

OIML

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VOLUME XXXV NUMBER 1 JANUARY 1994

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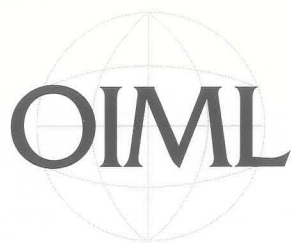
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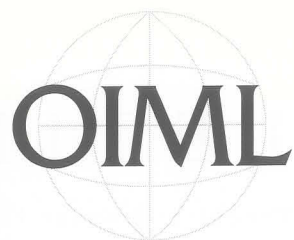
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INTERNATIONAL DE
MÉTROLOGIE LÉGALE
HOLDS ITS 28TH
MEETING IN BERLIN,
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E d i t o r i a l

Knut Birkeland

President, Comité International de Métrologie Légale

The introduction of the OIML Bulletin in 1960 was an important event in the life of OIML. After one-third of a century and 131 issues later, the OIML Bulletin is, so to speak, *reintroduced*. I am prepared to state that the reintroduction of the OIML Bulletin in 1993 looks like an even more important and challenging event than the introduction in 1960.

What has happened now is much more than a facelift, much more than a new layout. It is nothing less than the will and the need to change, to modernize *the image* not only of our Bulletin, but of legal metrology in general. And we are doing this by making the Bulletin a valuable source of information and by turning it into an attractive and prestigious forum for the presentation of all aspects of current legal metrology.

The Bulletin has always dealt with various aspects of legal metrology. If you look through the past issues of the Bulletin, it is like going through the history of modern legal metrology, watching the rapid development that has taken place in the last half of this century.

Clearly an evolution has taken place: from a relatively narrow view of the role of legal metrology to a modern, wider concept. Emphasis is now put on the creation

and maintenance of measurement credibility with particular priority in the fields of environment, health, safety, and trade. Consequently, legal metrology addresses a much wider group of participants and users than ever before. The Bulletin will have an increasing importance in reaching out to everybody concerned, thus creating the necessary links of communication and information.

Since the role of legal metrology is rapidly changing, it is necessary that the image of legal metrology follow suit, hence the new Bulletin, hence its ultimate ambition.

I must admit that even if I had been informed of the developments of the new Bulletin, I was pleasantly surprised when I saw the result. Actually, I was delighted. The new Bulletin looks very promising and I believe that it will be able to contribute strongly to change the image of legal metrology. In addition, it will continue to be our forum for the exchange of information, and for exploring and developing the concept of legal metrology.

A handwritten signature in dark ink, appearing to read 'K. Birkeland', written in a cursive style.



Testing instruments for electromagnetic compatibility

EMC TESTS BASED ON OIML R 76

J. WELINDER

Head of Section, EMC
Swedish National Testing and Research Industry

The wide appearance of electronics in modern industrial and consumer products has increased the awareness of electromagnetic compatibility (EMC) as a main quality feature.

This is also acknowledged in most industrial countries in legislation that requires at least limited radio frequency emissions from electronics. In Europe (EC and EFTA countries) there will also be a mandatory requirement of immunity. As a result of this interest, the standards organizations have increased their efforts to create a wide spectrum of test methods for various electrical phenomena.

Testing the influence of different phenomena on measuring instruments

The tests are designed to measure the radio wave emissions in the broadcast and communication frequencies and to assure the immunity to several electromagnetic phenomena:

- variations and interruptions in the main power supply
- electrostatic discharges
- fast transients from switches and relays
- surges from lightning strokes
- RF electromagnetic fields from various types of transmitters

Other threats exist but are less frequent and have seldom been included in mandatory standards.

The nature of these phenomena is very different and so are the problems that they cause in electronic circuits. Each of them requires its own set of measures to prevent malfunction or damage. The rise time for a surge is in the order of 1 μ s but for an electrostatic discharge, it can be less than 1 ps – a span of 10^6 . Electronic components behave differently under such circumstances. A typical problem is that a capacitor used for filtering mains power often behaves as an inductor at radio frequencies.

Questions for consideration

The existing standards are based on engineering experience and have been of great value for improving elec-



Fig. 1 Testing immunity to radiated electromagnetic fields. The instrument is placed on a wooden table and illuminated by the antenna. A field sensor with an optical fiber cable is installed by the test engineer. The wall is covered with absorbers to minimize reflections of the radiation.

tronic circuits. For type approval, however, a document shall be written stating that the apparatus is better than the specified limits. What requirement must we put on such a test? It must, for instance, simulate a relevant threat and be accurate, repeatable and of limited cost to implement. Is this the case with the present standards? These matters are discussed in numerous standards committees within IEC, CENELEC, and other organizations.

Balancing legal needs with scientific expertise

In parallel with the discussions, laboratories are built which, sometimes at a very high cost, implement the latest ideas. The situation is stressed in Europe by the fact that the general EMC directive will be mandatory in January 1996. We are now facing a situation where present preliminary standards are forced into use due to an urgent need for officially approved standards. However, the necessary experience is only slowly emerging through a number of projects where standards and methods are analyzed and compared.

For legal purposes, there is a large difference if the lowest immunity to radiated fields occurs at 2.9 V/m or 3.1 V/m when the specified limit is 3 V/m. The test laboratories should be able to distinguish between the two cases.

THE BCR 172 PROJECT

An intercomparison of type examinations for nonautomatic weighing instruments

One of the projects designed to gain experience is the BCR 172 project. The project covered all aspects of approval testing of weighing instruments according to OIML R 76. One test differed remarkably from the others in the results from the various laboratories – immunity to radiated electromagnetic fields. It turned out that the interpretation of the Recommendation differed substantially between the laboratories. One rea-

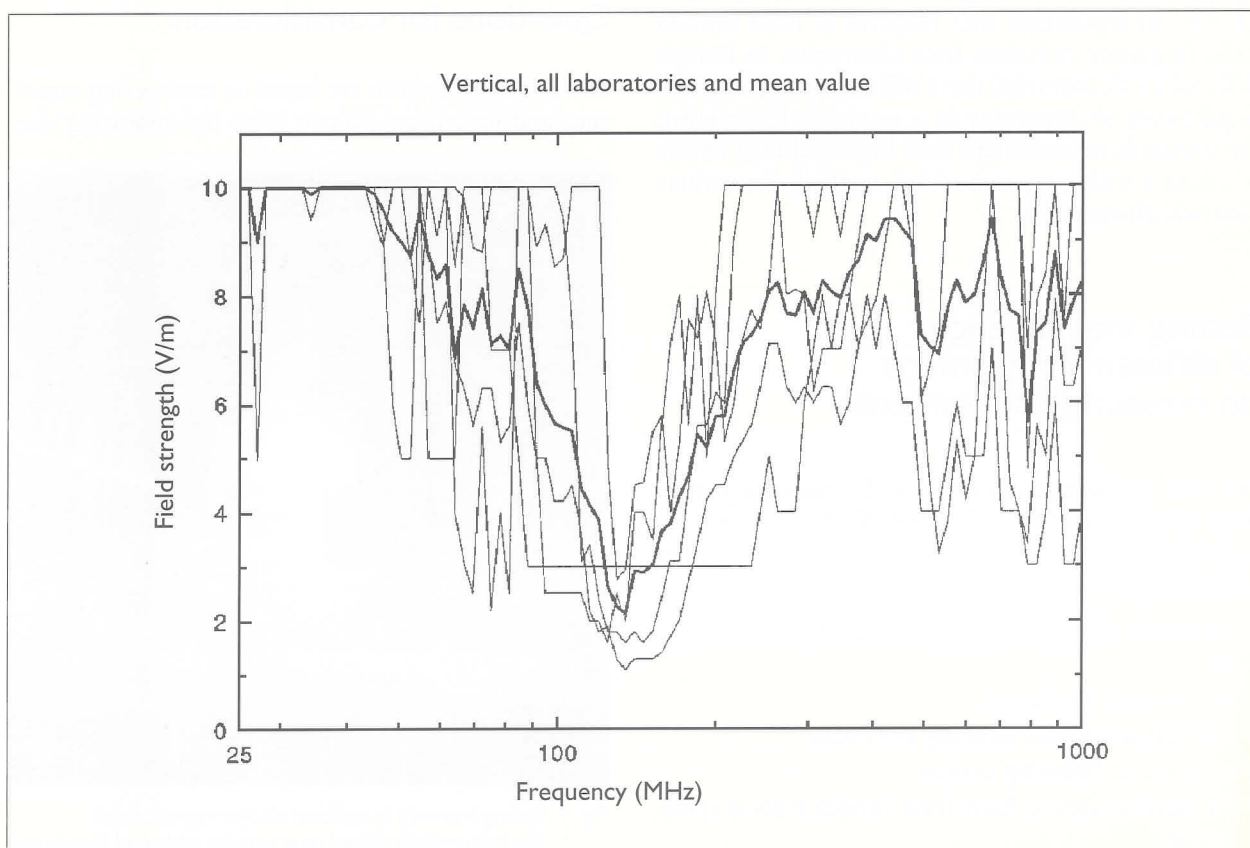


Fig. 2 The immunity level for the instrument measured at five different laboratories. The immunity level is defined as the field strength for each frequency where the instrument starts showing a value outside the allowed error margin.

son for this is that the test method in R 76 is based on a new version of IEC 801-3 that has not yet been published by IEC. A second round of EMC tests was therefore performed. Five laboratories participated in the tests: *ElektronikCentralen (EC)*, Denmark; *Physikalisch-Technische Bundesanstalt (PTB)*, Germany; *Nederlands Meetinstituut (NMI)*, Netherlands; *National Weights and Measures Laboratory (NWML)*, UK; and *Statens Provvningsanstalt (SP)*, Sweden as the pilot laboratory.

A single sample of a weighing instrument, modified to show EMC problems, was sent around to the five laboratories for a comparative test. The discussions prior to the tests showed a large span of possibilities for interpretations regarding both test equipment and test set-up. Each laboratory used its existing equipment under the condition that it fulfilled the requirements in the standard. The details were submitted to the pilot laboratory for the final analysis. The test set-up was described in detail with regard to the position of the scale, its accompanying printer, and the various cables. The test procedure was modified to allow a better interpretation of the results.

The main result of the test was the immunity profile. For each frequency in steps of 4 % over the frequency range 26–1 000 MHz, the field strength was measured when the measurement error for the scale was 1 ϵ (0.1 g). The maximum field strength was 10 V/m. The profile was constructed by each laboratory for both horizontally and vertically polarized fields. This is a more severe and detailed test than the approval test which requires that there be no significant fault at 3 V/m. (A fault is the difference between the error of indication and intrinsic error of the instrument; a significant fault is a fault greater than ϵ .) The resulting profiles can be seen in Fig. 2 and 3. It is obvious from the results that the measured immunity level for a certain frequency varies considerably between the laboratories.

Errors in testing immunity to radiation

The field is calibrated with a field sensor. All participating laboratories had some kind of calibration of their field sensors. This is not as obvious as could be expected since there exists neither a standardized calibra-

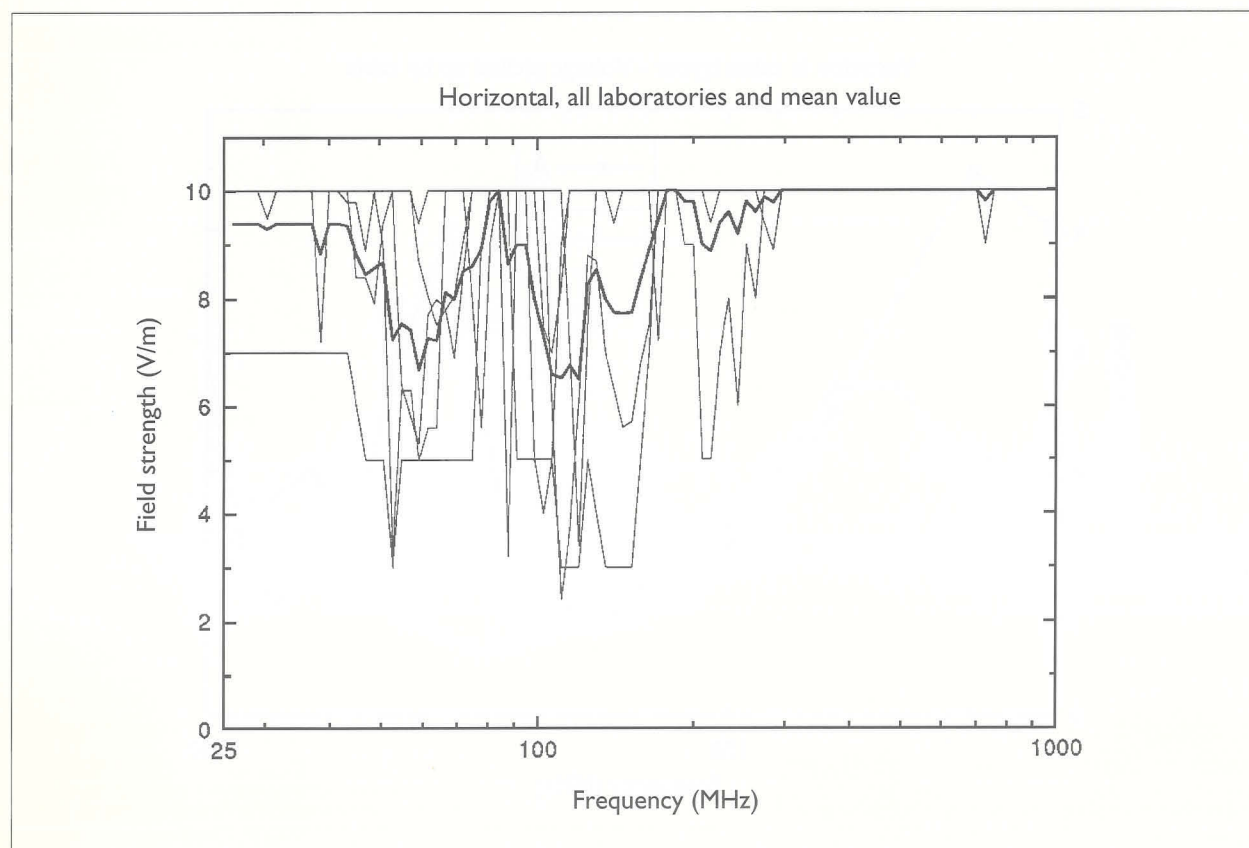


Fig. 3 The immunity level is dependent on the polarization of the field (if the antenna elements are vertical or horizontal).

tion method nor an internationally recognized calibration chain. In another project (BCR: Intercomparison of electric field meters), a number of laboratories calibrated the same set of probes. The project indicated that if a standard method is developed, an accuracy of 5 % can be reached.

In the test method normally used, antennas generate the field and in the standard, it is only indicated that they shall generate linearly polarized fields. An antenna has an antenna pattern which describes the field strength in various directions. It is normally measured in two planes. Some types of antennas (for example,

biconical) are isotropic (insensitive to direction) in one of these planes. Most antennas, however, have a main lobe where most power is radiated. For antennas used in EMC testing, a typical lobe width can be 40°. The antenna distance is normally chosen between 1 and 3 m. For the shorter antenna distance, the field strength will most likely vary at the test object 40 % over a width of 1 m. It must be noted that the test object often includes cables spread to the sides to a total length of over 1 m.

The chambers are constructed to avoid reflection of waves and thereby the creation of interference patterns. Modern absorber materials can achieve good results but only at high costs. Most chambers are constructed as a reasonable compromise between price and performance. An estimation of the field strength variations due to interference must be based on each specific design but reasonable figures are 10–20 % for a good chamber and up to a factor of 3 for simpler designs.

The two latter effects are recognized in the standard. The requirements of the field generation are expressed as a maximum allowed variation over a vertical plane on the place of the test object. The area is large enough (1.5 × 1.5 m), to cover many test objects and the

ERROR SOURCE	ERROR FACTOR	ERROR (%)	ERROR (dB)
Field measurement	1.05 – 1.2	5 – 20	0.5 – 2
Antenna diagram	1.1 – 1.5	10 – 50	1 – 4
Reflections	1.1 – 3	10 – 300	1 – 10
Cable layout	2 – 10	2 – 1 000	2 – 20

Table 1 The influence of different error sources when testing the immunity to radiated electromagnetic fields.

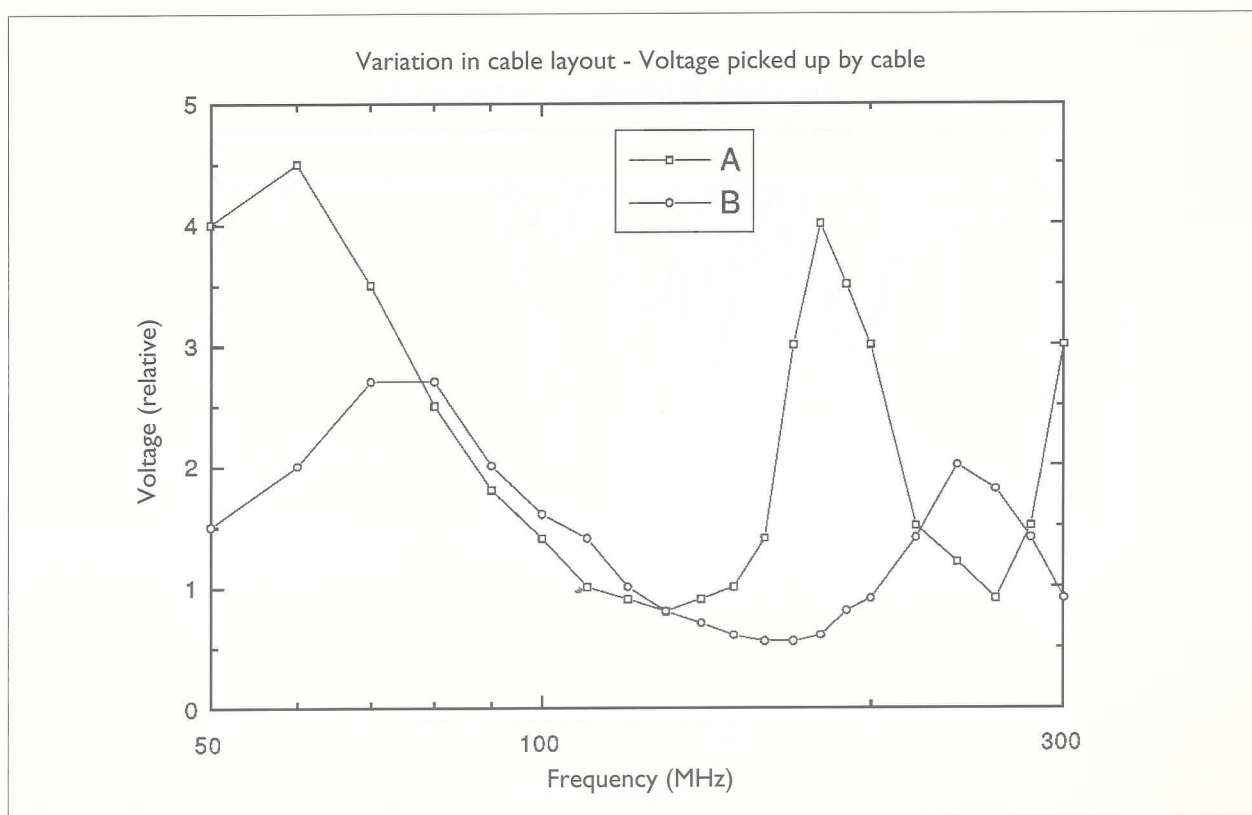


Fig. 4 Calculations showing the importance of the cable layout. The curves show the disturbance picked up by two cables of different lengths (A = 1.3 m and B = 1 m) and distance from a metallic floor (A = 0.3 m and B = 0.15 m). Both the levels and the frequency for the maximum sensitivity are modified.

requirement low enough to keep the cost at a reasonable level. In 75 % of the area measured in 16 points, the field should vary between 3 and 6 V/m but 25 % of the area in the field may be uncontrolled.

The discussion above shows that if we place a point-like field probe somewhere in the normal test volume of two different laboratories, the reading may be below 3 V/m for some frequencies in one laboratory and above 6 V/m in another without violating the requirements. For most frequencies it will vary between these two values.

Errors in the test set-up

The sensitive part of a test object can be a few cm large; the low amplitude sensor or the input leads to a high gain amplifier on a circuit board. In these cases, the sensitive part of the test object is point-like. But if the complete test object is taken into account, the radiation is scattered by cables and adjacent boxes. The field strength in the sensitive point is no longer the field strength calibrated in the empty chamber and is highly influenced by the geometrical set-up of the test object.

However, the radiation often does not reach the sensitive electronics directly but is instead picked up by a cable acting as an antenna. The cable has an antenna pattern of its own which varies widely depending on the layout of the cable, how it is bundled, how adjacent cables and boxes are oriented, etc. This is demonstrated by the example in Fig. 4 which shows a calculation of the voltage picked up by two cables that differ in length (1.3 and 1 m respectively) and in distance from a ground plane (0.3 and 0.15 m respectively). Otherwise the cables have the same orientation towards the antenna. Practical experiments verify the calculations: for single frequencies, the response from "normal" variations of the cable layout can be as large as a factor of 10 (near 200 MHz in Fig. 4). However, it can be noted that a large part of the variation is a shift in frequency. Results from a real measurement are shown in Fig. 5.

This effect can be seen in the results from the BCR intercomparison. It is assumed that in the horizontal polarization, the cables pick up most of the radiated energy disturbing the scale. The different test results (Fig. 2 and 3) may be due to small differences in the cable layout even if the intention was to avoid them. In vertical polarization, a slot in the scale was prepared to have a large leakage. The slot was of course more stable

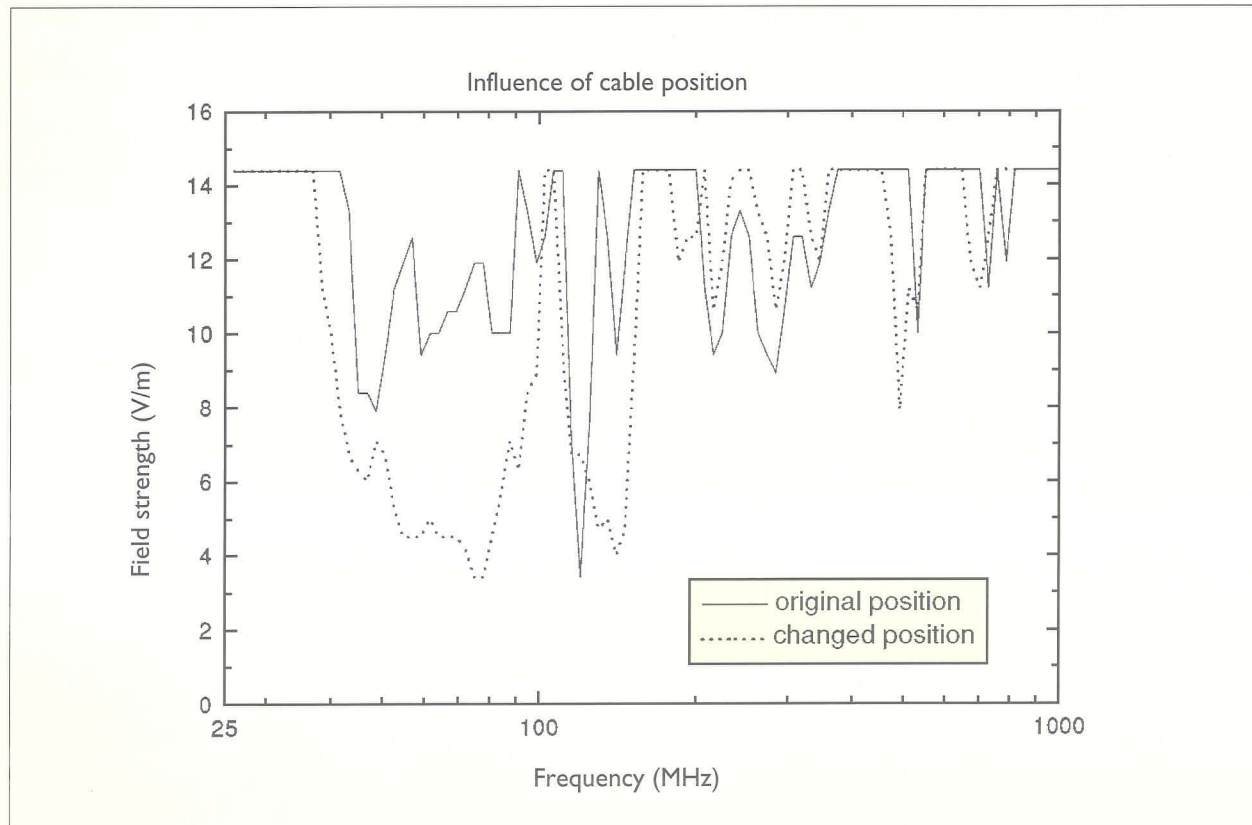


Fig. 5 Measurements showing what happens to the immunity level when a cable between the instrument and its printer is moved backwards 0.2 m from the front of the instrument and the wooden table. A set-up without a printer is shown in Fig. 1.

than the cable layout. The laboratories also found a common broad band sensitivity around 100–200 MHz (Fig. 3). To the large error margin of the test equipment, we have now added an even larger variation due to the set-up.

Some conclusions of the BCR supplementary intercomparison

The BCR supplementary intercomparison project addressed all these errors. The field measurement was checked by a probe sent around with the instrument. The antenna diagram and the reflections were checked by the calibration procedure prescribed by the standard and the cable layout was described in detail by the test procedures.

Unfortunately, the resulting variation cannot be calculated over the whole frequency range since at least one laboratory reached the maximum level 10 V/m over almost the whole range. For the frequencies where the complete variation can be seen, it is around a factor 2 (Fig. 2 and 3). If the frequency shifts of the various peaks are taken into account, this seems to be the result achieved.

It can be noted that the project also contained a part where only the “passed/failed” test at the 3 V/m (the type approval level) was included. All laboratories concluded that the instruments failed during this test.

The figures mentioned in this paper have a short statistical background and can only be used as examples. However, it is obvious that testing of immunity to radiated electromagnetic fields is a difficult art with error margins with a magnitude other than that which is normal in electrical measurement technique. ■



The coarse dust recorder

A SAMPLING DEVICE FOR LONG-TERM MONITORING OF COARSE DUST

E. VRINS

Buro Blauw, Wageningen, Netherlands



Making the distinction between fine and coarse dust

The environmental impact of airborne dust highly depends on its size distribution. It is common practice to distinguish airborne dust into two fractions according to particle size: fine and coarse dust.

By definition, the demarcation between fine and coarse dust is at a 50 % cut-off diameter of 10 μm . In Table 1, fine and coarse dust are compared with regard to environmental impact as well as the factors involved between source and environmental impact. For clarity's sake, a sharp distinction is drawn, whereas there is a gradient in actual fact.

Fine dust is emitted mainly as a result of chemical processes (for example combustion) and it is dispersed

over great distances; its composition and concentration may change due to chemical reactions. The environmental impact of fine dust is concentrated in its effects on a person's health resulting from its inhalation. Usually, effects cannot be traced back to an individual source due to the long and often complex path of the dust from its source to its environmental impact.

Coarse dust is emitted mainly as a result of mechanical processes, such as wind erosion and entrainment by vehicles. Weather conditions such as wind, speed, and rainfall often play a major part in its emission. The dispersion of coarse dust is highly influenced by particle size and generally, it travels over short distances. Deposition is the main cause of its environmental impact which includes dust nuisance, soil pollution, and economic damage.

FINE DUST		COARSE DUST	
chemical processes	SOURCE		mechanical processes
materials	↓ ↑	↓ ↑	materials
process conditions			activities
			weather conditions
	EMISSION (g/s)		
weather conditions	↓ ↑	↓ ↑	particle size distribution
chemical reactions			weather conditions
			terrain roughness
	EXPOSURE (µg/m³)		
chemical composition	↓ ↑	↓ ↑	particle size distribution
		DEPOSITION (g/m³)	
		↓ ↑	chemical composition
time of exposure			optical properties
			socio-economic factors
Continental:	IMPACT		Local:
health effects			visual nuisance
			soil pollution
			economic damage

Table 1 Comparison of fine and coarse dust.

Due to the local character of the effects of coarse dust, they can easily be traced back to an individual source; in fact, if adequate measures are taken, it is possible to quantify both dust emissions and their environmental effects.

Recognizing the potential danger of coarse dust

Because of the potential health hazards of fine dust, attention was focused on fine dust samplers, the so-called PM10-samplers, when developing dust measuring devices. Coarse dust, on the other hand, was assumed to be of minor importance because it is not inhaled. Local coarse dust, however, can cause considerable damage: the aerodynamic behavior of coarse dust as compared to fine dust is different and it is for this reason that the requirements for coarse dust measuring equipment differ.

Measuring coarse dust

Both emission and exposure can be quantified by means of concentration measurements; only the measuring strategy differs. Deposition is measured by assessing the mass deposition rate or the Effective Area Coverage Rate (%/day) and this rate highly depends on the shape of the receptor. Deciding which deposition measuring device is the most useful depends on the local situation and the impact under consideration. In general, deposition measurements are not useful to quantify dust emission. Concentrations measurements are generally the most useful in coarse dust studies.

Sampling coarse dust

In sampling coarse dust, systematic errors often occur: when air is sucked into a sampling device, accelerations of the airflow are not properly followed by the large particles due to their inertia. As a result, the measured dust concentrations differ from those found in ambient air.

Avoiding systematic errors

It is a well-known fact that systematic errors in sampling are best prevented by not accelerating the air in the inlet tube. This means that the air sucked in has the same speed and direction as the ambient air, i.e., isokinetic sampling is applied. This is commonly done in the case of stack sampling. In the open air, however, wind speed and direction vary constantly, thus making it difficult to adapt the suction velocity to the ambient conditions.

The Aerosol Tunnel Sampler

The above considerations have led to the design of the Aerosol Tunnel Sampler [May et al., 1976, Hofschreuder + Vrins, 1986]. The principle of this device is to reduce systematic errors at the inlet by sucking a large volume of air with a known velocity into a tunnel. The tunnel is mounted on a wind vane, so that the inlet constantly faces the wind. This actually transforms outdoor conditions into stack conditions to enable isokinetic dust sampling on a small filter. The transformation generates a systematic error in sampling; this error, however, is minimized due to the large volume of air. It has been proven that the Aerosol Tunnel Sampler samples total dust representatively under various atmospheric conditions.

The Tunnel Impactor

The usefulness of the Aerosol Tunnel Sampler led to the design of several other devices whose conception was based on the same sampling principle. One of these devices is the Tunnel Impactor [Regtuit et al., 1990].

The Tunnel Impactor was developed to determine the particle size distribution of coarse aerosols and consists of a wind-directed tube through which air is sucked in by four fans. The tunnel contains four circular plates which have different widths and dust particles collect on these plates as a result of impaction. A drawback to the use of this device is the restricted sampling time due to the limited capacity of the plates. It is therefore not an adequate device for long-term monitoring.

The Coarse Dust Recorder

The problem associated with long-term monitoring was solved by designing a Coarse Dust Recorder (Fig. 1) which continually renews its collection [Vrins, 1990].

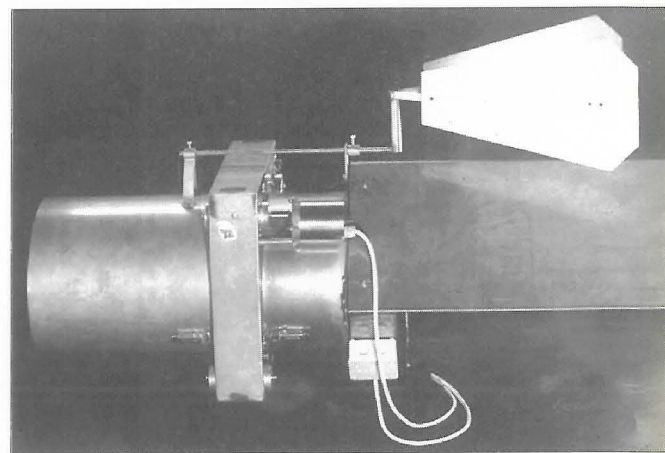


Fig. 1 The Coarse Dust Recorder.

The Coarse Dust Recorder has an additional advantage in that changes in the aerosol concentration and particle size distribution can be closely examined.

The dimensions of the Coarse Dust Recorder are equal to those of the Tunnel Impactor. The tube of the Coarse Dust Recorder contains a cassette (Fig. 2) instead of plates. In this cassette, a 12 metre strip is enclosed and moved at regular intervals. Every 18 minutes, a 20 mm piece of the strip is exposed to the airflow and the coarse dust particles collect on it due to inertial impaction. Since the strip will be fully exposed after one week, the cassette is replaced once a week. The 50 % cut-off aerodynamic diameter is 19 μm . The sampling rate is 1.62 m^3/h .

This device is very suitable for continuous monitoring of coarse dust concentrations. The number, size, and composition of the dust particles can be determined in the laboratory as well as the sampling time.

Analyzing coarse dust

Sampling coarse dust representatively is only one part of a measurement. Other requirements for a sampling device depend on the desired analyzing technique or data interpretation.

Source assessment

Weather conditions greatly affect the emission and dispersion of dust. The exposure of a receptor to dust that is emitted by an individual source greatly depends on wind direction. Because the wind direction may change within a few hours and the dust emission may fluctuate frequently due to factors such as wind speed and wind erosion, a high time resolution of dust measurements is desirable and improves the data analysis.

Particle size distribution

As already mentioned, particle size plays a dominant part in the emission, dispersion, and impact of coarse dust. Therefore, in many coarse dust studies, knowledge of the particle size distribution is indispensable.

The Coarse Dust Recorder samples particles individually on a strip, thus making it possible to analyze samples optically and for which an automatic image-analysis system is used. The individual particles of a sample are measured and the samples are changed automatically. In this way, large quantities of data are obtained without much effort. For assessing the particle size dis-

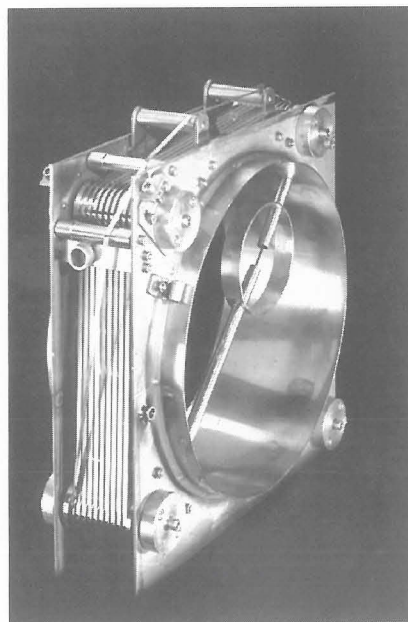


Fig. 2 The cassette of the Coarse Dust Recorder.

tribution in a sample, at least 500 particles should be counted. For particles that have an aerodynamic diameter of 50 μm , the corresponding mass is about 30 μg .

Gravimetical and chemical analysis

If gravimetical analysis is planned, a sample of at least 100 μg is needed. For chemical analysis, the necessary amount depends on the chemical component to be analyzed. Whether or not these requirements can be met by the Coarse Dust Recorder depends on the required accuracy in assessing the coarse dust concentration.

Figure 3 shows the lowest required concentration of particles with an aerodynamic diameter of 50 μm versus sampling time in the case of optical or gravimetical analysis. For optical analysis, a short sampling time is sufficient and the dust concentration should be at least 10 to 20 $\mu\text{g}/\text{m}^3$.

In the case of gravimetical analysis, accurate measurement requires a longer sampling time. The accuracy can be increased by combining several 1-hour samples which does not necessarily mean that successive samples are combined. The separate location of the various samples enables a large choice of possible sample combinations. For example, samples can be selected according to wind direction; in this way, the advantages of short sampling times can be kept.

Another way to obtain gravimetical data with a high time resolution is to establish the correlation between optical and gravimetical data. This correlation depends

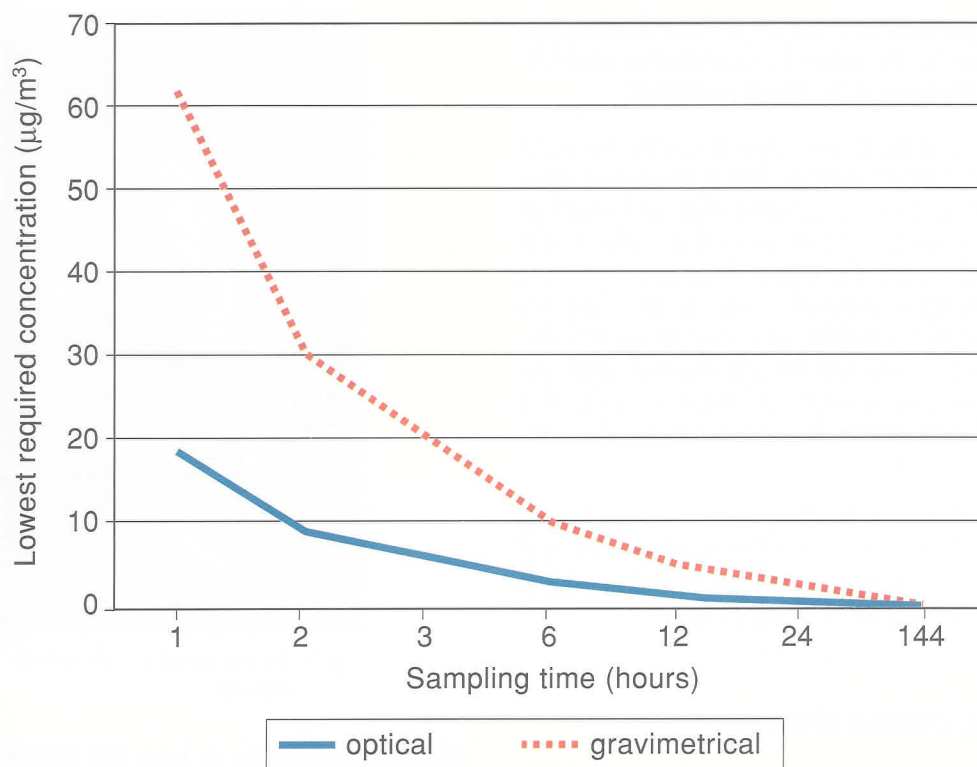


Fig. 3 The lowest required concentration for optical and gravimetric analysis for 50 µm particles versus sampling time. Sampling rate is 1.62 m³/h.

on the sort of dust and therefore is only useful if the type of dust is known. The correlation can be easily established in the laboratory by comparing the mass of a large, homogeneously loaded plate to the optically determined area coverage.

Monitoring the concentration of coarse dust

The Coarse Dust Recorder was used in a field study of windblown dust from a coal and iron ore storage site [Vrins, 1990]. Located near the port of Rotterdam, the site stretches from west to east over a distance of about 1 km and has a width of about 200 m. The loading and unloading of ships occurred along the entire south and west side; the main roads all have an east-west orientation.

The storage site is located south of the measuring site, at a distance of 500 m, with iron ore on the western half and coal on the eastern half. The data presented in this paper were collected during the period January-August, 1989. The automatic image-analysis system was used for analyzing the samples.

Locating the dust source

The location of the main coarse dust sources can be derived from concentration measurements for different wind directions. The average hourly dust concentration was calculated for all wind directions and was based on measurements taken over a period of seven weeks (Fig. 4). The contributions of the storage sites to the

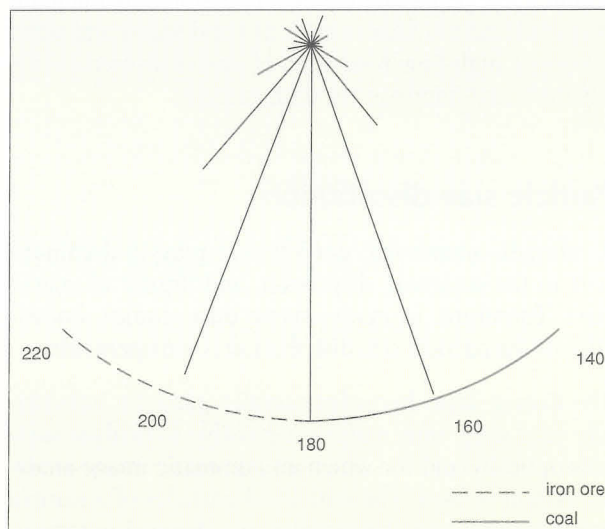


Fig. 4 The average dust concentration (µg/m³) versus wind direction.

dust concentrations that were measured at the measuring site are obvious. The highest value is $62 \mu\text{g}/\text{m}^3$ (wind direction 180°).

Later on, only the samples belonging to the wind directions for the coal storage site were processed. Furthermore, a distinction was made between the winter and summer period with the use of a watering system: at the storage site, the stockpiles are watered to reduce dust emission resulting from wind erosion. The watering system is only in use during the summer because there exists the risk of frost damage of the stockpiles during the winter. (The roads are also watered, but this is done throughout the year on weekday mornings.)

Figure 5 shows the particle size distribution of the coal dust as assessed with the automatic image analysis system. To obtain the aerodynamic size distribution, the optical diameters are multiplied by 0.7.

In that which concerns the effects of wind speed, a high correlation was found during the winter period between the hourly dust concentrations and wind speed (Fig. 6).

Figure 6 shows that wind erosion is the major cause of dust emission in the wintertime. From this figure, one can derive the potential dust concentration at different wind speeds due to wind erosion of the stockpiles. During the summer period, no such correlation was found.

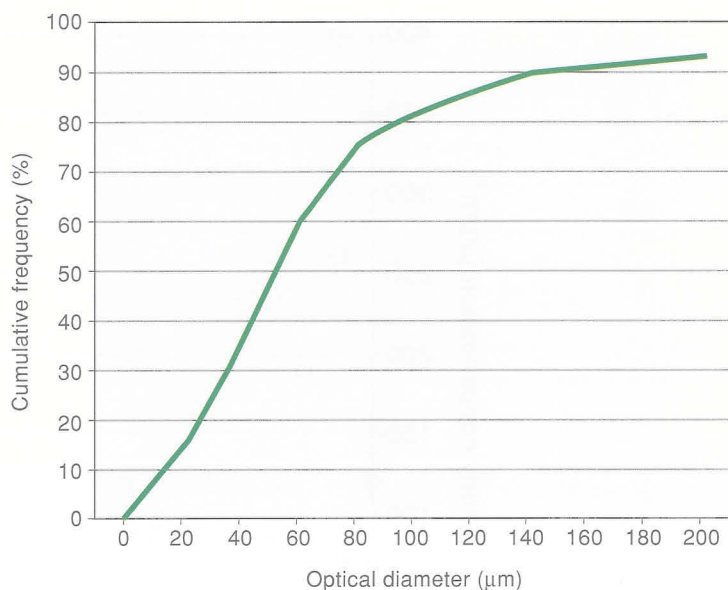


Fig. 5 The cumulative size distribution of coal dust.

Apparently, watering the stockpiles effectively reduces the dust emission due to wind erosion.

The remaining dust emission is due to vehicle movements and does not depend on wind speed. This same result was also found to be true during the summer period.

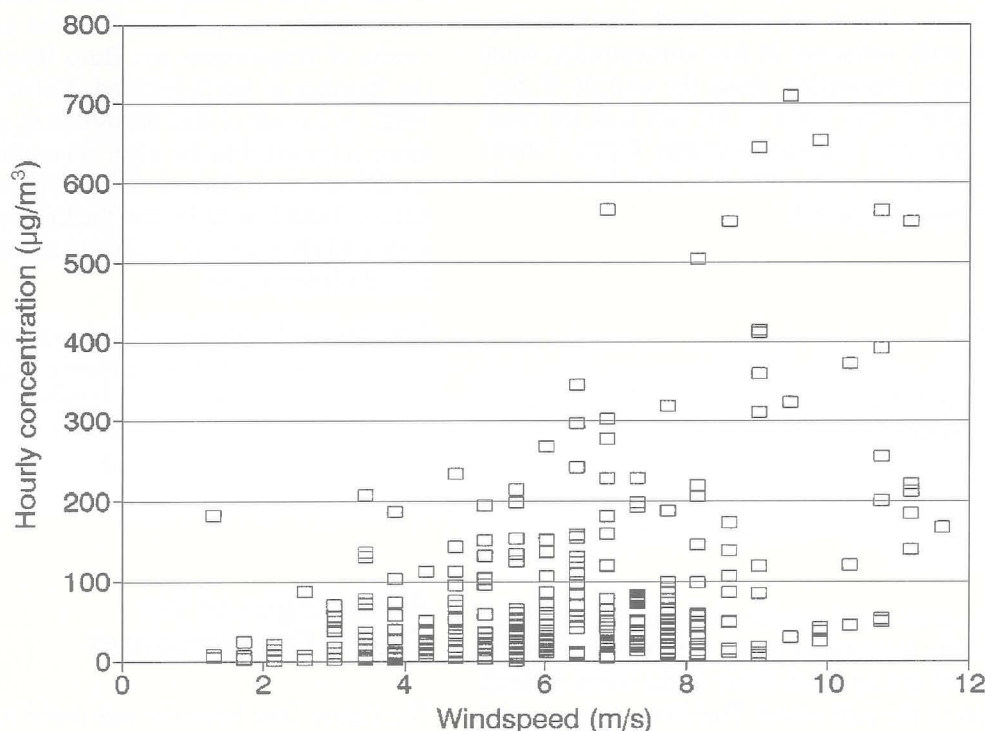


Fig. 6 The hourly dust concentration ($\mu\text{g}/\text{m}^3$) versus windspeed during the winter period (January-March, 1989).

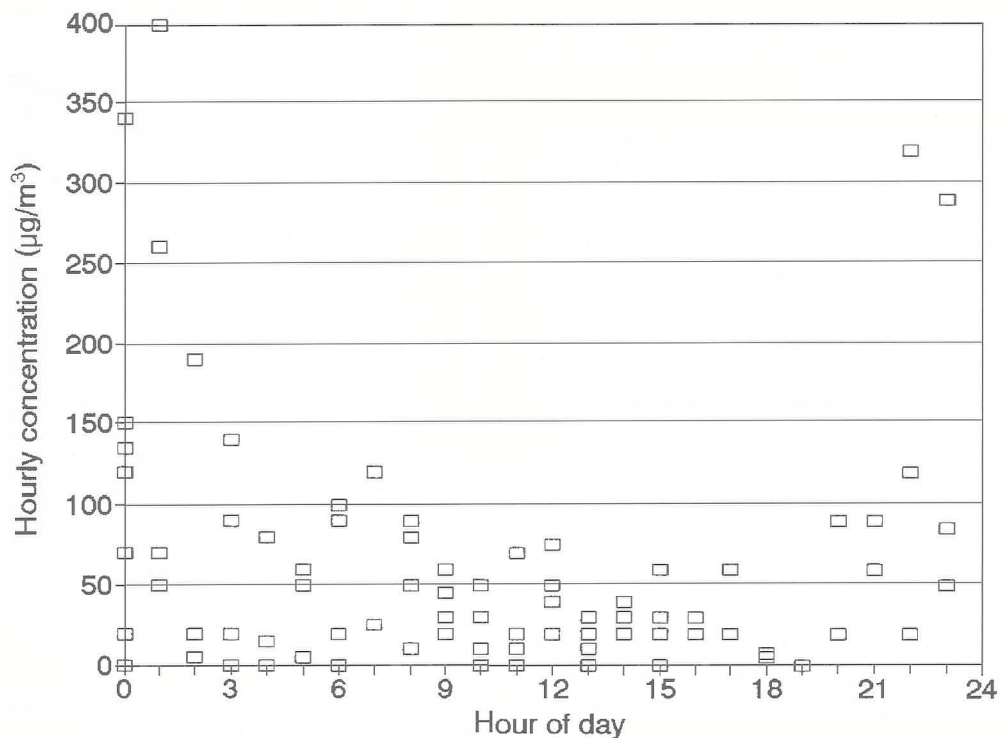


Fig. 7 The daily changes in coarse dust concentration.

Daily variations

The activities on the storage sites take place continuously 24 hours a day. It was considered that the evaluation of the daily variations in dust concentration could reveal specific information about the sources of dust. Special attention was given to the fact that the roads are only sprayed on weekday mornings. Figure 7 shows the daily changes in coarse dust concentration on weekdays in the summer period.

Findings

All high concentrations occurred at night. This might be explained by the fact that the roads are only watered in the mornings whereas vehicle movements occur all throughout the day. Unlike during the summer period, no daily trend in dust concentration was found during the winter period.

Firstly, the great wind erosion may hide the emission due to vehicle movements in the wintertime. Secondly, the roads will dry up much faster in the warm summer rather than in the cold winter. Therefore, only watering the roads in the morning may be sufficient during the winter but it is recommendable to water the roads morning and evening during the summer.

Dust nuisance

A study of the correlation between dust measurements and nuisance was performed by the Agricultural University of Wageningen and Buro Blauw mandated by the Province of North-Holland (Hofschreuder + Vries, 1992). As a result of dust deposition in urban areas, nuisance is regarded as the main environmental impact of windblown dust. Several dust samplers, including the Aerosol Tunnel Sampler and the Coarse Dust Recorder, measured the exposure to dust in an urban area over a period of eight weeks.

Simultaneously, 200 inhabitants were polled twice daily on the question of dust nuisance. Nuisance was expressed in the percentage of inhabitants that were annoyed by dust. The highest correlation was found between the cumulative coarse dust exposure in one week and the dust nuisance (Fig. 8).

Advantages of the Coarse Dust Recorder

The Coarse Dust Recorder was found to be a useful instrument in coarse dust studies. Its most important sampling features are the representativeness of the coarse dust samples and its high time resolution. The

Coarse Dust Recorder's total sampling period of one week is suitable for long monitoring campaigns; such long-term monitoring is desirable due to the unpredictability and weather dependency of coarse dust emissions.

Various techniques may be used to analyze the sampled dust. Data can be obtained concerning the variations in coarse dust concentration, particle size distribution, and chemical composition. In addition, correlations with meteorological data and dust emitting activities can be found. Finally, coarse dust measurements, contrary to fine dust measurements, can often be traced back to individual activities.

Recent developments

Emission rate measurements of fugitive dust is often difficult due to the large spatiotemporal variations of the dust concentrations. Recently, a method has been developed to estimate the emission rate of fugitive dust sources by using a fugitive dust dispersion model in combination with long time-series of meteorological data and measurements of Coarse Dust Recorders.

The surrounding area of three measuring sites (receptors) is divided in rectangles in such a way that each receptor is located at the vertex of four rectangles. Every rectangle is assumed to be an area source i with mean emission rate E_{id} (g/s) of particle size fraction d , that contributes to the dust concentration $C_d(t)$ at a receptor site:

$$C_d(t) = \sum_i C_{id}(t) = \sum_i \alpha_{id}(t) E_{id} \quad (1)$$

where $\alpha_{id}(t)$ is the dispersion factor. After a measuring campaign of four weeks, each receptor sampled 672 hourly dust concentrations $C_d(t)$ in 3 particle size fractions d . Therefore, 2 016 records are available per size fraction. The dispersion factor $\alpha_{id}(t)$ is calculated with the fugitive dust dispersion model for every receptor at every hour using the meteorological data of the measuring period. The mean emission rates E_{id} of the various area sources are calculated by solving equation (1) by multiple regression. The method turned out to be workable in order to locate the main dust sources and to assess their emission rates.

Acknowledgement

The Coarse Dust Recorder was developed by Buro Blauw in cooperation with the University of Wageningen.

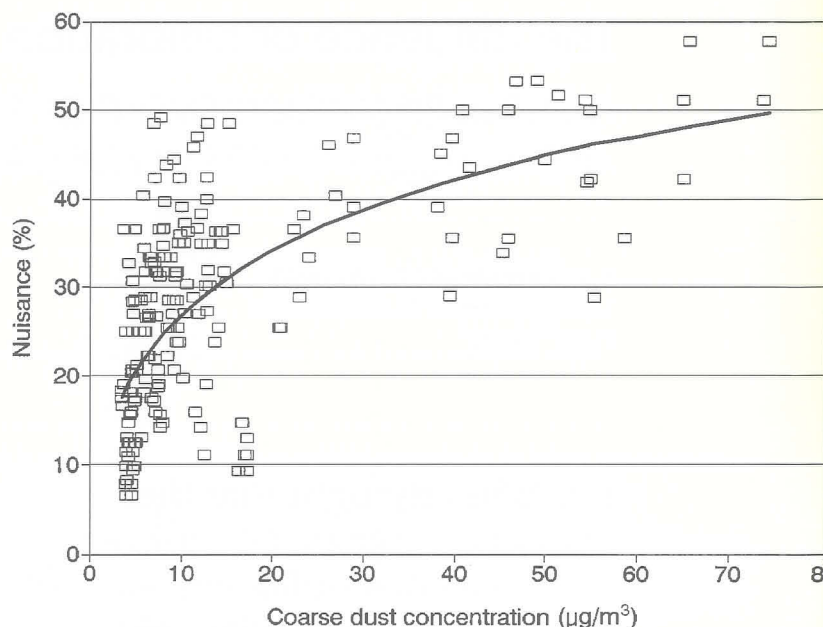


Fig. 8 Nuisance (%) versus the mean coarse dust concentration ($\mu\text{g}/\text{m}^3$) during the preceding seven days.

gen. It was funded by the Netherlands Agency for Energy and the Environment (NOVEM) and the Ministry of Housing, Physical Planning and Environment (VROM). ■

References

- [1] Hofschreuder P., Vrans E. (1986). The Aerosol Tunnel Sampler: A total airborne dust sampler. Proceedings of the 2nd Int. Aerosol Conf. Berlin, pp. 491-494.
- [2] Hofschreuder P., Vrans E. (1992). Nuisance from Coarse Dust. Proceedings European Aerosol Conference (in preparation).
- [3] May K. R., Pomeroy N. P., Hibbs S. (1976). Sampling techniques for large wind-borne particulates. *J. Aerosol Sci* 7, pp. 53-62.
- [4] Regtuit H. E., Ruiter C. J., Vrans E., Hofschreuder P., Oeseburg F., Benschop F. M. (1990). The Tunnel Impactor. A multiple inertial impactor for coarse aerosol. *J Aerosol Sci* 21, pp. 919-933.
- [5] Vrans E. (1990). The Coarse Dust Recorder. AEROSOLS, Science, Industry, Health and Environment (eds. Masuda S and Takahashi K). Proc. 3rd Int. Aerosol Conf, pp. 970-973.
- [6] Vrans E. (1991). A field study on the dust emission from a coal and handling site. Proceedings BULK 2000 conference, pp. 201-206.

The influence of calibration

CONTINUOUS MEASUREMENT OF SULFUR DIOXIDE AND NITROGEN OXIDES IN FLUE GASES



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It is often thought that the continuous measurement of main gaseous pollutants such as NO_x and SO₂ is a relatively easy task – one in which all possible errors are insignificant and under control.

There are many different aspects, however, that one has to take into account when carrying out measurements of gaseous pollutants, such as the calibration of the instrument and the conditioning of the sample gas before it is led to the analyzer. Usually the analyzers of the gaseous pollutants are calibrated using two-point calibration, e.g. zero gas and one calibration gas. In order to check the linearity, one should use at least four calibration points to cover the whole measurement range.

One problem that often occurs when using calibration gases stored in cylinders is the poor stability of these mixtures [1]. The concentrations change as a function of time and cylinder's pressure, and for this reason the calibration gas manufacturers give instructions of minimum pressure and stability time for the calibration gas cylinders.

In this study the linearities of SO₂- and NO/NO_x analyzers were investigated by producing dynamic gas dilutions with thermal mass flow meters. The sample gas in emission measurements has to be conditioned to remove particles and water vapor sufficiently from the sample. The particles can be easily removed with filter; however, the removal of water vapor poses additional problems.

The conventional method for the removal of water is to condense the water vapor in a cooling system. This

method can cause great losses of compounds to be measured because these compounds absorb into the water and are then removed together with the water. Such losses can be eliminated when the analysis is carried out at flue gas temperature or when using a dilution probe or a permeation dryer. For this research, three of these systems were studied and compared. The investigation of the permeation tube will be done in the near future. Also the possible quenching effect of CO₂ on chemiluminescence reaction was studied when measuring NO- and NO₂ concentrations [2].

Experimental apparatus and testing procedure

Dynamic gas dilutions were made with thermal mass flow meters by mixing the primary gas with the diluting gas. The primary gases, NO (5 000 ± 50) ppm and SO₂ (5 000 ± 50) ppm, were made by Messer Griesheim by using the gravimetric method. The thermal mass flow meters manufactured by Tylan were calibrated with a soap bubble meter and a wet test meter. The maximum error of the prepared gas concentrations was ± 3.0 % to 4.8 % depending on the flow rates used.

The scheme of the dilution system combined with the water vapor generation is shown in Fig. 1. Also shown are the three different gas conditioning methods that were used in this study.

The water vapor was generated by bubbling the gas (nitrogen or synthetic air) through a retort placed in a temperature-controlled water bath. The production of water vapor as a function of temperature is shown in Fig. 2.

The cooler used in the tests was made by Bühler. It operates much like a refrigerator and the condensed water is collected in bottles outside the apparatus.

The dilution probe (Fig. 1, experiment (b)) was made by Environmental & Process Monitoring, model 797. The

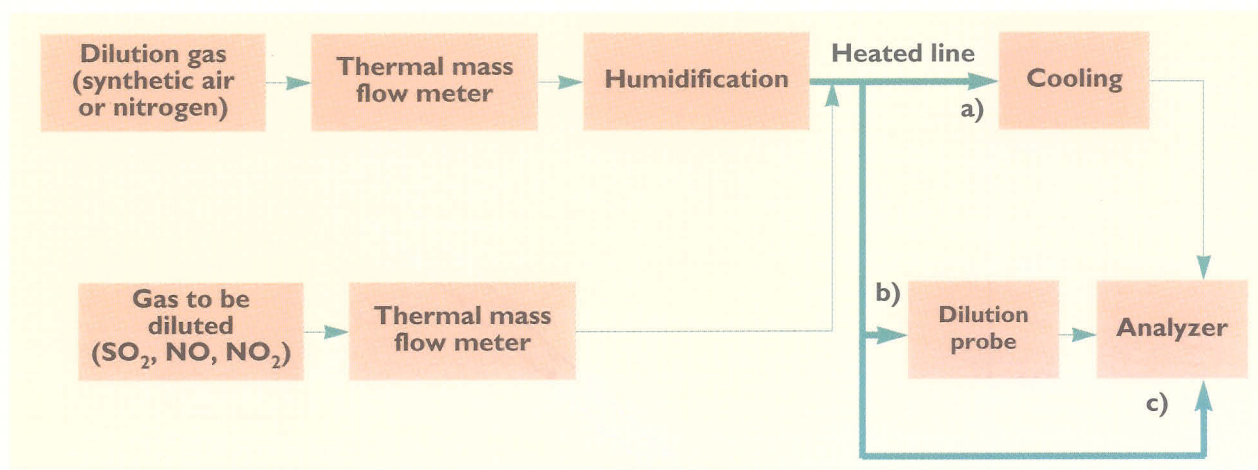


Fig. 1 Scheme of the experimental apparatus [3].

analyzers used with the dilution probe were Monitor Labs model 8850 for SO_2 and model 8840 for NO/NO_x .

The Teco 10A-analyzer was used for NO/NO_x - and the Teco 40-analyzer was used for SO_2 measurements in experiment (a). The Tecan CLD 700 EL ht-analyzer was used for NO/NO_x measurements in the experiment (c) in which the sample gas was led to the analyzer at flue gas temperature.

Results and discussion

The linearity of NO/NO_x - and SO_2 analyzers was investigated with the dynamic gas dilution system. The test

series were repeated twice; first the analyzers were calibrated with a high concentration (5 000 ppm SO_2 or NO) and the gas dilutions were led to the analyzers; then the analyzers were calibrated with a lower concentration (506 ppm SO_2 and 806 ppm NO) and the test was repeated.

The two calibration curves obtained are shown in Fig. 3 and 4. Due to the non-linear behavior of the analyzers, it is clear that errors of 10–20 % can occur when measurements are performed in concentration ranges in which the analyzer has not been calibrated.

The effect of H_2O on the measurement of SO_2 , NO , and NO_2 was investigated using the three different gas conditioning systems shown in Fig. 1. The gas dilutions were first led to the analyzer without water vapor; and were then humidified which resulted in water concentrations of 30–160 g/m^3 in the gas to be analyzed.

It was found that water vapor had no significant effect on the measured concentrations when the analysis was carried out at flue gas temperature (NO , NO_2) or when a dilution probe was used. In the real flue gas conditions, however, other problems may arise when using the dilution probe, clogging, when such as high particulate concentrations (especially condensing tar compounds) exist in flue gases.

The conventional cooling as a sample gas conditioning method caused losses in SO_2 concentrations and especially in NO_2 concentrations. This can be seen from the results presented in Tables 1 and 2.

As can be seen, the SO_2 concentrations decrease when the water vapor concentration increases. On the average, SO_2 concentrations are about 12–15 % lower in the cooled gas. SO_2 dissolves easily in water and therefore, it can be partially condensed together with water vapor.

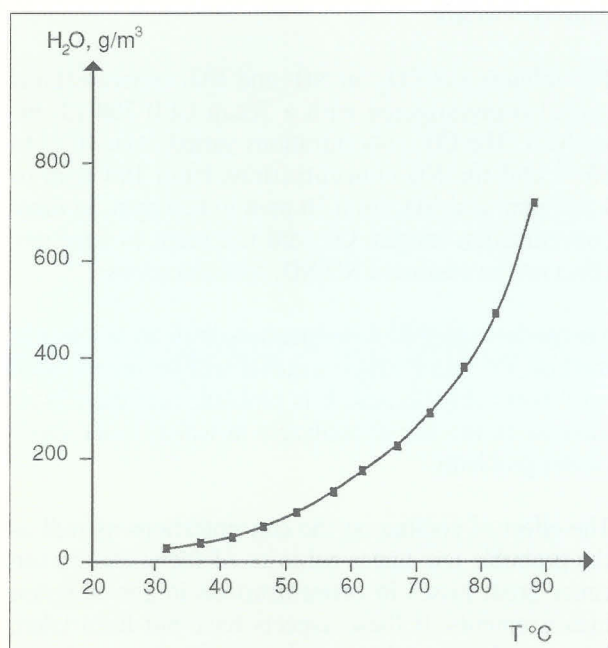


Fig. 2 The production of water vapor as a function of temperature.

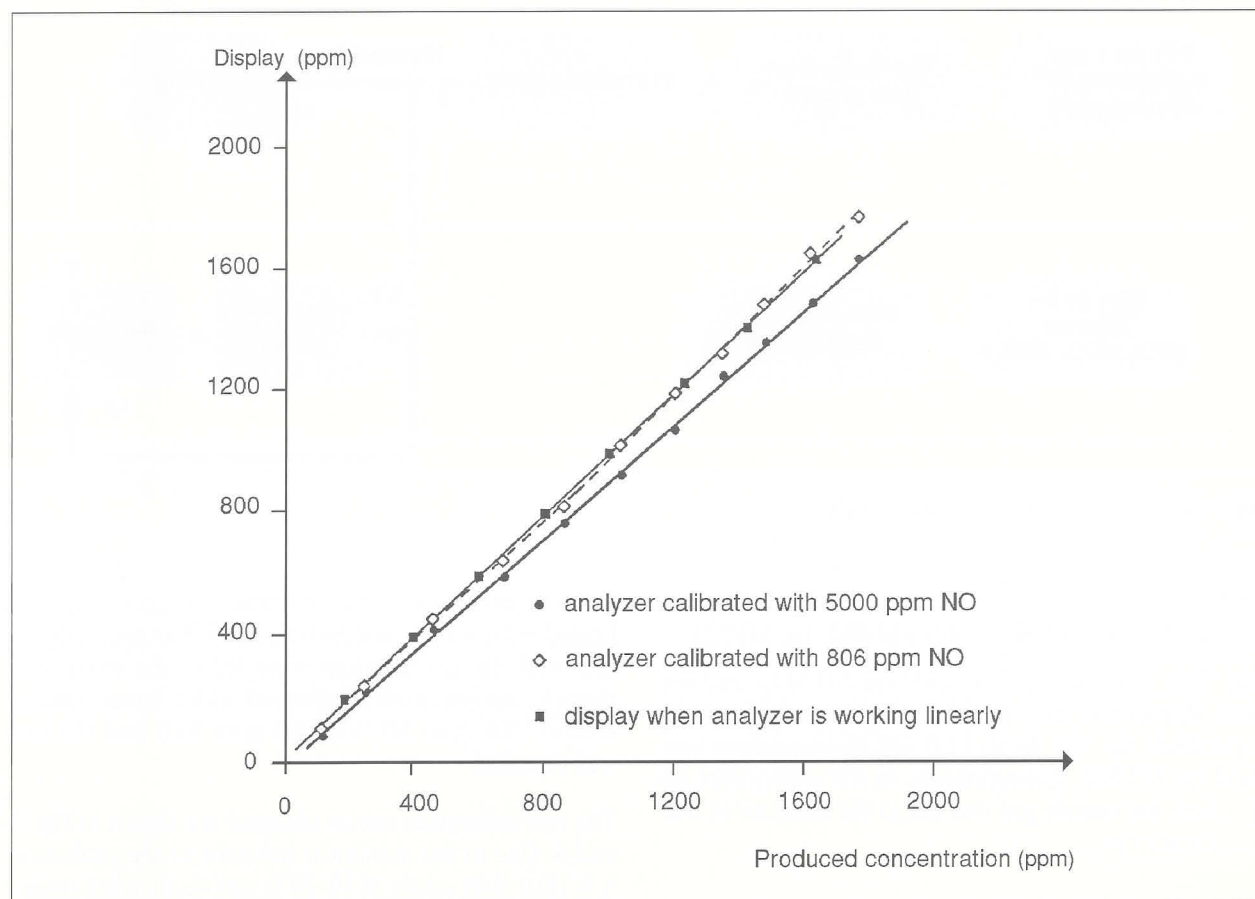


Fig. 3 Calibration curves for NO/NO_x analyzer.

NO₂ adsorbs very easily to cold surfaces and also dissolves in water, as can be seen from the results shown in Table 2. The greater the NO₂ concentration, the greater amount of it will be trapped in the cooling system. For example, when the NO₂ concentration was 27 ppm in the dry gas, about 65 % was left after cooling. When the NO₂ concentration was 370 ppm in the dry gas, only 34 % of NO₂ was left after the humidified gas was cooled and condensed. After

cooling NO, concentrations were greater than in the dry gas, which means that a part of NO₂ was most likely converted to NO.

The influence of CO₂ on NO- and NO₂ concentrations was also investigated with a Tecan CLD 700 EL ht-analyzer. The CO₂ concentrations varied from 10 % to 15 % and the NO concentrations from 100 ppm to 1 899 ppm and NO₂ from 30 ppm to 650 ppm. In these concentration ranges, CO₂ did not seem to have any effect on the measured NO/NO₂ concentrations.

The performance of a permeation-dryer as a selective method for water vapor removal will be investigated very thoroughly because it is probable that there is an increase in the use of analyzers in which water vapor causes problems.

The effect of cooling on the concentrations as well as the probable non-linear behavior of the analyzers can cause great losses in concentrations in gas emission measurements. If these aspects have not been taken into consideration, there can be significant errors in the results. ■

Dry gas	SO ₂ (ppm)		
	60 g/m ³ H ₂ O	100 g/m ³ H ₂ O	160 g/m ³ H ₂ O
99	87	85	80
192	170	162	158
255	225	218	208
475	415	400	395
830	740	705	685

Table 1 SO₂ concentrations after the sample gas is cooled and condensed.

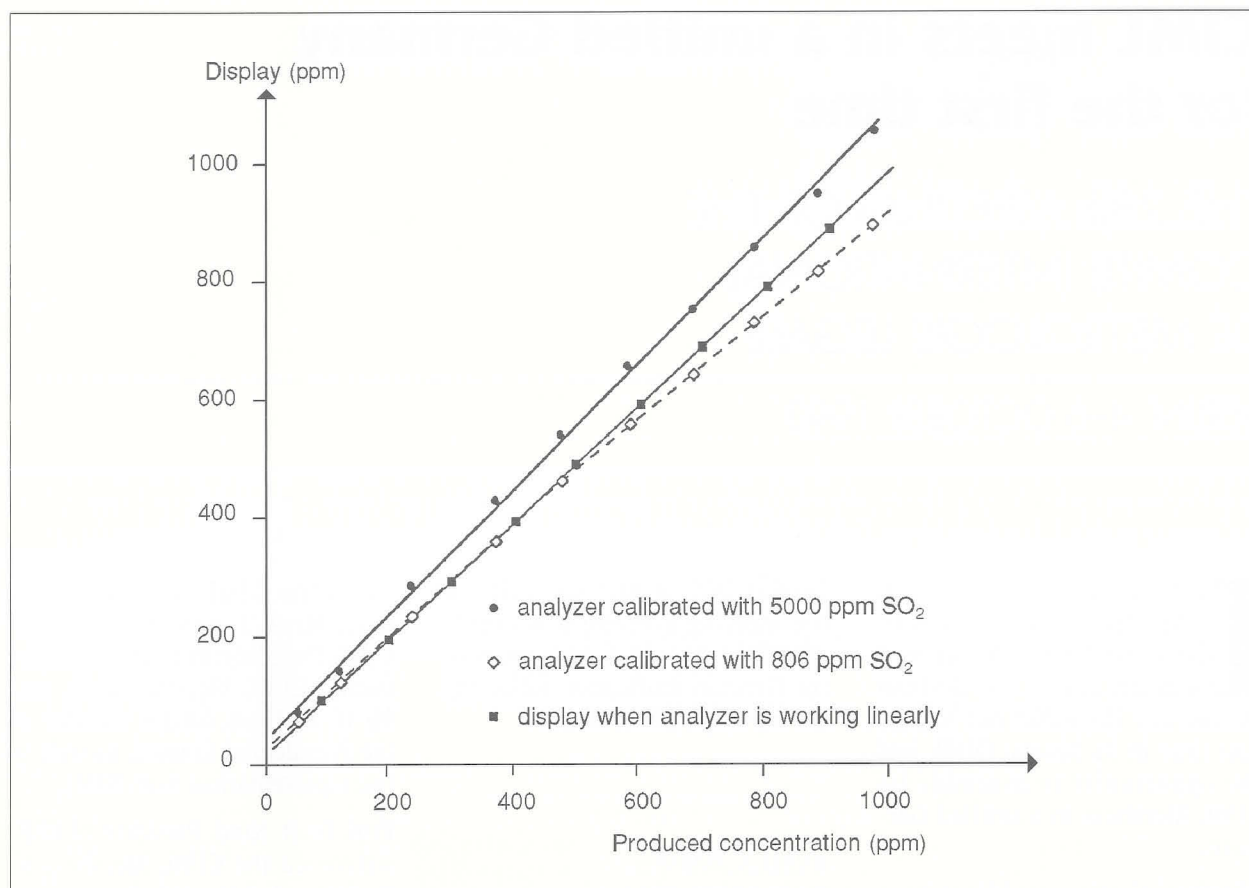


Fig. 4 Calibration curves for SO₂ analyzer.

Dry gas C (ppm)		60 g/m ³ H ₂ O C (ppm)		100 g/m ³ H ₂ O C (ppm)		160 g/m ³ H ₂ O C (ppm)	
NO ₂	NO	NO ₂	NO	NO ₂	NO	NO ₂	NO
27	3	17	8	20	5	20	8
110	5	45	25	50	20	55	15
207	8	76	52	84	42	87	38
290	10	98	72	105	68	113	60
370	10	117	93	112	90	128	82

Table 2 NO₂ concentrations after the sample gas is cooled and condensed.

References

- [1] Wechter, S. G., Grieco, H. A., 1976. "Gas standards, How standard are they?," Calibration in air monitoring, ASTM STP 598, Philadelphia, American Society for Testing and Materials (ASTM), 344 pages.
- [2] Campbell, N. T., Beres, G. A., Blasko, T. J., 1982. Effect of water and carbon dioxide in chemiluminescent measurement of oxides of nitrogen, J. Air Pollut. Control Assoc., 32, 5, pp. 533-535.
- [3] Vahlman, T., Larjava, K., 1990. The continuous analysis of sulphur dioxide and oxides of nitrogen in flue gases. Effect of calibration and sampling (in Finnish), Technical Research Centre of Finland, Research Report 712, 50 pages.

CIML meets in a unified Germany for the first time

THE 28th MEETING OF THE
COMITE INTERNATIONAL
DE METROLOGIE LEGALE

BERLIN, 4-6 OCTOBER 1993

In the past, there have been OIML technical meetings in the former Federal Republic of Germany and in the German Democratic Republic; but for the first time in its history, OIML had the opportunity to assemble its CIML Members in a unified Germany.

The Organisation could not have found a more symbolic place to bring together the representatives of its Member States: Berlin was the site of the 28th Meeting of the *Comité International de Métrologie Légale* (CIML) which was held 4-6

October 1993. In fact, the timing of the meeting symbolically corresponded to the third anniversary of the German unification following the fall of the Berlin Wall.

WELCOMING THE ASSEMBLY

Several delegations were present for this annual Committee meeting with a total of 65 participants representing 45 countries. Also present

were three CIML Honorary Members, Mr A. J. van Male, former CIML President; Prof. Dr W. Mühe, former CIML Vice-President; and Mr H. W. Liers, former member of the Presidential Council, as well as five representatives from BIML.

Prof. Dr D. Kind, President of PTB, welcomed the CIML Members to Berlin and delivered the opening address in which he spoke of the past and present situation of metrology in Germany (*see pp. 27-29*). Another speech was given by Dr H. Berghaus on behalf of the German Ministry for the Economy,



Participants lend their attention during the discussions of the 28th CIML Meeting.

concerning the economical situation of Germany after the unification and German assistance to developing countries.

DISCUSSIONS AND DECISIONS

The discussions were led by K. Birkeland, CIML President (Norway) and Vice-Presidents S. Chappell (USA), and Prof. M. Kochsiek (Germany). With a full agenda, the CIML addressed issues such as the advancement of its new technical structures and work methods; implementation of the *OIML Certificate System*, re-definition of the Organisation's long-term policy; and progress made by the Development Council (see pp. 49-50).

The new OIML Bulletin was also presented to the Committee, thus marking the Organisation's efforts to adapt its communication strategies to the changes taking place in metrology.

The Committee approved six OIML International Recommendations:

- Portable gas chromatographs for field measurements of hazardous chemical pollutants
- Pressure balances
- High performance liquid chromatographs for measurements of pesticides and other toxic substances
- Weights of accuracy classes E_1 , E_2 , F_1 , F_2 , M_1 , M_2 , M_3
- Continuous totalising automatic weighing instruments (belt conveyors) (revision of R 50)
- Petroleum measurement tables (revision of R 63)

The Committee recognized the importance of accelerating the work within the technical committees and subcommittees so that as many Recommendations as possible can be applied within the the *OIML Certificate System* in the near future. (For information on the System, see pp. 57-59.)

THE BALANCE BETWEEN ADMINISTRATION AND TECHNIQUE

In addition to the administrative sessions of the Committee, two technical seminars were organized



BIML Director, B. Athané, recounts OIML's history to Berlin State Secretary Dr H. Heuer; CIML President, K. Birkeland; and Vice-President, Prof. Dr M. Kochsiek.



CIML Honorary Members show their continued interest in OIML's evolution. Pictured from left to right: H. W. Liers, former CIML Member for the GDR; W. Mühe, former Vice-President and CIML Member for the FRG; and A. J. van Male, former President and CIML Member for the Netherlands.



Delegates representing the Netherlands and Poland. From left to right: G. Faber, General Director of NMI; J. Tuinder, NMI; M. Klarner-Sniadowska, PKNMij; Z. Referowski, former Assistant Director of BLM, Vice-President of PKNMij.

by a team from PTB led by Prof. M. Kochsiek, Member of the PTB Presidential Board.

The first seminar concerned the "Application of R 76 to pattern approval". Mr G. Faber of the *Nederlands Meetinstituut* chaired the seminar which included presentations by Prof. Dr C. U. Volkmann, PTB (Germany); and Mr J. Welinder, *Statens Provvningsanstalt* (Sweden).

By analyzing certain deficiencies of R 76 that were revealed through an intercomparison organized by the *Bureau Communautaire des Références*, the seminar demonstrated the need for OIML to improve the description of the test procedures and the format of the test reports.

"Medical measuring technique in PTB" was the topic of the second technical seminar which featured presentations on the various measuring instruments and methods used by PTB in the field of health. The finishing touch to the seminar

was a series of visits to PTB laboratories which gave the participants a glimpse into the practical application of a variety of measurement techniques. (See p. 34 for the seminar programs.)

UPCOMING MEETINGS

International Conference of Legal Metrology

The Cuban delegation confirmed its invitation to hold the Tenth OIML Conference in Habana in 1995. A final decision will be made by CIML before the end of 1994.

Comité International de Métrologie Légale

Paris will be the location of the 29th CIML Meeting scheduled for October 1994. The Committee also accepted the invitation by the P.R. of China to meet in Beijing in 1995.

Development Council

In conjunction with the 29th CIML Meeting, the Development Council will hold its next meeting in Paris in October 1994.

Presidential Council

The next meeting of the OIML Presidential Council is scheduled for 10-11 February 1994 in Paris, after a meeting of the editorial group which is in the process of elaborating documents concerning OIML's long-term strategy (7-8 February 1994).

TIME OUT FOR TOURISM

When the CIML Members were not in session, they were often participating in activities organized by the PTB and BLM, including a cocktail party held at the *Japanisch-Deutsches Zentrum*, a reception given by the Senate of Berlin in the *Deutscher Reichstag*, and an extensive tour of Berlin and Potsdam. An interesting program for the delegates' spouses was organized by Dipl.-phys. H. Neuleib, PTB Berlin.

ACKNOWLEDGEMENTS

BLM extends its sincere appreciation to Prof. Dr Kochsiek, Mme U. Schlüter, Mme S. Beiss, and everyone at PTB Braunschweig and Berlin who contributed to the success of the 28th CIML Meeting. We would also like to thank the interpreters, Aileen P. M. Sharpe and Paul A. Arend for their valuable assistance in making sure that all the delegates understood each other linguistically. ■

Pour la première fois, le CIML se réunit dans une Allemagne unifiée

LA 28^e REUNION DU COMITE INTERNATIONAL DE METROLOGIE LEGALE

BERLIN, 4-6 OCTOBRE 1993

DEPUIS de nombreuses années, des réunions techniques de l'OIML ont été organisées dans l'ancienne République Fédérale d'Allemagne ou en République Démocratique Allemande, mais pour la première fois de son histoire l'OIML a eu la possibilité de réunir les Membres du CIML dans une Allemagne unifiée.

L'Organisation ne pouvait trouver un endroit plus symbolique pour rassembler les représentants de ses Etats Membres: la ville de Berlin avait été choisie pour la tenue de la 28^e réunion du Comité International de Métrologie Légale (CIML) du 4 au 6 octobre 1993. De fait, les dates décidées pour la réunion cor-

respondent symboliquement au troisième anniversaire de l'unification de l'Allemagne après la chute du Mur de Berlin.

BIENVENUE A L'ASSEMBLEE

De nombreuses délégations étaient présentes pour cette réunion annuelle du Comité: au total 65 participants représentant 45 pays. Étaient également présents trois Membres d'Honneur du CIML, M. A.J. van Male, ancien Président du CIML, Prof. Dr W. Mühle, ancien Vice-Président du CIML, et M.

H.W. Liers, ancien Membre du Conseil de la Présidence, ainsi que cinq représentants du BIML.

Le Prof. Dr D. Kind, Président de la PTB, a accueilli les Membres du CIML à Berlin par un discours d'ouverture qui évoquait le passé et le présent de la métrologie en Allemagne (voir pp. 27-29). Une autre allocution fut donnée par le Dr Berghaus du Ministère allemand de l'Économie, qui relatait la situation économique en Allemagne après l'unification et l'aide de l'Allemagne aux pays en développement.

DISCUSSIONS ET DECISIONS

Les discussions furent conduites par K. Birkeland, Président du CIML (Norvège) et les Vice-Présidents S. Chappell (Etats-Unis d'Amérique) et Prof. M. Kochsiek (Allemagne). Parmi les nombreux points d'un ordre du jour, le CIML a examiné les questions suivantes: les progrès dans l'établissement des nouvelles structures techniques et directives de travail, la mise en application du *Système de Certificats OIML*, la redéfinition de la politique à long terme de l'Organisation, les progrès réalisés par le



Délégués écoutant attentivement le rapport du Président Birkeland.
De gauche à droite: MM. F. Boni et G. Riccioni, Italie; Y. Kurita, Japon;
M. Benkirane, Maroc; et K. Lindlöv, Norvège.

Conseil de Développement (voir pp. 50-51).

Le nouveau Bulletin OIML fut également présenté au Comité, témoignant ainsi des efforts de l'Organisation pour adapter ses stratégies de communication à l'évolution dans le domaine de la métrologie.

Le Comité a approuvé six Recommandations internationales OIML:

- Chromatographes portatifs en phase gazeuse pour les mesures sur site des polluants chimiques dangereux
- Manomètres à piston
- Chromatographes en phase liquide de haute performance pour les mesures de pesticides et autres substances toxiques
- Poids des classes de précision E_1 , E_2 , F_1 , F_2 , M_1 , M_2 , M_3
- Instruments de pesage totalisateurs continus à fonctionnement automatique (peseuses sur bande (révision de R 50))
- Tables de mesure du pétrole (révision de R 63).

Le Comité a noté l'importance d'une accélération du travail au sein des comités techniques et sous-comités, afin que le plus grand nombre possible de Recommandations soient applicables dans le cadre du *Système de Certificats OIML* au cours des prochaines années (des informations sur le *Système* sont reprises en pp. 57-59).

EQUILIBRE ENTRE ADMINISTRATION ET TECHNIQUE

Hormis les sessions administratives du Comité, deux séminaires techniques ont été organisés par une équipe de la PTB dirigée par le

Prof. M. Kochsieck, Membre du Conseil de Présidence de la PTB.

Le premier séminaire concernait "L'application de la R 76 dans le cadre des approbations de modèle"; M. G. Faber du *Nederlands Meetinstituut* a présidé ce séminaire, qui a donné lieu à des exposés du Prof. Dr C.U. Volkmann, PTB (Allemagne) et M. J. Welinder, *Statens Provningsanstalt* (Suède).

Un certain nombre de déficiences de la R 76, qui furent révélées au cours d'une intercomparaison organisée par le *Bureau Communautaire des Références* et qui ont été analysées dans le cadre de ce séminaire, démontrent le besoin pour l'OIML d'améliorer la description des méthodes d'essai et les formats de rapports d'essai.

"La technique des mesures médicales à la PTB" était le sujet du deuxième séminaire technique qui incluait des exposés relatifs aux différents instruments et méthodes de mesure utilisés à la PTB dans le domaine de la santé. Le séminaire s'est terminé par une série de visites des laboratoires de la PTB qui ont donné aux participants une idée des applications pratiques et de certaines techniques de mesures. (Voir p. 34 pour les programmes de ces séminaires.)

REUNIONS A VENIR

Conférence Internationale de Métrologie Légale

La délégation de Cuba a confirmé son invitation de tenir la dixième Conférence OIML à La Havane en 1995. La décision finale sera prise par le CIML à la fin de 1994.

Comité International de Métrologie Légale

La 29e réunion du CIML se tiendra en octobre 1994 à Paris. Le Comité a également accepté l'invitation de

la R.P. de Chine de tenir sa réunion en 1995 à Pékin.

Conseil de Développement

En conjonction avec la 29e réunion du CIML, le Conseil de Développement se réunira à Paris en octobre 1994.

Conseil de la Présidence

La prochaine réunion du Conseil de la Présidence de l'OIML est prévue pour les 10 et 11 février 1994 à Paris, après une réunion du groupe de rédaction qui élabore un ou plusieurs documents sur la politique à long terme de l'OIML (7-8 février 1994).

TOURISME

Hors session, les Membres du CIML ont pu participer à diverses activités organisées par la PTB et le BIML, entre autres un cocktail qui s'est tenu au *Japanisch-Deutsches Zentrum*, une réception offerte par le Sénat de Berlin au *Deutscher Reichstag* et une excursion à Berlin, et à Potsdam. Un programme très intéressant avait également été organisé par Dipl.-phys. H. Neuleib, PTB Berlin pour les épouses des délégués.

REMERCIEMENTS

Le BIML exprime ses remerciements au Prof. Dr Kochsieck, à Madame U. Schlüter, Madame S. Beiss et à tous les membres du personnel de la PTB qui ont contribué au succès de la 28e réunion du CIML. Nous remercions également les interprètes, Aileen P.M. Sharpe et Paul A. Arend pour leur aide efficace qui a permis à tous les délégués de mieux se comprendre. ■

On a historical note

THE 28th CIML MEETING OPENS WITH A VISION OF METROLOGY IN GERMANY

Opening address by **Dr D. Kind**, President of the Physikalisch-Technische Bundesanstalt Berlin, 4-6 October 1993



Prof. Dr D. Kind, President of PTB, speaks of past and present metrology in Germany.

IT is a great pleasure for me to welcome you here in Berlin. I am very grateful to you, Mr President and to the Director of BIML, for choosing Berlin as the place of this meeting. Berlin in these years appears to be the focus of world politics where many great changes take place. Such changes will not leave untouched the world of metrology to which we all belong.

Exactly three years ago, German unification took place and you are very close to where the wall separated Berlin; you only have to go a few hundred meters to find empty spaces – it is not easy to imagine what this looked like three years

ago. Of course, we all are very happy that the situation has changed as it has. We, as the hosts from the Physikalisch-Technische Bundesanstalt, PTB, will do our best to make your stay here comfortable.

I was asked to give a brief record of PTB and of the situation of metrology in Germany today.

In 1887, more than a hundred years ago, the famous Physikalisch-Technische Reichsanstalt (PTR) was founded, here in Berlin, as the first national standards institute. Werner von Siemens and Herman von Helmholtz, who became the PTR's first president, strongly supported the foundation.

A great change took place in 1923 when the Weights and Measures Service (today we would say the wide field of legal metrology) was entrusted to PTR, and from this year on, PTR was responsible for all fields of metrology: scientific, industrial, and legal. The next date which I should mention is 1950 when after the second world war, the Physikalisch-Technische Bundesanstalt, PTB, was founded in Braunschweig.

After German reunification in 1990, PTB took over many employees from the "Amt für Standardisierung, Messwesen und Warenprüfung" (ASMW) which was the metrology institute of the former

German Democratic Republic. I am very pleased that we have Dr Liers with us who, in the early days, was the representative of the GDR in OIML bodies.

Today PTB laboratories are located on three sites: the main site is in Braunschweig with about 1500 employees; the second is the traditional site of the former PTR in Berlin-Charlottenburg where 200 employees are working, and the third, the former ASWM laboratories in Berlin-Friedrichshagen with 300 employees.

Let me now briefly explain the fields of activity of PTB with the help of Fig. 1. The tasks are to be seen inside the outer circle. Our main duty is to realize, maintain, and, of course, disseminate the units in metrology. This certainly has strong scientific implications since we also contribute to the set of fundamental constants which form the solid foundation of metrological work.

On the left branch, you find the legal tasks such as approval and tests in compliance with legal regulations. The right branch shows other duties such as the dissemination of metrological results to science and economy.

Outside the circle you find the fields that depend on the PTB's work. Some of them should be very

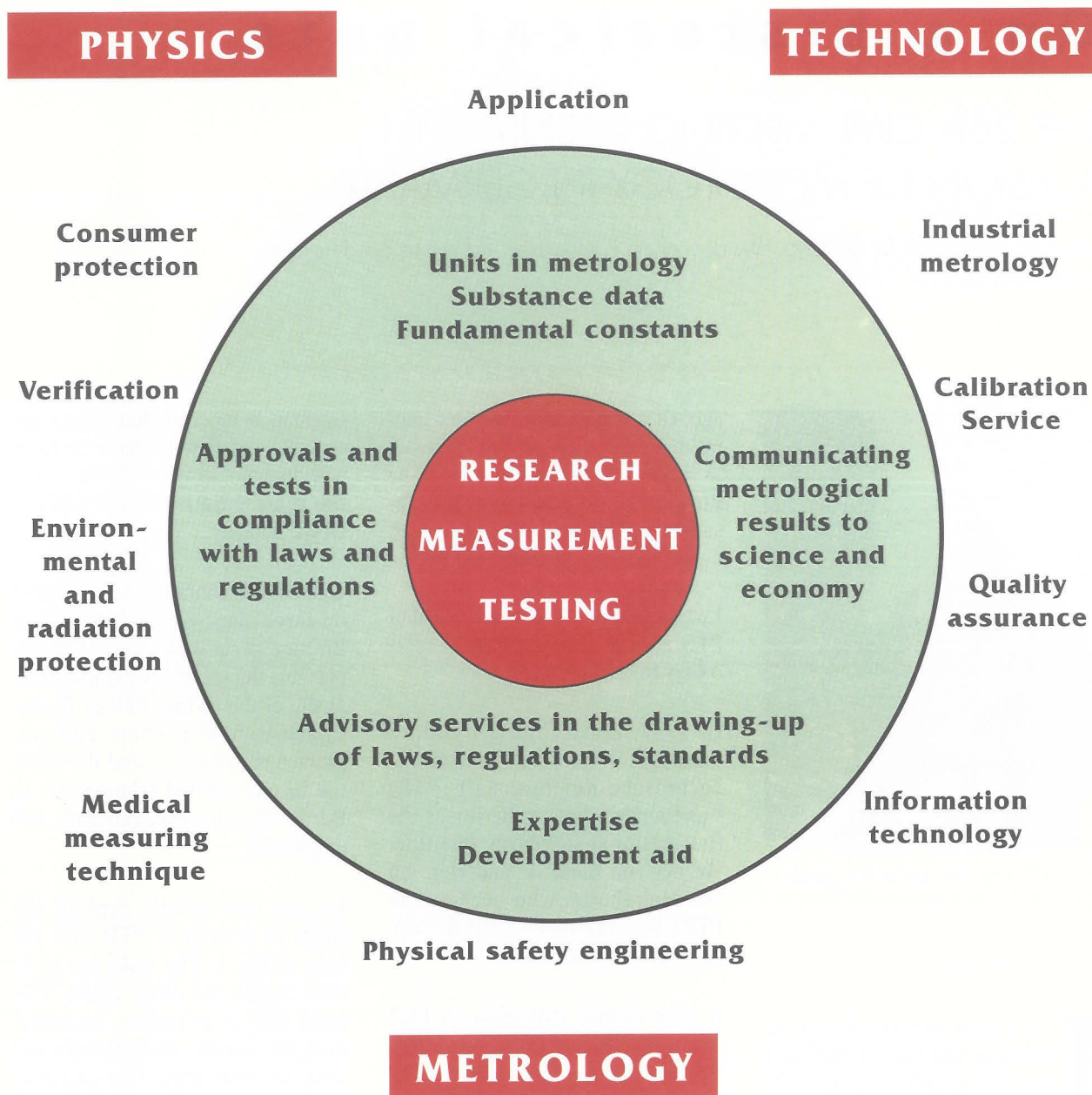


Fig. 1 Tasks of the PTB.

familiar to you: consumer protection, verification, environmental and radiation protection, medical measuring technique; all these things have to do with legal metrology. On the right branch, you find calibration service, quality assurance and information technology which represent the industrial side of our task. In the inner circle, you

read research, measurement, and testing; this is how the activities can be characterized.

During past years, ISO activities in quality assurance have entailed special demands on all metrology activities: to establish traceability in measurements. Traceability means that any measurement res-

ult must be traceable to national standards. With the diagram of Fig. 2, I have tried to show the lines of traceability seen from the user's point of view. For the field of legal metrology, the user will mostly get traceability through a verification office. To industry, the main partner should be a calibration service, or, as an exception, also the nation-

al metrology institute. The user has no direct contact with BIPM, since it is the exclusive partner of the national institutes.

It is evident that metrology on a world scale must be organized in regions. In Europe we have made a good step through the foundation of EUROMET, a cooperation of all national metrology laboratories of the European Community and the Free Trade Area.

Besides EUROMET we have two other organizations: the Western European Calibration Cooperation (WECC) and the Western European Legal Metrology Cooperation (WELMEC). One might say that WELMEC is the European partner to OIML.

I wanted to show with Fig. 3 that metrology, as we understand it at

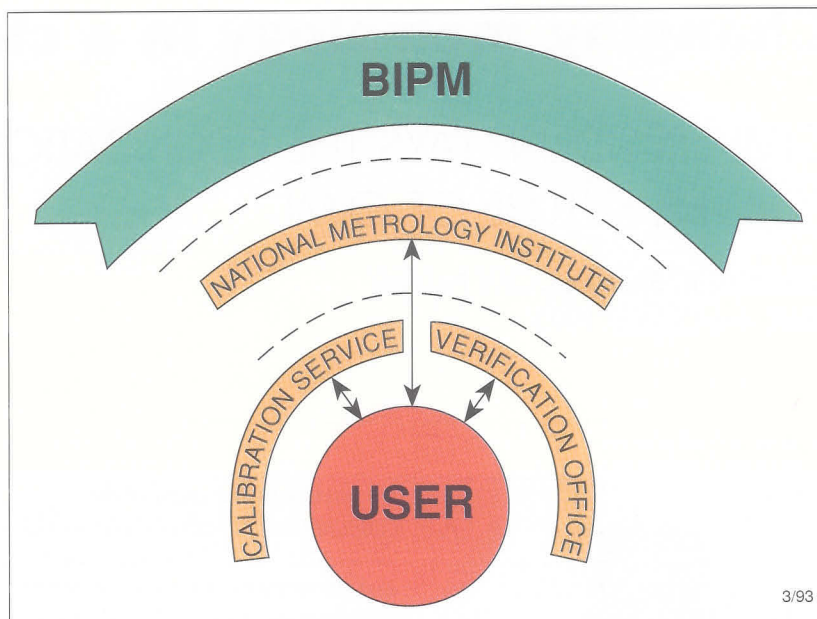


Fig. 2 Lines of traceability to meet user demand.

the PTB, is not exclusively a national concern but must be seen more and more as an international obligation

which, during the last years, has attained truly global dimensions.

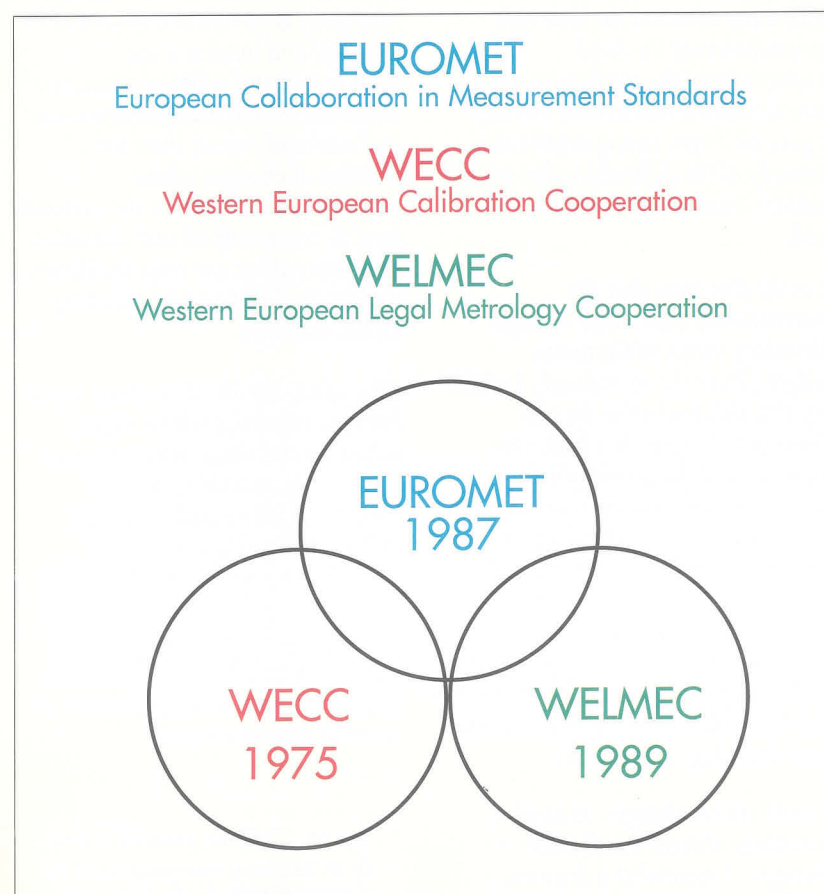


Fig. 3 Western European Metrology Organizations.

Institutions like OIML, which were founded many years ago, are exactly what we need today in the modern world. We should therefore commend our colleagues who, in early years, promoted activities such as those of OIML. I am pleased to see M. Van Male with us, who was a past President of OIML, and Prof. Mühe who was also an active member of OIML bodies for many years.

Again, the PTB is glad that you came to Berlin. We will do our best to make your stay agreeable and I welcome all of you to this meeting. Thank you. ■

Changing metrology in a changing world

CIML PRESIDENT LAYS THE FOUNDATIONS FOR THE FUTURE OF OIML

Address by **K. BIRKELAND**, CIML President
Berlin, 4–6 October 1993



CIML President, K. Birkeland, leads important discussions concerning OIML's future.

Mr K. Birkeland, CIML President, expressed his gratitude to Prof. Dr D. Kind, President of PTB, for his opening address* before delivering the Presidential discourse of the 28th CIML meeting.

Dear President Kind,
Dear Dr Berghaus**,
Ladies and Gentlemen,
Dear Colleagues,

Last year, when presenting a report on OIML activities to the Ninth OIML Conference, I started by expressing how I

was struck by the speed of the changes that had affected our world during the last three or four years and the number of important events that have taken place. In fact, these changes have occurred since the fall of the Berlin wall which stands out as perhaps the most symbolic event.

Dear German friends, it was indeed a great pleasure for us to be with you in Berlin yesterday, on the third of October which is the date that commemorated the third anniversary of the unification of your country. I can assure you that it gave us a very strong impression not only of the difficulties that your country experiences but the hopes as well.

It is the first time that the International Committee of Legal Metrology meets in Germany. Judging from the attendance, I must say that this invitation by our German colleagues has been very well-received. No doubt, this commemorative period is an inspiration for us to be here, to experience, and to contemplate. Let me express to you, dear President Kind, and to your colleagues who have participated in the organization of this meeting, the sincere thanks and appreciation of the international legal metrology community.

I spoke about changes. Is legal metrology affected by all these changes? I remember a drawing published in the British magazine, "Punch," some ten to fifteen years

ago. The drawing depicted a staff meeting of a Weights and Measures Bureau, and the Head of the Bureau announcing "I'm afraid, Gentlemen, we must learn to live with the hard truth: the Office of Weights and Measures is, by its very nature, colorless, noncontroversial, scandal-free, and is likely to remain so forever."

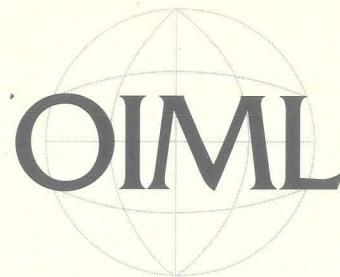
In some ways, this is true! But legal metrology is obviously influenced by national and international economical and political situations. In parallel to the major international and national events, there are a number of changes whose consequences are felt on the national level in practically all our countries; these may affect our responsibilities and tasks, therefore also affecting OIML activities.

First of all, the division of our world between countries with a market economy and those with a planned economy is vanishing and the concept of "all metrology is legal metrology" is disappearing. Therefore, we may hope that OIML will no longer be divided between two approaches to legal metrology, and that it will be easier to identify its priorities so as to concentrate on its most important goals.

* See pp. 27–29 for opening address.

** Dr H. Berghaus, representative of the German Ministry for the Economy, delivered a speech concerning the German economy.

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classified by subject

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 Centro de Control de Calidad y Metrologia
 Cra. 37 No 52-95, 4° piso
 BOGOTA D.E.

GHANA

Ghana Standards Board
 Kwame Nkrumah Conference Centre
 (Tower Block - 2nd Bay, 3rd Floor)
 P.O. Box M-245
 ACCRA

BANGLADESH

The Director General
 Bangladesh Standards
 and Testing Institution
 116-A Tejgaon Industrial Area
 DHAKA 1208

COSTA RICA

Oficina Nacional de Normas y Unidades
 de Medida
 Ministerio de Economia y Comercio
 Apartado 10 216
 SAN JOSE

HONG KONG

Commissioner of Customs and Excise
 (Attn. Trading Standards
 Investigation Bureau)
 Tokwawan Market & Government Offices
 165, Ma Tau Wei Road
 11/F., Kowloon
 HONG KONG

BARBADOS

The Director
 Barbados National Standards Institution
 Culloden Road
 St. Michael
 BARBADOS W.I.

CROATIA

Director General
 State Office for Standardization
 and Metrology
 Avenija Vukovar 78
 41000 ZAGREB

ICELAND

The Director
 Icelandic Bureau of Legal Metrology
 Löggildingarstofan
 Sidumuli 13
 P.O. Box 8114
 128 REYKJAVIK

BOTSWANA

The Permanent Secretary
 Division of Weights and Measures
 Department of Commerce
 and Consumer Affairs
 Private Bag 48
 GABORONE

ECUADOR

The General Director
 Instituto Ecuatoriano de Normalizacion
 Baquerizo Moreno No. 454 y Almagro
 Casilla 17-01-3999
 QUITO

JORDAN

Directorate of Standards
 Ministry of Industry and Trade
 P.O. Box 2019
 AMMAN

KUWAIT

The Under Secretary
Ministry of Commerce and Industry
Department of Standards and Metrology
Post Box No 2944
KUWAIT

LIBYA

The General Director
National Centre for Standardization
and Metrology (N.C.S.M.)
P.O. Box 5178
TRIPOLI

LUXEMBURG

Le Préposé du Service de Métrologie
Administration des Contributions
Zone commerciale et artisanale
Cellule A2
rue J.F. Kennedy
L-7327 STEINSEL

MALAWI

The Principal Assizer
Assize Department
P.O. Box 156
LILONGWE

MALAYSIA

The Director of Standards
Standards and Industrial Research
Institute of Malaysia
P.O. Box 7035
40911 Shah Alam
SELANGOR DARUL EHSAN

MALI

Le Directeur Général
des Affaires Économiques
(Service des Poids et Mesures)
BP 201
BAMAKO

MAURITIUS

The Permanent Secretary
Ministry of Trade and Shipping
(Division of Weights and Measures)
New Government Centre
PORT LOUIS

MEXICO

Direccion General de Normas
Secretaria de Comercio y Fomento Industrial
Sistema Nacional de Calibracion
Ave. Puente de Tecamachalco no. 6
Planta Baja
Lomas de Tecamachalco, Seccion Fuentes
53950 NAUCALPAN DE JUAREZ

MONGOLIA

Mongolian National Institute
for Standardization and Metrology
Peace Str.
ULAANBAATAR 51

NEPAL

The Chief Inspector
Nepal Bureau of Standards and Metrology
P.B. 985
Sundhara
KATHMANDU

NEW ZEALAND

The Manager
Trade Measurement Unit
Ministry of Consumer Affairs
P.O. Box 1473
WELLINGTON

OMAN

The General Director
for Specifications and Measurements
Ministry of Commerce and Industry
P.O. Box 550
MUSCAT

PANAMA

The Director
Comision Panamena de Normas Industriales
y Tecnicas
Ministerio de Comercio e Industrias
Apartado 9658
PANAMA 4

PERU

The Director General
INDECOPI
Instituto Nacional de Defensa de la
Competencia y de la Proteccion de la
Propiedad Intelectual
Prolong. Guardia Civil No.400
Esq. con Av. Canada, San Borja
LIMA

PHILIPPINES

Bureau of Product Standards
Department of Trade and Industry
3rd floor DTI Building
361 Sen. Gil J. Puyat Avenue
Makati, Metro Manila
PHILIPPINES 3117

SENEGAL

Le Directeur
Institut Sénégalais de Normalisation
Ministère du Plan et de la Coopération
DAKAR

SEYCHELLES

The Director
Seychelles Bureau of Standards
P.O. Box 648
VICTORIA

SYRIA

The General Director
The Syrian Arab Organization
for Standardization and Metrology
P.O. Box 11836
DAMASCUS

TRINIDAD AND TOBAGO

The Director
Trinidad and Tobago Bureau of Standards
P.O. Box 467
PORT OF SPAIN

TURKEY

The General Director
Sanayi ve Ticaret Bakanligi
Ölçüler ve Kalite Kontrol Genel
Müdürlüğü
06100 Tandoğan
ANKARA

UGANDA

Commissioner for Weights
and Measures
Weights and Measures Department
Ministry of Commerce
P.O. Box 7192
KAMPALA

VENEZUELA

The Director
Direccion General de Tecnologia
Servicio Nacional de Metrologia
Ministerio de Fomento
Av. Javier Ustariz, Edif. Parque Residencial
Urb. San Bernardino
CARACAS

YEMEN

The Director General
Yemen Standardization & Metrology
Organization
P.O. Box 19213
SANA'A

P U B L I C A T I O N S

Below is a list of OIML publications classified by subject (*) and indicated as follows: International Recommendations (R), International Documents (D), vocabularies (V), and other publications (P). Publications are available in French and English in the form of separate leaflets, unless otherwise indicated.

Publications may be ordered(**) by letter or fax from:

BUREAU INTERNATIONAL DE MÉTROLOGIE LÉGALE
11, RUE TURGOT, 75009 PARIS, FRANCE
TEL: 33 1 48 78 12 82 OR 33 1 42 85 27 11
FAX: 33 1 42 82 17 27

On trouvera ci-dessous une liste des publications OIML classées par sujets() et indiquées comme suit: Recommandations Internationales (R), Documents Internationaux (D), vocabulaires (V) et autres publications (P). Ces publications sont disponibles en français et en anglais sous forme de fascicules séparés sauf indication contraire.*

I GENERAL

GÉNÉRALITÉS

R 34 1979 - 1974	60 FRF	D 12 1986	50 FRF
Accuracy classes of measuring instruments <i>Classes de précision des instruments de mesure</i>		Fields of use of measuring instruments subject to verification <i>Domaines d'utilisation des instruments de mesure assujettis à la vérification</i>	
R 42 1981 - 1977	50 FRF	D 13 1986	50 FRF
Metal stamps for verification officers <i>Poinçons de métal pour Agents de vérification</i>		Guidelines for bi- or multilateral arrangements on the recognition of: test results - pattern approvals - verifications <i>Conseils pour les arrangements bi- ou multilatéraux de reconnaissance des: résultats d'essais - approbations de modèles - vérifications</i>	
D 1 1975	50 FRF	D 14 1989	60 FRF
Law on metrology <i>Loi de métrologie</i>		Training of legal metrology personnel - Qualification - Training programmes <i>Formation du personnel en métrologie légale - Qualification - Programmes d'étude</i>	
D 2 (in revision - en cours de révision)		D 15 1986	80 FRF
Legal units of measurement <i>Unités de mesure légales</i>		Principles of selection of characteristics for the examination of measuring instruments <i>Principes du choix des caractéristiques pour l'examen des instruments de mesure usuels</i>	
D 3 1979	60 FRF	D 16 1986	80 FRF
Legal qualification of measuring instruments <i>Qualification légale des instruments de mesure</i>		Principles of assurance of metrological control <i>Principes d'assurance du contrôle métrologique</i>	
D 5 1982	60 FRF	D 19 1988	80 FRF
Principles for the establishment of hierarchy schemes for measuring instruments <i>Principes pour l'établissement des schémas de hiérarchie des instruments de mesure</i>		Pattern evaluation and pattern approval <i>Essai de modèle et approbation de modèle</i>	
D 9 1984	60 FRF		
Principles of metrological supervision <i>Principes de la surveillance métrologique</i>			

(*) A list of publications classified by number may be obtained from BIML.
Une liste des publications par numéro est disponible auprès du BIML.

(**) Prices are given in French-francs and do not include postage.
Les prix sont donnés en francs-français et ne comprennent pas les frais d'expédition.

D 20 1988 80 FRF
Initial and subsequent verification of measuring instruments and processes
Vérifications primitive et ultérieure des instruments et processus de mesure

V 1 1978 100 FRF
Vocabulary of legal metrology (bilingual French-English)
Vocabulaire de métrologie légale (bilingue français-anglais)

V 2 1993 200 FRF
International vocabulary of basic and general terms in metrology (bilingual French-English)
Vocabulaire international des termes fondamentaux et généraux de métrologie (bilingue français-anglais)

P 1 1991 60 FRF
OIML Certificate System for Measuring Instruments
Système de Certificats OIML pour les Instruments de Mesure

P 2 1987 100 FRF
Metrology training - Synthesis and bibliography (bilingual French-English)
Formation en métrologie - Synthèse et bibliographie (bilingue français-anglais)

P 3 1990 200 FRF
Metrology in Member States and Corresponding Member Countries
Métrologie dans les Etats Membres et Pays Membres Correspondants de l'OIML

P 9 1992 100 FRF
Guidelines for the establishment of simplified metrology regulations

P 17 1993 300 FRF
Guide to the expression of uncertainty in measurement

II MEASUREMENT STANDARDS AND VERIFICATION EQUIPMENT *ÉTALONS ET EQUIPEMENT DE VERIFICATION*

D 6 1983 60 FRF
Documentation for measurement standards and calibration devices
Documentation pour les étalons et les dispositifs d'étalonnage

D 8 1984 60 FRF
Principles concerning choice, official recognition, use and conservation of measurement standards
Principes concernant le choix, la reconnaissance officielle, l'utilisation et la conservation des étalons

D 10 1984 50 FRF
Guidelines for the determination of recalibration intervals of measuring equipment used in testing laboratories
Conseils pour la détermination des intervalles de réétalonnage des équipements de mesure utilisés dans les laboratoires d'essais

D 18 1987 50 FRF
General principles of the use of certified reference materials in measurements
Principes généraux d'utilisation des matériaux de référence certifiés dans les mesures

D 23 1993 80 FRF
Principles of metrological control of equipment used for verification
Principes du contrôle métrologique des équipements utilisés pour la vérification

P 4 1986 - 1981 100 FRF
Verification equipment for National Metrology Services
Équipement d'un Service national de métrologie

P 6 1987 100 FRF
Suppliers of verification equipment (bilingual French-English)
Fournisseurs d'équipement de vérification (bilingue français-anglais)

P 7 1989 100 FRF
Planning of metrology and testing laboratories
Planification de laboratoires de métrologie et d'essais

P 15 1989 100 FRF
Guide to calibration

III MASS AND DENSITY *MASSES ET MASSES VOLUMIQUES*

R 15 1974 - 1970 80 FRF
Instruments for measuring the hectolitre mass of cereals
Instruments de mesure de la masse à l'hectolitre des céréales

R 22 1975 150 FRF
International alcoholometric tables (trilingual French-English-Spanish version)
Tables alcoométriques internationales (version trilingue français-anglais-espagnol)

R 33 1979 - 1973 50 FRF
Conventional value of the result of weighing in air
Valeur conventionnelle du résultat des pesées dans l'air

R 44 1985 50 FRF
Alcoholometers and alcohol hydrometers and thermometers for use in alcoholometry
Alcoomètres et aréomètres pour alcool et thermomètres utilisés en alcoométrie

R 47 1979 - 1978 60 FRF
Standard weights for testing of high capacity weighing machines
Poids étalons pour le contrôle des instruments de pesage de portée élevée

R 50 (being printed - en cours de publication)
Continuous totalising automatic weighing machines
Instruments de pesage totalisateurs continus à fonctionnement automatique

R 51 1985 80 FRF
Checkweighing and weight grading machines
Trieuses pondérales de contrôle et trieuses pondérales de classement

R 52	1980	50 FRF
Hexagonal weights, ordinary accuracy class from 100 g to 50 kg <i>Poids hexagonaux de classe de précision ordinaire, de 100 g à 50 kg</i>		
R 60	1991	80 FRF
Metrological regulation for load cells <i>Réglementation métrologique des cellules de pesée</i> (being printed - en cours de publication) Annex A: Test report format for the evaluation of load cells <i>Annexe A: Format du rapport d'essai des cellules de pesée</i>		
R 61	1985	80 FRF
Automatic gravimetric filling machines <i>Doseuses pondérales à fonctionnement automatique</i>		
R 74	1993	80 FRF
Electronic weighing instruments <i>Instruments de pesage électroniques</i>		
R 76-1	1992	300 FRF
Nonautomatic weighing instruments Part 1: Metrological and technical requirements - Tests <i>Instruments de pesage à fonctionnement non automatique Partie 1: Exigences métrologiques et techniques - Essais</i>		
R 76-2	1993	200 FRF
Nonautomatic weighing instruments Part 2: Pattern evaluation report <i>Instruments de pesage à fonctionnement non automatique Partie 2: Rapport d'essai de modèle</i>		
R 106	1993	100 FRF
Automatic rail-weighbridges <i>Ponts-basculés ferroviaires à fonctionnement automatique</i>		
R 107	1993	100 FRF
Discontinuous totalizing automatic weighing instruments (totalizing hopper weighers) <i>Instruments de pesage totalisateurs discontinus à fonctionnement automatique (peseuses totalisatrices à trémie)</i>		
R 111	(being printed - en cours de publication)	
Weights of accuracy classes E ₁ , E ₂ , F ₁ , F ₂ , M ₁ , M ₂ , M ₃ <i>Poids des classes de précision E₁, E₂, F₁, F₂, M₁, M₂, M₃</i>		
P 5	1992	100 FRF
Mobile equipment for the verification of road weigh-bridges (bilingual French-English) <i>Équipement mobile pour la vérification des ponts-basculés routiers (bilingue français-anglais)</i>		
P 8	1987	100 FRF
Density measurement <i>Mesure de la masse volumique</i>		

IV LENGTH AND SPEED LONGUEURS ET VITESSES

R 21	1975 - 1973	60 FRF
Taximeters <i>Taximètres</i>		
R 24	1975 - 1973	50 FRF
Standard one metre bar for verification officers <i>Mètre étalon rigide pour Agents de vérification</i>		

R 30	1981	60 FRF
End standards of length (gauge blocks) <i>Mesures de longueur à bouts plans (cales étalons)</i>		
R 35	1985	80 FRF
Material measures of length for general use <i>Mesures matérialisées de longueur pour usages généraux</i>		
R 55	1981	50 FRF
Speedometers, mechanical odometers and chronotachographs for motor vehicles. Metrological regulations <i>Compteurs de vitesse, compteurs mécaniques de distance et chronotachygraphes des véhicules automobiles. Réglementation métrologique</i>		
R 66	1985	60 FRF
Length measuring instruments <i>Instruments mesureurs de longueurs</i>		
R 91	1990	60 FRF
Radar equipment for the measurement of the speed of vehicles <i>Cinémomètres radar pour la mesure de la vitesse des véhicules</i>		
R 98	1991	60 FRF
High-precision line measures of length <i>Mesures matérialisées de longueur à traits de haute précision</i>		

V LIQUID MEASUREMENT MESURAGE DES LIQUIDES

R 4	1972 - 1970	50 FRF
Volumetric flasks (one mark) in glass <i>Fioles jaugées à un trait en verre</i>		
R 5	1981	60 FRF
Meters for liquids other than water with measuring chambers <i>Compteurs de liquides autres que l'eau à chambres mesureuses</i>		
R 27	1979 - 1973	50 FRF
Volume meters for liquids other than water. Ancillary equipment <i>Compteurs de volume de liquides autres que l'eau. Dispositifs complémentaires</i>		
R 29	1979 - 1973	50 FRF
Capacity serving measures <i>Mesures de capacité de service</i>		
R 40	1981 - 1977	60 FRF
Standard graduated pipettes for verification officers <i>Pipettes graduées étalons pour Agents de vérification</i>		
R 41	1981 - 1977	60 FRF
Standard burettes for verification officers <i>Burettes étalons pour Agents de vérification</i>		
R 43	1981 - 1977	60 FRF
Standard graduated glass flasks for verification officers <i>Fioles étalons graduées en verre pour Agents de vérification</i>		
R 45	1980 - 1977	50 FRF
Casks and barrels <i>Tonneaux et futailles</i>		

- R 49** (in revision - en cours de révision)
Water meters intended for the metering of cold water
Compteurs d'eau destinés au mesurage de l'eau froide
- R 57** 1982 80 FRF
Measuring assemblies for liquids other than water fitted with volume meters. General provisions
Ensembles de mesurage de liquides autres que l'eau équipés de compteurs de volumes. Dispositions générales
- R 63** (being printed - en cours de publication)
Petroleum measurement tables
Tables de mesure du pétrole
- R 67** 1985 50 FRF
Measuring assemblies for liquids other than water fitted with volume meters. Metrological controls
Ensembles de mesurage de liquides autres que l'eau équipés de compteurs de volumes. Contrôles métrologiques
- R 71** 1985 80 FRF
Fixed storage tanks. General requirements
Réservoirs de stockage fixes. Prescriptions générales
- R 72** 1985 60 FRF
Hot water meters
Compteurs d'eau destinés au mesurage de l'eau chaude
- R 77** 1989 60 FRF
Measuring assemblies for liquids other than water fitted with volume meters. Provisions specific to particular assemblies
Ensembles de mesurage de liquides autres que l'eau équipés de compteurs de volumes. Dispositions particulières relatives à certains ensembles
- R 80** 1989 100 FRF
Road and rail tankers
Camions et wagons-citernes
- R 81** 1989 80 FRF
Measuring devices and measuring systems for cryogenic liquids (including tables of density for liquid argon, helium, hydrogen, nitrogen and oxygen)
Dispositifs et systèmes de mesure de liquides cryogéniques (comprend tables de masse volumique pour argon, hélium, hydrogène, azote et oxygène liquides)
- R 85** 1989 80 FRF
Automatic level gauges for measuring the level of liquid in fixed storage tanks
Jaugeurs automatiques pour le mesurage des niveaux de liquide dans les réservoirs de stockage fixes
- R 86** 1989 50 FRF
Drum meters for alcohol and their supplementary devices
Compteurs à tambour pour alcool et leurs dispositifs complémentaires
- R 95** 1990 60 FRF
Ships' tanks - General requirements
Bateaux-citernes - Prescriptions générales
- R 96** 1990 50 FRF
Measuring container bottles
Bouteilles récipients-mesures

- R 105** 1993 100 FRF
Direct mass flow measuring systems for quantities of liquids
Ensembles de mesurage massiques directs de quantités de liquides

- D 4** 1981 50 FRF
Installation and storage conditions for cold water meters
Conditions d'installation et de stockage des compteurs d'eau froide

- D 7** 1984 80 FRF
The evaluation of flow standards and facilities used for testing water meters
Evaluation des étalons de débitmétrie et des dispositifs utilisés pour l'essai des compteurs d'eau

VI GAS MEASUREMENT MESURAGE DES GAZ

- R 6** 1989 80 FRF
General provisions for gas volume meters
Dispositions générales pour les compteurs de volume de gaz

- R 31** 1989 80 FRF
Diaphragm gas meters
Compteurs de volume de gaz à parois déformables

- R 32** 1989 60 FRF
Rotary piston gas meters and turbine gas meters
Compteurs de volume de gaz à pistons rotatifs et compteurs de volume de gaz à turbine

VII PRESSURE PRESSIONS(*)

- R 23** 1975 - 1973 60 FRF
Tyre pressure gauges for motor vehicles
Manomètres pour pneumatiques de véhicules automobiles

- R 53** 1982 60 FRF
Metrological characteristics of elastic sensing elements used for measurement of pressure. Determination methods
Caractéristiques métrologiques des éléments récepteurs élastiques utilisés pour le mesurage de la pression. Méthodes de leur détermination

- R 97** 1990 60 FRF
Barometers
Baromètres

- R 101** 1991 80 FRF
Indicating and recording pressure gauges, vacuum gauges and pressure vacuum gauges with elastic sensing elements (ordinary instruments)
Manomètres, vacuomètres et manovacuumètres indicateurs et enregistreurs à élément récepteur élastique (instruments usuels)

(*) See also medical instruments - Voir aussi instruments médicaux.

R 109 (being printed - en cours de publication)
Pressure gauges and vacuum gauges with elastic sensing elements (standard instruments)
Manomètres et vacuomètres à élément récepteur élastique (instruments étalons)

R 110 (being printed - en cours de publication)
Pressure balances
Manomètres à piston

VIII TEMPERATURE TEMPÉRATURES(*)

R 18 1989 60 FRF
Visual disappearing filament pyrometers
Pyromètres optiques à filament disparaissant

R 48 1980 - 1978 50 FRF
Tungsten ribbon lamps for calibration of optical pyrometers
Lampes à ruban de tungstène pour l'étalonnage des pyromètres optiques

R 75 1988 60 FRF
Heat meters
Compteurs d'énergie thermique

R 84 1989 60 FRF
Resistance-thermometer sensors made of platinum, copper or nickel (for industrial and commercial use)
Capteurs à résistance thermométrique de platine, de cuivre ou de nickel (à usages techniques et commerciaux)

P 16 1991 100 FRF
Guide to practical temperature measurements

IX ELECTRICITY ÉLECTRICITÉ

R 46 1980 - 1978 80 FRF
Active electrical energy meters for direct connection of class 2
Compteurs d'énergie électrique active à branchement direct de la classe 2

D 11 (in revision - en cours de révision)
General requirements for electronic measuring instruments
Exigences générales pour les instruments de mesure électroniques

X ACOUSTICS AND VIBRATION ACCOUSTIQUE ET VIBRATIONS

R 58 1984 50 FRF
Sound level meters
Sonomètres

R 88 1989 50 FRF
Integrating-averaging sound level meters
Sonomètres intégrateurs-moyenneurs

(*) See also medical instruments - Voir aussi instruments médicaux.

R 102 1992 50 FRF
Sound calibrators
Calibreurs acoustiques

R 103 1992 60 FRF
Measuring instrumentation for human response to vibration
Appareillage de mesure pour la réponse des individus aux vibrations

R 104 1993 60 FRF
Pure-tone audiometers
Audiomètres à sons purs

XI ENVIRONMENT ENVIRONNEMENT

R 82 1989 80 FRF
Gas chromatographs for measuring pollution from pesticides and other toxic substances
Chromatographes en phase gazeuse pour la mesure des pollutions par pesticides et autres substances toxiques

R 83 1990 80 FRF
Gas chromatograph/mass spectrometer/data system for analysis of organic pollutants in water
Chromatographe en phase gazeuse équipé d'un spectromètre de masse et d'un système de traitement de données pour l'analyse des polluants organiques dans l'eau

R 99 1991 100 FRF
Instruments for measuring vehicle exhaust emissions
Instruments de mesure des gaz d'échappement des véhicules

R 100 1991 80 FRF
Atomic absorption spectrometers for measuring metal pollutants in water
Spectromètres d'absorption atomique pour la mesure des polluants métalliques dans l'eau

R 112 (being printed - en cours de publication)
High performance liquid chromatographs for measurement of pesticides and other toxic substances
Chromatographes en phase liquide de haute performance pour la mesure des pesticides et autres substances toxiques

R 113 (being printed - en cours de publication)
Portable gas chromatographs for field measurements of hazardous chemical pollutants
Chromatographes en phase gazeuse portatifs pour la mesure sur site des polluants chimiques dangereux

D 22 1991 80 FRF
Guide to portable instruments for assessing airborne pollutants arising from hazardous wastes
Guide sur les instruments portatifs pour l'évaluation des polluants contenus dans l'air en provenance des sites de décharge de déchets dangereux

XII PHYSICO-CHEMICAL MEASUREMENTS

MESURES PHYSICO-CHIMIQUES

R 14 (in revision - en cours de révision)

Polarimetric saccharimeters
Saccharimètres polarimétriques

R 54 (in revision - en cours de révision)

pH scale for aqueous solutions
Echelle de pH des solutions aqueuses

R 56 1981 50 FRF

Standard solutions reproducing the conductivity of electrolytes
Solutions-étalons reproduisant la conductivité des électrolytes

R 59 1984 80 FRF

Moisture meters for cereal grains and oilseeds
Humidimètres pour grains de céréales et graines oléagineuses

R 68 1985 50 FRF

Calibration method for conductivity cells
Méthode d'étalonnage des cellules de conductivité

R 69 1985 50 FRF

Glass capillary viscometers for the measurement of kinematic viscosity. Verification method
Viscosimètres à capillaire, en verre, pour la mesure de la viscosité cinématique. Méthode de vérification

R 70 1985 50 FRF

Determination of intrinsic and hysteresis errors of gas analysers
Détermination des erreurs de base et d'hystérésis des analyseurs de gaz

R 73 1985 50 FRF

Requirements concerning pure gases CO, CO₂, CH₄, H₂, O₂, N₂ and Ar intended for the preparation of reference gas mixtures
Prescriptions pour les gaz purs CO, CO₂, CH₄, H₂, O₂, N₂ et Ar destinés à la préparation des mélanges de gaz de référence

R 92 1989 60 FRF

Wood-moisture meters - Verification methods and equipment: general provisions
Humidimètres pour le bois - Méthodes et moyens de vérification: exigences générales

R 108 1993 60 FRF

Refractometers for the measurement of the sugar content of fruit juices
Réfractomètres pour la mesure de la teneur en sucre des jus de fruits

D 17 1987 50 FRF

Hierarchy scheme for instruments measuring the viscosity of liquids
Schéma de hiérarchie des instruments de mesure de la viscosité des liquides

XIII MEDICAL INSTRUMENTS

INSTRUMENTS MÉDICAUX

R 7 1979 - 1978 60 FRF

Clinical thermometers, mercury-in-glass with maximum device
Thermomètres médicaux à mercure, en verre, avec dispositif à maximum

R 16 1973 - 1970 50 FRF

Manometers for instruments for measuring blood pressure (sphygmomanometers)
Manomètres des instruments de mesure de la tension artérielle (sphygmomanomètres)

R 26 1978 - 1973 50 FRF

Medical syringes
Seringues médicales

R 78 1989 50 FRF

Westergren tubes for measurement of erythrocyte sedimentation rate
Pipettes Westergren pour la mesure de la vitesse de sédimentation des hématies

R 89 1990 80 FRF

Electroencephalographs - Metrological characteristics - Methods and equipment for verification
Electroencéphalographes - Caractéristiques métrologiques - Méthodes et moyens de vérification

R 90 1990 80 FRF

Electrocardiographs - Metrological characteristics - Methods and equipment for verification
Electrocardiographes - Caractéristiques métrologiques - Méthodes et moyens de vérification

R 93 1990 60 FRF

Focimeters
Frontofocomètres

D 21 1990 80 FRF

Secondary standard dosimetry laboratories for the calibration of dosimeters used in radiotherapy
Laboratoires secondaires d'étalonnage en dosimétrie pour l'étalonnage des dosimètres utilisés en radiothérapie

XIV TESTING OF MATERIALS

ESSAIS DES MATÉRIAUX

R 9 1972 - 1970 60 FRF

Verification and calibration of Brinell hardness standardized blocks
Vérification et étalonnage des blocs de référence de dureté Brinell

R 10 1974 - 1970 60 FRF

Verification and calibration of Vickers hardness standardized blocks
Vérification et étalonnage des blocs de référence de dureté Vickers

R 11 1974 - 1970 60 FRF

Verification and calibration of Rockwell B hardness standardized blocks
Vérification et étalonnage des blocs de référence de dureté Rockwell B

R 12 1974 - 1970 60 FRF

Verification and calibration of Rockwell C hardness standardized blocks
Vérification et étalonnage des blocs de référence de dureté Rockwell C

- R 36** 1980 - 1977 60 FRF
Verification of indenters for hardness testing machines
Vérification des pénétrateurs des machines d'essai de dureté
- R 37** 1981 - 1977 60 FRF
Verification of hardness testing machines (Brinell system)
Vérification des machines d'essai de dureté (système Brinell)
- R 38** 1981 - 1977 60 FRF
Verification of hardness testing machines (Vickers system)
Vérification des machines d'essai de dureté (système Vickers)
- R 39** 1981 - 1977 60 FRF
Verification of hardness testing machines (Rockwell systems B,F,T - C,A,N)
Vérification des machines d'essai de dureté (systèmes Rockwell B,F,T - C,A,N)
- R 62** 1985 80 FRF
Performance characteristics of metallic resistance strain gauges
Caractéristiques de performance des extensomètres métalliques à résistance
- R 64** 1985 50 FRF
General requirements for materials testing machines
Exigences générales pour les machines d'essai des matériaux
- R 65** 1985 60 FRF
Requirements for machines for tension and compression testing of materials
Exigences pour les machines d'essai des matériaux en traction et en compression

- V 3** 1991 80 FRF
Hardness testing dictionary (quadrilingual French-English-German-Russian)
Dictionnaire des essais de dureté (quadrilingue français-anglais-allemand-russe)
- P 10** 1981 50 FRF
The metrology of hardness scales - Bibliography
- P 11** 1983 100 FRF
Factors influencing hardness measurement
- P 12** 1984 100 FRF
Hardness test blocks and indenters
- P 13** 1989 100 FRF
Hardness standard equipment
- P 14** 1991 100 FRF
The unification of hardness measurement

XV PREPACKAGING PRÉEMBALLAGES

- R 79** 1989 50 FRF
Information on package labels
Etiquetage des préemballages
- R 87** 1989 50 FRF
Net content in packages
Contenu net des préemballages

There is also a general increase in verification and calibration work, both in the regulatory and non-regulatory areas. This has led to a certain dissemination of the tasks of legal metrology, adding a number of new structures to the field through the accreditation of competent private and semi-private bodies. This development will oblige OIML to approach these new bodies and to associate them as its new partners.

Regionalization, very well-illustrated by the lecture of Prof. Dr Kind, is also a factor that will influence a growing number of international activities. De-regulation is of course a concern for a body whose activity, by definition, is based on regulations.

This is why it is time for OIML to reflect on its aims: to redefine them in the framework of the societal, economical, and political changes that affect our world, and to reaffirm its worldwide leadership in this limited, yet significant sphere of metrology. This can be done by making its activities more well-known and attracting the participation of all interested and relevant parties.

During the past five years, the Conference and CIML meetings have addressed this matter of long-term policy. Because of the complexity of the problem and the speed of the changes that are taking place, and perhaps because the issue has not yet ripened, nothing final has been publicized.

We will come back to this matter in our discussions, but for now, I can tell you that decisive steps have been taken to advance this issue, especially after the meetings of our Presidential Council and Presidium in February and June of this year. Hopefully, a good paper on the OIML strategy will appear within the next half-year or so.

It should be remarked that, during the same five-year period, we have not been inactive as regards the

necessary tools for correctly implementing our future policy.

New work methods and structures have been developed and are in operation or in the process of becoming operational. We must now make sure that all OIML technical committees are now able to implement these methods correctly and will be able to react quickly and adequately in the event that deficiencies or difficulties arise. Through these new work structures and methods, we expect an acceleration of our work as well as a notable technical improvement, with more concentration on matters of high priority for OIML.

The OIML Certificate System is operational as well and its success will depend on the advantages that legal metrology services, manufacturers, and users of measuring instruments will draw from it. The beginning of this System has been very promising for the future and our main task at hand is to gradually extend its application to other categories of measuring instruments.

The tools for OIML's communications had to be looked into and drastically changed. The new Bulletin has appeared, a new general informative brochure will be developed soon, and considerable efforts will be made by BIML and by national metrology services to enlarge the audience of OIML.

And even if our activity generally addresses all countries, specific actions shall be made for assisting and guiding developing countries in their establishment of appropriate metrology services.

These are the topics which, in my opinion, are vital to the future of our Organization. All of them will be addressed during our meeting, and I am looking forward to your active participation in these discussions.

But before considering the various items of the agenda, it is my pleasure

to welcome the new Members of our International Committee.

A new Member State joined OIML at the beginning of this year: the Republic of Slovenia, represented by Mr Hrovat. A former Member State, Czechoslovakia, has given birth to two new Members, the Slovak Republic and the Czech Republic, whose representatives are Mr Sutek and Mr Klenovský.

Newly appointed CIML Members include Mr Ribeiro for Brazil, Mr Krishnamoorthy for India, and Mr Murray for Ireland. In the People's Republic of China, Mr Bai has retired and been replaced by Mr Li; both are present here which is proof of the continuity of Chinese participation in OIML work. New colleagues, I am pleased to welcome you all to the Committee.

Last but not least, it is a very great pleasure for me to welcome three of our Honorary Members: Adrian van Male, former CIML Member for the Netherlands and my predecessor as President of the Committee, Walter Mühe, former German Member and Vice-President of the Committee, and Hans Werner Liers, former CIML Member for the German Democratic Republic and Member of our Presidential Council.

Dear Honorary Members of our Committee and Dear Friends,

Of course, OIML has changed over the last decade. We have had, and we have still to adapt our activity to the developments in legal metrology, the demands of new customers, the evolutions, and the revolutions of our world. However, a number of basic principles remain valid and when following and participating in our discussions, you will recognize that the basic aims of OIML are still very similar to those which existed when you were in charge of this Organisation. OIML has grown up and matured, but you will easily recognize it. Thank you very much, dear friends, for being with us during this meeting. ■

OIML in perspective

DO YOU KNOW
ABOUT THE COMITE
INTERNATIONAL DE
METROLOGIE LEGALE?



L'OIML en perspective

CONNAISSEZ-VOUS
LE COMITE
INTERNATIONAL DE
METROLOGIE LEGALE?

SERVING as a real "steering committee" for OIML, the *Comité International de Métrologie Légale* (CIML) is made up of a representative from each Member State of the Organisation.

The CIML Members are designated by their government or administration and must have official responsibilities in their national bodies of legal metrology. These members contribute their expertise to the benefit of the CIML without committing the responsibility of their governments.

WHAT DOES THE CIML DO? Activities and responsibilities

- The preparation and implementation of the decisions of the International Conference of Legal Metrology in the administrative and financial domains.
- The organization and control of the various technical activities of OIML, including the approval of OIML International Recommendations and Documents.
- Following up on various matters such as assistance to developing countries, liaisons with other institutions, the OIML Bulletin, and technical seminars.
- Controlling the work of the *Bureau International de Métrologie Légale* (BIML) and the situation of its personnel (the CIML elects the Director and Assistant Directors of BIML).

Over the past five years, CIML has successfully led the work of establishing the OIML Certificate System and is now undertaking the task of redefining the long-term policy of the Organisation.

VÉRITABLE "comité de direction" de l'OIML, le Comité International de Métrologie Légale (CIML) se compose d'un représentant de chacun des États Membres de l'Organisation.

Les Membres du CIML sont désignés par leur gouvernement ou administration et doivent avoir des responsabilités officielles dans l'organisme national de métrologie légale. Ils font bénéficier le CIML de leur expérience sans engager par cela la responsabilité de leur gouvernement.

QUE FAIT LE CIML? Activités et responsabilités

- La préparation et l'application des décisions de la Conférence Internationale de Métrologie Légale dans les domaines administratifs et financiers.
- L'organisation et le contrôle des diverses activités techniques de l'OIML, y compris l'approbation des Recommandations et Documents Internationaux de l'OIML.
- Le suivi de diverses questions comme l'assistance aux pays en développement, les liaisons avec d'autres institutions, le Bulletin OIML ou les séminaires techniques.
- Le contrôle du travail du Bureau International de Métrologie Légale (BIML) et la situation de son personnel (le CIML élit le Directeur et les Adjoints).

Au cours de ces cinq dernières années, le CIML a mené à bien les travaux d'établissement du Système de Certificats OIML et s'attache maintenant à redéfinir la politique à long terme de l'Organisation.

LEADERSHIP

CIML discussions are led by the President who is elected by the Committee for six years. Mr K. Birkeland (Norway) was elected President in 1980 and re-elected in 1986. In 1992, President Birkeland's mandate was exceptionally extended for two years. The President is assisted by two Vice-Presidents who are also elected for six years; the posts for Vice-President are presently being served by Mr S. Chappell (USA) and Mr M. Kochsiek (Germany).

MEETINGS

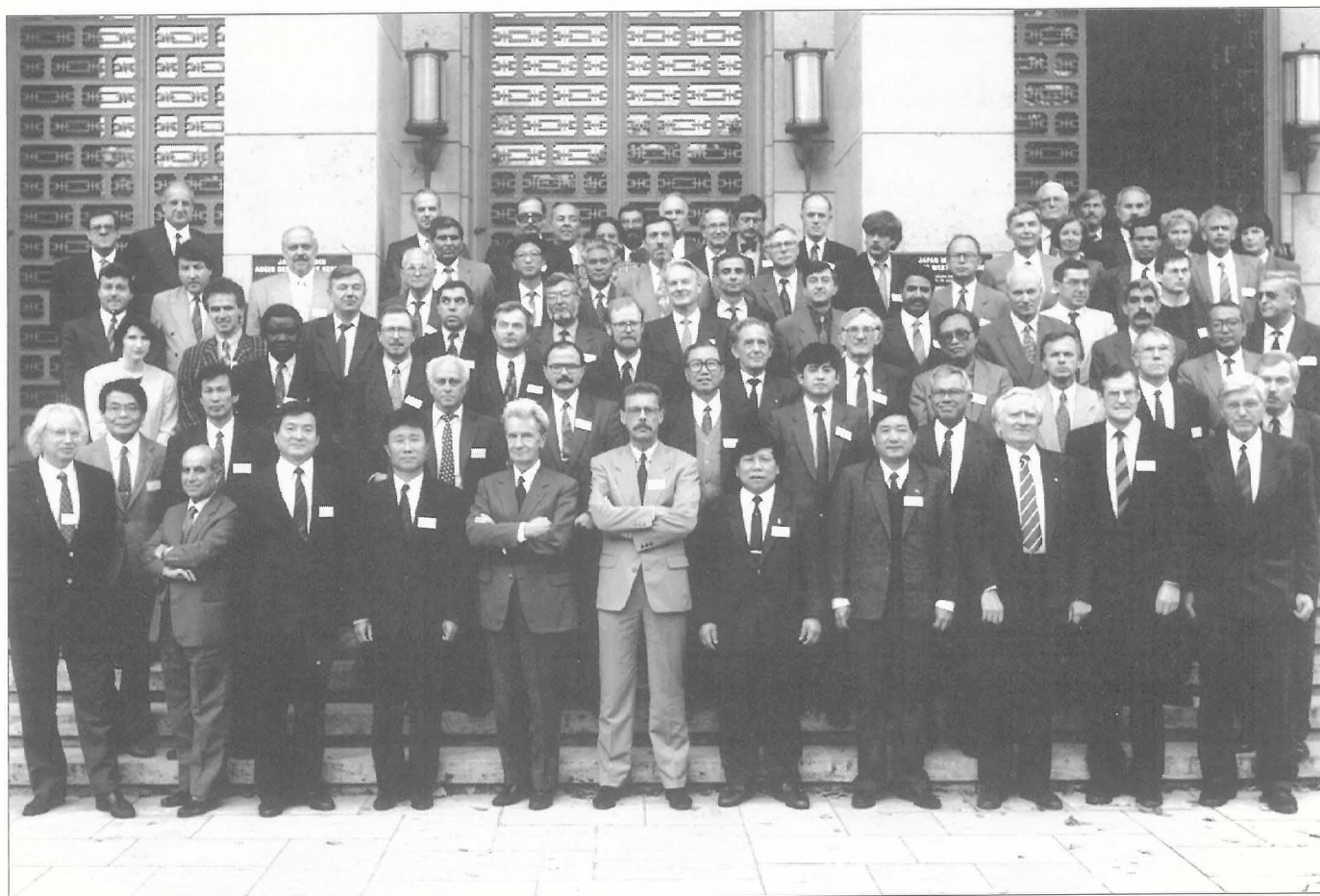
The Committee generally meets on an annual basis either in a Member State that has volunteered to host the assembly or in Paris (OIML headquarters). The 28th CIML Meeting was held in Berlin and upcoming meetings are scheduled to be held in Paris (1994) and Beijing (1995).

PRESIDENCE

Les débats du CIML sont dirigés par son Président, élu pour six ans. M. Birkeland (Norvège) avait été élu en 1980 et réélu en 1986, son mandat ayant été ensuite exceptionnellement prolongé de deux ans. Le Président est assisté par deux Vice-Présidents eux aussi élus pour six ans; les deux Vice-Présidents en fonction actuellement sont MM. Chappell (USA) et Kochsiek, (Allemagne).

REUNIONS

Les réunions du CIML sont en général annuelles et se tiennent soit dans un État Membre, sur invitation de celui-ci, soit à Paris (le siège de l'OIML). La 28e réunion du CIML s'est tenue à Berlin et les deux prochaines réunions se tiendront à Paris (1994) et à Pékin (1995).



Members of OIML's Comité International de Métrologie Légale and other delegates to the 28th CIML Meeting, 4-6 October 1993 in Berlin.

Seminars

The following two technical seminars were organized by PTB (Germany) for the occasion of the 28th Meeting of the Comité International de Métrologie Légale.

THE APPLICATION OF R 76 TO PATTERN APPROVAL

Deutsch-Japanisches Zentrum (German-Japanese Centre)

Berlin, 4 October 1993

Chairman: G. Faber, Nederlands Meetinstituut

C. U. Volkmann, PTB (Germany), "Experiments with R 76 by 15 European pattern approval authorities"

Intercomparison under project BCR 172 • Testing and technical evaluation of three types of nonautomatic weighing instruments: industrial, high accuracy, and retail instruments by 15 European laboratories • Results presented in test reports and fictitious pattern approval certificates • Advantages and shortcomings of R 76 revealed by this exercise: influence on future revision of R 76

J. Welinder, Statens Provningsanstalt (Sweden), "EMC tests under R 76"

Experience from applying R 76 and related IEC Publications under BCR project 172 intercomparison • Problems and discrepancies that arose • Solutions proposed by BCR and WELMEC working groups

C. U. Volkmann, PTB (Germany), "The concept of modules in R 76"

Module concept for testing and approving parts of instruments • Typical examples: load cells, electronic indicators, peripheral printers • Testing of load cells to R 60 not fully compatible with requirements in R 76 • Test regime for indicators developed by BCR working group • Test regime for peripherals agreed upon by WELMEC

MEDICAL MEASURING TECHNIQUE IN PTB

Physikalisch-Technische Bundesanstalt

Berlin, 7 October 1993

Mr B. Athané, Director of BML, Introductory remarks

Prof. Dr R. Nink (PTB), *Medical measuring technique in PTB*

Dr S. Mieke (PTB), *Type testing of non invasive sphygmomanometers by using an electronic simulator*

Prof. Dr H. Rinneberg (PTB), *Laser based measuring techniques for medical diagnostics*

Dr M. Burghoff (PTB), *Measurement of magnetic signals from the human body*

VISITS TO PTB LABORATORIES

Biomagnetism (Magnetocardiography), Dr L. Trahms • *Arm phantom for blood pressure measurement*, Dr S. Mieke • *Type testing of ergometers*, Dr J. Tilgner • *Laser flow cytometry for haematology*, Dr J. Neukammer • *Laser light scattering in biological tissue*, Frau Dr H. Wabnitz • *Fluorescence imaging for detection of cancer*, Dr B. Ebert

Developing countries

GERMANY ACTIVELY PURSUES ECONOMIC COOPERATION AND DEVELOPMENT

Presentation by **H. FÄHNEL**, Ministry for Economic Cooperation and Development, Germany
OIML Development Council Meeting
Berlin, 30 September–1 October 1993

Mr Chairman,
Ladies and Gentlemen,

It is both an honour and a pleasure for me to greet you on behalf of the Federal Minister for Economic Cooperation and Development. He wishes you a pleasant stay in the capital of the reunified Federal Republic, and every success for your conference at the Physikalisch- Technische Bundesanstalt in Berlin. I would like to echo these sentiments and hope that your meeting, and the following conference of the International Committee of OIML, will be crowned with success.

As you may know, the Federal Ministry for Economic Cooperation and Development (BMZ) is responsible for the planning, financing, supervision, and control of programs and projects for the development of cooperation with all countries, according to the definition of the Development Assistance Committee of the OECD. In coordination with the Federal Ministry of Economics, the BMZ is also active in central and eastern Europe.

The financial scale of this cooperation is made clear by the following figures: the upper limit of the 1994 budget, which is being deliberated by parliament, is approximately 8.4 billion DM. Part of this total, about 4 billion DM, is apportioned to bi-

lateral Technical (TZ) and Financial Cooperation (FZ). In addition to this, approximately 3 billion DM is contributed to international development organizations such as the World Bank (IDA), UNDP, the European Development Fund (EEF) and the global environmental facility of the World Bank (GEF). 1.2 billion DM is placed at the disposal of the non-governmental bodies of development cooperation. (See diagram below for regional distribution of funds.)

German cooperation for developing countries is concentrated in three key areas which are given priority in the respective partner country. These areas are:

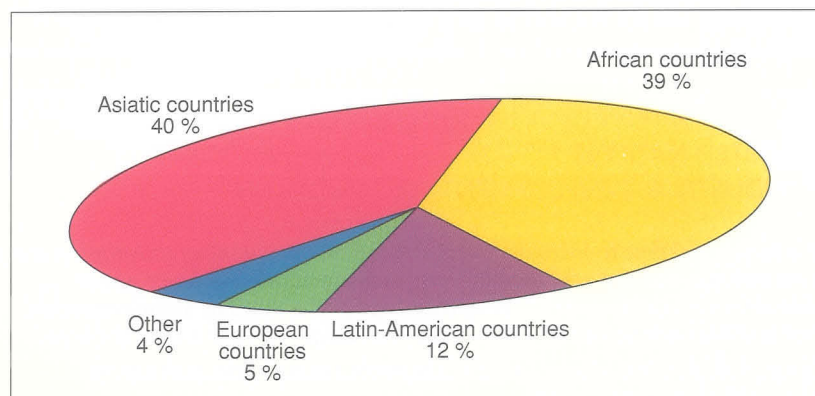
- 1) Fighting poverty and its causes;
- 2) Promoting education, particularly basic education and professional qualification;
- 3) Environmental protection – maintaining the basis of life.

- 3) Environmental protection – maintaining the basis of life.

The promotion of private entrepreneurial initiative is also a field of activity ranking high on the list. In this connection, legal metrology has an important role to play as part of the technical and economic infrastructure to which standardization, testing, and quality assurance also belong.

In the past, a number of bilateral projects for the advancement of legal metrology have been financed. Examples of this activity include projects planned with Argentina, Brazil, and India and this year, two more have been added: one in Turkey and the other in Thailand.

Legal metrology has important functions to fulfill in the fields of



Regional distribution of funds allocated by the German Federal Ministry for Economic Cooperation and Development for building cooperation in developing countries.

consumer, health, and environmental protection. It is of great significance in fair trading, also across national borders. It creates confidence in consumers who, thanks to verified measuring equipment, receive the equivalent value in goods for their money. Achieving these conditions and safeguarding them in developing countries is a vital economic and sociopolitical concern.

In this respect, the work of legal metrology is extremely important. There are high expectations that through your work, the situation of the people in the Third World will be improved. In the past, we have been able to help you to achieve this aim.

In addition to the projects already mentioned with individual coun-

tries (most of whom are members of OIML) through seminars and workshops, some of them in cooperation with OIML, it has been possible to give considerable impetus to the building up of structures for legal metrology. I shall mention only two – the seminars on weighing technology held in 1991, 1992, and 1993, each with 20 participants from a total of 49 countries - and the workshops on medical measuring equipment in 1991 and 1992 with a total of 40 participants from 25 countries.

These events were initiated by the PTB and successfully prepared and implemented together with representatives of the Bureau International de Métrologie Légale and the German Academy of Metrology in Munich.

Evaluations of these events have shown that they were judged by the participants to be extremely beneficial and effective, providing a stimulus for positive development in industries and other fields.

We all know that development is a process that must be continuously maintained both by institutions and individual activity. The PTB has therefore applied to the BMZ for a continuation of the support for such programs, and BMZ is presently examining this application.

I sincerely hope that even if stricter criteria are applied, this project will be approved, thus making it possible for your valuable work to be continued.

Thank you for your attention. ■



Discussions of the OIML Development Council Meeting which was held in Berlin in conjunction with the 28th CIML Meeting (see pp. 49–50). Pictured from left to right: Prof. G. Sauerbrey, Director of PTB, Berlin; M. Benkirane, President of the Council; and A. Vichenkov, Assistant Director of BIML.



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

...we think it is very important to increase all efforts to assist developing countries in the field of legal metrology. You are well aware, from your previous experience about UNIDO's specialization in assisting developing countries in the fields of Standardization, Quality Control and Metrology, out of which legal metrology is a very important area.

...we are very interested in the ideas and new approaches in assisting developing countries in the field of legal metrology.

Excerpts from a letter written by the Director of the Industrial Institutions and Services Division of UNIDO, M.H.A. Hamdy, and presented at the OIML Development Council Meeting in Berlin, 30 Sep.–1 Oct. 1993.

**XIII IMEKO
WORLD CONGRESS**
INTERNATIONAL MEASUREMENT
CONFEDERATION



**FROM
MEASUREMENT
TO INNOVATION**

SEPTEMBER 5 - 9, 1994
Lingotto Centro Congressi
Torino (Italy)

Exchanging experience

WORKSHOP ON THE KOREAN NATIONAL STANDARDS SYSTEM

A report given to the OIML Development Council by **S. LEE**, Korea Research Institute of Standards and Science

The establishment of an effective national standards system is a prerequisite to facilitating the advancement of the scientific and technical basis of a country.

One can hardly expect to make industrial and economic growth possible without widespread adoption and efficient application of the national standards system in industrial sectors. The provisions of the national standards system and a satisfactory calibration scheme are essential to assuring the quality of products. When it comes to international trade, confidence in the marketplace depends on the correctness of measurements based on a uniform and generally agreed-upon standards system.

Most of the industrialized countries are well-equipped with a metrological infrastructure in which the national metrology institutes play a key role. In order to meet an increasing demand of precision measurements and quality products, the Korea Standards Research Institute (KSRI) was founded in 1975. It was renamed Korea Research Institute of Standards and Science (KRISS) a couple of years



The Rep. of Korea delegation at the 28th CIML Meeting: S. Lee, KRISS, surrounded by C. Paik and Y. Kim, CIML Member.

ago, representing its expanded assignments in metrology and basic science.

Much like the national metrology institutes of other countries, KRISS has been mainly responsible for maintaining and improving the national standards system in Korea, and disseminating it to the industries and the general public. Ever since its establishment, KRISS has devoted itself to research and development activities on measurement standards and precision technology. And now, KRISS is in a position to support the Korean industries in such ways as the calibration of precision instruments and the provision of technical ad-

vice, information, and training programs.

THE BEGINNING OF A TRADITION

A workshop on the national standards system in Korea

With a view to sharing its experience with other countries, KRISS asked the Korean government to finance an international workshop on the national standards system. The proposal was accepted, and the first workshop on the Role of the

National Standards System was held at KRISS in 1983.

Fifteen participants from seven countries (mostly in Asia) attended the workshop and ever since, the workshop has been held annually at KRISS. Generally, about 13 foreign participants take part in the workshop from abroad: the past 11 workshops were attended by a total of 141 participants from 43 different countries.

A DIVERSE PROGRAM

The two-week program of the workshop consists of lectures, in-laboratory practical training, and industrial visits. Past workshops have covered technical fields such as length, mass, electricity, temperature, humidity, and acoustics.

During the workshop, the participants have a chance to understand the national standards system of Korea and to become acquainted with measurement techniques in selected measurement fields. There is also an opportunity for the participants to introduce and learn the standards systems of the various countries represented.

The Korean government provides roundtrip transportation and a reasonable living allowance for the participants during the whole period of the workshop. Looking back on past gatherings, the workshop at KRISS seems to have contributed to promoting technical cooperation among the participating countries.

STRIVING FOR MORE INTERNATIONAL PARTICIPATION

It should be pointed out that standards and measurement technology

is characterized by the need for a more vast international cooperation than any other scientific and technical discipline. In this context, the regional workshop should be encouraged to encompass the participation by a growing number of countries.

KRISS has been asking Korean government for additional financial support for the workshop so that the opportunity may be given to more people to participate in the workshop. These requests, however, have not been so successful due to the limited funds available.

International organizations such as OIML are more than welcome to contribute to the regional metrology program. KRISS and the Korean government would be pleased to co-sponsor the workshop with such organizations, and thus provide increasing opportunities for more countries (especially developing countries) to share their experience in metrology. To give an example, last year's workshop at KRISS was organized by KRISS in cooperation with the Asia/Pacific Metrology Programme (APMP). It was co-sponsored by the Korean government acting through the Korea International Cooperation Agency (KOICA), the United Nations Economic and Social Commission for Asia and Pacific (ESCAP), and the Physikalisch-Technische Bundesanstalt (PTB) of Germany. The participation of 20 people made it the most successful event ever held.

INCREASING AWARENESS OF THE GLOBAL IMPORTANCE OF METROLOGY

The benefits we can obtain from metrology are not well-known by government officials and the pub-

lic, especially in the case of developing countries. Most of the national metrology institutes are non-profit organizations and they are supported by government resources for their operation; however, it is not easy to find the resources necessary to expand their work domains.

Generally, this is due to the lack of knowledge that the economic benefits of investment in metrology far exceed the costs associated with this investment. This is an obstacle faced by every metrology institute throughout the world today and the solution to this problem is far beyond the capacity of the individual efforts of a metrologist or of an organization. This obstacle may be overcome by cooperative efforts at the regional and international levels.

Here I would emphasize that international bodies engaged in metrology are invited to work more and more closely with regional bodies by giving attention and contribution to their activities. This can lead people and governments toward a better awareness of the extent to which metrology is important for the national and regional welfare.

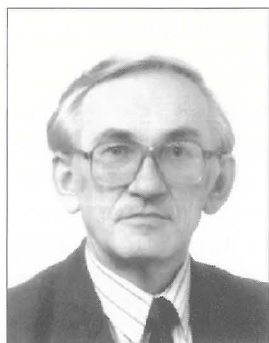
I believe this type of international cooperation would surely help promote the harmonized development of measurement standards and precision techniques throughout the world. In the long run, it would also contribute to achieving a healthy environment in the global marketplaces. ■

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Measurement uniformity

RUSSIAN METROLOGY UNDER THE NEW LEGISLATION

L. K. ISSAEV, Vice-President, Gosstandart of Russia and CIML Member for the Russian Federation



THE EXTENT OF METROLOGY IN THE RUSSIAN FEDERATION

At all times in the past, metrology in Russia was of State concern as shown in the referenced chronology [1]. The first scientific body in the field of metrology was established by law (Depot of Standard Weights and Measures) in 1842 in St. Petersburg.

Now, there are more than one billion measuring instruments and devices, as well as many measurement systems in the country. For verification and calibration purposes, there are more than 9 million working measurement standards and 500 reference measurement standards traceable to 117 State primary measurement standards. Many of the 7 000 types of certified reference materials approved at the State level are used for verification and calibration. The assurance of uniformity of

measurement is supported by 2 600 technical documents, including approximately 500 standards.

Throughout the Russian Federation, there are 10 metrological research institutions with their State measurement standards and 100 weights and measures laboratories within the territorial bodies of the Gosstandart of Russia.

The territorial bodies are responsible for the supervision of a product's compliance with the mandatory requirements of standards, as well as for regional metrological supervision and control with the help of the State Inspectors. These institutions and territorial laboratories represent the State Metrology Service; in addition, more than 30 000 enterprises and organizations have their own metrology services.

The following text describes the legislative, executive, and supervisory metrological functions that now fall under the new law on the assurance of measurement uniformity in the Russian Federation. Extracts from the law are presented (unofficial translation from Russian).

A FOUNDATION FOR ASSURING MEASUREMENT UNIFORMITY

In accordance with the Constitution of the Russian Federation, all State measurement standards,

System of Units, and Time Scale are subjects of the Federal Competence. In April 1993, a law on the assurance of measurement uniformity [2] passed through the Russian Parliament and was adopted by the President.

This law establishes the legal basis for the assurance of measurement uniformity in the Russian Federation, regulates the relations between the State administrative bodies and persons and juridical bodies concerning activity of production, use, repairs, sale, and importation of measuring instruments and also aims to protect citizens from the negative consequences of incorrect measurement results.

COMPONENTS AND CONCEPTS

The new law includes the following main sections:

- General clauses
- Units of measurement, measuring instruments, and measurement processes
- Metrological services
- State metrological control and supervision
- Calibration and certification of measuring instruments
- Provisions for violations of the law
- Financing the assurance of measurement uniformity

In the new law, the following main definitions apply:

Measurement uniformity

The measurement conditions reached when results of measurement are expressed in legal units and when measurement errors do not exceed specified limits within a specified probability.

Metrological service

All activities aimed at assuring measurement uniformity.

Certificate of type approval of a measuring instrument

A document issued by an authorized State body attesting that a given type of measuring instrument meets the established requirements and has been approved in accordance with the rules provided by the current legislation.

Accreditation for the right to perform the verification of measuring instruments

Official recognition by an authorized state body of the right to carry out the verification.

RESPONSIBILITIES OF THE GOSSTANDART OF RUSSIA

State administration of the activities related to the assurance of measurement uniformity in the Russian Federation is carried out by the Committee of the Russian Federation for Standardization, Metrology, and Certification (the Gosstandart of Russia). These responsibilities include the following:

- Inter-regional and interbranch coordination of activities for providing measurement uniformity;
- Submission of proposals to the Government concerning permitted units of measurements;
- Establishment of regulations for the production, approval, conser-

vation, and application of measurement standards;

- Establishment of principal metrological requirements for measuring instruments, methods of measurement, and measurement results;
- Execution of State metrological control and supervision;
- Control of the observance of international treaties concerning the recognition of test and verification results for measuring instruments;
- Administration of the activities to be carried out by the State metrological service and other State services concerned with the assurance of measurement uniformity;
- Participation in the activities of international organizations concerned with the assurance of measurement uniformity.

In compliance with this law and other legislative acts of the Russian Federation, the Gosstandart of Russia shall approve normative documents on the assurance of measurement uniformity; these documents establish the legally binding metrological regulations and norms in the territories of the Russian Federation.

The International System of Units, approved by the General Conference for Weights and Measures, and recommended by the International Organization of Legal Metrology, is admitted for use in the Russian Federation.

Characteristics and parameters of products for exportation, including measuring instruments, may be expressed in units of measurement that are established by the customer.

The State measurement standards are the exclusive property of the government and are subject to approval and supervision by the Gosstandart of Russia.

METROLOGICAL SERVICE

The State metrological service is under the authority of the Gosstandart of Russia and includes State scientific metrological centres and State metrological service bodies of the Republics that are part of the Russian Federation, autonomous regions and districts, territories, and cities of Moscow and St. Petersburg.

The Gosstandart of Russia is also in charge of the administration of the State service of time and frequency and determination of the earth's revolution parameters (GSVCH), the State service of reference materials (GSSO) and the State service of standard reference data on physical constants and properties of substances and materials (GSSSD).

The State scientific metrological centres are responsible for development, improvement, maintenance, and application of State measurement standards, as well as for development of standards on the assurance of measurement uniformity. The State metrological service bodies shall execute state metrological control and supervision to check the observance of metrological regulations and standards in various domains (see Table 1).

TYPE APPROVAL

In the areas covered by the State metrological control and supervision, measuring instruments are subject to mandatory testing with a view to their type approval.

Decisions concerning measuring instrument type approvals shall be made by the Gosstandart and attested by a certificate of type approval whose validity period shall

be fixed at the time of its issue. Type approvals shall be recorded in the State register of measuring instruments kept by the Gosstandart.

In order for measuring instruments to receive type approvals, testing shall be conducted by the scientific metrological centres of the Gosstandart (accredited by Gosstandart as State centres for testing measuring instruments). The Gosstandart of Russia may authorize other specialized organizations to carry out the functions of state accredited test centres for measuring instruments.

To perform testing, samples of measuring instruments accompanied by corresponding normative and operational documents shall be furnished. The compliance of measuring instruments with national type approvals in the territories of the Russian Federation shall be carried out by the State metrological service bodies at the location of the manufacturer or user of the instrument.

An authorized mark shall be applied to approved measuring instruments and operational documentation and information on type approvals shall be printed in the official publications of the Gosstandart of Russia.

VERIFICATION

Measuring instruments subject to State metrological control and supervision shall be verified by the State metrological service bodies during their production or repair, importation, and use. Only verified measuring instruments shall be allowed for sale or for rent. The lists of the measuring instruments that must be verified shall be approved by the Gosstandart of Russia.

EXAMPLES OF ACTIVITIES THAT ARE SUBJECT TO METROLOGICAL CONTROL IN THE RUSSIAN FEDERATION

- ▶ Health services
- ▶ Environmental protection
- ▶ Assurance of labour safety
- ▶ Commercial operations and payments between buyer and seller
- ▶ State accounting
- ▶ Assurance of State defense
- ▶ Geodetic and hydrometeorological activities
- ▶ Bank, taxation, customs, and postal operations
- ▶ Manufacture of products supplied under contracts to satisfy State needs in accordance with the Russian Federation legislation
- ▶ Test and inspection of product quality to determine compliance with the mandatory requirements of the Russian Federation standards
- ▶ Mandatory certification of products and services
- ▶ Measurements performed on the basis of mandates by juridical and State executive bodies
- ▶ Registration of national and international sports records

Table 1 Activities that are subject to the metrological control and supervision by the State Metrological Service bodies in the Russian Federation.

SUPERVISION

The State metrological supervision of commercial operations shall be assured by the Gosstandart of Russia in accordance with the legislation of the Russian Federation. The State metrological supervision is also in charge of packaged goods, including controls during packaging and commercialization.

The State metrological control and supervision shall be accomplished by officials of the Gosstandart of Russia, referred to as state inspectors for the assurance of measurement uniformity. These inspectors are responsible for duly fulfilling their official obligations in keeping with the legislation of the Russian Federation.

CALIBRATION AND CERTIFICATION

Measuring instruments that are not subject to verification may be subject to calibration during their production or repair, importation, sale, rent, and use; this shall be carried out by metrological services of persons or juridical bodies using measurement standards traceable to the State measurement standards.

Calibration results for measuring instruments shall be indicated by stamping the marks onto the measuring instruments or by the issue of a certificate of calibration. The calibration activity must be controlled by the State scientific metrological centres or State metrological service bodies. Voluntary certification

of measuring instruments shall be carried out in compliance with the legislative acts of the Russian Federation.

FINANCING

The following are subject to mandatory State financing:

- Development, improvement, maintenance and use of state measurement standards;
- Fundamental research in metrology;
- Activities performed by the GSVCH, GSSO and GSSSD;
- Maintenance, acquisition, and development of equipment necessary for the State metrological service bodies;
- Development of standards on the assurance of measurement uniformity (approved by the Gosstandart of Russia);
- Work related to State metrological supervision.

When developing federal or other State programs that shall be financed fully or partly by the budgeted funds of the Russian Federation, clauses on metrological assurance shall be included in such programs.

BEYOND THE FRONTIERS

The Prime-Ministers of the Member States of the Community of Independent States (CIS) signed the "Agreement on coordinated policy in the fields of Standardization, Metrology and Certification" on March 13, 1992. Through this agreement, members of the CIS have obtained essential advantages for their producers and for mutual trade in a common economic space.

The Agreement accords each participant independence in its activity and promotes the development of national documentation. The Interstate Council on Standardization, Metrology and Certification (IC) was established in accordance with the Agreement and it has already held four meetings (in Russia, Uzbekistan, Belarus, and Moldova).

The IC has adopted new agreements concerning activities for certified reference materials, standard reference data, mutual recognition of test, verification, and calibration results, type approvals, and the accreditation of laboratories for testing, verification, and calibration. For example, during 1990-1991, 19 independent test centres were accredited in the USSR, 14 of which were in the Russian Federation; these centres are still active.

At the intergovernmental level, it was agreed to recognize and to maintain use of the previous State Standards (norms) of the USSR (GOST) and State Measurement Standards of USSR (etalons); it was also decided to maintain the uniformity of the measurements for time and frequency.

In 1991, the majority of East European countries (ex-CMEA members) set up a new metrological body known as COOMET, with Dr Z. Referowski (Poland) elected as its first President. The activities of WECC, WELMEC, EOTC and EUROMET have a strong influence on COOMET and the active position of the latter is very important for the economical and technical relations between its participating countries.

Gosstandart of Russia, as the successor to the Gosstandart of the USSR, actively participates in international bodies such as the Metric Convention, OIML, ISO, and IEC. ■

REFERENCES

- [1] Measurement Techniques, Vol. 35, No. 3-5, (March, April, May) 1992.
- [2] Izmeritelnaya Tekhnika, No. 7, pp. 3-9, 1993.

Editorial note: Some additional views by Dr Issaev concerning various aspects of metrology and their interrelation will be published in the next issue of the OIML Bulletin.

International cooperation Coopération internationale

OIML PARTICIPATES IN THE
DEVELOPMENT OF TWO
IMPORTANT PUBLICATIONS

L'OIML PARTICIPE AU
DEVELOPPEMENT DE DEUX
PUBLICATIONS IMPORTANTES

Now available: The second edition of the *International Vocabulary of Basic and General Terms in Metrology (VIM)* and the *Guide to the Expression of Uncertainty in Measurement (Guide)*. The international collaboration between experts representing seven organizations – BIPM, IEC, ISO, IFCC, IUPAC, IUPAP, and OIML – produced these long-awaited documents which will no doubt serve as a valuable reference tool for metrologists.

The VIM and the Guide were published by ISO on behalf of the author organizations whose work was carried out in the framework of an ISO technical advisory group, ISO/TAG 4. Copies may be obtained from BIPM with prices set at 200 FRF for the VIM and 300 FRF for the Guide (postage not included) as well as from the other participating organizations.

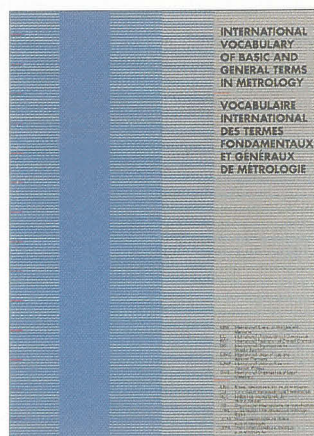
Sont maintenant disponibles la seconde édition du *Vocabulaire International des termes fondamentaux et généraux de métrologie (VIM)* et le *Guide to the Expression of Uncertainty in Measurement (Guide)*. Une collaboration internationale entre des experts représentant sept organisations – BIPM, CEI, ISO, IFCC, IUPAC, IUPAP et OIML – a produit ces documents que l'on attendait depuis longtemps et qui constitueront certainement des outils de référence de grande valeur pour les métrologistes.

Le VIM et le Guide ont été publiés par l'ISO au nom des organisations-auteurs dont le travail s'est déroulé dans le cadre d'un groupe technique consultatif de l'ISO, ISO/TAG 4. Des exemplaires peuvent être obtenus auprès du BIPM aux prix de 200 FRF pour le VIM et 300 FRF pour le Guide (port non compris) ainsi qu'auprès des autres organisations concernées.

THE NEW AND IMPROVED VIM

The VIM is already well-known by all metrologists since its first edition (1984) which was based on an OIML document "Vocabulary of Legal Metrology" and the "International Electrotechnical Vocabulary" published by the IEC.

With an aim to complete and improve the general terminology used in metrology, the experts strived to take into consideration the most recent scientific and technical developments in the field of metrology. New studies on the uncertainties of measurement were also given careful attention and the fruits of this labor are contained in this new edition.



The VIM: Bilingual French-English

UN VIM NOUVEAU ET AMELIORE

Le VIM est déjà bien connu de tous les métrologistes depuis sa première édition (1984). Elle était basée sur un document OIML "Vocabulaire de Métrologie Légale" et le "Vocabulaire Electrotechnique International" publié par la CEI.

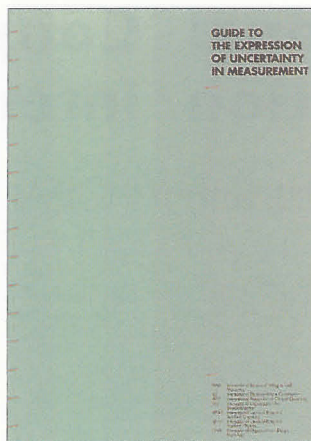
Afin de compléter et d'améliorer la terminologie à utiliser en métrologie, les experts se sont efforcés de tenir compte des plus récents développements

scientifiques et techniques dans ce domaine. Les études nouvelles sur les incertitudes de mesure ont reçu toute l'attention nécessaire et les fruits de ce travail sont présentés dans une nouvelle édition.

THE COMPLEXITY OF UNCERTAINTY

The *Guide to the Expression of Uncertainty in Measurement* was based on a resolution by the *Comité International des Poids et Mesures* (1980) which established the combination rules for two types of uncertainties: those for which one evaluates the numerical value statistically and those for which one applies other methods.

Some difficulties were encountered when developing this Guide: in addition to the complexity of the subject itself, the authors were confronted with issues such as the opposition expressed in certain statistical spheres and choices concerning the theoretical and practical nature of the document.



The Guide: Available in English only (French version expected towards the beginning of 1994).

LE PROBLEME COMPLEXE DES INCERTITUDES

Le *Guide to the Expression of Uncertainty in Measurement* résulte d'une résolution du Comité International des Poids et Mesures (1980) qui a établi les règles de combinaison des deux types d'incertitudes: celles dont on évalue les valeurs numériques au moyen de méthodes statistiques et celles pour lesquelles on applique d'autres méthodes.

Le développement de ce Guide s'est heurté à certaines difficultés: outre la complexité du sujet lui-même, les auteurs ont dû faire face à d'autres questions, comme une opposition exprimée par les milieux de la statistique et les choix entre la nature théorique et/ou pratique du document.

WHEN IN DOUBT, CONSULT THE GUIDE

A uniform and metrologically sound system for expressing measurement uncertainties is necessary at international level in that it permits valid comparisons of the metrological capabilities of the national primary and secondary metrology laboratories, and eliminates the risks of confusion concerning the degree of accuracy of any given measurement. Such a system contributes to the establishment of a climate of confidence in measurement and test results which is necessary for their international recognition.

Therefore, the application of the Guide is not limited to purely scientific metrology but extends to all fields of calibration and testing. Anyone concerned by these matters will find in the Guide a solution to their problems of expressing uncertainties.

This Guide is also destined for those who establish metrological specifications. The development of OIML Recommendations is a good example of work that can be improved and made easier by the Guide.

EN CAS DE DOUTE, CONSULTER LE GUIDE

Un système d'expression des incertitudes de mesure, uniforme et fondé sur de bonnes bases métrologiques, est nécessaire au niveau international: il permet des comparaisons valables des possibilités métrologiques des laboratoires nationaux primaires et secondaires de métrologie, et élimine les risques de confusion en ce qui concerne le degré d'exactitude de tout mesurage. Dans ce sens il contribue à l'établissement d'un climat de confiance sur les résultats de mesures et d'essais, nécessaire pour leur reconnaissance internationale.

Donc, l'utilisation du Guide n'est pas limitée à la métrologie scientifique pure mais s'étend à tous les domaines des étalonnages et des essais. Ceux qui sont concernés par ces questions trouveront dans le Guide une solution à leurs problèmes d'expression des incertitudes.

Le Guide est également destiné à tous ceux qui établissent des spécifications métrologiques. Le développement des Recommandations OIML est un bon exemple du travail qui peut être amélioré et facilité par le Guide.

ADDITIONAL CONSULTATION

ISO/TAG 4 is aware of the difficulties associated with the Guide's application and its experts are willing to assist metrologists in this task. Dr W. Emerson, one of the most active experts in the working groups and former Consulting Engineer of BIML, is preparing an article containing useful advice on the subject for OIML technical bodies (to be published in the OIML Bulletin). ■

UNE SOURCE DE CONSEILS

ISO/TAG 4 est conscient des difficultés de mise en application du Guide et les experts de ce groupe sont prêts à aider les métrologistes dans ce travail. Dr W. Emerson, l'un des plus actifs experts des groupes de travail et ancien Ingénieur Consultant au BIML, prépare un article contenant des conseils utiles sur ce sujet à l'intention des organes techniques de l'OIML (publication prévue dans le Bulletin OIML). ■

Interview

The Editors of the OIML Bulletin asked Dr S. Bennett, Chairman of WELMEC, to express his views on the WELMEC Type Approval Agreement.* Following is the interview between BIML and Dr Bennett conducted in Berlin, October 1993.

BIML: The Western European Legal Metrology Cooperation (WELMEC) Committee held a meeting in Borås, Sweden, 27–28 September 1993. Mr Bennett, as Chairman of this organization, how would you describe the level of cooperation in Europe in the field of legal metrology?

S. Bennett: In one word, good; the creation of WELMEC has provided the opportunity to cooperate in quite a number of areas in the field of legal metrology.

BIML: During this WELMEC meeting, the Type Approval Agreement was signed by Belgium, Denmark, Iceland, Portugal, Sweden, and the United Kingdom. Could you please comment on the importance of this agreement?

S. Bennett: This agreement is important for WELMEC because it represents a willingness on the part of the members of WELMEC to go forward into some firm agreement and I think it is an important step

for European cooperation as well, as we agree to cooperate in recognizing tests and type approvals carried out in other Western European countries.

BIML: Italy and Luxemburg have just signed the Memorandum of Understanding and joined WELMEC. How many countries now participate in WELMEC and what are the prospects for further signatories of the Type Approval Agreement?

S. Bennett: At present, there are 18 countries participating in WELMEC; I believe the majority of the 18 countries will sign the Agreement and in fact, I am hopeful that 15 or 16 will have signed by the end of this year.

BIML: Is this an agreement based on national type approvals?

S. Bennett: No; it is in fact an agreement to issue national type approvals on the basis of statements of conformity with OIML Recommendations.

BIML: The EC type approval and enforcement of an EC horizontal Directive on measuring instruments is not to be expected in the near future; the Type Approval Agreement is therefore a step

towards the construction of the European single market for measuring instruments. For which instruments?

S. Bennett: It is true that one of the prime reasons for this Agreement is to create a single market for measuring instruments in Europe ahead of the measuring instruments Directive; the Agreement initially refers to automatic weighing instruments and I have no doubt that some other categories of instruments will be added in the near future as soon as the relevant Recommendations and supporting test reports are ready.

BIML: For the signatories of the Type Approval Agreement, the basis of the national type approval will be a national type approval and a statement of conformity with the relevant OIML Recommendations.

Why not only a statement of conformity with OIML Recommendations?

S. Bennett: The Agreement is in two parts, and a little is to be said about the philosophy of the Agreement and the need to develop confidence between the members. The first part is the statement of



Dr S. Bennett, WELMEC Chairman, signs the WELMEC Type Approval Agreement in Borås, Sweden in September 1993.

* A recognition agreement for type approvals issued within Europe for automatic weighing instruments.

conformity with the OIML Recommendation which may be an OIML certificate or a statement that ensures that the instrument in question complies fully with the OIML Recommendation; the second part of the Agreement provides that the country issuing this statement of conformity with the OIML Recommendation also grants a national type approval; in this way, it is taking legal responsibility for the instrument; it is not just a question of issuing a ticket to the manufacturer to sell equipment in other countries.

BIML: In this context, it is expressed in the Agreement that "tests of conformity will be performed in the laboratory(ies) designated by the body granting the original type approval (point 8). The laboratories chosen must observe the principles established in international guidelines on testing (in particular EN 45001). Is this sufficient or do the laboratories need a formal accreditation?

S. Bennett: The Agreement only establishes the principles that should be used in selecting the laboratory that will carry out the testing; it is up to each country to decide whether to use some formal accreditation for these laboratories. The confidence comes from the fact that the country granting the first national type approval will, on its own responsibility, satisfy itself that the testing laboratories were adequate for the task.

BIML: With regard to accreditation problems, it is said by European experts that the quality level

reached by the bodies or manufacturers that have been accredited for quality assurance is not the same from one to another. What can WELMEC do to change this situation? Are the European standards EN 45000 series, and EN 29000 series too general with regard to legal metrology?

S. Bennett: I am not sure whether WELMEC can directly change the situation because it must not be forgotten that WELMEC is a voluntary cooperation. This is an issue which has been exercising WELMEC.

One of the WELMEC working groups (WG 4) has been looking particularly at the manner in which the EN 45000 series of standards should be applied to the bodies carrying out type approval and verification and also the way EN 29000 standards are applied to manufacturers. Some recommendations on how standards should be applied have been made; I think that in the future, we will be looking at the uniformity of the application in Europe.

BIML: What is the future of the WELMEC system and the OIML Certificate system?

S. Bennett: Complete synergy; the reason that the WELMEC Agreement refers to statements of conformity rather than OIML Certificates is that we would like to be able to use some of the Draft OIML Recommendations at the stage of postal agreement and before the formal adoption into the OIML Certificate Scheme; but once a statement of conformity of this

type has been issued under the WELMEC Agreement, it could at some future date be transformed into an OIML Certificate.

BIML: A type approval data base was proposed a few years ago; what is the stage of this work?

S. Bennett: The work is very much in progress; the data base demonstrator project will be commencing within the next few weeks.

BIML: One year has passed since the Directive 90/384/EC on nonautomatic weighing instruments came into force. What is your experience with this Directive at this point?

S. Bennett: I am not aware of any major problems; there have been some small differences in interpretation and application, but I think that, perhaps due to the links we have created in WELMEC, we are able to discuss the problems that arise and make the Directive work; manufacturers say that they are very pleased with the way it is working.

BIML: Are there any WELMEC documents expected in the near future?

S. Bennett: We hope to publish some guidelines soon on the application of the EN 45000 series of standards; there will also be a document on the application and interpretation of the EC Directive 90/384; this document is in preparation at the final draft stage and will be issued quite shortly. ■



TC 4

Measurement standards and calibration and verification devices

Secretariat: Slovakia

Technical committee 4 (formerly Pilot Secretariat SP 23) held its first meeting in Bratislava, Slovakia 13-17 September 1993 to discuss the future directions of the TC's work.

Chairman: L. Šutek, President of the Slovak Office of Standards, Metrology and Testing.

Participation: 21 delegates representing 9 P-members and 1 O-member; A. Vichenkov, Assistant Director of BIML.

MAIN POINTS

- ⇒ The original title of TC 4 was changed from "Calibration and verification devices" to "Measurement standards and calibration and verification devices."
- ⇒ TC 4 will assume responsibility for reviewing the OIML Documents prepared by SP 23: D 5, D 6, D 8, D 10, and D 23.

- ⇒ No subcommittee will be established for the time being, but three ad hoc working groups were created:

WG 1 For finalizing the draft "Principles for the selection and expression of metrological characteristics of standards and devices used for calibration and verification".

WG 2 For the future revision of D 23 "Principles of the metrological control of equipments used for verification".

WG 3 For the analysis and preparation of the revision of D 10 "Recalibration intervals of measurement standards and calibration devices".

- ⇒ A recommendation was made for TC 4 to review its scope with due regard for accreditation and certification in metrology, and to establish close co-operation with OIML TC 3 "Metrological control".

- ⇒ Visits to the laboratories of the Slovak Institute of Metrology and to the monitoring and control system of the Gabčíkovo hydroelectric power station near Bratislava demonstrated the modern level of metrology in Slovakia which will serve as a basis for the activities of TC 4.

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TC 4

Etalons de mesure et dispositifs d'étalonnage et de vérification

Secrétariat:
Slovaquie

Le comité technique 4 (précédemment secrétariat pilote SP 23) a tenu sa première réunion à Bratislava, Slovaquie du 13 au 17 septembre 1993 pour discuter de l'orientation future de ses travaux.

Président: L. Šutek, Président de l'Office Slovaque de Normalisation, de Métrologie et d'Essais.

Participation: 21 délégués représentant 9 membres-P et 1 membre-O; A. Vichenkov, Adjoint au Directeur du BIML.

POINTS PRINCIPAUX

⇒ Modification de l'ancien titre du TC 4 de "Dispositifs d'étalonnage et de vérification" en "Étalons, dispositifs d'étalonnage et de vérification".

⇒ Le TC 4 est chargé de la révision des Documents OIML qui avaient été préparés par le SP 23: D 5, D 6, D 8, D 10 et D 23.

⇒ Il a été décidé de ne pas établir de sous-comité mais de créer trois groupes de travail ad hoc:

WG 1 Pour terminer le projet "Principes du choix et de l'expression des caractéristiques métrologiques des étalons et dispositifs utilisés pour les étalonnages et vérifications"

WG 2 En vue de la prochaine révision du D 23 "Principes du contrôle métrologique des équipements utilisés pour les vérifications"

WG 3 Pour étudier et préparer la révision du D 10 "Intervalle de réétalonnage des étalons et dispositifs d'étalonnage"

⇒ Une recommandation a été faite au TC 4 de revoir son domaine d'application étant donné l'introduction des processus d'accréditation et de certification en métrologie et de coopérer étroitement avec le TC 3 de l'OIML "Contrôle métrologique".

⇒ Les visites des laboratoires de l'Institut Métrologique Slo-

vaque et du système de surveillance et de signalisation à la centrale hydro-électrique de Gabčíkovo près de Bratislava ont démontré le niveau moderne de la métrologie en Slovaquie, qui servira au mieux le travail du TC 4.

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TC 7/SC 4

Measuring instruments for road traffic

Secretariat:
United Kingdom

The technical subcommittee TC 7/SC 4 (former Pilot Secretariat SP 10-Sr 2: Poland) held its first meeting at BIML, Paris 25-26 Oct 1993.

Chairman: Ph. Degavre, BIML, replacing Mr Z. Referowski, Vice-President, Polish Committee for Standardization, Poland.

Participation: 11 delegates representing 7 P-members; Ph. Degavre, Assistant Director of BIML.

MAIN POINTS

⇒ A 2nd pre-draft revision of OIML R 55 (speedometers, odometers and chronotachographs for motor vehicles) was presented together with comments received by the former secretariat (Poland); amendments were proposed by the European delegates in order to take into consideration the new technologies that will appear in the near future and that will most likely be mandatory in the European common market; all changes to the text were unanimously accepted.

⇒ An agreement was made to ensure the transferral of work between the former and the new secretariats. As the new secretariat of this technical subcommittee, the UK will finalize and circulate a draft for comments and vote by the end of 1993; a final version of the draft will be sent to BIML in February 1994 (BIML is responsible for the approval stage by CIML). This draft revision of OIML R 55 should be accepted by CIML during its next meeting in October 1994.

⇒ Testing procedures and test report formats are expected to be included soon as annexes to the revised Recommendation 55: the secretariat is charged to prepare these drafts in 1994.

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TC 7/SC 4

Instruments de mesure pour la circulation routière

Secrétariat:
Royaume-Uni

Le sous-comité technique TC 7/SC 4 (ancien secrétariat pilote SP 10-Sr 2: Pologne) a tenu sa première réunion au BIML, Paris les 25 et 26 octobre 1993.

Président: Ph. Degavre du BIML, remplaçant Z. Referowski, Vice-Président du Comité Polonais de Normalisation, Pologne.

Participation: 11 délégués représentant 7 membres-P; Ph. Degavre, Directeur Adjoint du BIML.

secrétariat de ce sous-comité technique, le Royaume-Uni terminera le projet et le fera circuler pour vote et commentaires avant fin 1993; une version finale sera envoyée au BIML en février 1994 (le BIML est en effet responsable de la procédure d'approbation par le CIML). Le projet de révision de la R 55 devrait être accepté par le CIML lors de sa prochaine réunion en octobre 1994.

⇒ Les procédures et les formulaires des rapports d'essais seront inclus plus tard sous forme d'annexes dans la Recommandation 55 révisée; le secrétariat est chargé de préparer ces projets en 1994.

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DEVELOPMENT COUNCIL

The OIML Development Council met in Berlin, 30 September-1 October 1993 in liaison with the 28th CIML meeting.

President: M. Benkirane, CIML Member of Morocco.

Official opening:

Prof. G. Sauerbrey, Director, PTB Berlin, Mr H. Fährnel, Ministry of Economic Cooperation and Development, Germany.

Participants: 28 delegates representing 14 countries (Australia, China, Cuba, Germany, Greece, Indonesia, Rep. of Korea, D.P.R. of Korea, Morocco, Romania, Russian Federation, Saudi Arabia, United Kingdom, Zambia), and three international organizations: IMEKO, APMP, CIMET. BIML: B. Athané, A. Vichenkov, K. French, E. Weber.

POINTS PRINCIPAUX

- ⇒ Un 2e avant-projet de révision de la Recommandation OIML R 55 (compteurs de vitesse, compteurs de distance et chronotachygraphes des véhicules automobiles) a été présenté avec les commentaires reçus par l'ancien secrétariat (Pologne); des modifications ont été proposées par les délégués européens afin de tenir compte des nouvelles technologies qui vont apparaître prochainement et qui seront très probablement obligatoires dans le marché commun européen; tous les amendements ont été approuvés à l'unanimité.
- ⇒ Un accord a été obtenu en vue du transfert des activités entre les ancien et nouveau secrétariats. En tant que nouveau



Celebrating the progress made during the OIML Development Council Meeting. Pictured from right to left: the President of the Council and Mrs Benkirane, and B. Arya from the Embassy of India in Berlin.

MAIN POINTS

⇒ A report by BIML on activities of the Development Council in 1992-1993 was approved by the Council. The Council took note of its last two consultative meetings concerning activities of developing countries which took place in Greece (November 1992) during the 9th International Conference of Legal Metrology and in Havana, Cuba (March 1993) in conjunction with the International Symposium "Metrology 93". Other activities included a training course for developing countries held in Germany in August 1993, and another course held in Cuba, in October 1993.

⇒ The activities of national, regional, and international organizations were reflected in presentations on behalf of the following bodies:

- IMEKO TC 11
Dr E. Seiler
- Korea Standards Research Institute (KRISS, Rep. of Korea)
Dr S. Lee
- Commonwealth Metrology Centre (CIMET, India)
Dr B. Mathur
- German Academy for Metrology (DAM)
Dr H. Wallerus

⇒ Letters sent to the Council from other international organizations such as UNIDO, UNCTAD/GATT, and ISO demonstrated the continued interest of these organizations in the pursuit of cooperation in the field of metrology and related subjects.

⇒ A draft work program for 1993-1995 was approved by the Council and endorsed by CIML. This program includes:

- *General guidelines on activities of national metrology services, management of human resources of different metrology bodies, creation of metrology specifications, planning for laboratories and their equipment, development of international cooperation and communication.*

- *The distribution of information on the Council's activities, updating training manuals and collecting relevant information pertaining to metrology education for all interested countries, updating brochures on the planning of metrology laboratories and their equipment, extension of contacts with relevant international and regional organizations;*

- *The establishment of two working groups to pursue development in training and the planning of laboratories and their equipment.*

- *The establishment of an ad hoc group charged with analyzing any implications that OIML's long-term policy may have on developing countries, and particularly those related to the scope of legal metrology, institutional structures, governmental role, and metrological legislation.*

⇒ BIML will study a proposal made by the Development Council concerning the possibility of organizing an international conference on metrology activities in developing countries in liaison with international, regional, and national bodies concerned.

⇒ M. Benkirane, CIML Member for Morocco, was re-elected as President of the Development Council for the period 1993-1995.

⇒ The next meeting of the Development Council will be held in October 1994 in Paris in conjunction with the 29th CIML meeting.

CONSEIL DE DEVELOPPEMENT

Le Conseil de Développement de l'OIML s'est réuni à Berlin les 30 septembre et 1er octobre 1993 en liaison avec la réunion du CIML.

Président: M. Benkirane, Membre du CIML pour le Maroc.

Ouverture officielle:

Prof. G. Sauerbrey, Directeur, PTB Berlin et M. H. Fähnel, Ministère de la Coopération Économique et du Développement, Allemagne.

Participants: 28 délégués représentant 14 pays (Australie, Chine, Cuba, Allemagne, Grèce, Indonésie, République de Corée, République Pop. Dém. de Corée, Maroc, Roumanie, Fédération de Russie, Arabie Saoudite, Royaume-Uni, Zambie, ainsi que trois organisations internationales: IMEKO, APMP, CIMET. BIML: B. Athané, A. Vichenkov, K. French, E. Weber.

POINTS PRINCIPAUX

⇒ Le rapport du BIML sur les activités du Conseil de Développement pour la période 1992-1993 a été approuvé par le Conseil. Le Conseil a pris note de ses deux réunions consultatives concernant les activités des pays en développement qui se sont tenues en Grèce (novembre 1992) pendant la 9e Conférence Internationale de Métrologie Légale et à La Hava-



Dr D. Stuck, Chef du Laboratoire Compteurs de Chaleur à la PTB, Berlin expliquant les procédures de mesure de débits à un groupe de visiteurs OIML.

ne, Cuba (mars 1993), en conjonction avec le Symposium International "Métrologie 93". D'autres activités comprenaient un cours de formation pour pays en développement, qui s'est tenu en Allemagne en août 1993, et un autre cours qui s'est tenu à Cuba en octobre 1993.

⇒ Les activités des organisations nationales, régionales et internationales ont été présentées dans les discours suivants:

- IMEKO TC 11
Dr E. Seiler
- Institut de la Recherche et Normalisation de Corée (KRISS, Rép. de Corée)
Dr S. Lee
- Centre de Métrologie du Commonwealth (CIMET, Inde)
Dr B. Mathur
- Académie Allemande pour la Métrologie (DAM)
Dr H. Wallerus

⇒ Des lettres adressées au Conseil par d'autres organisations comme l'ONUDI, le CNUCED/GATT et l'ISO, témoignent de l'intérêt constant de ces organisations à poursuivre la coopération dans le domaine de la métrologie et des sujets connexes.

⇒ Le programme d'action 1993-1995 a été approuvé par le Conseil et par le CIML. Ce programme comprend:

- Une réflexion générale au sujet des activités des services nationaux de métrologie, la gestion des ressources humaines des différents organismes de métrologie, le développement des spécifications métrologiques, la planification pour les laboratoires et leurs équipements et le développement de la coopération internationale et de la communication.
- La diffusion des informations relatives aux activités du

Conseil, la mise à jour des manuels de formation, la collecte et la mise à jour des informations concernant la formation en métrologie pour tous les pays intéressés, la mise à jour des brochures sur la planification pour les laboratoires de métrologie et leurs équipements, l'extension des contacts avec les institutions internationales et régionales concernées.

- La création de deux groupes de travail pour l'étude des questions concernant la formation et la planification des laboratoires et de leurs équipements.

- La création d'un groupe ad hoc chargé de l'analyse des implications que la politique à long terme de l'OIML peut avoir sur les pays en développement, particulièrement dans les domaines de la métrologie légale, des structures institutionnelles, du rôle des gouvernements et des législations métrologiques.

⇒ Le BIML étudiera une proposition du Conseil de développement en vue de l'organisation éventuelle d'une conférence internationale sur la métrologie dans les pays en développement en liaison avec les organismes internationaux, régionaux et nationaux concernés.

⇒ M. Benkirane, Membre CIML pour le Maroc, a été réélu Président du Conseil de Développement pour la période 1993-1995.

⇒ La prochaine réunion du Conseil de Développement se tiendra en octobre 1994 à Paris en conjonction avec la 29e réunion du CIML.

- L** As the headquarters for OIML, the Bureau International de Métrologie Légale (BIML) is responsible for various administrative and technical tasks.
- M**
- Following is a summary of BIML's activities from November 1992 through December 1993.
- B**

ADMINISTRATION

- **OIML Ninth International Conference of Legal Metrology (Greece, November 1992)**
Editorial work and distribution of the "Decisions and Resolutions" of the Conference and the preparation of the Minutes (to be distributed towards the beginning of 1994); implementation of the decisions and resolutions.
- **27th Meeting of the Comité International de Métrologie Légale (Greece, November 1992)**
Editorial work and distribution of the "Decisions and Resolutions" of the Committee meeting and its Minutes; implementation of the decisions and resolutions.
- Administrative work associated with CIML approval of various International Recommendations and Documents; publication and diffusion of all OIML documents.

TECHNICAL WORK

Directives for the technical work of OIML

- Editorial work and distribution of the *Directives for the technical work of OIML*, which explain the new OIML work methods and structures.
- Assisting Member States with the implementation of the Directives.

Establishment of new technical structures (TCs/SCs)

- Organization of the TC and SC structures in liaison with the secretariats, establishment of work programs, and coordination of the P- and O-membership.

Technical publications

- Editorial work, publication, and distribution of seven OIML International Recommendations (R 74, R 76-2 and Rs 104-108) and one International Document (D 23); preparation of new Recommendations for publication.

Seminars/Conferences

- Participation in the organization of a training course on weighing instruments in coordination with the PTB and the German Academy for Metrology (DAM) in Munich, August 1993.
- Representation at the 2nd International Symposium on metrological assurance (Metrologia 93) in Habana, June 1993.
- Participation in the *National Conference on Weights and Measures* (Kansas City, July 1993).
- Participation in a conference for *Flow Measurement for the Utilities* (Amsterdam, 4-5 November 1993).
- Representation at the CEN/CENELEC/ETSI Conference, *Standards at work in the European Marketplace* (Brussels, 30 Nov.-1 Dec. 1993).

THE OIML CERTIFICATE SYSTEM

- Registration of OIML certificates and diffusion of information about the System to various interested bodies.
- Consultations with ISO and IEC for future developments.

LONG-TERM POLICY OF OIML

- Participation in the elaboration of preliminary documents concerning OIML's long-term strategy.

COMMUNICATIONS

- Ensuring the exchange of information between OIML Member States, Corresponding Members and liaison Institutions.
- Development and distribution of a report on OIML's internal and external communications; implementation of proposals presented in the report.

- Study/intercomparisons of communication systems through visits to other bodies including ISO (Geneva), AFNOR (Paris), NWML (UK), and PTB (Germany).
- Creation of a new conception and layout for the Organisation's quarterly journal, the OIML Bulletin.
- Development and implementation of marketing strategies for expanding the Bulletin's readership.

OIML MEETINGS

- **Presidential Council** (Paris, February 1993)
Preparations and organization of the meeting.
- **The 28th CIML Meeting** (Berlin, October 1993)
Preparation of documents and arrangements for the meeting, in liaison with the German authorities.
- **Development Council** (Berlin, Sept.-Oct. 1993)
Preparation of documents and arrangements for the meeting in Berlin, in liaison with the Council Chairman and German authorities.
Note: Two preliminary meetings were held in Greece (November 1992) and in Cuba (March 1993). BIML was represented at these meetings.
- Participation in several OIML technical meetings: TC 13 (Oslo); TC 9/SC 2 (Teddington); TC 4 (Bratislava) and the organization of one technical meeting at BIML (TC 7/SC 5).

OTHER MEETINGS

- WELMEC (Brussels, January 1993, and Borås, September 1993)
- COOMET (Berlin, March 1993)
- ISO/DEVCO (Geneva, April 1993)
- ECE-UNO (Geneva, May 1993)
- ISO/TAG 4 (Geneva, June 1993)
- EUROMET (Torino, June 1993)

MAINTAINING LIAISONS WITH INTERNATIONAL INSTITUTIONS

- Commission of the European Communities (CEE)
- European Free Trade Association (EFTA)
- International Standardization Organization (ISO)
- International Electrotechnical Committee (IEC)
- Comité Européen de Normalisation (CEN)
- Comité Européen de Normalisation Electrotechnique (CENELEC)
- Western European Legal Metrology Cooperation (WELMEC)
- Metrological cooperation for Central and Eastern countries (COOMET)
- Economical Commission for Europe of the United Nations (ECE-UNO)
- and others

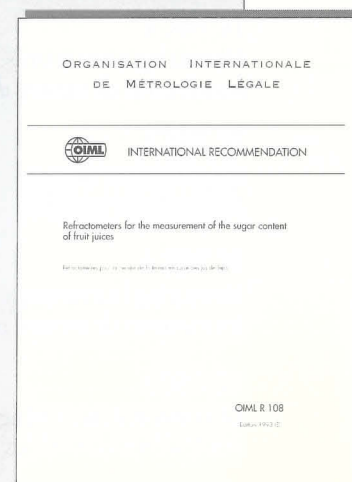
NEW PUBLICATIONS / NOUVELLES PUBLICATIONS

- R 74 Electronic weighing instruments (*second edition*)
Instruments de pesage électroniques (deuxième édition)
- R 107 Discontinuous totalising automatic weighing instruments (totalising hopper weighers)
Instruments de pesage totalisateurs discontinus à fonctionnement automatique
- R 108 Refractometers for the measurement of the sugar content of fruit juices
Réfractomètres pour la mesure de la teneur en sucre des jus de fruits
- D 23 Principles for the metrological control of devices used for verification
Principes du contrôle métrologique des équipements utilisés pour la vérification

These publications are available in French and English (see center section of the OIML Bulletin for price-list).

Ces publications sont disponibles en langues française et anglaise (voir prix dans le cahier central du Bulletin OIML).

To order a publication, please contact BIML / Pour commander une publication, contactez le BIML:
11, rue Turgot • 75009 Paris • France • Fax: 33 1 42 82 17 27



OIML TECHNICAL COMMITTEES/SUBCOMMITTEES COMITES TECHNIQUES/SOUS-COMITES DE L'OIML

TC 1 Terminology <i>Terminologie</i>	POLAND	TC 8/SC 1 Static volume measurement <i>Mesurage statique volumique</i>	FRANCE
TC 2 Units of measurement <i>Unités de mesure</i>	AUSTRIA	TC 8/SC 2 Static mass measurement <i>Mesurage statique massique</i>	AUSTRALIA
TC 3* Metrological control <i>Contrôle métrologique</i>	USA	TC 8/SC 3 Dynamic volume measurement (liquids other than water) <i>Mesurage dynamique volumique (liquides autres que l'eau)</i>	GERMANY
TC 4 Measurement standards and calibration and verification devices <i>Etalons de mesure et dispositifs d'étalonnage et de vérification</i>	SLOVAKIA	TC 8/SC 4 Dynamic mass measurement (liquids other than water) <i>Mesurage dynamique massique (liquides autres que l'eau)</i>	USA
TC 5 Electronic instruments <i>Instruments électroniques</i>	NETHERLANDS	TC 8/SC 5 Water meters <i>Compteurs d'eau</i>	UNITED KINGDOM
TC 6 Prepackaged products <i>Produits préemballés</i>	USA	TC 8/SC 6 Measurement of cryogenic liquids <i>Mesurage des liquides cryogéniques</i>	USA
TC 7 Measuring instruments for length and associated quantities <i>Instruments de mesure des longueurs et grandeurs associées</i>	UNITED KINGDOM	TC 8/SC 7 Gas metering <i>Mesurage des gaz</i>	BELGIUM
TC 7/SC 1 Measuring instruments for length <i>Instruments de mesure des longueurs</i>	RUSSIAN FEDERATION	TC 8/SC 8 Gas meters <i>Compteurs de gaz</i>	NETHERLANDS
TC 7/SC 3 Measurement of areas <i>Mesurage des surfaces</i>	HUNGARY	TC 9 Instruments for measuring mass and density <i>Instruments de mesure des masses et masses volumiques</i>	USA
TC 7/SC 4 Measuring instruments for road traffic <i>Instruments de mesure pour la circulation routière</i>	UNITED KINGDOM	TC 9/SC 1 Nonautomatic weighing instruments <i>Instruments de pesage à fonctionnement non automatique</i>	FRANCE, GERMANY
TC 7/SC 5 Dimensional measuring instruments <i>Instruments de mesures dimensionnelles</i>	AUSTRALIA	TC 9/SC 2 Automatic weighing instruments <i>Instruments de pesage à fonctionnement automatique</i>	UNITED KINGDOM
TC 8 Measurement of quantities of fluids <i>Mesurage des quantités de fluides</i>	SWITZERLAND	TC 9/SC 3 Weights <i>Poids</i>	USA
		TC 9/SC 4 Densities <i>Masses volumiques</i>	VACANT

TC 10	USA	TC 16/SC 2	USA
Instruments for measuring pressure, forces and associated quantities <i>Instruments de mesure des pressions, forces et grandeurs associées</i>		Water pollution <i>Pollution de l'eau</i>	
TC 10/SC 1	BULGARIA, CZECH REPUBLIC	TC 16/SC 3	USA
Pressure balances <i>Balances manométriques</i>		Pesticides and other toxic substances pollutants <i>Pesticides et autres substances polluantes toxiques</i>	
TC 10/SC 2	RUSSIAN FEDERATION	TC 16/SC 4	USA
Pressure gauges with elastic sensing elements <i>Manomètres à élément récepteur élastique</i>		Field measurements of hazardous (toxic) pollutants <i>Mesures de terrain des polluants dangereux (toxiques)</i>	
TC 10/SC 3	UNITED KINGDOM	TC 17*	RUSSIAN FEDERATION
Barometers <i>Baromètres</i>		Instruments for physico-chemical measurements <i>Instruments pour mesurages physico-chimiques</i>	
TC 10/SC 4	USA	TC 18*	GERMANY
Material testing machines <i>Machines d'essai des matériaux</i>		Medical measuring instruments <i>Instruments de mesure médicaux</i>	
TC 10/SC 5	USA	* Establishment of subcommittees still under consideration. <i>Etablissement de sous-comités encore à l'étude.</i>	
Hardness standardized blocks and hardness testing machines <i>Blocs de référence de dureté et machines d'essai de dureté</i>			
TC 10/SC 6	USA		
Strain gauges <i>Jauges de contraintes</i>			
TC 11*	GERMANY		
Instruments for measuring temperature and associated quantities <i>Instruments de mesure de la température et grandeurs associées</i>			
TC 12*	GERMANY		
Instruments for measuring electrical quantities <i>Instruments de mesure des grandeurs électriques</i>			
TC 13	GERMANY		
Measuring instruments for acoustics and vibration <i>Instruments de mesure pour l'acoustique et les vibrations</i>			
TC 14	HUNGARY		
Measuring instruments used for optics <i>Instruments de mesure utilisés en optique</i>			
TC 15*	RUSSIAN FEDERATION		
Measuring instruments for ionizing radiations <i>Instruments de mesure pour rayonnements ionisants</i>			
TC 16	USA		
Instruments for measuring pollutants <i>Instruments de mesure des polluants</i>			
TC 16/SC 1	NETHERLANDS		
Air pollution <i>Pollution de l'air</i>			

Progress on Automatics

REPORT ON OIML TC 9/SC 2 ACTIVITIES

J. Reed, National Weights and Measures Laboratory, UK

The TC 9/SC 2 "Automatic weighing instruments" is responsible for five OIML Recommendations:

- R 106** Automatic rail weighbridges (*published*)
- R 107** Discontinuous totalising automatic weighing instruments (*published*)
- R 50** Continuous totalising automatic weighing instruments
(*revised version to be published soon*)
- R 51** Automatic catchweighing instruments (*in revision*)
- R 61** Automatic gravimetric filling instruments (*in revision*)

As a supplement to the requirements established in published or draft Recommendations, each document will contain **test procedures** and a **pattern evaluation report**.

TEST PROCEDURES: Methods and processes for testing an instrument's conformity with the requirements of the corresponding Recommendation. The objective of these procedures is to ensure that all Member States adopt the same test methods with a view to obtaining consistent results.

PATTERN EVALUATION REPORT: A checklist and a test report format providing a standard procedure for recording the results of the testing; this report is used for recording the compliance of an instrument's test results and operational factors with the requirements specified in the relevant Recommendation.

The test procedures and pattern evaluation reports for R 107, R 106 and R 50 were sent to the working group of SC 2 for a vote (deadline set for the end of January, 1994). Revised drafts of R 51 and R 61 were due for circulation and vote by December 1993; accompanying test procedures and pattern evaluation reports will be developed after the circulation of the main documents.

WHY THE NEED FOR OIML TEST REPORT FORMATS?

OIML Recommendations were initially limited to the metrological and technical requirements of the instruments concerned; it was in fact assumed that the international harmonization of these requirements would be sufficient to eliminate the technical barriers to the trade of measuring instruments.

These Recommendations were then extended to cover the methods and means of testing since the conclusions of a pattern evaluation can largely depend on these parameters. More recently, a new element has appeared in our Recommendations: the **test report format**. It became apparent that this addition is both **useful** and **necessary**.

USEFUL FOR APPROVING AUTHORITIES AND MANUFACTURERS.

The metrological and technical requirements that are specified in an OIML Recommendation are sometimes numerous and complex. Therefore, it can be useful to summarize the tests in the form of tables in which test results may be entered; a simple study of the tables can lead one to determine whether or not the instrument has satisfied all the tests, or identify the characteristics that the manufacturer must improve in order to obtain a pattern approval.

NECESSARY FOR ESTABLISHING A CLIMATE OF CONFIDENCE.

A climate of confidence that permits the effective recognition of test results can only be established when a country has proof that the results obtained by its national test-

ing bodies are the same as those obtained in other countries for the same type of instrument. Recent intercomparisons carried out through the *Bureau Communautaire des Références* showed that it is necessary to follow very detailed test protocols and to use the best test report format possible in order to obtain valid comparisons of test results.

The success of the *OIML Certificate System for Measuring Instruments* depends largely on the degree of confidence that the metrological services will have in test results obtained in other countries. OIML certificates must therefore be supported by test reports that have been established in conformity with a report format that responds to the conditions evoked above. ■

POURQUOI DES FORMATS DE RAPPORTS D'ESSAI OIML?

Intialement, les Recommandations OIML étaient limitées aux exigences métrologiques et techniques des instruments concernés; il était en effet supposé que l'harmonisation internationale de ces exigences serait suffisante pour éliminer les entraves techniques au commerce des instruments de mesure.

Ultérieurement, ces Recommandations ont été étendues pour couvrir les méthodes et moyens d'essai, car les conclusions d'un essai de modèle peuvent largement dépendre de ces paramètres. Plus récemment, un nouvel élément est apparu dans nos Recommandations: le format du rapport d'essai; il est en effet ap-

paru que cet élément était à la fois **utile** et **nécessaire**.

UTILE POUR LES AUTORITES D'APPROBATION ET LES CONSTRUCTEURS.

Les exigences métrologiques et techniques spécifiées dans une Recommandation OIML sont parfois nombreuses et complexes. Il peut donc être utile de résumer les essais sous forme de tableaux permettant d'inscrire les résultats de chaque essai; un simple examen des tableaux permet de constater si l'instrument a satisfait à tous les essais, ou quelles sont les caractéristiques que le constructeur devra améliorer pour obtenir l'approbation de modèle.

NECESSAIRE POUR CREER UN CLIMAT DE CONFIANCE.

Le climat de confiance permettant la reconnaissance effective des résultats d'essai ne peut s'instaurer que si un pays a la preuve que les résultats obtenus par ses organismes d'essai nationaux sont les mêmes que ceux obtenus dans d'autres pays pour le même modèle d'instruments. Des exercices récents d'intercomparisons effectués dans le cadre du Bureau Communautaire des Références ont montré la nécessité de suivre des protocoles d'essai très détaillés et d'utiliser un format de rapport d'essai aussi parfait que possible pour permettre des comparaisons valables des résultats d'essai.

Le succès du *Système de Certificats OIML pour les Instruments de Mesure* dépend largement du degré de confiance que les services de métrologie auront dans les résultats d'essai obtenus dans d'autres pays. Les certificats OIML doivent en conséquence être étayés par des rapports d'essai, établis selon un format qui répond aux conditions évoquées plus haut. ■



APPLICATION OF THE OIML CERTIFICATE SYSTEM FOR MEASURING INSTRUMENTS

APPLICATION DU SYSTEME DE CERTIFICATS OIML POUR LES INSTRUMENTS DE MESURE

CATEGORIES OF MEASURING INSTRUMENTS APPLICABLE WITHIN THE SYSTEM

Nonautomatic weighing instruments
Barometers
High-precision line measures of length

OIML RECOMMENDATIONS RECOMMANDATIONS OIML

R 76-1, 1992
R 76-2, 1993
R 97, 1990
R 98, 1991

CATEGORIES D'INSTRUMENTS DE MESURE APPLICABLES DANS LE CADRE DU SYSTEME

Instruments de pesage à fonctionnement
non automatique
Baromètres
Mesures matérialisées de longueur à traits
de haute précision

UPCOMING APPLICATIONS

*after publication of the corresponding OIML
Recommendations
(during the course of 1994)*

Pressure balances
High performance liquid chromatographs
for measurement of pesticides and other
toxic substances
Portable gas chromatographs for field
measurements of hazardous chemical
pollutants

*after publication of the test report format
annex (in the beginning of 1994)*

Load cells

*after development and publication of the
annexes on the test report format
and test procedures
(by the end of 1994)*

Weights of accuracy classes E_1 , E_2 , F_1 , F_2 ,
 M_1 , M_2 , M_3

R 110
R 112
R 113
R 60, 1991 + Annex A, 1993

R 111

APPLICATIONS PREVUES

*après publication des Recommandations
OIML correspondantes
(dans le courant de 1994)*

Manomètres à piston
Chromatographes en phase liquide de
haute performance pour la mesure des
pesticides et autres substances toxiques
Chromatographes en phase gazeuse
portatifs pour la mesure sur site des
polluants chimiques dangereux

*après publication de l'annexe sur le format
du rapport d'essai (début 1994)*

Cellules de pesée

*après développement et publication des
annexes sur les procédures d'essai et le
format du rapport d'essai
(avant la fin de 1994)*

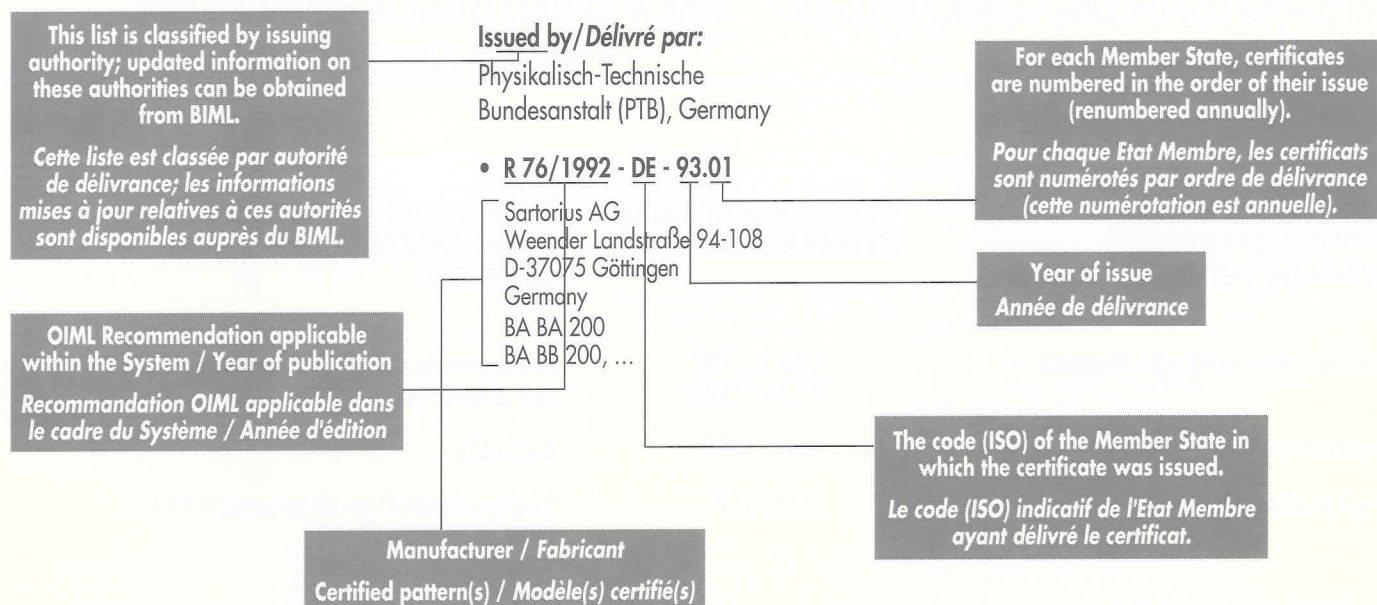
Poids des classes de précision E_1 , E_2 , F_1 ,
 F_2 , M_1 , M_2 , M_3

OIML CERTIFICATES registered up to November 1993

CERTIFICATS OIML enregistrés jusqu'à novembre 1993

HOW TO USE THE LIST OF OIML CERTIFICATES

COMMENT UTILISER LA LISTE DES CERTIFICATS OIML



INSTRUMENT CATEGORY Nonautomatic weighing instruments R 76-1 (1992) R 76-2 (1993)

CATÉGORIE D'INSTRUMENT Instruments de pesage à fonctionnement non automatique R 76-1 (1992) R 76-2 (1993)

Issued by / Délivré par:
 Physikalisch-Technische Bundesanstalt (PTB), Germany

- R 76/1992-DE-93.01
 Sartorius AG
 Weender Landstraße 94-108
 D-37075 Göttingen
 Germany
 BA BA 200, BA BB 200, MD BA 200,
 MD BB 200, MB BB 200 (Class II)

- R 76/1992-DE-93.02
 PAG Oerlikon AG
 Wallisellenstraße 333, CH 8050 Zürich
 Switzerland
 480D, 480G, 480D-480G, 480DG-FR
 (Class II)

Issued by / Délivré par:
 NMI IJkwesen B.V.,
 The Netherlands

- R 76/1992-NL-92.01 Rev. 1
 Mettler-Toledo AG
 Im Langacher, 8606 Greifensee
 Switzerland
 SM and PJ (Class II)
 SM and PJ (Class III)

- **R 76/1992-NL-93.01**
Mettler-Toledo AG
Im Langacher, 8606 Greifensee
Switzerland
SB (Class II)
SB (Class III)
- **R 76/1992-NL-93.02**
Mettler-Toledo AG
Im Langacher, 8606 Greifensee
Switzerland
AB, CB, PB and GB (Class I)
AB, CB, PB and GB (Class I and Class II)
AB, CB, PB and GB (Class II)
AB, CB, PB and GB (Class III)
- **R 76/1992-NL-93.03**
Mettler-Toledo AG
Im Langacher, 8606 Greifensee
Switzerland
PB and GB (Class II)
PB and GB (Class III)
- **R 76/1992-NL-93.04**
Mettler-Toledo AG
Im Langacher, 8606 Greifensee
Switzerland
PM 11-K, PM 15-K, PM 16-K,
PM 30000-K, PM 30-K, PM 34-K,
PM 11-N, PM 15-N, PM 16-N,
PM 30-N, PM 34-N (Class II);
PM 30-N-P (0-5 kg, 5-30 kg),
PM 30-N-P (0-3 kg, 3-10 kg, 10-30 kg),
PM 30-K-P, PM 30-K-MR-P,
PM 30-N-MRP (Class III)
- **R 76/1992-NL-93.05**
Mettler-Toledo AG
Im Langacher, 8606 Greifensee
Switzerland
PM 1200, AM 50, AM 100, AJ 50L,
AJ 100L, AJ 150L, AJ 260L (Class I);
PM 100, PM 200, PM 300, PM 400,
PM 480, PM 600, PM 2000, PM 3000,
PM 4000, PM 4800, PM 6000, PM 6,
CM 200, PM 400C, CJ 150, PJ 300,
PJ 360, PJ 400, PJ 600, PJ 1500,
PJ 3000, PJ 3600, PJ 4000, PJ 6000,
PJ 6, CM 1200 (Class III);
PM6-P, PM6-RE, PJ3 (Class III)
- **R 76/1992-NL-93.07 Rev. 1**
Mettler-Toledo Inc.
350 West Wilson Bridge Road,
Worthington, Ohio 43085
USA
8432 (Class III)
- **R 76/1992-NL-93.08**
Tokyo Electric Co., Ltd.
6-78, Minami-cho, Mishima-shi
Shizuoka-ken, 411
Japan
SL2200 (Class III)
- **R 76/1992-NL-93.09**
Tokyo Electric Co., Ltd.
6-78, Minami-cho, Mishima-shi
Shizuoka-ken, 411
Japan
SL47 (Class III)
- **R 76/1992-NL-93.10**
Tokyo Electric Co., Ltd.
6-78, Minami-cho, Mishima-shi
Shizuoka-ken, 411
Japan
SL21 (Class III)
- **R 76/1992-NL-93.11**
Teraoka Weigh-System PTE Ltd.
3A Tvas Avenue 8, Singapore 2263
Singapore
DS-650 (Class III)
- **R 76/1992-NL-93.12**
Teraoka Seiko Co., Ltd.
3-13 Ohsaki, 2-Chome, Shinagawa-ku,
Tokyo 141
Japan
SM25 (Class III)
- **R 76/1992-NL-93.13**
Teraoka Seiko Co., Ltd.
3-13 Ohsaki, 2-Chome, Shinagawa-ku,
Tokyo 141
Japan
SM70 (Class III)
- **R 76/1992-UK-93.01**
NCR Corporation
2651 Satellite Blvd, Duluth,
GA 30136
USA
NCR 7870-2000 (Class III)

Issued by/Délivré par:

National Weights & Measures
Laboratory (NWML), United
Kingdom



Fred Samuels, who for many years has worked in the field of legal metrology, initially representing the UK Government and latterly the European Weighing Instrument Industry, has now relinquished his representational activities. He is not, however, forsaking his metrology interests and hopes that his on-going consultancy commissions will bring him into contact with his many OIML friends and associates.

**February 1994**

- | | | |
|-------|---------------------------------|-------|
| 7-8 | Ad hoc group "Long-term policy" | PARIS |
| 10-11 | Presidential Council | PARIS |

March 1994

- | | | |
|-------|--|---------|
| 16-17 | TC 11
Instruments for measuring temperature and
associated quantities
<i>Instruments de mesure de la température
et grandeurs associées</i> | GERMANY |
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October 1994

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| 29th CIML Meeting | PARIS |
| Development Council Meeting | PARIS |

**February 1994**

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| 16-18 | ISO/TC 158
Analysis of gases
Contact information:
<i>Nederlands Normalisatie-instituut, Attn: Mr R. E. Gerritsen/Mrs R. I. Lobry
P.O. Box 5059,
2600 GB Delft,
The Netherlands</i> | NETHERLANDS |
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April 1994

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|-------|---|--------|
| 11-12 | ISO TC 3/SC 3
Limits and fits; Dimensional measuring
instrument and associated calibration procedures
Contact information:
<i>Mr J.-P. Bodmer, Swiss Association for Standardization,
Mühlebachstr. 54, CH 8008 Zurich, Switzerland</i> | ZURICH |
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June 1994

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| 2-3 | ISO/CASCO
Committee on Conformity Assessment
Contact information:
<i>Mr J. Blanc, Case postale 56, CH-1211 Genève 20, Switzerland</i> | GENEVA |
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i n f o**FLOW MEASUREMENT
FOR THE UTILITIES**

Amsterdam
4-5 November 1993

Organized by Butterworth-Heinemann Conferences, this conference aimed to address an audience interested in both the technology and policy matters relating to the effects of flow measurement on utilities business. Approximately 80 delegates attended the Conference representing European countries, Canada, Rep. of Korea, and the USA. The CIML Member for the Netherlands, Mr G. Faber, was among the participants.

The conference was divided into six sessions: Strategic/legal implications; Charging/metering policy; Novel metering; Meter performance; Domestic metering; and Certification/standardization/calibration. A total of about 20 lectures covered a wide range of topics from laboratory research to verification.

Legal aspects were mainly covered by two lecturers: Mr E. Jongen from the EC Commission, and the Director of BIML, Mr B. Athané. Mr Jongen described the future metrological legislation in the European Community through mandatory Directives and voluntary CEN/CENELEC standards; he also mentioned the links between these European specifications and the OIML Recommendations.

Mr Athané described OIML objectives and highlighted activities in the specific fields of gas and water measurements. Developments of the *OIML Certificate System*, which is expected to apply to gas and water meters within two or three years, were also mentioned.

Most of the lectures given in the framework of this conference are expected to be published in a special issue of "Flow Measurement and Instrumentation," a technical journal published by Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP, United Kingdom.



OIML BULLETIN

CALL FOR PAPERS

The Editors of the OIML Bulletin welcome the submission of technical papers and articles that address new advances in Metrology, particularly in the fields of Trade, Health, Environment, and Safety in which the credibility of measurements remains a challenging priority.

Metrology is adapting to the changes that are rapidly occurring worldwide and the OIML Bulletin strives to reflect this adaptation. National, regional, and international activities concerning evaluation procedures, accreditation and certification, measuring techniques and instrumentation, and implementation of OIML Recommendations as well as other international publications relative to metrology are of interest to the expanding audience of the OIML Bulletin.

In addition to a manuscript and visual materials (photos, illustrations, slides, etc.), a disk copy of the submission should be included whenever possible (floppy disk or 3 1/2" microdisks – Wordperfect/DOS or other compatible software). Authors are also encouraged to send a passport-size photo for publication. Selected papers will be remunerated at the rate of 150 FRF per printed page, provided that they have not been previously published. The Editors of the OIML Bulletin reserve the right to edit contributions for style and space restrictions.

Papers should be sent to the *Bureau International de Métrologie Légale*, Attn. Editors of the OIML Bulletin, 11, rue Turgot, 75009 Paris France.

CORRIGENDA

Due to an error in the composition of the last issue of the OIML Bulletin, Numbers 132/133, the logo for papers presented at the seminar on "Clean Air Measurement" mistakenly appeared in the article "Non-invasive Sphygmomanometers; A review and outlook" by Stephan Mieke and Ulrich Eickelkamp (page 5).

