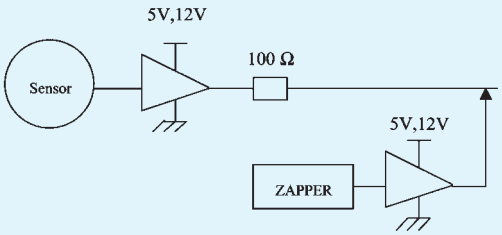
HE/OPC sensor versus zapper type 1

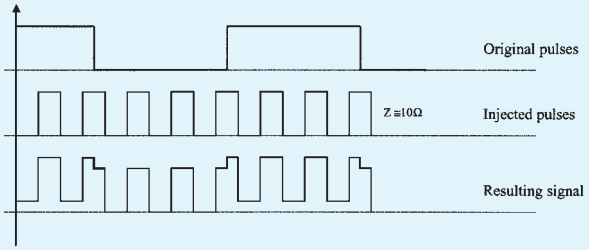




- only the high levels of the sensor signal are affected by the zapper;
- the average amplitude is modified; and
- similar phenomena can be observed with sine pulses.

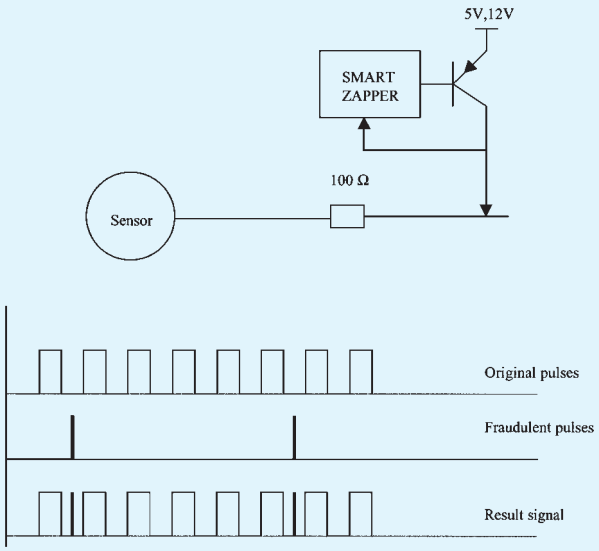
HE/AMP sensor versus zapper type 2 OR 5





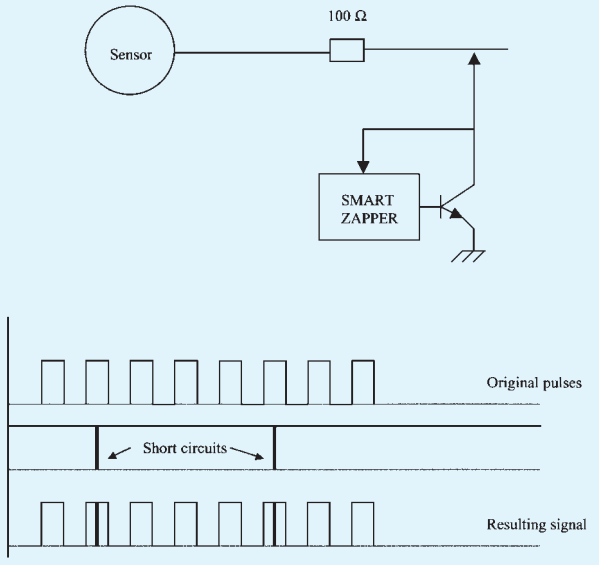
- the fraudulent signal is injected through a low impedance. Then the zapper dominates the sensor;
- injection also generates an amplitude modulation; and
- similar phenomena can be observed with sine pulses.

HE sensor versus smart zapper (high level)



- the smart zapper watches the line (in high impedance), counts *n* pulses and injects an additional pulse, (of very low impedance);
- for instance, if *n* = 5, the distance is up 20 %; and
- similar phenomena can be observed with sine pulses.

HE sensor versus smart zapper (low level)



in the field (ATA has been working on this issue since 1991 and 15 000 anti-zapper systems operate in cabs daily).

But for a manufacturer, this is not a normal concern. The company will tend to satisfy the minimum requirements to pass the type approval tests, but not more. Otherwise the market will reject the product. So the rules must be defined by standards.

Several specialists are working to prevent fraud and at the same time, thousands of drivers are conducting tests to find the flaws in the system. When such flaws are detected, drivers take advantage of them and once they find a way to cheat, many do not hesitate to do so.

Metrology Organizations and States have been dealing with the problem of fraud for a long time. Several Weights and Measurement Boards are working to include security directives in standards and regulations, and especially directives based more on the global result than on imposed solutions. ■

ATA (S.A.) is a private company located near Marseilles in the South of France. The company has been working on taximeters since 1977 and more than 200 000 instruments have been sold around the world. ISO 9002 certified, ATA is recognized for its excellence in fraud fighting: 15 000 anti-zapper systems are working daily. Gleike Inc is an ATA subsidiary in charge of the American market, managed by the ATA founder and located in Chicago.

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LEGAL METROLOGY INFRASTRUCTURES

Creation of a subsystem for the execution of tests on measuring instruments in the Republic of Cuba

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1 Summary

The importation, production or use of measuring instruments which do not guarantee measurement reliability because they either fail to fulfill the relevant technical and/or metrological requirements or operate in an unsatisfactory manner under environmental conditions, led to the need for an in-depth, objective study of the situation that existed some years ago in Cuba and for efforts to find a solution to achieve a progressive decrease in the negative economic, social and technical consequences that resulted from such a situation.

The conception and gradual realization of the subsystem presented in this paper to help solve these problems have made it possible to implement one essential element to control the production and importation of measuring instruments, and thus positively influence the Cuban economy.

This is a modest example of the implementation of such an important aspect of metrological control, as a part of legal metrology, in a developing country.

2 Introduction and background

Metrology includes measurement theory, units of measurement and their physical realization, the characteristics of measuring instruments, measuring procedures and methods, and the people and organizations involved in implementing measurements [1]. Legal metrology, as a part of applied metrology, deals with the technical obligations and legal requirements necessary to ensure the appropriate guarantees in terms of the safety and precision of measurements in fields such as technical safety, public health, national and international trade and product control [2], among others.

The subsystem presented is a part of the metrological control established in Cuba concerning the development, design, production, importation, marketing and subsequent use of measuring instruments [3]. It summarizes several years of work by the group of specialists who created and put it into practice.

3 Brief summary of the status of measuring equipment in the national context of the past decade

From 1981 to 1988 Cuba invested around 30 million pesos annually in measuring instruments and test equipment - a considerable sum which nevertheless proved insufficient, since the demand was almost twice the quantity of instruments imported. By way of example, retail trade alone needed 85 000 weighing instruments.

Industrial investment projects also had a bearing on the situation, since they included instruments for which sometimes no brand or pattern could be chosen and which had unknown technical and metrological characteristics. This situation tended to worsen because of the continued acquisition of defective measuring instruments; national production of measuring instruments was only just beginning, was still restricted in variety and quantity, and suffered from a high rejection rate. There was no testing of measuring instruments, due to the lack of local information and expertise to create and develop this activity. To sum up, the situation concerning measuring instruments was as follows:

- substantial importation with little attention paid to metrological issues;
- national production based on poor scientific and technical bases and high percentage of unfitness for use; and
- lack of an infrastructure to carry out tests.

As a result, some aspects were generally not taken into account during these actions, namely:

- quality;
- adequacy for the expected use;
- behavior under influence quantities;
- the system used to express the units of measurement; and
- conditions for any repair work and nationwide metrological control.

Because of this, the following events developed:

- importation and production of measuring instruments which failed to meet the requirements;
- misuse of supplies and services made available by exporting enterprises;
- problems in submitting claims based on existing information since the proper scientific-technical character was often lacking;
- difficulties in verifying, calibrating and repairing the instruments; and
- deviations from their planned use.

All of the above led to serious economic problems brought about by potential losses, sometimes real and irreversible, due to the use of instruments which did not guarantee the satisfactory development of a productive process, product or service quality control, or the right execution of a testing or measuring method, along with the resulting impact on production, services and research.

4 Testing and development

Efforts then focussed on executing tests to ascertain whether given instruments could be used for specific purposes under specific conditions, with the following aims:

- ascertain the truthfulness of the technical and metrological characteristics claimed by the manufacturers in order to achieve the required uniformity and accuracy of measurements;
- rationalize the available measuring instruments;
- help guarantee the metrological control of the instruments; and
- ensure the necessary technical level and quality of the instruments manufactured in the country.

To this end, the following development elements were taken into consideration (as described in 4.1 to 4.4):

- methodological-organizational basis;
- technical-material basis;
- normative basis; and
- human potential basis.

4.1 Methodological-organizational basis

As a developing country with no system to carry out state testing of measuring instruments, no well-equipped facilities and no skilled staff (but with a large number of measuring and testing instruments and a large normative and legal basis) Cuba had to approach the problem as a whole, albeit gradually and objectively, considering its real possibilities.

The first priority was to implement those elements that would immediately allow this activity to be started: procedures for the prior-to-purchase analysis and the metrological evaluation of measuring instruments were devised, as well as provisions for state testing of instruments and medical equipment pattern approval. These procedures were gradually implemented as the appropriate conditions materialized.

In the beginning, no attention was paid to legal concerns, hence any improvement of these activities was mainly dependent upon the level of awareness that could be reached with manufacturers and importers alike, through the understanding of the need to carry out the said tests.

As progress was made, the procedures had to be revised more than once to fit them to existing conditions. In the early 1980's prior-to-purchase analyses and metrological evaluations of measuring instruments were started so as to decide whether or not they met the requirements for use and whether or not they could be verified in the country (taking account of the information given in documentation or the results obtained from partial checks made on the instruments).

At national level, after consolidating the concept of "total quality" (amongst others) in the mid 1980's [4, 5], worldwide actions enlarged to embrace effective quality management and assurance in enterprises and other entities, with a view to reaching higher quality levels. International organizations began to draw up a number of documents aimed at assuring quality as one of the major aspects of optimal performance for any activity.

ISO issued a series of standards on *Quality management and quality assurance* [6] and, together with the IEC, the *General requirements for the competence of calibration and testing laboratories* [7]. The OIML issued a series of International Documents on the execution of metrological controls, among which (and of special interest to INIMET) OIML D 19 *Pattern evaluation and pattern approval* [8].

At the same time in Cuba, a reorganization was taking place in which national production had to increase to reduce imports and make potential exports possible. Thus the term *quality* became a must in the face of fierce competition, therefore fostering understanding on the part of national manufacturers about

the role of testing as a contribution to improving product quality.

As an OIML and ISO Member State, Cuba could not be left on the sidelines of such new work, so the early 1990's witnessed the beginning of actions to adopt the above-mentioned international documents.

The adoption of OIML D 19 provides a vantage point to develop work in the field of testing, since:

- it allows for harmonization between countries regarding terms, definitions and organizational issues;
- its general provisions can easily be adjusted to each country's characteristics; and
- it is very flexible by providing varied ways to include testing in the stages of equipment development, production and use.

To introduce OIML D 19 in Cuba several topics were developed, including the *Procedure for the evaluation and pattern approval of measuring instruments* [9], the models for the pattern evaluation report with the corresponding annexes, and the *Procedure for the organization and content of the test program*. The former is of paramount importance within the subsystem created since it facilitates foreign interaction with modest (yet modern) terms and provides a stronger scientific rationale, which permits:

- a definition of which types of instruments are to be submitted for mandatory pattern approval;
- a distinction between the *evaluation body* and the *approval body*, creating the methodological-organizational basis for their respective operation; and
- the emphasis to be put on the need to assure the competence of the testing laboratory, taking into account these international guidelines.

All this called for substantial changes in the subsystem and provided the opportunity to move up to a higher development stage from the conceptual and documentary viewpoint, so that work not only focussed on supervising the fulfillment of the necessary requirements in order to obtain reliable results (as had been the case until then) but also on a commitment to actually demonstrating it.

The starting point was proving INIMET's technical capability, for which the existing *Quality System* was redesigned and the *Quality and Procedures Manuals* were developed.

The following specific steps were taken:

- improvement of the work organization;
- specialization of testing;
- preparation of specifications to develop non-repetitive testing;
- elaboration of instructions for quality control of laboratory activity; and
- definition of boundaries to interact with the fundamental interfaces.

Details of this work were published in the OIML Bulletin [10].

Finally, in December 1997, after the fulfillment of the existing requirements for laboratory competence had been verified, the National Bureau of Standards granted INIMET the status of "Accredited".

4.2 Technical-material basis

In the mid 1980's the necessary material conditions were progressively created to carry out tests involving measurements of various physical quantities. The acquisition of a climatic chamber later in the decade made it possible to start testing influence quantities, particularly humidity and temperature tests.

The acquisition of specific measuring instruments to test medical equipment and the construction by laboratory specialists of the necessary devices allowed INIMET to expand the nomenclature of both the tests and the types of equipment to be tested. Also considered were tests to verify the fulfillment of electrical safety requirements, including immunity trials for low frequency disturbances, through which the first and simpler steps were made in the field of electromagnetic compatibility. Within this framework, a reference material was made as well, the "Striped pattern", to verify the resolution of densitometers, equipment produced in Cuba or imported for use in bio- and pharma-sample analytical laboratories.

All this allowed INIMET to increase its capabilities concerning the information obtained about the general behavior of the equipment tested.

The purpose and scope of the laboratory accreditation supports testing work in the following fields:

- parametric tests (length, angle, mass, hardness, kinematics, temperature, ambient humidity, electricity and radio);
- electrical safety;
- electromagnetic compatibility; and
- climatic tests.

The service covers testing of measuring instruments, controlling equipment and medical devices.

Instrument types evaluated so far include:

- weighing instruments;
- multimeters, ammeters, watt-meters;
- temperature and humidity meters and various kinds of thermometers;
- measuring tapes, vernier calipers, micrometers;
- electrocardiographs;

- electroencephalographs; and
- systems for diagnostic techniques.

Hundreds of the above tests have been made in more than 400 evaluations, covering instruments manufactured nationally or imported from around 20 countries in Latin America, Europe and Asia.

4.3 Normative basis

Due to the strengthening of INIMET's links with international organizations, the main normative basis used nowadays is that of the OIML, ISO and the IEC, without neglecting that of developed countries in the case of specific tests and equipment.

As a rule and when applicable, INIMET has used national documents related to measuring methods and instruments, testing, verification, classification and technical requirements, as well as the elaboration of internal measuring procedures.

4.4 Human potential basis

The main labor source of the testing laboratories has been INIMET's verification and calibration facilities, both for the laboratory staff itself and for the supporting personnel who occasionally participate in this activity. This has made it possible for the staff to achieve a significant improvement in the sphere of measurements by using standard measuring instruments and systems of the various physical quantities.

It has been customary for staff to attend postgraduate courses offered by INIMET or by other centers on complementary subjects of a general nature, or on subjects needed by the experts with a view to their integrated qualification.

The experienced laboratory staff is responsible for the qualification of newcomers in order to ensure their ability to carry out the testing work. The evidence of this result and its introduction is given by the creation of the subsystem itself, by its implementation and also by its use in industry and elsewhere.

The subsystem is extended to the Territorial Metrology Centers (TMC) which conform to the system of the National Bureau of Standards (ONN) of the Republic of Cuba, with the relevant modifications according to the characteristics and possibilities of those centers and what they produce in their territories.

5 Conclusions

In concluding, it can be stated that the subsystem has allowed INIMET to:

- help to guarantee measurement reliability in various activities of public interest such as health and trade, among others;
- contribute to increased product quality and the saving of many kinds of resources by obtaining production supported by scientific-technical bases;
- contribute to the enhancement of product reliability by providing technical support to goods-related contracts or claims both in Cuba and abroad;
- eliminate technical barriers to trade between countries;
- interact with other international systems and activities such as the *OIML Certificate System for Measuring Instruments* and the actions for mutual recognition of test results, pattern approvals and measuring instrument verifications;
- make a modest contribution to the development of metrology in Cuba and in the region, since INIMET ranks high among the countries with a certain level of expertise in the field; and
- play a major role in the international context from an updated position over the same concepts, despite any limitations inherent to a developing country.

The introduction and achievement of this result is just the starting point for continued interaction within the field. Some difficulties still exist which should soon be overcome, and INIMET is faced with important tasks to be undertaken so as to increase its generalization and improvement. ■

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LEGAL METROLOGY INFRASTRUCTURES

Harmonization of the legislative acts and normative documents on metrology in Ukraine

OLEG VELYCHKO, Deputy Head of the Committee for Standardization, Metrology and Certification of Ukraine

This article describes the modern metrological legislative and normative bases in Ukraine, as well as the primary tasks to be undertaken for their harmonization. Ukraine has been an OIML Corresponding Member since January 1997.

Modern metrology is distinguished by close worldwide collaboration and cooperation, since no individual country can resolve the whole set of metrological issues alone. This is why cooperation is increasing between the various national metrological services both multilaterally and bilaterally, accompanied by key mutual exchanges of experience and information.

Internationalization is an obligatory feature of measurement: world trade determines the global economy while scientific, technological and medical studies depend on international cooperation. Developing the coordination of legal metrology concepts, requirements and procedures is a long-term process, but accelerating this coordination is necessary especially taking into consideration the main goal of the WTO *Agreement on Technical Barriers to Trade* and reinforced by other related international agreements on the elimination of such barriers.

International organizations such as the OIML, ISO, the IEC and others define and implement the main concepts of metrological harmonization policy; in particular the OIML is concerned with harmonizing normative legal metrology documents, which are made effective through or on behalf of national legal metrology departments. Requirements can be laid down both by normative documents (ND) and by national standards developed by the various national bodies.

Taking into consideration the international acceptance and worldwide application of OIML publications, a priority task for the development of a national normative metrology base is the harmonization of national documents with OIML publications, which should be carried out taking into account the priorities given below.

The State Metrology System of Ukraine [1, 2] is based on the provisions of the new Law of Ukraine *Metrology and Metrological Activity* No. 113/98 of 11.02.98 (hereafter called "the Law"). The main provisions of the Law are harmonized with norms and rules on metrology and with OIML publications (OIML D 1 in particular [3]) which are generally accepted throughout the world.

The SI units, adopted by the CGPM, coordinated by ISO and recommended by the OIML, are used in Ukraine. One of the most important challenges is the unification of units of measurement; if the results of measurements are to be comparable worldwide they are to be based on the SI units, though some other units that are not covered by the SI (but widely used in practical metrology) may be permitted for implementation by decision of the unified national metrological body of Ukraine, the Derzhstandart.

For the first time the Law regulates the acceptance procedures of the results of metrological work conducted abroad. In accordance with international agreements signed by Ukraine, test results, type approvals, verifications and calibration of measuring instruments conducted in foreign countries can be accepted. As of today the Derzhstandart has signed two bilateral agreements on recognition of type approval (with Lithuania and Bulgaria), as well as multilateral agreements with 11 CIS countries (Russia, Belarus, Moldova, Kazakhstan and others).

To implement the provisions of the Law and to ensure the efficient functioning of the State Metrology System, in 1998–1999 the Cabinet of Ministries of Ukraine adopted the following Decrees:

- On approval of the Regulations on the State Service of Unified Time and Reference Frequencies (No. 1121 of 18.07.98);
- On approval of the Regulations on the State Service of Certified Reference Materials for the Composition and Properties of Substances and Materials (No. 1120 of 18.07.98);
- On approval of the Regulations on the State Service of Standard Reference Data on Physical Constants and

Properties of Substances and Materials (No. 1117 of 18.07.98);
- On approval of Regulations on the Procedures for Importing Measuring Instruments into the Territory of Ukraine (No. 1300 of 17.08.98);
- On approval of the Regulations of Establishing Payment for all Kinds of State Metrological Inspection (No. 770 of 02.06.98);
- On approval of the Regulations on Metrological Activities in the Field of Defense in Ukraine (No. 1306 of 17.08.98); and
- On approval of the Regulations on Metrological Activities in the Sphere of Scientific Research and Development in Ukraine (No. 528 of 01.04.99).

According to article 15 of the Law measuring instruments, measurement methods and prepacked products are liable to state metrological inspection and supervision. According to article 16 the state metrological supervision covers measurements used in:

- diagnosis and curing of human illness;
- quality inspection of drugs;
- quality and safety inspection of foods;
- environmental inspection;
- job safety;
- geodesic and hydro-meteorological work;
- trade-commercial operations and settlements between buyer (consumer) and seller (supplier, manufacturer, executor);
- fiscal, banking and customs operations;

Table 1 Obligatory conditions for type approval and verification in Ukraine and inter-verification intervals for the most widespread measuring instruments

Measuring instrument	*Mandatory type approval and verification*	*Inter-verification interval*
Trade scales	+	1 year
Gas meters	+	5 years
Water meters	+	2 years
Heat meters	+	2 years
Electricity meters	+	8-16 years
Taximeters	+	1 year
Noise-meters	+	1 year
Gas analyzers	+	1 year
Glass medical thermometers	+	∞
Tonometers	+	1 year
Fuel dispensers	+	1 year
Manometers	+	1 year
Dosimeters	+	1 year
Alcoholometers at exhalation	+	1 year
Instruments for checking velocity	+	1 year

Table 2 Structure of the normative basis of metrology in Ukraine

ND Name	*Total ND*	*Basic ND*	*Verification schemes*	*Methods of verification*	*MM*	*Other ND*
State standard (DSTU)	43	11	30	2	-	-
Managing ND and Recommendations (MND, R)	11	5	-	5	-	1
Interstate standard (GOST)	347	18	114	192	23	-
Interstate managing ND (RD)	269	8	-	126	11	124
Methods of the metrological institute (MR)	1 872	53	35	1 625	111	48
Total:	**2 542**	**95**	**179**	**1 950**	**145**	**173**

Table 3 Structure of the normative basis in fields of measurement

Area of measurement	*Number of ND's*				
	OIML (R, D, P)	*Total ND in Ukraine*	*DSTU, MND, R*	*GOST, RD*	*MR*
1. Geometric value measurement	8	326	3	77	246
2. Mechanical value measurement	26	228	4	43	181
3. Measurement of parameters of flow, consumption, level, volume of materials	27	181	5	34	142
4. Pressure measurement, vacuum measurements	4	117	2	24	91
5. Measurement of a physical and technical composition and characteristics of materials	28	447	1	47	399
6. Pharma-physical and temperature measurements	6	111	2	29	80
7. Time and frequency measurements	-	48	2	10	36
8. Measurement of electrical and magnetic values, radiotechnical measurements	4	408	12	100	296
9. Acoustic measurement	5	38	-	8	30
10. Optical and optometrist-physical measurements	2	149	6	27	116
11. Measurement of ionizing radiating and nucleus constants	-	77	3	33	41

- recording of energy and material resources (electrical and thermal power, gas, water, oil products, etc.);
- work carried out on the instruction of the courts, arbitrators and other public bodies;
- mandatory product certification; and
- registration of national and international sporting records.

In Fig. 1 the fields of applications of legal metrology are shown, and Fig. 2 depicts the scope of activities for which type approval and measuring instrument verification are necessary. Table 1 gives information on mandatory type approval and verification as well as interlaboratory verification intervals for commonly used measuring instruments.

According to the positive results of the state calibration and checking tests conducted by the Derzhstandart, more than 1 000 types of measuring instrument were entered in the State Register in 1992–1998. At present over 230 domestic and joint ventures manufacture such instruments in Ukraine.

Fig. 1 Fields of application of legal metrology

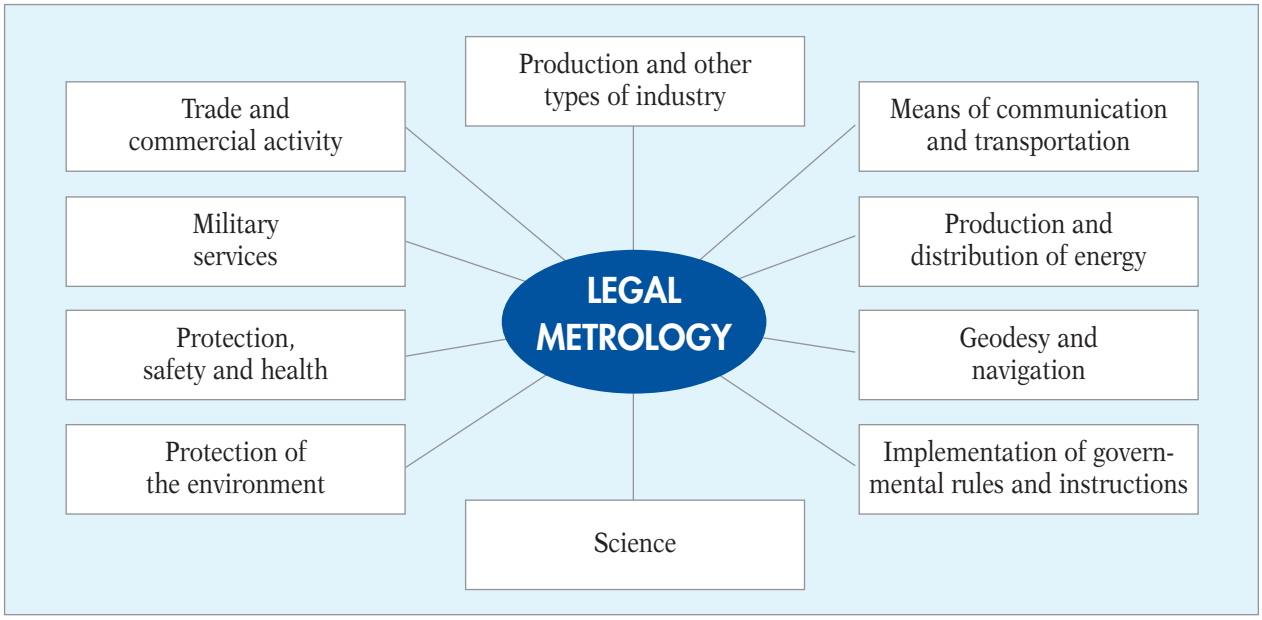
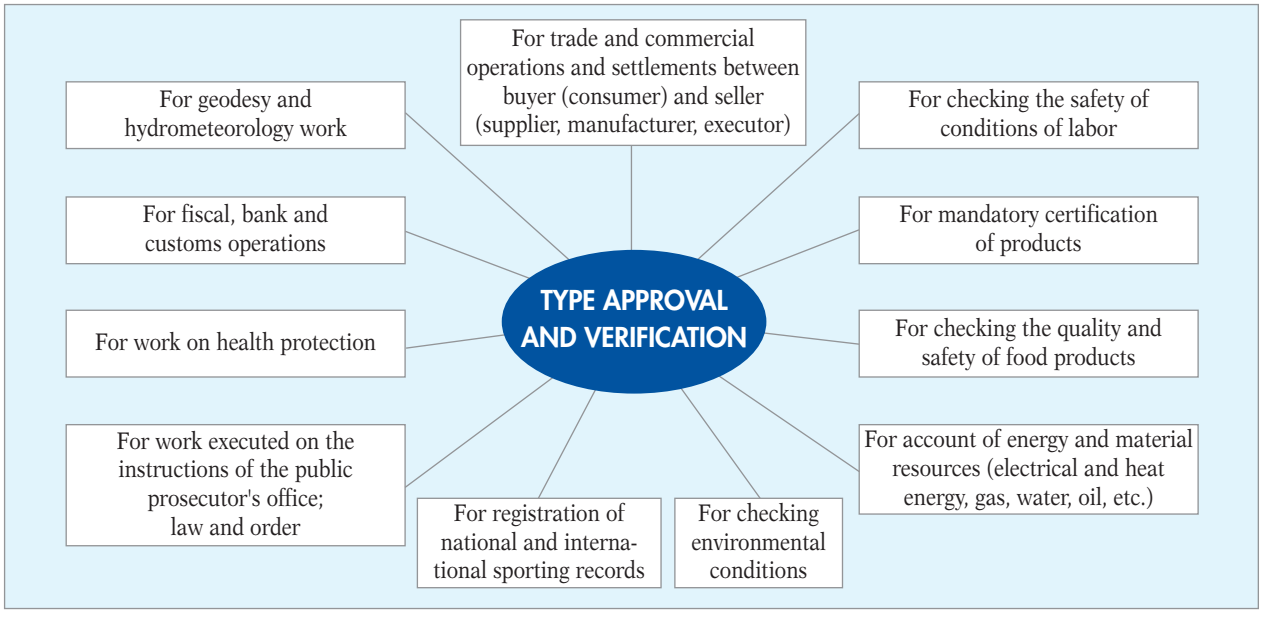


Fig. 2 Scope of metrology activities in Ukraine for which type approval and verification of measuring instruments are necessary



The Normative State Metrological System basis includes state standards (DSTU), managing normative documents and Recommendations on metrology (ND, R), interstate standards of CIS countries (GOST), interstate managing documents on metrology of CIS countries (RD, PMG), and methods (recommendations) of the metrological institutes (MR), which were drawn up before January 1, 1992. The System consists of over 2 500 normative documents, (mainly MR's) and includes 59 national ND's and over 350 GOST. Table 2 shows ND distribution by type; the number of fundamental ND's will increase in the future with the reduction of the relative amount of interstate ND's. Table 3 shows ND distribution by measurement area, which determines the necessary number of ND's by area.

Below are the main metrological standardization activity categories:

- terms and definitions in the field of metrology (DSTU 2681-94);
- units of measurement and units systems (DSTU 3651-97);
- state standards and verification schemes (DSTU 3231-95);
- organization and procedures for conducting state tests of measuring instruments (DSTU 3400-96);
- organization and procedures for conducting verification of measuring instruments (DSTU 2708-94);
- organization and procedures for conducting metrological certification of measuring instruments (DSTU 3215-95);
- methods of measuring instrument verification and for conducting measurements (MM);
- nomenclature of normalized metrological characteristics of measuring instruments;
- presentation of measurement results and rates of measurement accuracy;
- requirements for reference materials composition and characteristics of materials and substances; and
- methods of evaluation of probability and forms of data presentation for the characteristics of properties and materials, and others.

The Ukrainian Technical Committee for standardization TC-63 *General norms and rules for state traceability* was established on the basis of the Metrology Institute, which developed about 40 national ND (DSTU, MND, R) from 1992 to 1998. 107 intergovernmental ND's (including 32 GOST, 14 RD and 57 MR) were canceled and revised during this period.

Taking into consideration that in Ukraine intergovernmental ND's are as effective as national ones, a problem exists in defining the metrological issues to be regulated at national and international levels, as well as questions of harmonizing both national and intergovernmental ND's with international documents, standards and regulations. It is advantageous to develop and adopt fundamental ND's at national level which regulate the metrology service's organizational and methodical functioning, and at intergovernmental level to regulate those ND's which promote the mutual recognition of the results of measurements, testing of measuring instruments, type approval and verification (methods and means of verification, MM, and others).

In 1997 the Derzhstandart approved state standard DSTU 3651.0...2-97 which regulates both the specific units of the SI system and off-system units, based on ISO 31: 1992 *Values and units* and ISO 1000: 1992, which was used as the state standard in CIS countries for the first time. It comprises three interconnected parts: (1) regulation of the main units of the SI system, (2) derivatives of SI units and off-system units, and (3) physical constants and characteristic numbers that are regulated (also for the first time) in CIS countries.

In accordance with Resolution 8 of the 20th CGPM (1995) a class of additional SI units (radian and steradian) was excluded; these are referred to in the new standard as derived units and are determined as non-dimensional units. For the first time in CIS countries the updated provisions of CGPM documents were implemented in a state standard.

The national normative base is harmonized in detail with OIML International Documents and Recommendations; broader technical harmonization principles for measurement reliability are specified by the EU to ensure free trade flow. As an essential element in ensuring quality, the international and European standards in the area of systems quality assurance contain requirements for measuring instrument calibration and for referencing all the results of measurements to units, which are reproduced by national measurement standards.

As shown in Table 4 the system of international standards, Documents and Recommendations, interstate and national ND includes the following main categories of ND:

- terminology;
- traceability;
- units of measurement;
- measurement standards of units;
- state and local verification schemes;
- general requirements for measuring instruments;
- measuring instrument metrological characteristics;
- measuring instrument tests;
- measuring instrument verification and calibration;
- metrological inspection and supervision;
- metrological supervision for prepackaged goods; and
- accreditation of measurement and calibration laboratories.

The OIML Certificate System is used for types of measuring instruments that are covered by OIML Recommendations for metrological requirements, testing procedures and test report formats. Up to date

Table 4 System of international standards, Recommendations, Documents and national ND

Object of standardization	*International standard, Recommendation, Document*	*National standard Ukraine, interstate standard or other ND*
Terminology	VIML (V 1: 1978) VIM (V 2: 1993)	DSTU 2681-94. Metrology. Terms and definitions (draft DSTU 2681-99)
Traceability	OIML D 1: 1975 OIML D 13: 1986	Law of Ukraine "On metrology and metrological activity", 1998
Units of measurement	ISO 31/0-13: 1992 ISO 1000: 1992 OIML D 2: 1998	DSTU 3651-97. Metrology. Units of measurement (three parts) Draft DSTU 3651-3-99 (OIML D2:1998)
Measurement standards	OIML D 6: 1983 OIML D 8: 1984	DSTU 3231-95. Metrology. Measurement standards. Main positions, order of development, statement, registrations, keeping and using (draft additions DSTU 3231-95) GOST 8.381-80. SSM. Measurement standards. Ways of expressing inaccuracy
Verification hierarchy schemes for measuring instruments	OIML D 5: 1982 OIML P 4: 1986	Requires development of national ND. GOST 8.061-80. SSM. Verification schemes. Contents and building
General requirements for measuring instruments	OIML D 3: 1979 OIML D 11: 1994 OIML R 34: 1979	Requires development of national ND. GOST 8.401-80. SSM. Accuracy classes of measuring instruments. General requirements
Metrological requirements for measuring instruments	OIML D 15: 1986 OIML P 17: 1995	Requires development of related national ND. GOST 8.009-84. SSM. Standardized metrological characteristics of measuring instruments
Testing of measuring instruments and metrological control	OIML D 16: 1986 OIML D 19: 1988 OIML P 1: 1991	DSTU 3400-96. Metrology. State testing of measuring instruments. Main positions, organization, order of undertaking and consideration of results (draft DSTU 3400-99)
Verification and calibration of measuring instruments	OIML D 10: 1984 OIML D 12: 1986 OIML D 20: 1988 OIML D 23: 1993 OIML R 42: 1981 OIML P 15: 1989	DSTU 2708-94. Metrology. Verification of measuring instruments. Organization and order of undertaking DSTU 3215-95. Metrology. Metrological qualification of measuring instruments. Organization and order of undertaking MND 50-032-94. Metrology. Fabrication rules, using and keeping state verification stamp of Ukraine
Certified reference materials	OIML D 18: 1987	GOST 8.315-96. Certified reference materials. Basic principles
Metrological supervision	OIML D 9: 1984	NDU-96. State metrological supervision
Metrological supervision for prepackaged products	OIML R 79: 1989 OIML R 87: 1989	MND 50-048-95. State metrological supervision. Order of checking the amount of prepackaged products during packing and sale
Accreditation of measurement and calibration laboratories	OIML P 7: 1989 ISO/IEC 25: 1990 EN 45001: 1989	NDU-98. Accreditation of measuring laboratories

figures and full details can be found on the OIML web site: www.oiml.org.

The program of harmonization of national ND's with the related OIML Recommendations is currently being undertaken. For instance, work on developing DSTU projects harmonized with OIML R 31 and R 32 are coming to an end. The analysis of the existing system of national measuring instrument standards, covered by OIML Certificate System, has been fulfilled. Table 5 presents information as at 01.01.99 on the number of measuring instruments that have been approved in Ukraine against national ND's, similar to OIML Recommendations. The Recommendations shown in Table 5 are planned for urgent harmonization in Ukraine.

Therefore in Ukraine 12 national ND's and 10 ND projects are harmonized to some extent with 27 OIML Vocabularies, Documents or Recommendations. The main method of harmonizing national ND's is to directly introduce the OIML Documents or Recommendations (with translation into Ukrainian with some national revisions or additions, if required). It is planned to harmonize six other ND's with OIML Recommendations in the near future.

The general analysis of the metrological normative base shows that in Ukraine, despite the availability of a wide range of basic national ND's, both the development of new ND's and the revision of some existing ND's are required.

Table 5 Information on type approval of measuring instruments in Ukraine

OIML Recommendation	*Recommendation title*	*OIML certificates*	*No. of measuring instrument types approved in Ukraine*
OIML R 31: 1995	Diaphragm gas meters (DSTU)	1	25
OIML R 32: 1989	Rotary piston gas meters and turbine gas meters (DSTU)	-	16
OIML R 50-1: 1997 OIML R 50-2: 1997	Continuous totalizing automatic weighing instruments (belt weighers) - Parts 1 and 2	20	-
OIML R 51-1: 1996 OIML R 51-2: 1996	Automatic catchweighing instruments - Parts 1 and 2	-	2
OIML R 60: 1991	Metrological regulation for load cells *(currently being revised)*	143	10
OIML R 61-1: 1996 OIML R 61-2: 1996	Automatic gravimetric filling instruments - Parts 1 and 2	1	23
OIML R 76-1: 1992 OIML R 76-2: 1993	Nonautomatic weighing instruments - Parts 1 and 2	165	77
OIML R 117: 1995 OIML R 118: 1995	Measuring systems for liquids other than water Fuel dispensers for motor vehicles (Test procedures/report)	} 10	32
	Total:	**340**	**185**

Taking into consideration international metrological practice in metrology would better align the Ukrainian metrological system with requirements generally accepted throughout the world and would ensure both the acceptance of measurement results carried out in Ukraine, and the results of industrial product testing all over the world. This would contribute to increasing the competitiveness of Ukrainian enterprises on markets worldwide. ■

References

[1] Velychko O.: *Metrological activity in Ukraine*. OIML Bulletin, July 1997, pp. 36–41

[2] Velychko O.: Metrology activity in Ukraine. 8th International Congress of Metrology (Metrology 97), Besançon, France, pp. 572–577

[3] OIML D 1 *Law on Metrology*. OIML, 1975

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COMMUNIQUE DE PRESSE – PRESS RELEASE

9ème Congrès International de Métrologie
9th International Metrology Congress

BORDEAUX, 1999.10.18–21

Le 9ème Congrès International de Métrologie, organisé par le Collège Métrologie du Mouvement Français pour la Qualité s'est tenu du 18 au 21 octobre dernier à Bordeaux. Les chiffres suivants démontrent son succès grandissant et sa réputation internationale:

- la présence de 630 participants, soit une augmentation de 26 % par rapport au Congrès 97;
- une participation étrangère toujours plus forte: 25 % des congressistes sont issus de 33 pays différents (20 % seulement en 1997 pour 27 pays);
- 178 conférences présentées (131 seulement en 1997);
- une exposition de matériel métrologique encore élargie: 56 stands en 1999 contre 48 en 1997.

Le Congrès a maintenant une vocation industrielle très marquée puisque le public du Congrès Métrologie se compose de métrologues de laboratoires industriels, de prestataires de services ou consultants (75 %), de responsables des laboratoires ou organismes nationaux (14 %), d'universitaires (11 %).

Les participants jugent les informations recueillies tout à fait satisfaisantes ou satisfaisantes dans 80 % des cas, et 37 % d'entre eux déclarent qu'ils reviendront de toutes façons pour Métrologie 2001.

Dans son discours d'ouverture du Congrès Christian Pierret, Secrétaire d'État à l'Industrie, a démontré une nouvelle fois qu'il était convaincu de l'importance de la métrologie dans une économie moderne. Il a rappelé le programme d'action en faveur de la métrologie qui est actuellement développé au sein du gouvernement et l'intérêt du développement de la normalisation en métrologie. Il a tenu à souligner l'importance des échanges internationaux en métrologie. Les congressistes français ont apprécié le discours de M. Pierret et les représentants des grands laboratoires nationaux européens de métrologie ont compris avec envie que la métrologie en France était une préoccupation endossée au plus haut niveau de l'État.

Techniquement qu'a apporté le Congrès de Bordeaux? Quelles sont les évolutions par rapport au Congrès de Besançon? Il est très difficile de répondre à ces questions sans analyser toutes les sessions, c'est ce qui sera fait très rapidement. La synthèse sera publiée dans la revue "Contrôle industriel" de novembre 1999.

Plus généralement, il est évident que ce Congrès est devenu un rendez-vous attendu des métrologues français mais aussi de beaucoup de nos collègues du monde entier. Créé en 1983 avec pour objectif de permettre aux métrologues de communiquer, d'échanger des idées ou des expériences, on peut affirmer que l'objectif est largement atteint.

Ce succès est dû au développement de la qualité dans l'industrie, à la mondialisation des échanges commerciaux mais aussi au développement de la mesure.

Ce dernier point étant intimement lié aux précédents nous devrions entrer dans un cycle qui devrait permettre au prochain Congrès, en 2001, d'être encore plus attendu que celui que nous venons de terminer.

Le recueil des conférences du Congrès est mis en vente au MFQ à Nanterre au tarif de 486 FRF TTC pour les adhérents MFQ et 540 FRF TTC pour les non adhérents. ■

The 9th International Metrology Congress, organized by the Metrology School of the French *Movement for Quality*, took place in Bordeaux from 18 through 21 October 1999. The figures below show how increasingly successful this event is becoming and confirm its international reputation:

- 630 participants attended, representing an increase of 26 % compared to the 1997 Congress;
- ever increasing foreign attendance: 25 % of delegates came from 33 different countries (only 20 % and 27 countries in 1997);

- 178 papers given (131 in 1997);
- widened scope of the metrological equipment exhibition: 56 stands as against 48 in 1997.

The Congress now has a very marked industrial vocation, since attendees include metrologists from industrial laboratories, service providers or consultants (75 %), laboratory or national organism managers (14 %) and university staff (11 %).

Delegates were totally satisfied or satisfied by the information they gathered in 80 % of cases, and 37 % of them said they would most probably also attend the 2001 Congress.

In his opening speech, Secretary of State for Industry Christian Pierret again told delegates that he was convinced of the importance of metrology in a modern economy, reminding participants of the metrology action plan which is currently being developed by the French government; he also spoke of the development of standardization in the context of metrology. He especially underlined the importance of international metrology exchanges and his speech was of particular interest to French delegates; in addition, representatives of the major European national metrology laboratories enthusiastically understood that metrology was a concern that is backed up at the highest governmental levels in France.

So what did the Bordeaux Congress bring about in the way of technical know-how and what developments have been witnessed since the Besançon Congress? It is very difficult to answer these questions without fully analyzing all the sessions, though this will be done shortly and the summary will be published in the November 1999 "Contrôle industriel" magazine.

On a more general level, it is clear that the Congress has become an event that both French metrologists and their colleagues world-wide eagerly await. The objective laid down in 1983 when the Congress first started has clearly been met, i.e. to provide a forum for metrologists to communicate by exchanging ideas and experience.

This success is due to the development of the concept of quality in industry, to the opening up of trade on a world-wide scale and also to the development of measurement.

This last point is closely linked to the first two, and so we should now enter into a cycle that should lead to the 2001 Congress being even more eagerly awaited than the Bordeaux event.

The collection of papers presented at the Congress is on sale at the Nanterre MFQ office (near Paris) at the price of 486 FRF inc. Vat for MFQ Members and 540 FRF inc. Vat for non members. ■

Liste des pays représentés

Afrique du Sud
Allemagne
Belgique
Bosnie
Bulgarie
Cameroun
Canada
Cote d'Ivoire
Croatie
Danemark
Espagne
Estonie
États-Unis d'Amerique
Finlande
France
Italie
Japon
Lettonie
Luxembourg
Maroc
Mexique
Pays-Bas
Portugal
République Slovaque
République Tchèque
Roumanie
Royaume-Uni
Singapour
Slovénie
Suède
Suisse
Thaïlande
Tunisie

List of countries represented

Belgium
Bosnia
Bulgaria
Cameroon
Canada
Croatia
Czech Republic
Denmark
Estonia
Finland
France
Germany
Italy
Ivory Coast
Japan
Lithuania
Luxemburg
Mexico
Morocco
Netherlands
Portugal
Romania
Singapore
Slovakia
Slovenia
South Africa
Spain
Sweden
Switzerland
Thailand
Tunisia
United Kingdom
United States of America

Exposants - Exhibitors

Aerospatiale Matra Lanceurs Stratégiques et Spatiaux
Air Liquide - Metrotech
Aoip Instrumentation
Apave Sud
Bea Métrologie
Bfi Optilas
Brown & Sharpe Roch
Bureau National de Métrologie (BNM)
Bureau Veritas
Caltechnix
Cary - Division De Nivarox-Far
Cast (Insa Lyon Développement)
Cellule Capteur - Laboratoire de Recherche Aquitaine
Cemam Aquitaine
Centech
Centre d'Achèvement et d'Essais des Propulseurs (Caepe)
Cetim
Comité Français d'Accréditation (COFRAC)
Commissariat à l'Energie Atomique (Cea/Cesta)
CT2M - IMQ
Delta Mu Conseil
Direction Régionale de l'Industrie, de la Recherche et de l'Environnement (DRIRE)
Druck
E2M
Ecole des Mines de Douai
Ecole Nationale Supérieure d'Arts et Métiers (ENSAM)
Europool
Exam BTP
Felix Informatique
Fluke France
Implex
Laboratoire Central des Industries Electriques (LCIE)
Laboratoire National d'Essais (LNE)
Leica Géosystems
Les Automatismes Appliques (LAA)
Lycée Jules Richard
Mahr France
MB Electronique
Metrologic Instruments
Métroqual
Mitutoyo France
Renishaw
Sartorius
Scientec
Snecma Division SEP
Solex Métrologie
Somelec
Somicronic
Sopemea
Syndicat National des Ingénieurs de l'Industrie des Mines (SNIIM)
Taylor Hobson
Temex Telecom

Points forts du Congrès

- Ouverture du Congrès par Christian Pierret, Secrétaire d'État à l'Industrie
- 178 conférences (88 conférences orales et 90 conférences affichées)
- 33 pays représentés (voir liste)
- 630 participants dont 25 % de participants étrangers
- 56 stands à l'exposition (voir liste)
- 6 visites techniques dans des établissements girondins:
  Aerospatiale Matra – CAEPE – Ford – Mouton Rothschild – Sanofi – SNECMA Division SEP

Main points of the Congress

- Congress opened by Christian Pierret, Secretary of State for Industry;
- 178 papers (88 oral presentations and 90 poster sessions);
- 33 countries represented (see list);
- 630 participants, of which 25 % foreign attendees;
- 56 stands at the exhibition (see list);
- 6 technical visits to Bordeaux region establishments:
  Aerospatiale Matra – CAEPE – Ford – Mouton Rothschild – Sanofi – SNECMA Division SEP

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In this Bulletin: OIML certificates registered

Dans ce Bulletin: certificats OIML enregistrés

1999.11 – 2000.01

OIML Certificate System

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

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

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

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

Système de Certificats OIML

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

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

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

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

This list is classified by Issuing Authority; updated information on these Authorities may be obtained from the BIML.

Cette liste est classée par Autorité de délivrance; les informations à jour relatives à ces Autorités sont disponibles auprès du BIML.

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

For each Member State, certificates are numbered in the order of their issue (renumbered annually).

Pour chaque État Membre, les certificats sont numérotés par ordre de délivrance (cette numérotation est annuelle).

R61/1996 - NL - 00.01

Type MP ... (Class X(1))

Atoma GmbH, Traunreuter Straße 2-4, D-84478 Waldkraiburg, Germany

OIML Recommendation applicable within the System / Year of publication

Recommandation OIML applicable dans le cadre du Système / Année d'édition

Year of issue

Année de délivrance

The code (ISO) of the Member State in which the certificate was issued.

Le code (ISO) indicatif de l'État Membre ayant délivré le certificat.

Certified pattern(s)

Modèle(s) certifié(s)

Applicant

Demandeur

For up to date information on OIML certificates:

Pour des informations à jour sur les certificats OIML:

www.oiml.org

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Continuous totalizing automatic weighing instruments (belt weighers)
Instruments de pesage totalisateurs continus à fonctionnement automatique (peseuses sur bande)

R 50 (1997)

▶ Issuing Authority / *Autorité de délivrance*

Danish Agency for Development of Trade and Industry, Division of Metrology, Denmark

R50/1997-DK-99.01 Rev. 1
Type M2000-B01 Flow Scale (Class 0.5)
Marel hf, Hofdabakka 9, IS-112 Reykjavik, Iceland

▶ Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R50/1997-NL-99.01
Type EWM 609 (Classes 0.5, 1 or 2)
Hans Boekels GmbH & Co., Am Gut Wolf 11, D-52070 Aachen, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

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

R 51 (1996)

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R51/1996-DE-99.02 Rev. 1
Type ES 600... (Classes X(0.5) and Y(a))
Espera-Werke GmbH, Moltkestr. 17-33, D-47058 Duisburg, Germany

▶ Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R51/1996-NL-99.09
Type EWK ....., Class X(1)
Hans Boekels GmbH & Co., Am Gut Wolf 11, D-52070 Aachen, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Load cells
Cellules de pesée

R 60 (1991), Annex A (1993)

▶ Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R60/1991-DE-99.05
Strain-gauge compression load cell with digital output, type SBC (Classes C1 to C6)
Revere Transducers Europe BV, Ramshoorn 7, P.O. Box 6909, 4802 HX Breda, The Netherlands

R60/1991-DE-99.07
Type C16.. (Class C1 up to C6)
Hottinger Baldwin Messtechnic Wägetechnik GmbH, Im Tiefen See 45, D-64293 Darmstadt, Germany

R60/1991-DE-99.08
Strain-gauge platform load cell, type BCL (Class C3)
CAS Corporation, CAS Factory #19 Kanap-ri, Kwangjeok-myon, Yangju-kun, Kyungki-do, South Korea

▶ Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R60/1991-NL-99.14
Type 3520 (Class C)
Tedea Huntleigh Europe Ltd., 37 Portmanmoor Road, Cardiff CF24 5HE, United Kingdom

R60/1991-NL-99.15
Type 1243 (Class C)
Tedea Huntleigh International Ltd., 2 Hazoran street, Netanya 42506, Israël

R60/1991-NL-99.16
Type WBK ... / WBS ... (Class C)
CAS Corporation, CAS Factory # 19 Kanap-ri, Kwangjeok-myon, Yangju-kun, Kyungki-do, South Korea.

R60/1991-NL-99.17
Type 1510 (Class C)
Tedea Huntleigh Europe Ltd., 37 Portmanmoor Road, Cardiff CF24 5HE, United Kingdom

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic gravimetric filling instruments
Doseuses pondérales à fonctionnement automatique

R 61 (1996)

Issuing Authority / *Autorité de délivrance*

National Weights and Measures Laboratory (NWML), United Kingdom

R61/1996-GB-99.01
Type SpeedAc8 (Class Ref X(0.2))
Chronos Richardson Ltd., Arnside Road, Bestwood Estate, Nottingham NG5 5HD, United Kingdom

R61/1996-GB-99.02
Computapak 4 (Class Ref X(0.2))
Clyde Richard Simon Ltd., Park Lane, Basford, Nottingham NG6 0DT, United Kingdom

R61/1996-GB-99.03
Avapac Single Head/Compact Bag Filler (Class Ref X(0.5))
Avalon Engineering Ltd., 12-18 Foreman Road, PO Box 10266, Te Rapa, Hamilton, New Zealand

Issuing Authority / *Autorité de délivrance*

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R61/1996-NL-99.04
Type Duplex Weighmaster (Class X(1))
Thiele Technologies Inc., 315 27th Avenue Northeast, Minneapolis, MN 55418-2715, USA

R61/1996-NL-00.01
Type MP ... (Class X(1))
Atoma GmbH, Traunreuter Straße 2-4, D-84478 Waldkraiburg, Germany

R61/1996-NL-00.02
Type AT ... (Class X(1))
Atoma GmbH, Traunreuter Straße 2-4, D-84478 Waldkraiburg, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Nonautomatic weighing instruments
Instruments de pesage à fonctionnement non automatique

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

Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R76/1992-DE-95.02 Rev. 3
Nonautomatic electromechanical weighing instrument Types BC BC 100, KA BC 100, MB BC 100 (Class I), BA BC 200, BD BC 200, MA BC 200 and MD BC 200 (Class II)
Sartorius A.G., Weender Landstraße 94-108, D-37075 Göttingen, Germany

R76/1992-DE-99.05
Nonautomatic electromechanical weighing instrument, type ITC... (Class III)
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Straße 65, D-72336 Balingen, Germany

R76/1992-DE-99.08
Types SIWAREX M, SIWAREX AWS (Classes III and IIII)
Siemens AG Fürth, Würzburger Str. 121, D-90766 Fürth, Germany

Issuing Authority / *Autorité de délivrance*

Sous-direction de la Métrologie, France

R76/1992-FR-94.01 Rev. 1
Balance modèle EL 25 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11, F-62401 Béthune, France

R76/1992-FR-94.03 Rev. 1
Balance Testut modèle B200 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11, F-62401 Béthune, France

R76/1992-FR-97.01 Rev. 1
Instrument de pesage à fonctionnement non automatique, étiqueteur de prix, modèles EL 17 GP, EL 18 GP, EL 19 GP, EL 20, interdit pour la vente directe au public (Class III)
Société Testut, 957 rue de l'Horlogerie, BP 11, F-62401 Béthune, France

R76/1992-FR-97.02 Rev. 2
Balance électronique TESTUT modèle B300 versions B300S et B317 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-97.03 Rev. 2
Balance électronique TESTUT ALPHA J8 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-98.01 Rev. 1
Balance électronique TESTUT modèle B250 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-98.02 Rev. 1
Balance électronique TESTUT modèle B200P (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-98.03 Rev. 1
Bascule électronique TESTUT modèle WSI1 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-99.01
Balance modèle EL 26 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-99.02
Balance modèle EL 20 TD (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-99.03
Balance modèles B350M et B350T (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

R76/1992-FR-99.04
Balance modèle L 300 (Classe III)
Société Testut, 957 rue de l'Horlogerie, BP 11,
F-62401 Béthune, France

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

National Weights and Measures Laboratory (NWML), United Kingdom

R76/1992-GB-99.05
Type HV-15KGL / HV-15KGV (Class III)
A&D Instruments Ltd., Abingdon Science Park,
Abingdon, Oxford OX14 3YS, United Kingdom

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

Netherlands Measurement Institute (NMi) Certin B.V., The Netherlands

R76/1992-NL-99.10
Type GR-EC (Class I)
A&D Instruments Ltd., Abingdon Science Park, Abingdon,
Oxford OX14 3YS, United Kingdom

R76/1992-NL-99.18
Type OAP-series (Class III)
Universal Weight Enterprise Co. Ltd., 2-5 Fl.,
No. 39 Pao Shing Road, Hsin Tien City, Taipei Hsien 231, Taiwan

R76/1992-NL-99.19
Type SW ... Series (Class III)
Mettler-Toledo Inc., 1150 Dearborn Drive, Worthington,
OH 43085-6712, USA

R76/1992-NL-99.20
Type RM-30 (Class III)
Teraoka Seiko Co., Ltd., 13-12 Kugahara, 5-Chome, Ohta-ku,
Tokyo 146-8580, Japan

R76/1992-NL-00.01
Type PC-100 (Class III)
Acom Inc., A#479 Tonghoon Bldg., Uijongbu - 2Dong,
Uijongbu-Si, Kyungki-do, 480-012 South Korea

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Discontinuous totalizing automatic weighing instruments (Totalizing hopper weighers)
Instruments de pesage totalisateurs discontinus à fonctionnement automatique (Peseuses totalisatrices à trémie)

R 107 (1997)

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

Danish Agency for Development of Trade and Industry, Division of Metrology, Denmark

R107/1997-DK-99.01
Type JVA-778-DTHS-xx (Class 0.2)
Jydsk Vaegtfabrik Aarhus, Vejlbjergvej 12,
DK-8240 Risskov, Denmark

OVERVIEW - OIML TC 13

Legal metrology and standardization: an effective cooperation in acoustics

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1 Acoustics and legal metrology

Acoustic instruments to measure sound (sound level meters - see Fig. 1) and related equipment such as sound calibrators (see Fig. 2), as well as instruments to measure human hearing functions, (audiometers - see Fig. 3), are not usually subject to legal control. In Europe, only a few countries (for example Austria, Czech Republic, France, Germany, Poland and Switzerland) prescribe type approval based on pattern evaluation and/or regular verification of individual instruments. The situation is similar outside Europe, which is surprising considering that millions of people suffer from excessive noise, especially in industrialized countries. Manufacturers and communities spend large sums reducing noise, but for this to be effective any action must be based on precise noise measurements.

These were good reasons to include sound measuring instruments used for official traffic noise measurements in the scope of legal metrology in Germany in 1972. Later on, the use of verified sound level meters and related equipment was also prescribed for other types of environmental noise. Results of pattern evaluations carried out at the PTB and of verifications of individual instruments fully justified these regulations [1].

Similarly, noise-induced hearing loss of workers in industry is still one of the most frequent occupational hazards and insurers frequently end up paying out compensation. Such compensation is based on the exact measurement, by means of pure-tone or speech audiometers, of the hearing impairment due to noise.

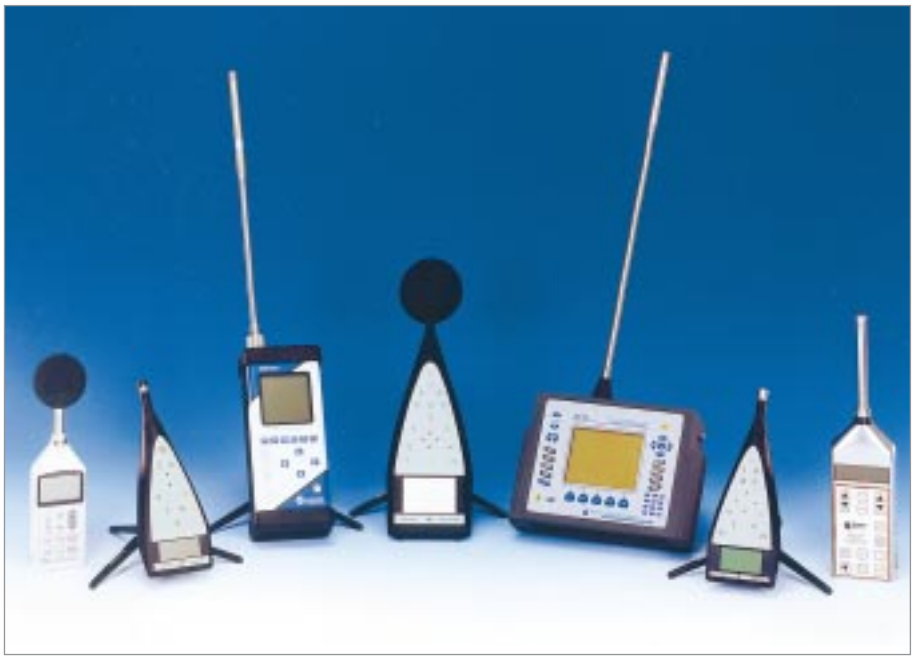

Photo: PTB Ref. 3518

Fig. 1

Collection of sound level meters meeting the essential requirements of OIML R 88 (1998) and/or OIML R 58 (1998)

Photo: PTB Ref. 3519

Fig. 2

Collection of sound calibrators meeting the essential requirements of OIML R 102 (1992).

"Pistonphone" type sound calibrators are equipped with a barometer for ambient pressure correction

Fig. 3

Combined pure-tone and speech audiometer equipped with earphones and bone vibrator, meeting the essential requirements of OIML R 104 (1993) and OIML R 122 (1996)

Photo: PTB Ref. R1123-3

Audiometers were subject to legal metrology control in Germany from 1988 to 1998. The results of pattern evaluations carried out at the PTB again clearly underlined the need for tests by an independent laboratory [2]. This activity ended when the European Directive on medical devices came into force substituting any national regulations which were considered to hinder the free market within Europe. Unlike the preceding German regulations, the Directive does not provide for any third party conformity assessment of audiometers but essentially relies on manufacturers' declarations instead. The main emphasis is therefore put on safety rather than on metrological aspects.

The performance of sound level meters is not yet covered by any European Directive and the Measuring Instruments Directive (MID) will not specify sound level meters either. The reasons for such omissions are not that obvious, bearing in mind that noise limits and noise measurements are specified in a number of European directives [3, 4]. To a certain extent it might not be considered logical that noise limits are fixed in European legislation while the accuracy of measuring instruments used to verify such limits is not catered for. The same arguments hold for measuring instruments for mechanical vibrations. Anyhow, measuring instruments for acoustics and vibration have not yet been

allocated a high priority by the European Commission. Therefore, national regulations are still allowed for such devices which in Germany (and in some other countries) are considered as essential to improve the accuracy of sound and vibration measurement results.

2 History of OIML activities in acoustics

The decision to start activities in the field of acoustics within the general scope of the OIML was taken over 20 years ago. A "Pilot Secretariat" OIML-SP14 *Acoustics and vibrations* was established under Germany's responsibility, together with the "Reporting Secretariats" SP14-SR1 *Sound measuring instruments* (Switzerland), SP14-SR2 *Audiometers* (Germany) and SP14-SR3 *Mechanical vibrations and shocks* (Denmark). At a later stage China and the former GDR took over responsibility for SR1 and SR3 respectively.

An inaugural meeting of SP14 and its three Reporting Secretariats was held at the PTB in February 1982. The scope and detailed work programs for each Secretariat were discussed and agreed upon, and at that meeting the general decision was taken to avoid any duplication of technical work and to rely on International Standards prepared by the IEC and/or ISO, whenever applicable and possible. A first draft, later to become the first edition of R 58 *Sound level meters*, was discussed and a general framework was agreed upon which has been maintained since then (with slight amendments) for all later Recommendations issued under the responsibility of OIML-SP14 and its successor OIML TC 13. This framework contained a main body of one and a half pages of text, referring to the relevant International Standard and adding a small number of specifications, essential for legal metrology, for example on maximum permissible errors on verification and in service, on the stability of the device, on inscription and markings and on seals. In addition to that, it was decided to provide a one-page appendix, specifying the recommended extent of the pattern evaluation and verification procedures for the kind of instrument concerned. This new information was not usually included in the relevant standard and was based, in the case of R 58, on the extensive experience gained at the PTB with type testing and testing of individual sound level meters. Annexes of this kind have been included in each OIML Recommendation on measuring instruments for acoustics and vibration since then.

Several further meetings of SP14 and its Reporting Secretariats were held since 1982, resulting in the adoption of other OIML Recommendations (R 88, R 102, R 103 and R 104), all following the same general principle described above. Participation in these meetings by non-European countries and the general response from OIML Members to drafts circulated were, however, rather limited.

As this situation was not that different in many other OIML Pilot and Reporting Secretariats, there were good reasons to carefully reconsider the structure of the OIML and its procedures for technical work starting in the late 1980's. In parallel, the new OIML Certificate System for Measuring Instruments [5] was introduced, requiring broader consensus of OIML Recommendations for the purpose of mutual acceptance of pattern evaluations. This was another strong motivation for completely reorganizing OIML work.

3 Policy of OIML TC 13

Following the CIML decision to completely restructure ongoing OIML technical work and to adopt ISO/IEC technical work rules wherever appropriate, OIML TC 13 *Measuring instruments for acoustics and vibration* was established to succeed OIML-SP14. TC 13 was one of the first OIML Technical Committees to hold an inaugural meeting: this took place in Oslo on 26 May 1993 in conjunction with a meeting of the related IEC TC 29 *Electroacoustics*, taking advantage of the fact that acoustics experts from a number of countries met on this occasion with considerable overlapping interests both in legal metrology and in standardization. Correspondingly, the TC 13 meeting was attended by 21 delegates from 14 different countries and three International Organizations - a far better participation than in any meeting of the former SP14.

Three basic decisions were taken at this first meeting, which have guided TC 13's work since then:

1 The practice of the former SP14 and its Reporting Secretariats of basing draft Recommendations on existing IEC and/or ISO Standards would be maintained wherever possible. The need for close cooperation between TC 13 and the relevant IEC/ISO TC's was emphasized to ensure that International Standards are compatible with the specific needs of legal metrology.

2 Instead of establishing Subcommittees corresponding to the previous Reporting Secretariats, temporary Working Groups for well-defined tasks were established and a convener appointed for each of them with a view to disbanding the WG's as soon as their tasks were completed.

3 Whenever feasible, further meetings of TC 13 should be held at the same venue and coinciding with

meetings of IEC TC 29, thus enabling experts of both Organizations to participate in each other's meetings without incurring extra traveling costs.

Furthermore, the TC 13 work program was discussed and adopted, resulting in the general conclusion that OIML Recommendations would be prepared in the format as prescribed by the OIML Certificate System [5], especially requesting the inclusion of test requirements and detailed test report formats. It was recognized that this would result in extensive additional work compared with the previous practice.

These basic decisions were, without exception, consequently implemented in the following years and are still considered as being the most economic and effective way to organize OIML work in a technical field in which the number of experts interested in legal metrology and in standardization world-wide is limited, and at a time when universal restrictions in manpower and budgets are becoming the rule. The advantages of this policy (as seen after several years of experience) can be described as below.

Any duplication of technical work was avoided. The development of technical specifications was exclusively carried out within IEC TC 29 while OIML TC 13 contributed by adding special aspects of legal metrology and, especially, elaborating test report formats as required by the OIML for the inclusion of a Recommendation in the Certificate System. The reason for this is that the acceptance of test results is certainly much higher if they are presented in a harmonized and transparent way. These formats have evoked great interest in IEC TC 29 and are likely to be included in future IEC Standards.

The benefit for manufacturers of acoustic instruments is obvious. They are not obliged to produce different instruments for legal purposes in some countries according to special OIML requirements while in other countries users merely request that IEC Standards are met.

Considering the quality of documents, IEC TC 29 (through its cooperation with OIML TC 13) certainly became more aware and took greater note than before of metrological aspects such as the extent of testing required, test procedures and measurement uncertainty. This resulted in a marked improvement of standards recently developed within IEC TC 29.

Experts from OIML Member States who did not show much interest in IEC work before now participate actively in TC 29 work while, vice versa, experts from TC 29 member bodies who were not present at OIML TC 13 meetings before now attend and contribute considerably. Thus, participation and expertise has been broadened in both Organizations. This is of benefit especially for the OIML, which is the lesser recognized of the two Organizations in the field of acoustics. However, by continuous reporting on OIML activities at TC 29 meetings, the standardization community in acoustics is now well aware of the OIML, its scope and its activities.

The substructure within OIML TC 13 is as lean and flexible as possible, avoiding any formalism linked with subcommittees. Meetings are usually limited to one-day Committee meetings following the sequence of IEC TC 29 meetings of roughly every 18 months. Working Groups meet, if at all, in close connection with related IEC meetings, most of their work being done by correspondence. The establishment and disbanding of Working Groups can be completely dealt with within the Technical Committee, thus avoiding any delay by time-consuming decision processes at another level.

To summarize, OIML TC 13 - IEC TC 29 cooperation can be considered as being quite successful, resulting in a reasonable number of good quality documents as described below.

4 State of the work

So far, six International Recommendations have been issued, elaborated by TC 13 and its predecessor SP14. Each is based on the relevant IEC/ISO Standards as applicable but (with one exception - R 103) considerably amended by specification of the extent of procedures for pattern evaluation and verification together with a detailed test report format. These Recommendations are the following:

- R 58 *Sound level meters*, 2nd edition 1998: Refers to IEC 60651, *Sound level meters*, 1st edition 1979 with amendment No. 1-1993;
- R 88 *Integrating-averaging sound level meters*, 2nd edition 1998: Refers to IEC 60804, *Integrating-averaging sound level meters*, 1st edition 1985 with amendments Nos. 1-1989 and 2-1993;
- R 102 *Sound calibrators*, 1st edition 1992, together with Annexes B & C, 1st edition 1995: Refers to IEC 60942, *sound calibrators*, 1st edition 1988[1];
- R 103 *Measuring instrumentation for human response to vibration*, 1st edition 1992: Refers to ISO 8041, *Human response to vibration - Measuring instrumen-*

[1] OIML TC 13 decided not to accept the 2nd edition of IEC 60942 (1997) for its purposes, mainly due to the large number of tests required. This was one reason for IEC TC 29 to immediately begin a further revision of this Standard and is an indicator of the fruitful communication between the two committees.

tation, 1st edition 1990, and ISO 5347-0, *Methods for the calibration of vibration and shock pick-ups*, Part 0: Basic concepts, 1st edition 1987, with Technical Corrigendum 1: 1990, and ISO/DIS 5347-3, *Methods for the calibration of vibration and shock pick-ups*, Part 3: *Secondary vibration calibration*, 1987;

- R 104 *Pure-tone audiometers*, 2nd edition 1993, together with Annex F, 1st edition 1997: Refers to IEC 60645-1, *Audiometers* Part 1: *Pure-tone audiometers*, 1st edition 1992, and various other related IEC or ISO Standards, e.g. IEC 60126, IEC 60303, IEC 60318, IEC 60373, IEC 60711, ISO 389, ISO 7566 and ISO 8798; and
- R 122 *Equipment for speech audiometry*, 1st edition 1996, together with Annex C, 1st edition 1999: Refers to IEC 60645-2, *Audiometers* - Part 2: *Equipment for speech audiometry*, 1st edition 1993, and various other related IEC or ISO Publications, e.g. IEC 60303, IEC 60318, IEC 60373 and ISO 8253-3.

A seventh Recommendation, *Octave-band and one-third octave-band filters*, referring to IEC 61260, *Octave-band and fractional-octave-band filters*, 1st edition 1995, has reached approval stage.

From the nearly 60 active OIML Technical Committees and Subcommittees, fewer than 10 % have issued an equal or higher number of Recommendations. TC 13 might, therefore, be considered as relatively productive and effective which is doubtless a result of its cooperation with standardization organizations. Looking at the large number of IEC/ISO Standards referred to and bearing in mind the magnitude of each of them, a comparable result in the given period could certainly not have been achieved in the OIML if this technical work had been started from scratch, regardless of the other obvious disadvantages that such an approach would entail.

TC 13's ongoing work is nearly completed, and the approval of the seventh Recommendation mentioned above is expected in the course of 2000. It has, however, to be noted that most of the IEC/ISO Standards referred to in the corresponding OIML Recommendations are presently under revision within the respective committees, due to technical progress; this will require revision of the corresponding OIML Recommendations in the near future. This situation, together with the fact that Germany (PTB) is no longer in a position to maintain the TC 13 Secretariat, gave reason to thoroughly reflect on the established cooperation with IEC/ISO and to consider even more effective solutions. This was done at the last meeting of TC 13 in March 1999 and led to the conclusions explained in section 6. It might, however, be appropriate first to explain some of the problems as they occurred in the present stage of cooperation.

5 Cooperation problems

Though very effective, the present cooperation procedure still has some inherent disadvantages:

- There is a considerable time delay (4–5 years on average) between the publication of an IEC/ISO Standard and the issuing of the corresponding OIML Recommendation. This is due to the extra work needed for OIML purposes, i.e. the elaboration of a test report format, and the necessary discussion and approval procedure within the OIML; experience shows that IEC/ISO Standards may already be under revision before the corresponding OIML Recommendation is actually issued. Manufacturers and users, however, usually do not accept legal requirements which do not immediately follow technical progress in a field.
- During the elaboration of a test report format, it appeared in a few cases that the test conditions as specified in the IEC Standard referred to were partially ambiguous. It would therefore be preferable if test conditions and test report formats are elaborated simultaneously and by the same group of experts.
- It was sometimes only during the elaboration of the test report format that experts really became aware of the number of detailed tests required in the IEC Standards. Such tests result in testing costs which are not likely to be acceptable for manufacturers unless there is a legal requirement for type approval in a country. Problems of this kind might have been avoided if test conditions and test report formats had been worked out in parallel.
- Another problem which might be inherent to the OIML Certificate System became obvious in this context: while during pattern evaluation in a national type approval procedure the testing laboratory usually has the competence and is given the necessary flexibility to omit or to simplify certain tests if evidence is provided that the instrument under test will easily meet the requirements, this is not allowed within the OIML Certificate System. Therefore, OIML certificates are usually much more expensive than a corresponding type approval for the same model of instrument. This may be one of the reasons why no applications for OIML certificates for acoustic instruments have yet been received[2]; manufacturers are used to advertising their products with national (e.g. PTB) type approval certificates in countries where no legal requirements exist for this kind of instrument.

[2] Up to date information on OIML certificates is provided on the OIML web site (http://www.oiml.org)

6 Recent developments

After thorough discussions, at its meeting in Frankfurt on 5 March 1999 TC 13 decided to initiate a new and even more extensive phase of cooperation with IEC and ISO. Correspondingly, the following resolution was unanimously adopted:

> "OIML TC 13 *Measuring Instruments for Acoustics and Vibration* at its 5th meeting on March 5 1999 in Frankfurt am Main, Germany
>
> - considering that the development of OIML Recommendations on electroacoustics with reference to IEC TC 29 standards, although mostly satisfactory, nevertheless creates some duplication of efforts and does not allow for simultaneous issuing or revision of IEC standards and OIML Recommendations,
> - considering that the agreement between IEC/ISO and the OIML provides for the possibility of developing joint publications,
>
> REQUESTS its chairman to suggest to IEC TC 29 to consider the possibility of having its drafts developed with the participation of OIML TC 13 with a view to issuing joint IEC/OIML publications in fields of interest for both Organizations (with the possibility for each Organization to develop and issue addenda to cover topics of specific interest),
>
> REQUESTS the BIML to discuss this matter with the IEC Central Office in case of a positive reaction from IEC TC 29, with a view to a rapid implementation of the joint IEC TC 29-OIML TC 13 decision."

A similar resolution was adopted addressing the wish of OIML TC 13 to cooperate with ISO TC 108 in the field of measuring instruments for vibration.

It happened to be of great advantage that several delegates at the TC 13 meeting were equally involved in IEC TC 29 activities - including the Chairman of TC 29 as well as the conveners of those IEC Working Groups responsible for acoustic instruments that are of most relevance to the OIML, i.e. sound level meters and sound calibrators. The Secretariat of IEC TC 29 had been informed in advance and had also indicated its agreement.

Therefore, it was without any objection that at its plenary meeting the following week IEC TC 29 unanimously accepted the proposal made by TC 13 and took the following decision:

> "TC 13 requests the Secretariat to contact the IEC/CO in order to establish a procedure for establishing joint Working Group's with the OIML and to issue common IEC/OIML publications in areas of interest for both Organizations".

A few months later, this decision was submitted to the IEC Committee of Action for approval, who "noted with satisfaction the joint work undertaken by IEC TC 29 and OIML TC 13. The Central Office is requested to develop with OIML a voting/approval procedure for joint IEC/OIML documents resulting from Joint Working Groups for publication with a double logo and single IEC prefix standard".

This decision finally opened the door for a new type of cooperation between the OIML and IEC.

Meanwhile, and as a first step, the BIML has requested several TC 13 member countries to nominate delegates to the relevant IEC TC 29 Working Groups in order to establish formal liaisons on the working level. These delegates will represent the OIML and ensure that aspects of legal metrology are sufficiently covered by future IEC Standards. Especially, these should include those amendments, originally introduced by the OIML, dealing with the extent of pattern evaluation and verification as well as test report formats.

Since the rules for technical work and the various stages of development of documents are quite similar in the IEC and in the OIML, both Organizations may work completely in parallel. That means the following:

- Committee Drafts are circulated in parallel to IEC national committees and OIML TC 13 members for comments. Comments received will be discussed by the joint working groups.
- If sufficient consensus is reached among TC 29 and TC 13 members, the document is approved and circulated as a Committee Draft for Vote (CDV) to national committees within IEC or as a Draft Recommendation to CIML Members within the OIML. This stage is the last opportunity to submit minor technical comments in addition to a positive vote.
- A final vote is taken in IEC by a two months' ballot, in the OIML by a decision at a CIML Meeting.
- If approved, the document may be issued with the logos of both Organizations or, if timing does not permit this, with just a specific OIML cover page added to the IEC Standard.

Since each of the IEC Working Groups in question already started the revision of IEC Standards of relevance to the OIML some years ago, an advanced stage has been reached in some cases. It might therefore soon happen that parallel circulation of documents and parallel voting has to be organized.

Cooperation with IEC TC 29 is of high priority for the OIML since most of the OIML Recommendations within the scope of TC 13 are based on IEC Standards. There is one exception, however, and that is OIML R 103 specifying measurement instrumentation for human response to vibration. By convention, these instruments are dealt with in ISO/TC 108/SC 3 *Mech-*

anical vibration and shock - Use and calibration of vibration and shock measuring instruments. The request of OIML TC 13, as formulated in the resolutions of its last meeting, was consequently presented to this Committee (the TC 108/SC 3 Secretariat happens to be held by the same country, i.e. Denmark, as the IEC TC 29 Secretariat). ISO TC 108/SC 3 equally accepted the OIML's request and adopted a corresponding resolution at its meeting in September 1999. Further details of cooperation still have to be agreed upon and will be based on the experience with the corresponding OIML/IEC cooperation.

The matter is however of less urgency since the revision of the relevant ISO Standards is still at a less advanced stage. The fact that Germany (which was responsible for the drafting of R 103) is represented at ISO TC 108/SC 3 by the same expert as in OIML TC 13 ensures that appropriate steps will be taken as soon as necessary.

7 Final remarks

The decisions taken by the OIML in conjunction with the IEC or ISO, respectively, to establish joint working groups in the fields of acoustics and vibration and to issue documents with the logos of both Organizations may be considered a milestone in their mutual cooperation. It is most effective to optimize the use of limited expertise and resources and is certainly the quickest way to ensure equal requirements for measuring instruments both in the regulated and the non-regulated fields. Both manufacturers and users of instruments will benefit from this cooperation.

The authors, who have been responsible for the OIML TC 13 Secretariat from the beginning, sincerely hope that this cooperation will be successful and that other OIML Committees might feel encouraged to follow the example of TC 13. They would like to express their sincere thanks to all their colleagues both in the OIML and in IEC/ISO who have contributed to promoting mutual understanding in the respective Organizations and who supported the ideas which finally led to the agreements described above with great enthusiasm. ■

References

[1] Brinkmann, K.: *Zulassung und Eichung von Schallpegelmessern*, ACUSTICA (1985) 58: pp. 2–10

[2] Richter, U.; Gössing, P.: *Zulassungsprüfungen von Reinton- und Sprachaudiometern*, HNO-Mitteilungen (1993) 43: pp. 101–116

[3] *Council Directive of 12 May 1986 on the protection of workers from the risks related to exposure to noise at work* (86/188/EEC), Off. J. Europ. Comm. (1986): L 137 pp. 28–34

[4] *Council Directive of 14 June 1989 on the approximation of the laws of the Member States relating to machinery (89/392 EEC)*, Off. J. Europ. Comm. (1989): L183 pp. 9–32

[5] OIML P 1: OIML Certificate System for Measuring Instruments (1991)

OIML technical activities

- 1999 Review
- 2000 Forecasts

Activités techniques de l'OIML

- Rapport 1999
- Prévisions 2000

The information given on pages 40–44 is based on 1999 annual reports submitted by OIML secretariats. Work projects are listed for each **active** technical committee and sub-committee that produced and/or circulated a WD or CD during 1999, together with the state of progress at the end of 1999 and projections for 2000, where appropriate.

Les informations données en pages 40–44 sont basées sur les rapports annuels de 1999, fournis par les secrétariats OIML. Les thèmes de travail sont donnés pour chaque comité technique ou sous-comité **actif** qui a produit et/ou distribué un WD ou un CD pendant 1999, avec l'état d'avancement à la fin de 1999 et les prévisions pour 2000, si approprié.

KEY TO ABBREVIATIONS USED

WD	Working draft (Preparatory stage) *Projet de travail (Stade de préparation)*
CD	Committee draft (Committee stage) *Projet de comité (Stade de comité)*
DR/DD/DV	Draft Recommendation/Document/Vocabulary (Approval stage) *Projet de Recommandation/Document/Vocabulaire (Stade d'approbation)*
Vote	CIML postal vote on the draft *Vote postal CIML sur le projet*
Approval	Approval or submission to CIML/Conference for approval *Approbation ou présentation pour approbation par CIML/Conférence*
R/D	International Recommendation/Document (Publication stage) For availability: see list of publications *Recommandation/Document International (Stade de publication)* *Pour disponibilité: voir liste des publications*
Postponed	Development of project suspended pending completion of relevant document by other international organization(s) *Développement du projet suspendu en attendant l'achèvement d'un document correspondant par une (d')autre(s) organisation(s) internationale(s)*

OIML TECHNICAL ACTIVITIES	1999	2000
TC 1 Terminology		
• Revision V 1: International vocabulary of legal metrology (VIML)	DV	Vote
TC 2 Units of measurement		
• Revision D 2: Legal units of measurement *(harmonized with SI (BIPM 7th edition, 1998)	D	-
TC 3 Metrological control		
• Revision D 1: Law on metrology	WD	WD/1 CD
TC 3/SC 1 Pattern approval and verification		
• Initial verification of measuring instruments utilizing the manufacturer's quality system	DD	Vote
• Revision D 3: Legal qualification of measuring instruments and inclusion in its text the existing D 19 and D 20	-	1 CD
TC 3/SC 2 Metrological supervision		
• Revision D 9: Principles of metrological supervision	1 CD	2 CD
TC 3/SC 3 Reference materials		
• Revision D 18: General principle of the use of certified reference materials in measurements	1 CD	2 CD
TC 3/SC 4 Application of statistical methods		
• Applications of statistical methods for measuring instruments in legal metrology	WD	1 CD
TC 3/SC 5 Conformity assessment		
• Mutual acceptance agreement on OIML pattern evaluations	5 CD	DD
• Expression of uncertainty in measurement in legal metrology applications	WD	1 CD
• OIML Certificate System for Measuring Instruments	WD	1 CD
• Interpretation document for application of ISO DIS 17025 in the assessment of laboratories performing pattern evaluation tests	WD	1 CD
• Interpretation document for application of ISO/IEC Guide 65 in the assessment of legal metrology certification bodies	WD	1 CD
• Peer review for assessing the competence of legal metrology testing laboratories and certifying bodies for pattern evaluation	WD	1 CD

OIML TECHNICAL ACTIVITIES	1999	2000
TC 5/SC 1 Electronic instruments		
• Revision D 11: General requirements for electronic measuring instruments	WD	WD/1 CD
TC 5/SC 2 Software (new SC established by the CIML in 1999)		
• Software in legal metrology	-	WD
TC 6 Prepackaged products		
• Revision R 87: Net content in packages	1 CD	2 CD
TC 7/SC 5 Dimensional measuring instruments		
• Multi-dimensional measuring instruments (R 129)	Approval	R
• Test report format for the evaluation of multi-dimensional measuring instruments	DR	Vote
TC 8 Measurement of quantities of fluids		
• Laboratory volume measures - Automatic pipettes - D 26	D	-
• Combined revision of: R 4: Volumetric flasks (one mark) in glass; R 29: Capacity serving measures; R 45: Casks and barrels; and R 96: Measuring container bottles	WD	1 CD
TC 8/SC 3 Dynamic volume measurement (liquids other than water)		
• Revision R 118: Testing procedures and test report format for pattern evaluation of fuel dispensers for motor vehicles	1 CD	DR
• Revision R 117: Measuring systems for liquids other than water	WD	1 CD
TC 8/SC 4 Dynamic mass measurement (liquids other than water)		
• Revision R 105: Direct mass flow measuring systems for quantities of liquids (with the intention of incorporating R 105 into R 117)	WD	1 CD
TC 8/SC 5 Water meters		
• Revision R 49: Water meters intended for the metering of cold water (including requirements for electronic devices)	Approval	R
• Annex to R 49: Test procedures and test report format	WD	1 CD

OIML TECHNICAL ACTIVITIES	1999	2000
TC 8/SC 6 Measurement of cryogenic liquids		
• Annex to R 81: Test report format	Vote	R
TC 8/SC 7 Gas metering		
• Metering systems for gaseous fuel	1 CD	2 CD
• Compressed gaseous fuel measuring systems for vehicles	WD	1 CD
TC 9 Instruments for measuring mass and density		
• Revision R 60: Metrological regulation for load cells (including Test report format)	Approval	R
• Revision R 74: Electronic weighing instruments	WD	1 CD
TC 9/SC 2 Automatic weighing instruments		
• Automatic instruments for weighing road vehicles in motion (Part A - total vehicle weighing)	3 CD	4CD
• Revision R 51: Automatic catchweighing instruments	-	WD
TC 9/SC 3 Weights		
• Revision R 111: Weights of accuracy classes E_1, E_2, F_1, F_2, M_1, M_2, M_3 plus test procedures and test report format (including requirements of R 47: Standard weights for testing high capacity weighing machines)	1 CD	2 CD
• Revision R 33: Conventional value of the result of weighing in air	WD	1 CD
TC 9/SC 4 Densities		
• Hierarchy scheme for density measuring instruments	1 CD	2 CD
TC 10/SC 1 Pressure balances		
• Pressure transducers with uniform output signal	2 CD	3 CD/DR
TC 10/SC 2 Pressure gauges with elastic sensing elements		
• Pressure transmitters with elastic sensing elements	WD	1 CD
• Revision R 101: Indicating and recording pressure gauges, vacuum gauges and pressure vacuum gauges with elastic sensing elements (ordinary instruments)	-	WD
• Revision R 109: Pressure gauges and vacuum gauges with elastic sensing elements (standard instruments)	-	WD

OIML TECHNICAL ACTIVITIES	1999	2000
TC 10/SC 4 Material testing machines		
• Force measuring systems of material testing machines (R 65) (Revision R 65 combining requirements of R 64)	Approval	R
• Requirements for force measuring instruments for verifying material testing machines	WD	1 CD
TC 11 Instruments for measuring temperature and associated quantities		
• Revision R 75: Heat meters	1 CD	2 CD/DR
TC 11/SC 1 Resistance thermometers		
• Revision R 84: Resistance-thermometer sensors made of platinum, copper or nickel (for industrial and commercial use) and inclusion of metallic electrical platinum, copper and nickel resistance thermometers with extended range	1 CD	2 CD
TC 11/SC 3 Radiation thermometers		
• Revision R 48: Tungsten ribbon lamps for calibration of optical pyrometers	WD	1 CD
TC 12 Instruments for measuring electrical quantities		
• Revision R 46: Active electrical energy meters for direct connection of class 2	WD	1 CD
TC 13 Measuring instruments for acoustics and vibration		
• Annexes to R 122: Test procedures and test report format for the evaluation of equipment for speech audiometry	R	-
• Octave-band and fractional octave-band filters	DR	Vote
• Revision R 102: Sound calibrators	Postponed	Postponed
• Revision R 103: Measuring instrumentation for human response to vibration	Postponed	Postponed
TC 14 Measuring instruments used for optics		
• Amendment and Test report format to R 93: Focimeters	R	-

OIML TECHNICAL ACTIVITIES	1999	2000
TC 15/SC 2 Measuring instruments for ionizing radiations used in industrial processing		
• Radiochromic film dosimetry system for ionizing radiation processing of materials and products (R 127)	R	-
• Polymethylmethacrylate (PMMA) dosimetry system for measuring ionizing radiations absorbed dose in materials and products	2 CD	DR
• Alanine (EPR) dosimetry system for measuring ionizing radiations absorbed dose in materials and products	2 CD	DR
TC 16/SC 1 Air pollution		
• Annex to R 99: Test report format for the evaluation of instruments for measuring vehicle exhaust emissions	Postponed (pending joint ISO 3930/OIML 99 publication)	1 CD
TC 18 Medical measuring instruments		
• Ergometers for foot crank work (R 128) (including Test report format)	Vote (Test report format)	R
TC 18/SC 1 Blood pressure instruments		
• Revision R 16: Manometers for instruments for measuring blood pressure (sphygmomanometers) plus Test report format	(Redrafted in two parts: 4 CD (Revision R 16) 2 CD (Test report format)	DR
TC 18/SC 4 Bio-electrical measurements		
• Annex to R 90: Test report format	1 CD	2 CD
TC 18/SC 5 Measuring instruments for medical laboratories		
• Absorption spectrometers for medical laboratories	WD	1 CD

For ease of reference the English text is published first, immediately followed by the French version (in grey boxes)

Afin d'en faciliter la lecture, le texte anglais est publié en premier, suivi immédiatement par la version française (dans les cases grises)

OIML Presidential Council

The OIML Presidential Council met at the BIML on 21 and 22 February 2000.

Present were Gerard Faber, CIML President, Sam Chappell and Manfred Kochsiek, Vice-Presidents, Seton Bennett, John Birch, Lev Issaev, Jean-François Magana and Bernard Athané, Council Members. Li Chuanqing was unable to attend and was represented by Han Jianping. BIML Assistant Directors Attila Szilvássy and Ian Dunmill, Engineer Edouard Weber and Editor Chris Pulham also attended.

After Mr. Faber had welcomed the participants, the Council examined the financial situation of the OIML, which was deemed to be satisfactory. It was however noted that two Member States were very late in the payment of their contributions. Mr. Athané was asked to contact the relevant Authorities in these two countries with a view to finding a solution that would enable them to remain OIML Members. The BIML staff situation was also examined, but no comments were made on this subject.

A draft budget for the period 2001–2004 was examined in detail before being sent to Member State Governments with a view to it being approved by the Eleventh Conference in October 2000. This draft was based on a preliminary proposal studied by the CIML in October 1999 and on the reactions received since from certain CIML Members. After some discussion and the insertion of certain modifications, the draft budget was deemed acceptable and the BIML Director would rapidly send it to Member States for final comments prior to the Conference. It would also be sent to Corresponding Members for information.

The Council then devoted several hours to analyzing the *1999–2002 Action Plan* item by item, the main points of this document having been accepted by the CIML in October 1999. This analysis gave Council Members the chance to review most of the OIML's fields of activity (technical work, certification, developing countries, etc.). The main conclusions of these discussions are set out below.

Technical work

The need to speed up technical work was underlined, for example by using modern communication means (such as e-mail, electronic submission of votes and comments, creation of web sites by TC's/SC's), whilst still ensuring that those Members that do not have ready access to the Internet are not prevented from participating in such work. The specific concerns of developing countries and regions should also be better taken into consideration when TC/SC work programs are drawn up.

OIML Certificate System for Measuring Instruments

The development of this System (families of instruments, modules, certification of individual instruments) and its applicability to a future agreement on the acceptance of type evaluations were deemed to be high priority items.

Agreement on the acceptance of type evaluations

Sam Chappell gave information on the development of this activity, which was carried out in the framework of TC 3. A meeting on this subject could be organized in June 2000. The Council approved measures destined to facilitate the setting up of such an agreement, such as a database of laboratories that carry out type evaluations with information on their capabilities, accreditation, etc. or the development of training on testing methods.

Prepacked goods

TC 6's activities were mentioned, in particular its studies aimed at instigating an international mark guaranteeing the contents of packages.

Role of CIML Members

The third draft revision of the *Guide for CIML Members* was deemed acceptable and the BIML would be responsible for distributing the final text as widely as possible. Copies sent to CIML Members would be

accompanied by a letter from the CIML President underlining the fundamental aspects of this role.

Promotion of legal metrology

Certain Council Members were asked to reflect on this matter and begin drawing up one (or more) documents on the economic and social role of legal metrology, its interaction with other branches of metrology, standardization, etc.

External liaisons

Cooperation between the OIML and various international and regional organizations was discussed and measures destined to improve the situation whenever appropriate were put forward. Special note was paid to:

- regional legal metrology organizations, in view of the strong ties between their responsibilities and those of the OIML;
- cooperation with the BIPM and ILAC, which was the object of specific discussions held to prepare a meeting between the three Organizations at the BIPM on 23 February.

Development Council

Mrs. Annabi underlined the importance of the fact that the Development Council was now systematically represented at Presidential Council meetings. She outlined the Development Council's work program for the coming two years and for the Council's meeting scheduled for October 2000, and also mentioned the need to develop cooperation with other international (especially ISO/DEVCO) and regional organizations.

Messrs. Kochsiek and Magana also spoke of joint actions envisaged with UNIDO and the European Commission's MEDA program. Information on questions of training was given in particular by John Birch on behalf of the APLMF.

Following these discussions, the BIML was asked to draw up the final *1999–2002 Action Plan* and to distribute it to OIML Member States, as well as to Corresponding Members and Liaison Institutions for it to be accepted by the Eleventh Conference.

Seton Bennett then summarized the state of progress of preparations for the Eleventh Conference. The CIML had been keen on the idea of a round table, and several topics had been put forward. After much discussion, the subject *Mutual recognition* (proposed by Mr. Bennett) was finally chosen as this was of considerable interest for many OIML activities and was a subject that was likely to give rise to participation by other international and regional institutions. To this end, it was therefore decided that the round table would take place on Wednesday 11th October, i.e. in the middle of the Eleventh Conference, and that the technical visits originally planned for the Wednesday would in fact now take place on Friday 13th.

In concluding the meeting and after having examined various other subjects, Mr. Faber invited Council Members to a brief meeting in London on Sunday 8th October immediately prior to the Eleventh Conference and the 35th CIML Meeting. ■

Conseil de la Présidence de l'OIML

Le Conseil de la Présidence s'est réuni au BIML les 21 et 22 février 2000.

Étaient présents Gerard Faber, Président du CIML, Sam Chappell et Manfred Kochsiek, Vice-Présidents, Ghaïet-El-Mouna Annabi, Présidente du Conseil de Développement de l'OIML, ainsi que Seton Bennett, John Birch, Lev Issaev, Jean-François Magana et Bernard Athané, Membres du Conseil. Li Chuanqing, empêché, était représenté par Han Jianping. Les Adjoints au Directeur du BIML, Attila Szilvássy et Ian Dunmill, l'Ingénieur Édouard Weber et le Rédacteur Chris Pulham étaient également présents.

Après quelques mots de bienvenue par M. Faber, le Conseil a examiné la situation financière de l'OIML qui a été jugée satisfaisante. Il a cependant été noté que deux États Membres étaient très en retard dans le paiement de leurs contributions. Il a été demandé au Directeur du BIML de contacter les Autorités concernées de ces deux pays en vue de trouver une solution qui leur permettrait de conserver leur appartenance à l'OIML. La situation du personnel du BIML a également été examinée mais n'a fait l'objet d'aucun commentaire.

Un projet de budget pour la période 2001–2004 a ensuite fait l'objet d'un examen attentif avant son envoi aux Gouvernements des États Membres en vue de son approbation par la Onzième Conférence en octobre 2000. Ce projet était basé sur une proposition préliminaire étudiée par le CIML en octobre 1999 et sur les réactions reçues depuis de certains Membres du CIML. Après discussion et introduction de quelques modifications, le projet de budget a été jugé acceptable et le Directeur du BIML a été chargé de l'envoyer rapidement aux États Membres pour ultimes commentaires avant la Conférence (ainsi qu'aux Membres Correspondants pour information).

Le Conseil a ensuite consacré plusieurs heures a examiner point par point le *Plan d'Actions 1999–2002* dont les grandes lignes avaient été acceptées par le

CIML en octobre 1999. Cet examen a permis de passer en revue la plupart des domaines d'activités de l'OIML (travaux techniques, certification, pays en développement, etc.). Les principales conclusions de ces discussions ont été les suivantes:

Travaux techniques

La nécessité d'accélérer les travaux a été soulignée, par exemple par l'utilisation des méthodes de communication modernes (e-mail, commentaires et votes électroniques, création de sites web par les TC/SC) tout en s'assurant que les Membres qui n'ont pas encore un accès facile à Internet ne soient pas éliminés de la participation aux travaux. Les intérêts spécifiques des pays en développement et des régions doivent également être mieux pris en considération dans l'établissement des programmes de travail des TC/SC.

Système de Certificats OIML pour les Instruments de Mesure

Le développement de ce Système (familles d'instruments, modules, certification des instruments individuels) et son application à un futur accord sur l'acceptation des évaluations de types ont été jugés très prioritaires.

Accord sur l'acceptation des évaluations de types

Sam Chappell a donné des informations sur les développements de cette activité conduite dans le cadre du TC 3. Une réunion à ce sujet pourrait être organisée en juin 2000. Le Conseil a approuvé des mesures (par exemple: base de donnée sur les laboratoires effectuant des évaluations de types avec des informations sur leurs moyens, accréditation, etc.; ou encore développement de la formation en matière d'essais) propres à faciliter la mise en place d'un tel accord.

Produits préemballés

L'activité du TC 6 a été évoquée, en particulier dans ses études en vue de l'établissement d'une marque internationale garantissant le contenu des emballages.

Rôle des Membres du CIML

Le troisième projet de révision du *Guide* à ce sujet a été jugé acceptable et le BIML a été chargé de diffuser largement le texte définitif. Son envoi aux Membres du CIML sera accompagné d'une lettre du Président du CIML soulignant les aspects fondamentaux de ce rôle.

Promotion de la métrologie légale

Certains Membres du Conseil ont été chargés de réfléchir à ce sujet et de mettre en route l'élaboration d'un ou plusieurs documents sur le rôle économique et social de la métrologie légale, les interactions avec d'autres aspects de la métrologie, la normalisation, etc.

Left to right:
Gauche à droite:

John Birch
Jean-François Magana
Sam Chappell
Manfred Kochsiek
Gerard Faber
Bernard Athané
Ghaïet-El-Mouna Annabi
Seton Bennett
Lev Issaev

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Liaisons externes

La coopération entre l'OIML et diverses organisations internationales et régionales a été discutée et des mesures visant à améliorer la situation chaque fois que nécessaire ont été envisagées. Une attention particulière a été portée:

- aux organisations régionales de métrologie légale, en raison des très fortes synergies entre leurs responsabilités et celles de l'OIML;
- à la coopération avec le BIPM et ILAC, qui a fait l'objet de discussions spécifiques en préparation à une réunion entre les trois Organisations, le 23 février au BIPM.

Conseil de Développement

Mme Annabi a souligné le très grand intérêt pour ce Conseil d'être maintenant systématiquement représenté au Conseil de la Présidence. Elle a fait le point sur l'établissement du programme de travail du Conseil de Développement pour les deux prochaines années et sur les préparatifs pour la réunion du Conseil de Développement d'octobre 2000. La nécessité de développer la coopération avec d'autres organisations internationales (en particulier ISO/DEVCO) et régionales a été mentionnée. MM. Kochsiek et Magana ont également mentionnés les activités communes envisagées avec l'ONUDI et le programme MEDA de la Commission Européenne. Les questions de formations ont fait l'objet d'informations en particulier de John Birch, au nom de l'APLMF.

À l'issue de cet examen, le BIML a été chargé de mettre définitivement au point le *Plan d'Actions 1999–2002* et de le distribuer aux États Membres de l'OIML, ainsi qu'aux Membres Correspondants et institutions en liaison, pour acceptation par la Onzième Conférence.

Seton Bennett a ensuite fait le point sur les préparatifs pour cette Onzième Conférence. L'organisation d'une table ronde ayant été vivement souhaitée par le CIML, plusieurs sujets ont été envisagés. Celui proposé par M. Bennett sur la *reconnaissance mutuelle* a été finalement retenu car présentant un intérêt considérable pour plusieurs activités OIML, et propre à susciter la participation d'autres institutions internationales et régionales. À cet effet, il a été décidé que la table ronde aurait lieu le mercredi 11 octobre, c'est-à-dire en plein milieu de la Onzième Conférence, et que les visites techniques prévues pour ce jour-là seraient reportées au vendredi 13.

En conclusion, et après avoir examiné divers autres sujets, M. Faber a convié les Membres du Conseil à une brève réunion qui se tiendra à Londres le dimanche 8 octobre juste avant la Onzième Conférence et la 35ème réunion du CIML. ■

OIML TC 8/SC 5/WG 2 Water meters

The BIML hosted the meeting of OIML TC 8/SC 5/WG 2 from 8 to 10 February 2000 in Paris. The meeting was attended by 17 delegates representing 7 P-members of TC 8/SC 5, one liaison organization (ISO) and Mr. Szilvássy (BIML).

The Convenor of the Working Group Mr. J. Williamson reported on the results of the WG 2 meeting held at NIST (Gaithersburg, USA) in November 1999 and the WG discussed in detail the working draft of *Test procedures* to R 49 *Water meters* produced after that meeting.

It was decided that OIML TC 8/SC 5/WG 2 will next meet from 3 to 5 May 2000 in Copenhagen to continue to develop the test procedures and the test report format to OIML R 49.

The WG 2 intends to present an advanced working draft to OIML TC 8/SC 5 which will hold its next meeting in November 2000 (date and venue to be confirmed) with a view to having a 1 CD by the end of the year. ■

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OIML TC 8/SC 5/WG 2 Compteurs d'eau

Le BIML a accueilli la réunion de OIML TC 8/SC 5/WG 2 du 8 au 10 février 2000 à Paris. Étaient présents 17 délégués représentant 7 membres-P du TC 8/SC 5, une organisation en liaison (ISO) et M. Szilvássy (BIML).

Le Président du Groupe de travail M. J. Williamson a fait un rapport sur les résultats de la réunion du WG 2 tenue au NIST (Gaithersburg, USA) en novembre 1999 et le WG a discuté en détail du projet de travail sur les *Procédures d'essai* pour R 49 *Compteurs d'eau* produit après cette réunion.

Il fut décidé que la prochaine réunion de OIML TC 8/SC 5/WG 2 se tiendrait du 3 au 5 mai 2000 à

Copenhague pour continuer le développement des procédures d'essai et du format du rapport d'essai pour OIML R 49.

Le WG 2 prévoit de présenter un projet de travail avancé au TC 8/SC 5 de l'OIML qui tiendra sa prochaine réunion en novembre 2000 (date et lieu à confirmer) en vue de produire un premier projet de Comité (CD) d'ici la fin de l'année. ■

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

OIML TC 8/SC 4 Dynamic mass measurement (liquids other than water)

The BIML hosted the meetings of TC 8/SC 3, TC 8/SC 3 + SC 4 and TC 8/SC 4 from 14 to 17 February in Paris at the Maison de la Chimie.

Participants: 27 delegates representing 14 P-members, liaison organization (CECOD), Mr. Dunmill and Mr. Szilvássy (BIML)

Meeting 1: Revision of OIML R 118 *Testing procedures and test report format for pattern evaluation of fuel dispensers for motor vehicles*

Chairman: Dr. D. Mencke, PTB (Germany)

Dr. Mencke first gave an overview of the status of the Measuring Instrument Directive (MID) of the EU, which will cover certain measuring instruments including volume and mass flow meters. OIML R 117 will be the basis for the Normative Documents on volume and mass flow meters.

He then gave a summary of the development of R 118; since it did not cover certification of modules of fuel dispensers for motor vehicles, in 1998 a working group was formed by the Secretariat to expand coverage. The draft was developed over six meetings and was circulated in May 1999 for comments, which were reviewed and responses developed by the WG.

During the meeting, discussions centered on these comments and the responses to them. The results of discussions will be used as a basis for the finalization of a CD on the revision of R 118 by April 2000. This draft Recommendation on *Test procedures and test report format for fuel dispensers for motor vehicles* will then be sent to the P- and O-members of TC 8/SC 3 and to the CIML for parallel vote and comment. The goal is to obtain CIML approval in October 2000.

Discussion continued on the questionnaire and the priorities to develop additional test procedures and a test report format for R 117. It was agreed that the existing ad-hoc working group shall continue its work as a new Working Group TC 8/SC 3/WG 1 *Testing procedures* (Convenor Dr. Mencke) with the help of other members to continue the work effort.

There are no plans to hold another meeting; it was felt that most of the work could be handled via e-mail for now.

Meeting 2: OIML TC 8/SC 3 - Changes to OIML R 117, *Common interpretation for application of OIML R 117*

Chairman: Dr. D. Mencke

First discussions centered on the document *Common interpretation for application of OIML R 117* prepared by the PTB, NMi and SDM in 1999. It was finally agreed to use it as a basis for the revision of R 117.

It was also agreed that a new Working Group TC 8/SC 3/WG 2 *Revision of R 117* (Convenors Mr. Engler and Mr. Kooiman (NL)) shall be established to revise R 117.

Discussion regarding the revision of R 117 centered around the EMC tests and environmental influence tests. A listing of the current IEC environmental factors tests was distributed by the BIML to the group and there were also discussions on the applicability of D 11.

Dr. Mencke agreed to develop a list of proposed changes to R 117 based on the interpretation document to be distributed for comment.

It was also agreed that a letter should be sent to all P- and O-members of TC 8/SC 3 requesting comments for the revision of R 117 and stating that members are welcome to participate in WG 2.

The question to establish a Working Group on test procedures for meters without a pulse was discussed. Since this was not only a problem for SC 3 and 4 but also for SC 5 and SC 7, it was agreed that the Secretariat of TC 8 should be asked to form a WG to solve the problem of how to simulate the measuring signals and how to perform the test of a meter without pulses. It was also agreed that manufacturers should be involved.

Meeting 3: Joint meeting of OIML TC 8/SC 3 + SC 4 - Combination of OIML R 105 *Direct mass flow measuring systems for quantities of liquids* (1993) and R 117 *Measuring systems for liquids other than water* (1995)

Chairperson: Debbie McGann Ripley, NIST (USA)

The purpose of this meeting was to discuss the merger of OIML R 105 *Direct mass flow measuring systems for quantities of liquids* (for which the USA is the Secretariat) with OIML R 117 *Measuring systems for liquids other than water* (Germany).

R 105 was published in 1993 and was up for its five-year review. In 1998, the USA began revising R 105 and produced a WD for review. In January 1999 Dr. Mencke proposed to the US Secretariat to merge the two Recommendations. A detailed study of R 105 to R 117 was completed by Ms. Ripley and distributed to the US/NWG along with a shorter summary on the main differences and a ballot to merge the Recommendations. Based on the unanimous vote the US Secretariat proposed to the joint meeting of SC 3 and SC 4 to discuss and accept the merger (combined revision) of the two OIML Recommendations.

It was identified that for the measurement of quantities of liquid there are four possibilities:

1) Direct volume meter where the measured quantity is the volume at metering conditions and the indicated value is the volume at metering conditions;
2) Indirect mass meter (volume meter with conversion device) where the measured quantities are volume and density at metering conditions and the indicated value is the mass;
3) Direct mass meter where the measured quantity is the mass and the indicated value is the mass; and
4) Indirect volume meter (mass meter with conversion device) where the measured quantities are mass and density at metering conditions and the indicated value is the volume at metering conditions.

R 117 covers items 1 and 2 and R 105 covers item 3; the fourth item is not covered by either Recommendation. The function of the mass flowmeter with density conversion device was described at the meeting, as well as an additional paper by Dr. Mencke entitled *Function of a Coriolis mass flowmeter with conversion device*.

It was also pointed out that the draft MID brings R 105 and R 117 together and only R 117 was used by European Issuing Authorities instead of R 105 to test the devices since it was felt that R 105 was missing several items.

Since 2/3 of the P-members were present and a majority of those present voted "Yes", it was accepted to merge the two Recommendations.

A new Working Group TC 8/SC 4/WG 1 named *Combination R 105/R 117* (Convenor Ms. Ripley) was formed comprising the same members as TC 8/SC 3/WG 2.

Basically there are three tasks for the working group:

1 Identify what needs to change in R 105;
2 Identify what needs to change in R 117; and
3 Establish how to merge the two Recommendations.

It was stated that i) stability of zero at rest; ii) no test during vibration and iii) the gas elimination problem also needed to be addressed.

It was also agreed that $2\frac{1}{2}$ years could be the time needed for this work, and that TC 8/SC 3/WG 2 would update R 117 independently to R 105 but that the two WG's needed to work closely together. This should not be a problem since the members of TC 8/SC 4/WG 1 were the same as those of TC 8/SC 3/WG 2 and the Convenors agreed to work closely together.

Since all the WG members were present, it was agreed to continue with a TC 8/SC 4/WG 1 meeting to review the differences between R 105 and R 117.

Among others there was a discussion on:

- gas elimination/air removal;
- checking facilities;
- the temperature range for the instrument and reduction of the range without further testing; and
- flow disturbances.

It was agreed that more discussions were needed on some of these subjects and it was suggested by the Convenor that care should be taken in deciding what is changed in R 105 and R 117/R 118 and how those changes may affect OIML certificates already issued for patterns under these Recommendations.

No further meetings were planned and delegates were satisfied with the outcome of all the meetings. ■

OIML TC 8/SC 3 Mesurage dynamique volumique (liquides autres que l'eau)

OIML TC 8/SC 4 Mesurage dynamique massique (liquides autres que l'eau)

Le BIML a accueilli les réunions du TC 8/SC 3, TC 8/SC 3 + SC 4 et du TC 8/SC 4 du 14 au 17 février à Paris à la Maison de la Chimie.

Participants: 27 délégués représentant 14 membres-P, une organisation en liaison (CECOD), M. Dunmill et M. Szilvássy (BIML)

Réunion 1: Révision de OIML R 118 *Procédures d'essai et format du rapport d'essai des modèles de distributeurs de carburant pour véhicules à moteur*

Président: Dr. D. Mencke, PTB (Allemagne)

Dr. Mencke a d'abord donné un aperçu du statut de la Directive sur les Instruments de Mesure (MID) de l'Union Européenne, qui couvrira certains instruments de mesure y compris les débitmètres volumiques et massiques. OIML R 117 constituera la base pour les Documents Normatifs sur les débitmètres volumiques et massiques.

Il fit ensuite un résumé du développement de la R 118; étant donné qu'elle ne couvre pas la certification de modules de distributeurs de carburant pour véhicules à moteur, un groupe de travail fut formé en 1998 par le Secrétariat pour étendre son domaine d'application. Le projet fut développé au cours de six réunions et diffusé en mai 1999 pour commentaires, lesquels furent examinés et traités par le WG.

Pendant la réunion, les discussions ont porté sur ces commentaires et les réponses qui y ont été apportées. Les résultats des discussions seront utilisés comme base pour finaliser un CD sur la révision de R 118 courant avril 2000. Ce projet de Recommandation sur les *Procédures d'essai et format du rapport d'essai pour les distributeurs de carburant pour véhicules à moteur* sera alors envoyé aux membres-P et membres-O du TC 8/SC 3 et au CIML pour vote et commentaires parallèles. Le but est d'obtenir l'approbation du CIML en octobre 2000.

La discussion s'est poursuivie sur le questionnaire et les priorités pour l'élaboration de procédures d'essai supplémentaires et d'un format de rapport d'essai pour la R 117. Il fut convenu que le groupe de travail existant ad-hoc devait poursuivre son travail en tant que nouveau groupe de travail TC 8/SC 3/WG 1 *Procédures d'essai* (avec Dr. Mencke comme Président) avec l'aide d'autres membres pour soutenir le travail déjà accompli.

Aucune autre réunion n'est prévue; il a été estimé que la plupart du travail pourrait être entrepris via e-mail pour l'instant.

Réunion 2: OIML TC 8/SC 3 - Changements à OIML R 117, *Interprétation commune pour l'application de OIML R 117*

Président: Dr. D. Mencke

Les premières discussions ont porté sur le document *Interprétation commune pour l'application de OIML R 117* préparé par la PTB, le NMi et la SDM en 1999. Il a finalement été convenu de l'utiliser comme base pour la révision de R 117.

Il fut aussi convenu qu'un nouveau groupe de travail TC 8/SC 3/WG 2 *Révision de R 117* (Présidents M. Engler et M. Kooiman (NL)) sera établi pour la révision de R 117.

La discussion relative à la révision de la R 117 a surtout porté sur les essais EMC et les essais d'influence environnementale. Une liste des actuels essais CEI des facteurs environnementaux fut distribuée par le BIML au groupe et il fut également question de l'applicabilité de OIML D 11.

Dr. Mencke a approuvé la nécessité d'élaborer une liste des changements proposés à la R 117 basés sur le document d'interprétation afin de la distribuer pour commentaires.

Il a aussi été convenu qu'une lettre devrait être envoyée à tous les membres-P et membres-O du

OIML TC 8/SC 3 and SC 4 met at the Maison de la Chimie from 14 to 17 February 2000
OIML TC 8/SC 3 et SC 4 se sont réunis à la Maison de la Chimie du 14 au 17 février 2000

TC 8/SC 3 pour demander des commentaires en vue de la révision de R 117 et pour inviter les membres à participer au WG 2.

La question de la création d'un groupe de travail sur les procédures d'essai pour les compteurs sans impulsions fut discutée. Dans la mesure où cela posait problème non seulement aux SC 3 et SC 4 mais aussi aux SC 5 et SC 7, il fut convenu qu'il serait demandé au Secrétariat du TC 8 de constituer un WG pour résoudre le problème quant à la façon de simuler les signaux de mesure et d'effectuer l'essai d'un compteur sans impulsions. Il fut aussi convenu que les fabricants devraient être impliqués.

Réunion 3: Réunion conjointe de OIML TC 8/SC 3 + SC 4 - Combinaison de OIML R 105 *Ensembles de mesurage massiques directs de quantités de liquides* (1993) et de OIML R 117 *Ensembles de mesurage de liquides autres que l'eau* (1995)

Présidente: Debbie McGann Ripley, NIST (USA)

Le but de cette réunion était de discuter de la fusion de OIML R 105 *Ensembles de mesurage massiques directs de quantités de liquides* (sous le Secrétariat des USA) avec OIML R 117 *Ensembles de mesurage de liquides autres que l'eau* (Allemagne).

La R 105 a été publiée en 1993 et venait le moment de son réexamen quinquennal. En 1998, les USA commencèrent à réviser la R 105 et élaborèrent un WD pour examen. En janvier 1999, Dr. Mencke proposa au Secrétariat USA de fusionner les deux Recommandations. Une étude complète de R 105 par rapport à R 117 fut achevée par Ms. Ripley et distribuée au US/NWG avec un bref résumé des principales différences et un vote concernant la fusion des Recommandations. Suite au vote unanime, le Secrétariat USA proposa lors de la réunion conjointe des SC 3 et SC 4 de discuter de la fusion des deux Recommandations OIML (révision combinée) et de l'accepter.

Quatre possibilités furent identifiées pour le mesurage des quantités de liquide:

1) Compteur volumique direct où la quantité mesurée est le volume dans les conditions de mesurage et la valeur indiquée est le volume dans les conditions de mesurage;
2) Compteur massique indirect (compteur de volume avec dispositif de conversion) où les quantités mesurées sont le volume et la masse volumique dans les conditions de mesurage et la valeur indiquée est la masse;
3) Compteur massique direct où la quantité mesurée est la masse et la valeur indiquée est la masse; et
4) Compteur volumique indirect (compteur massique avec dispositif de conversion) où les quantités mesurées sont la masse et la masse volumique dans les conditions de mesurage, et la valeur indiquée est le volume dans les conditions de mesurage.

La R 117 couvre les possibilités 1 et 2 et la R 105 la possibilité 3; la quatrième n'est couverte par aucune des deux Recommandations. La fonction du débitmètre massique avec dispositif de conversion de la masse volumique fut commentée en cours de réunion, ainsi qu'un document supplémentaire de Dr. Mencke intitulé *Fonction d'un débitmètre massique à effet Coriolis avec dispositif de conversion*.

Il fut aussi remarqué que le projet de la MID réunit la R 105 et la R 117 et que seule la R 117 était utilisée par les autorités de délivrance européennes au lieu de la R 105 pour essayer les dispositifs car, de l'avis général, plusieurs points font défaut à la R 105.

Etant donné que 2/3 des membres-P étaient présents et qu'une majorité de ceux présents ont voté "Pour", la fusion des deux Recommandations fut acceptée.

Un nouveau groupe de travail TC 8/SC 4/WG 1 nommé *Combinaison de R 105/R 117* (Présidente, Ms. Ripley) fut constitué comprenant les mêmes membres que ceux du TC 8/SC 3/WG 2.

En principe, il y a trois tâches pour le groupe de travail:

1 Identifier ce qui doit changer dans la R 105;
2 Identifier ce qui doit changer dans la R 117; et
3 Déterminer la procédure de fusion des deux Recommandations.

Il fut établi qu'il était nécessaire d'aborder les questions sur i) la stabilité du zéro au repos; ii) le fait de ne pas effectuer d'essai pendant les vibrations et iii) le problème de l'élimination du gaz.

Il fut aussi convenu que 2 $\frac{1}{2}$ années pourraient être le temps nécessaire pour ce travail, et que le TC 8/SC 3/WG 2 réactualiserait la R 117 indépendamment de la R 105 mais que les deux WG avaient besoin de travailler étroitement ensemble. Ce qui ne devrait pas être un problème puisque les membres du TC 8/SC 4/WG 1 étaient les mêmes que ceux du TC 8/SC 3/WG 2 et que les Présidents sont d'accord pour travailler en collaboration étroite.

Tous les membres du WG étant présents, il fut convenu de continuer avec une réunion TC 8/SC 4/WG 1 pour examiner les différences entre R 105 et R 117.

Entre autres, les discussions ont porté sur:

- l'élimination du gaz/la purge d'air;
- les systèmes de contrôle;
- l'étendue de température pour l'instrument et la réduction de l'étendue sans essai supplémentaire; et
- les perturbations d'écoulement.

Il fut convenu que certains de ces sujets nécessitaient plus de discussions et il fut suggéré par le Président que beaucoup d'attention devrait être apportée au moment de décider des changements dans R 105 et R 117/R 118 et de la façon dont ceux-ci peuvent concerner les certificats OIML déjà délivrés pour les modèles couverts par ces Recommandations.

Aucune autre réunion ne fut envisagée, et les délégués furent satisfaits des résultats obtenus. ■

OIML TC 6 Prepackaged products

Sam Chappell chaired a meeting of TC 6 on 24–25 February at the Maison de la Chimie, attended by 29 delegates from 16 P-members and one O-member, plus representatives of CECIP and the BIML.

The first Committee draft (CD) revision of OIML R 87 *Net Content in Packages* was reviewed in its entirety. Specific and substantive changes to the draft were proposed, discussed and agreed upon for the main clauses and annexes. In particular, the Secretariat agreed to add an annex on drained weight.

The **International Quantity (IQ) Marking System** proposed in Annex C, intended to facilitate international trade, was discussed in detail. The principle of whether the system should be described within R 87 or made the subject of a separate document (along the lines of that on the OIML Certificate System) was considered. It was felt that the present Annex should remain since it outlined the principles of the system, although a much more detailed separate document would also be needed. The Secretariat agreed to revise Annex C to provide an explanation of its benefits to affected parties and simplify its application and implementation by all participants including regulatory bodies and small, medium and large packing firms.

Resolutions of the meeting were:

1 To consider comments made at the meeting and others submitted by correspondence to the Secretariat on the 1 CD by April 1;

2 To prepare a 2 CD revision of R 87 for review and comment by no later than June 1;

3 To endeavor to complete the revision of OIML R 87 in time for it to be approved by the CIML at its October 2001 meeting;

4 To call this work to the attention of responsible authorities within OIML Member States and regions so that its requirements could be considered when revising and harmonizing applicable laws and regulations;

5 To recommend that mutual recognition of net content of product in prepackages be considered as a topic for discussion at the Round Table during the Eleventh International Conference in October 2000 in London;

6 To ensure that the status of this project is made known to all relevant organizations and, in particular, to the Technical Barriers to Trade Committee of the WTO.

The participants in the meeting expressed a special appreciation to the BIML for its efforts in arranging and hosting the meeting in Paris, and Mr. Birch thanked Sam Chappell for his work in the development of this CD, which is very significant in view of the importance of prepackaged goods in international trade. ■

OIML TC 6 Produits préemballés

Sam Chappell a présidé une réunion du TC 6 les 24–25 février à la Maison de la Chimie, avec 29 délégués représentant 16 membres-P et un membre-O, ainsi que le CECIP et le BIML.

Le premier projet de comité (CD) de révision de OIML R 87 *Contenu net des préemballages* a été examiné dans sa totalité. Des modifications spécifiques et substantielles au projet ont été proposées, discutées et acceptées pour les principales clauses et annexes. En particulier, le Secrétariat a accepté d'ajouter une annexe sur le poids égoutté.

Le **Système de Marquage International de la Quantité (IQ)** proposé en Annexe C et destiné à faciliter le commerce international a été discuté en détail. La question de savoir si le système serait décrit dans R 87 ou ferait l'objet d'un document séparé (similaire à ce qui existe pour le Système de Certificats OIML), a été examinée. Il a été admis que l'Annexe actuelle devrait être maintenue étant donné qu'elle décrit les principes du système mais qu'un document séparé beaucoup plus détaillé était nécessaire. Le Secrétariat a accepté de revoir l'Annexe C afin d'en expliquer les bénéfices pour les parties concernées et de simplifier son application par les

participants, y compris les organismes de réglementation et les sociétés de préemballage, qu'elles soient de taille petite, moyenne ou grande.

Conclusions de la réunion:

1 Examiner les commentaires sur le 1er CD, présentés en réunion ou envoyés au Secrétariat par courrier avant le 1er avril;
2 Préparer un 2ème CD de révision de R 87 pour examen et commentaires avant le 1er juin;
3 S'efforcer de terminer la révision de OIML R 87 en temps pour son approbation par le CIML à sa réunion d'octobre 2001;
4 Attirer l'attention des autorités responsables des États Membres de l'OIML et des régions sur ce travail afin que les exigences en soient reprises dans le réexamen et l'harmonisation des lois et règlements applicables;
5 Recommander que la reconnaissance mutuelle du contenu net des préemballages soit retenu comme sujet de discussion de la Table Ronde organisée à l'occasion de la Onzième Conférence Internationale en octobre 2000 à Londres;
6 Faire en sorte que cette activité soit portée à la connaissance de toutes les organisations concernées, en particulier le Comité des Barrières Techniques de l'OMC.

Les participants à la réunion ont exprimé leur appréciation toute particulière au BIML qui avait pris en charge l'organisation de la réunion à Paris puis M. Birch a remercié Sam Chappell pour ce travail essentiel eu égard à l'importance des produits préemballés dans le commerce international. ■

OIML TC 6 met at the Maison de la Chimie on 24 and 25 February 2000
OIML TC 6 s'est réuni à la Maison de la Chimie les 24 et 25 février 2000

Committee Drafts received by the BIML 1999.11.01–2000.01.31

Title	Language	CD n°	TC/SC	Country
Polymethylmethacrylate (PMMA) dosimetry system for measuring ionizing radiations absorbed dose in materials and products	E	2 CD	TC 15/SC 2	USA
Alanine (EPR) dosimetry system for measuring ionizing radiations absorbed dose in materials and products	E	2 CD	TC 15/SC 2	USA
Mutual acceptance agreement on OIML pattern evaluations	E	5 CD	TC 3/SC 5	USA
Revision of R 118, plus proposals concerning modification of R 117 and combination of R 117 and R 105	E	-	TC 8/SC 3	Germany
Recording electrocardiographs Annex C (Test report format) to OIML R 90	E	1 CD	TC 18/SC 4	Russia
Gas metering: "Measuring systems for gaseous fuel"	E	1 CD	TC 8/SC 7	Belgium/France

meetings OIML réunions

June 2000

To be confirmed	TC 3/SC 5 Conformity assessment	PARIS, FRANCE

October 2000

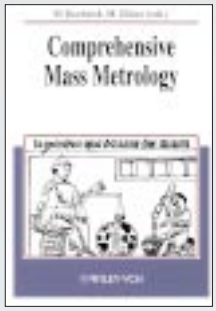
9–13	11th International Conference of Legal Metrology, 35th CIML and Development Council Meetings	LONDON, UK

November 2000

To be confirmed	TC 8/SC 5 Water meters	TBA

The OIML is pleased to welcome the new CIML Member for Kazakhstan:

Mr. M. Rysbekov



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