Bulletin OIML n° 96
Septembre 1984

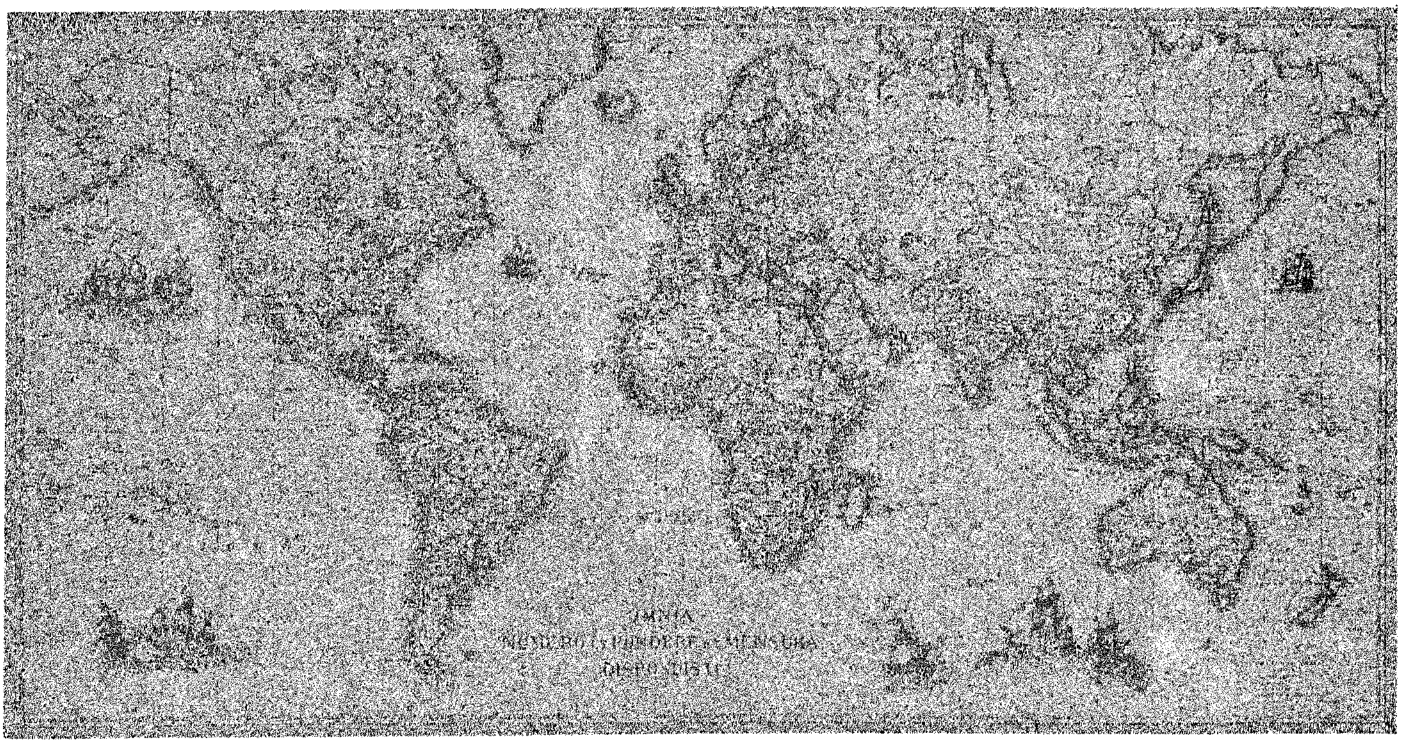
ISSN 0473-2812

BULLETIN

DE

L'ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE

Organe de Liaison entre les Etats-membres



BUREAU INTERNATIONAL DE METROLOGIE LEGALE
11, Rue Turgot — 75009 PARIS — France

Bulletin OIML n° 96
25e Année — Septembre 1984
Trimestriel

ISSN 0473-2812

BULLETIN
de
l'ORGANISATION INTERNATIONALE de MÉTROLOGIE LÉGALE

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Abonnement annuel : Europe : 85 F-français
Autres pays : 100 F-français
Chèques postaux : Paris 8 046-24 X
Banque de France : B.P. 140-01 - 75049 Paris Cedex 01
Comptes Courants, Banques Etrangères : n° 5051-7

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REP. FED. D'ALLEMAGNE

SPECIAL METHODS for TESTING of CERTAIN TYPES of PREPACKAGES SUCH as SPARKLING BEVERAGES, AEROSOLS, ICE-CREAM *

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Introduction

With respect to the test requirements and difficulty one may distinguish between three kinds of prepackage control :

(1) Control of prepackages declared by weight. Usually this control is simple and need not to be treated here,

(2) Control of prepackages declared by volume, by weighing them and determining the density of the product. Technically it would be simpler here to apply volumetric control but this is not done in practice, as it requires too much time,

(3) Control of prepackages declared by weight when additional determinations are necessary.

There still exists a fourth kind of control : prepackages which are declared by length or number. In Germany these prepackages are covered by the Prepackages Regulations. Length measurements of textile products, for example, are particularly difficult and require much skill and time ; in the case of yarns and threads, for example, the so-called yarn size must be determined according to the international TEX system. Such examinations are also most difficult.

Refering to points (2) and (3) the author will in this paper describe some special methods for the control of prepackages containing specific products requiring density determinations.

In Germany all difficult tests and special testing methods are described and thus bindingly defined for the inspectors in a directive of the Federal Minister of Economics, in which the sections regarding density measurements and weight determinations of textile products, are being largely dealt with. Moreover, the carrying-out of the control in industrial enterprises is covered by a brochure from the series « Prepackages Practice », which deals with the methods of density determination for liquid, pasty and powdery products.

(*) This is an abridged version of a paper presented at the OIML seminar on prepackages in Berne, Switzerland, 6-8 June 1983.

Table 1 — Evaluation of methods of density measurement

PRODUCT \ METHOD	areometer	metal pycnometer	glass pycnometer	immersion-body	hydrostatic balance	height level marked glass bottle	non-deformable bottle as pycnometer	standard graduated flask	electrical density meter	tray with cover plate
1 - liquid food with the exception of beverages	3	4	3	2	3	4	4	1	3	4
2 - beverages without carbon dioxide	1	4	1	2	1	4	4	1	1	4
3 - slightly carbonated transparent beverages	3	4	4	2	4	2	1	4	4	4
4 - strongly carbonated transparent beverages	5	4	4	3	4	1	4	4	4	4
5 - nontransparent carbonated beverages	5	4	4	4	4	2	4	4	4	4
6 - liquid washing, cleaning and preservative agents	3	4	1	2	3	4	4	2	1	3
7 - creamy and pasty washing, cleaning and preservative agents	4	2	4	4	4	4	4	4	3	1
8 - mineral oils	1	4	1	2	1	4	4	1	1	4
9 - lacquers, varnishes and paints	4	2	4	1	4	4	4	4	1	3
10 - strongly thixitropic lacquers and varnishes	5	2	5	4	4	4	4	4	1	3
11 - putties and seals	5	2	5	4	4	5	4	5	5	1
12 - liquid drugs	4	4	1	2	2	4	4	3	1	4
13 - aerosols	5	5	1	5	5	5	5	5	2	5

METHOD : 1 — well suited
2 — satisfactory
3 — suitability to be checked
4 — not advised
5 — unsuitable or impossible

The methods of density determination and the suitable devices are summarized in a table of the directive and they are assigned the marks 1 to 5. Mark 1 corresponds to well suited, mark 5 to completely unsuitable, see Table 1.

Sparkling beverages

Let us take sparkling beverages as an example (items 3, 4, or 5 in Table 1). Generally, the density of sparkling beverages is higher by up to some 0.3 % than that of uncarbonated beverages. It is thus natural to determine the density of the sparkling beverage. On the other hand, this is expedient because otherwise, the density of the liquid itself can be determined with sufficient accuracy only when the carbon dioxide has been removed by prolonged stirring. It must also be taken into account that the purchaser buys the beverage with the carbon dioxide included. In most cases the density of the beverage must thus be determined in the originally filled bottle. The so-called height-level marked bottle or the bottle designed as a pycnometer have here proved to be good. These methods have been rather favourably assessed, as can be seen in Table 1.

The procedure for the density determination is shown in Table 2. For density determination a random originally filled bottle is used. When a height-level marked bottle is used, the filling height is marked after the bottle has been brought to a temperature of 20 °C. Then its gross weight is determined. Subsequently the emptied bottle is filled with water of 20 °C up to the mark and again weighed. When a bottle designed as a pycnometer is used, the first step consists in the gross weighing of the opened bottle filled to the brim with beverage or water. Then the emptied bottle is filled to the brim with water of 20 °C and again its gross weight is determined. In both methods, the division of the two net weights yields a factor R. Naturally, several density determinations (for example, five) should be carried out so as to be able to average the margin of error for the marks or the actual fillings up to the brim. The density then is (by taking into account air buoyancy) :

$$\rho = 0.997\,R + 0.0012 \text{ g/ml}$$

TABLE 2 — Steps for the density determination of carbonated beverages

1a Gross weight of the closed bottle filled with beverage brought to a temperature of 20 °C with the filling height level marked

1b Gross weight of the bottle filled with beverage — filled to the brim with water — and brought to a temperature of 20 °C

2a Gross weight of the bottle filled with water up to the filling height mark - 20 °C -

2b Gross weight of the bottle filled to the brim with water - 20 °C -

3 Tare weight of the emptied bottle

4 Net weight of the beverage : No. 1a or 1b — No. 3

5 Density ρ of the water at 20 °C

6 Net weight of the water filling : No. 2a or 2b — No. 3

7 Water volume = beverage volume $= \dfrac{\text{No. 6}}{\text{No. 5}}$

8 Density ρ of the beverage $= \dfrac{\text{net weight}}{\text{volume}} = \dfrac{\text{No. 4}}{\text{No. 7}}$

9 Mean density from 5 determinations $\bar{\rho} =$

Aerosols

Table 1 reveals that good and completely unsuitable density determination methods coexist for a same product. For definite viscous lacquers and varnishes and for putties, for example, some measuring instruments are well suited and some measuring instruments are not suitable at all. As to the aerosols, the last line shows that only two methods are suitable.

In the case of the electronic density meter the natural frequency of an incorporated flexural resonator in the form of a hollow tuning fork made of glass represents a measure of the density of the liquid in its inside. In the case of aerosols, the density must be determined under pressure ; therefore a special adapter is required to accommodate the aerosol container. This auxiliary adapting device allows the check to be carried out by automatically filling the flexural resonator and by automatically rinsing and cleaning it. The accuracy of measurement is very high, of the order of $2.5 \cdot 10^{-4}$ g/ml. Unfortunately it is not possible to check all products in the form of aerosols. Aerosols containing adhesive or abrasive components, for example, can scarcely be checked, as it is difficult to satisfactorily clean the testing device.

According to Table 1 pycnometers made of glass are suitable as well. Such pycnometers of a pressure-proof special design are marketed under the trade name « pamasol » *, see Fig. 1.

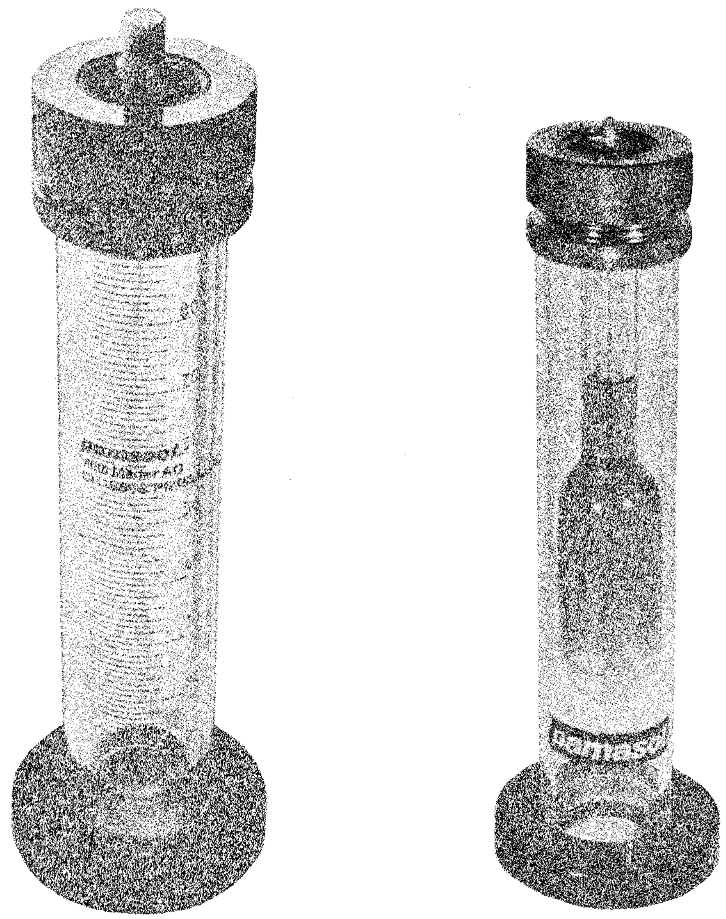

Fig. 1
Pressure proof glass pycnometer

(*) Manufactured by Willi Mäder AG, CH-8808 Pfäffikon/SZ Switzerland.

The uncertainties of measurement are less than ± 1 percent, i.e. substantially greater than for the electronic density meter. This results from the small effective capacity of approx. 35 ml, the necessary volume determination with water and the large tare weight of more than 400 g. Additional errors result when product has already been taken from the aerosol container because this would mean that part of the propellent has evaporated and that the composition of the propellent active ingredient mixture has changed. Another error is due to the fact that the scale division of the pycnometer allows only the volume of the liquid phase to be determined, whereas the gaseous portion in the pycnometer is included when weighing the pycnometer. This error can be determined only by computation from the gas volume and the vapour density. As the error is only approx. 0.5 percent, it can certainly be tolerated.

The testing steps are shown in Table 3.

Table 3 — Steps for density determination of aerosols using a pressure pycnometer

1 determination of the weighed mass of the completely assembled pycnometer (m_2)

2 cooling in a deep-freeze compartment

3 filling with approx. 1 ml propellent gas from a container filled with pure propellent

4 mounting of the valve with ascending pipe, locking of the pressure pycnometer, tightening of the screw connection

5 spraying of propellent and air until the liquid phase is exhausted

6 vigorous shaking of the aerosol container, i.e. the object to be tested, for about one minute

7 mounting of the refilling adapter onto the valve of the object to be tested

8 placing of the pycnometer head onto the object to be tested and refilling until pressure compensation has been reached ; if necessary, removal and cooling of the pycnometer in between

9 determination of the filled pycnometer's mass (m_1)

10 heating in a water bath thermostat to 20 °C

11 calculation of the density

$$\rho = \frac{m_1 - m_2}{V}$$

12 emptying of the pycnometer by spraying.

Refilling is the most difficult step, as the pycnometer can take up product only until pressure compensation has taken place. It has therefore proved to be suitable to cool the pycnometer to at least 20 °C below the temperature of the aerosol container and to displace the air by introducing a small quantity of propellent gas into the pycnometer. It is also possible to remove the air from the pycnometer with the aid of a suction pump. Furthermore, the pycnometer can be filled via an intermediate vessel or by means of a gas-tight and pressure-proof syringe.

Similar features as in the case of the pressure-proof pycnometer are shown by a gas-tight and pressure-proof syringe with millimetre graduation. The sensitivity of the millimetre graduation on the cylinder of the syringe is still somewhat smaller than in the case of the pycnometer so that the permissible inaccuracy of ± 1 percent is already attained without allowance being made for other influences. As compared with the pycnometer, the syringe is easy to handle because it is not necessary to displace or compress air during refilling. The other steps are similar to those of the test with the pycnometer.

As has already been said, some aerosols cannot be tested because of the cleaning problem. These are lathers and foams such as, for example, shaving lathers and polyurethane foam, protective undercoating for vehicles and definite lacquers, varnishes and paints such as, for example, zinc dust paints. Furthermore, the density of aerosols filled in containers with a so-called vapour phase valve can be determined only very inaccurately, as in this case, liquid and gaseous phase are taken from the container simultaneously. Here it is necessary to determine the density by computation from the densities of the components. According to whether the recipe is given in percent by weight or in percent by volume, different calculation formulas apply. These formulas, too, are given in the above-mentioned directive and in the brochure concerning density determinations.

Ice-cream

The next example of a difficult check is the testing of ice-cream. In cooperation with the industry, volume determination methods have been elaborated because all over the world ice-cream is marketed by volume, so this volume must be checked when the ice-cream is frozen.

A particularly suitable method is the so-called immersion upthrust method. This means that the upthrust in water is measured by immersing the ice-cream. The volume is calculated using the densities of ice-water at approximately 0 °C, of air and of the weights. The test is carried out as follows :

A special fork with clamps is fastened to a laboratory mount. The container with the required quantity of ice-water placed on the scale is tared after the fork has been immersed up to mark No. 2. The ice-cream from which the wrapping has been removed is then impaled on the fork up to mark No. 1. After immersion up to mark No. 2 the scale indication is read.

This method also allows the volume of the used packing to be determined. In a first step the overall volume, i.e. ice-cream with packing and in a second step, only the packing volume can be determined. Melting of the ice-cream which can result in considerable errors is thus avoided. The calculations are made as follows :

$$V_{\text{ice-cream}} = m_G \frac{1 - \dfrac{\rho_L}{\rho_G}}{\rho_E - \rho_L} - V_{Ga\,1}$$

where

$V_{\text{ice-cream}}$	volume of ice-cream in ml
m_G	indication of scale in g
ρ_L	density of air = 0.0012 g/ml
ρ_G	density of weights = 8.000 g/ml
ρ_E	density of ice-water = 0.9999 g/ml
$V_{Ga\,1}$ or $V_{Ga\,2}$	volume of fork portion immersed up to mark 1 or 2 in ml
V_{Pa}	volume of packing material

The following simplified relationship is thus obtained :

$$V_{\text{ice-cream}} = m_G \cdot 1.0012 - V_{Ga\,1}$$

In the case of ice-cream packed in containers of, for example, more than 5 litres, the immersion upthrust method can no longer be applied. Here four mass determinations must be carried out and the volume must then be determined using the simplified formula :

$$V_{\text{ice-cream}} = 1.0012\ (m_2 - m_1) - (m_4 - m_3)$$

For soft ice a third method must be used. Here a density determination of the soft ice is carried out using a metal pycnometer. According to this formula, the density then is :

$$\rho_o = \frac{m_G}{V_o\ [1 + \beta(t - t_o)]}$$

where

ρ_o density of soft ice in g/ml

m_G weighed mass of pycnometer filling in ml

V_o pycnometer volume at 20 °C in ml

β cubic expansion coefficient of the pycnometer material in K^{-1}

t testing temperature of soft ice in °C

t_o reference temperature of pycnometer

ROYAUME-UNI

USE of MEASURING CONTAINER BOTTLES in the PREPACKAGING INDUSTRY *

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Introduction

Measuring Container Bottles are bottles whose capacity is legally guaranteed. Consistency in the size and capacity of the bottles has always been a matter of importance to bottlers and to designers of filling equipment, but it is only more recently that it has become clear to the metrological authorities that control over bottle capacities presents an opportunity to use them as a simple and effective method of controlling the quantity in packaged goods - at least as far as liquids are concerned.

The purpose of this paper is to outline the links in the chain from bottle manufacturer to consumer, a chain which provides a guarantee of quantity to the consumer, and a guarantee of fair competition to other bottlers. The introduction of the full concept derived from a Directive adopted by the Council of the European Communities in December 1974 on the use of bottles as measuring containers. This Directive laid down common rules for the metrological characteristics of such bottles and paved the way for their acceptance throughout the Member States of the Community, and hence for their wider us by the food packaging industry in particular. It also laid the basis of the OIML draft International Recommendation on Measuring Container Bottles.

The Measuring Container Bottle fulfills two distinct roles in the process by which correctly packaged goods reach the consumer. It is an aid to the bottler in his filling operation, because he can rely on its capacity being correct. It also performs another function - that of enabling the packer to check his filled packages and demonstrate to the metrological authorities that he is in fact meeting the legal requirements for the quantity contained in packaged goods.

Characteristics of MCBs

Perhaps the best starting point is to examine the characteristic features of a Measuring Container Bottle (MCB).

Fig. 1 shows a drawing of a bottle of the type prepared by glass manufacturers prior to constructing moulds. To be an MCB, the container need not be made of glass, but it must be rigid in order to maintain its metrological characteristics. Bottles

(*) Paper presented at the OIML seminar on prepackages in Berne, Switzerland, 6-8 June 1983.

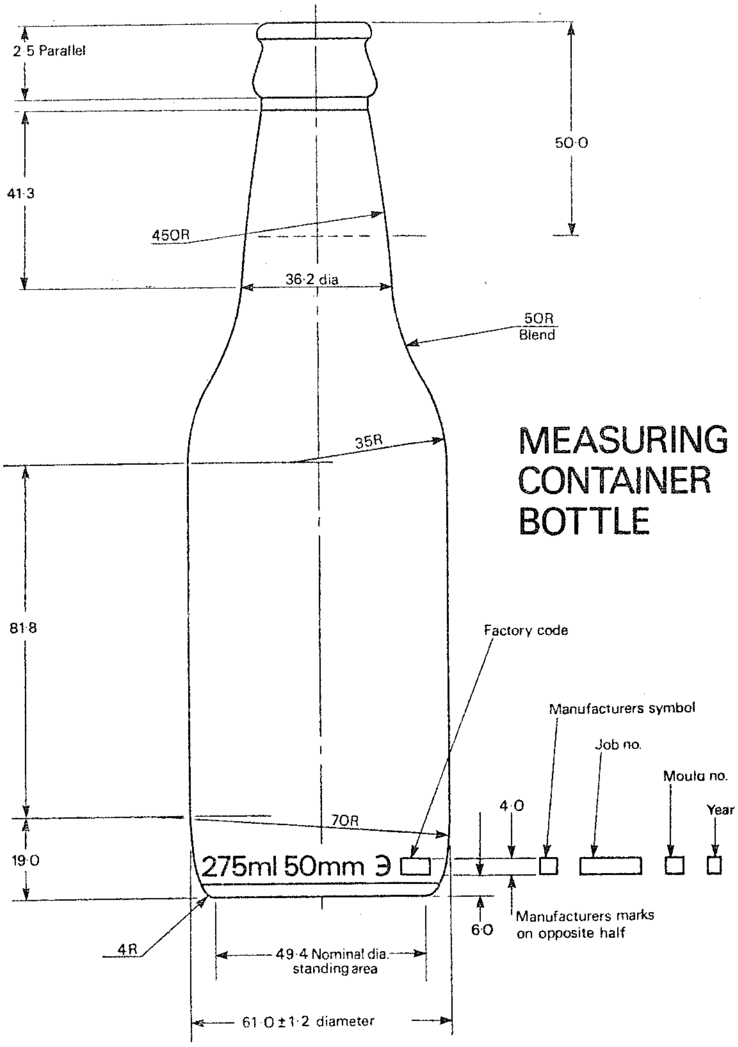

Fig. 1

made of flexible plastics, such as are being introduced into certain parts of the soft drinks trade are not suitable for this purpose.

The bottle must be marked on the bottom, bottom rim or on the side with certain information. The markings do not, of course, affect its metrological characteristics, but they form an important part of the control procedure, and it is likely that any scheme developed elsewhere would require similar markings. They are specified in the EEC Directive and are reproduced in the OIML draft.

The first mark is the nominal capacity, that is the volume of liquid which the bottle is intended to contain. This may be given in litres, centilitres or millilitres, and is followed by the symbol for the unit of measurement.

The second mark may be one of two alternatives. Either the fill height in millimetres, followed by the symbol mm, or the brim capacity in centilitres, but not followed by any symbol for units of measurement. This introduces us to the two different types of MCB - those intended to be filled to a definite level, a linear distance between the top of the bottle and the liquid level, and those where it is intended that there will be a constant head space, a constant volume between the nominal capacity and the volume of the bottle to the brim.

LEVEL TYPE AND BRIMFULL MCBs

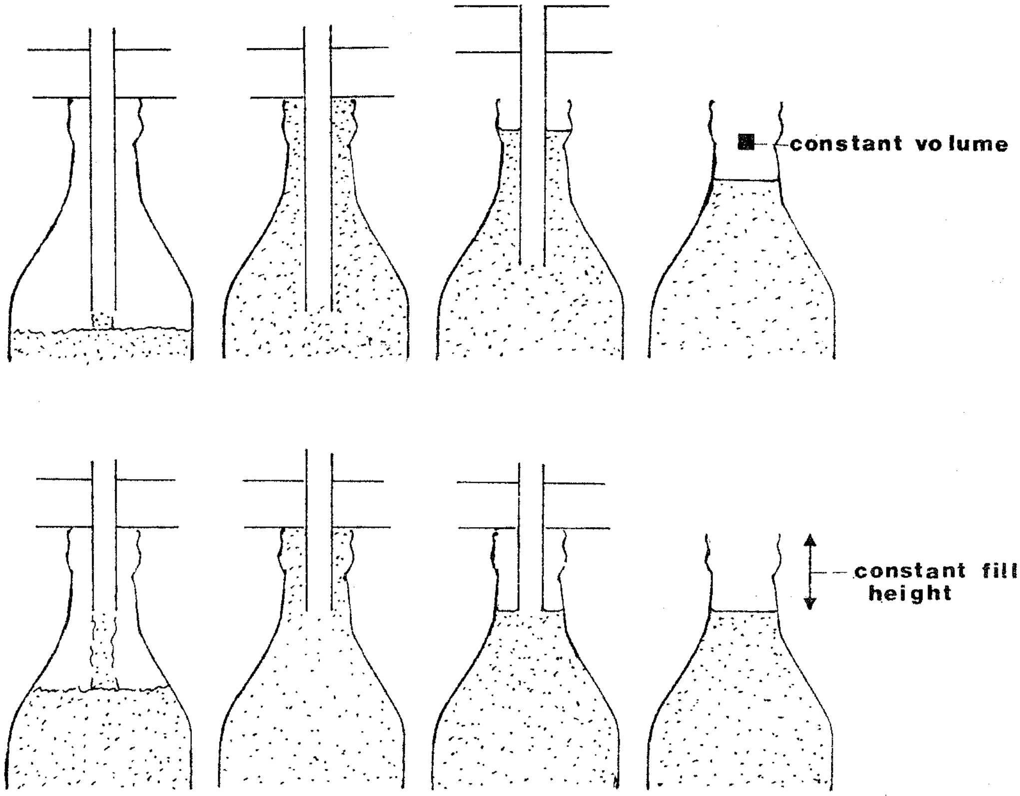

Fig. 2

The third mark is a symbol which signifies that the bottle was manufactured in conformity with the legal specifications. The EEC sign for this purpose is a reversed epsilon.

The fourth and final required mark is one which identifies the manufacturer of the bottle. Within the EEC a procedure exists whereby each Member State may approve such marks.

Fill Level and Brimfull MCBs

Some bottling machines are designed to actually measure a definite volume of liquid into the bottle. These suffer from various disadvantages - slowness of operation, inflexibility in changing from one package size to another and so on. Once packers were in a position to specify to manufacturers the details of acceptable variation in capacity, the way was opened for the widespread introduction of filling machines which relied on the bottles to determine the volume of liquid delivered.

This can be achieved in two ways. In the first method the bottle is filled to the brim, and then the filling tube is withdrawn. The liquid level falls as this is done, and at the end of the operation a head space is left with a volume equal to the volume of liquid displaced by the fill tube. This method of filling corresponds to the brimfull type of MCB.

The second type of equipment is a vacuum filler. Initially the bottle is filled to the brim. But then the liquid in the top of the container is removed by a pump, leaving the liquid in the bottle at a height determined by the length of the fill tube. It may be seen that this method of filling results in a constant fill height, and that this corresponds with the fill level type of MCB [Fig. 2].

The EEC Directive suggests that the manufacturers of MCBs should ensure that the two types of bottles are equivalent to each other, in other words that fill level bottles should have a constant difference between their capacity at the defined fill height and at the brim, and that brimfull type bottles should end up with liquid at a constant level when a fixed volume is removed. This presumes a very close control over the internal dimensions of the necks of the bottles.

The area where the difference between the two types of bottle becomes most critical is in the checks which must be carried out after the filling operation to ensure and to demonstrate that the bottles have been correctly filled. The most convenient way of doing this is to use a templet, a linear gauge which can be placed against the bottle. By using this the actual height of liquid in the bottle may be measured. It is a simple matter to calibrate such a templet for a fill level bottle, but to do so for a brimfull type bottle, where the fill level is not defined, is problematic.

Manufacture of MCBs

In order to appreciate the problems faced by a bottle manufacturer in attempting to produce consistently sized bottles, it will be helpful to briefly examine the process of bottle making, with particular emphasis on the various factors which can cause bottle capacities to vary. Before beginning it is worth looking very crudely at the means by which the bottle manufacturer aims to achieve a given bottle capacity.

Fig. 3 shows the essentials of the problem. The manufacturer has moulds against the inside of which glass is blown. The overall capacity of the bottle is determined by the difference between the capacity of the mould and the volume of glass which is deposited inside. Another very important variable is the distribution of the glass within the mould - it will be remembered that where the fill level is important this is a critical feature. Controlling the distribution of glass is not easy, so from the bottle manufacturer's viewpoint brimfull type MCBs where only the total capacity of the bottle is important are much easier to make. However from the point of view of bottlers and of the enforcement authorities fill level is important.

In the actual bottle making process there are a number of variables in controlling the volume of glass. The first point to note is that each bottle will be made from one of a number of different types of glass, and that each will have its own characteristic density, viscosity at particular temperatures and so on. These will be known to the manufacturer and taken into account when he plans the bottle making process.

At the start of the process there is a large reservoir of molten glass. This is maintained at a closely controlled high temperature. At the bottom of the vessel containing the molten glass is an aperture which permits glass to flow out. Immediately below the aperture is a pair of shears which cut the stream of glass, separating off a series of gobs of hot glass. These gobs contain all of the glass which will subsequently form the bottle, and it can be seen that the amount of glass contained in each depends on the temperature of the furnace, and hence the viscotisy of the glass, the size of the aperture, and the frequency with which the shears cut the glass stream [Fig. 4].

The remainder of the process is the means by which the gob of molten glass is transformed into a bottle. There is a two-stage moulding process, which assists in ensuring that the glass is distributed reasonably evenly within the mould, and a particular piece of the mould - the neck ring - which is maintained in contact with the bottle through both stages. This neck ring serves both to assist in the handling of the hot glass by the machinery, and also to ensure that the moulding which will ultimately hold the bottle closure is precisely formed.

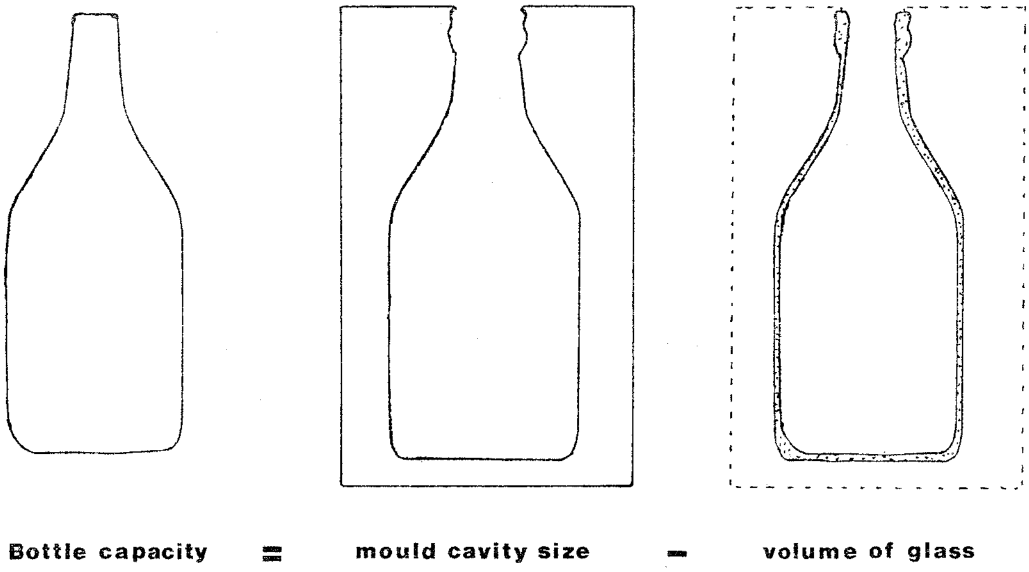
Bottle capacity = mould cavity size − volume of glass

Fig. 3

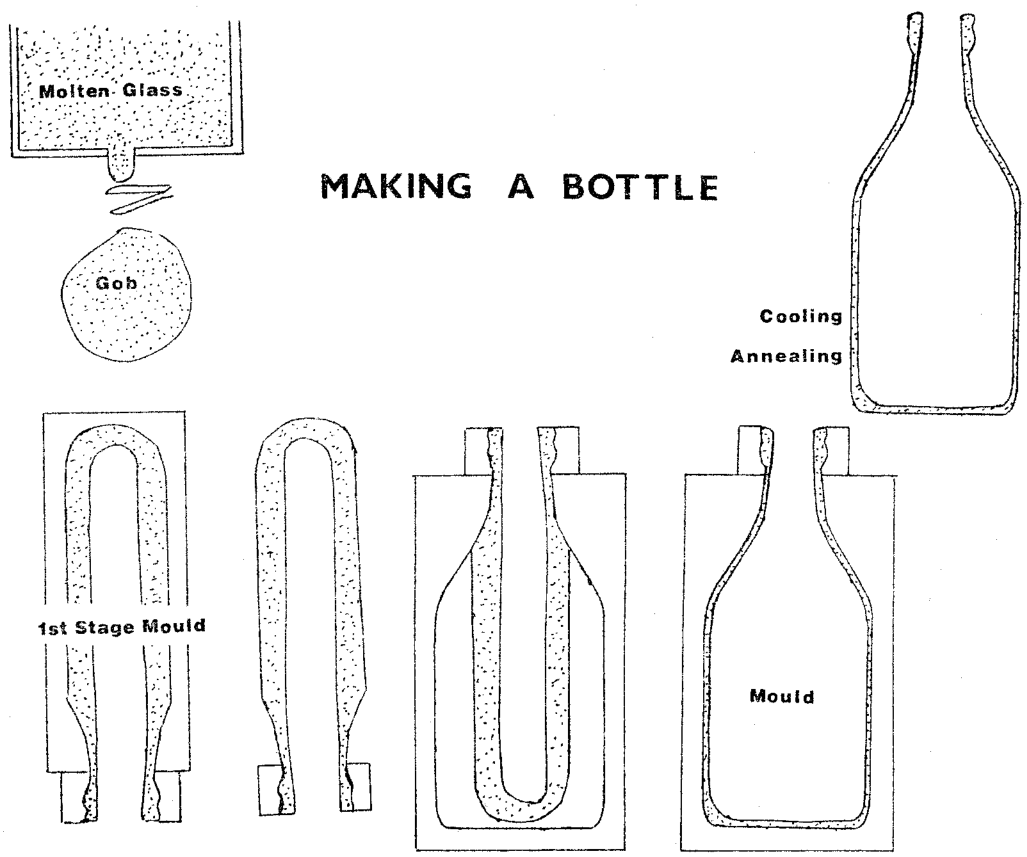
Molten Glass
MAKING A BOTTLE
Gob
Cooling
Annealing
1st Stage Mould
Mould

Fig. 4

The bottles which emerge at the end of this process are still extremely hot and can easily be distorted, and must go through a lengthy cooling and an annealing process before they can be used.

The variables in the manufacturing process which affect bottle capacity include :
— variations from mould to mould when they are made
— wear in the moulds
— the temperature of the molten glass
— the size of the aperture from the furnace
— the rate of operation of the shears
— the distribution of glass through the bottle.

Manufacturer's Checks

The control procedures used by bottle manufacturers fall into two main groups. On the one hand there are checks carried out to ensure that the process is operating as it should, on the other there are checks carried out to ensure that the bottles fall within the legal specifications. Records of these second type of checks are kept by the manufacturers so that the enforcement officers can examine them and satisfy themselves that production has been acceptable during the majority of the time when he is not actually present on the premises.

Manufacturers can carry out this type of check by taking periodic samples of finished bottles from the production line and testing their capacity at the defined fill height. This is normally done by weight. The manufacturer's checks would demonstrate whether or not his production would pass an official test.

Although this check is perfectly adequate from the point of view of legal control, it is not adequate for the manufacturer to detect and correct problems which may occur during the bottle making process. Before the final check can be done the bottles must have cooled down and have been annealed. It would be extremely dangerous to handle them otherwise. But this can take a considerable time - several hours - and it would plainly be unsatisfactory to make a large number of bottles which have to be scrapped because a problem was not detected and corrected early enough. So the manufacturers monitor the main variables in the process. Furnace temperature is regularly checked. The rate of operation of the shears is checked. Hot bottles which have just been moulded are weighed to check that the right amount of glass is being moulded, and so on. In addition checks for non-metrological factors such as the residual stresses in the glass following annealing and the prevalence of flaws in the glass are carried out.

Checks by the Enforcement Authorities

A check is carried out by the enforcement authorities. This check has significance greater than being the means by which it can be judged whether or not the bottle manufacturer is complying with his legal obligations. It also sets the standard for those obligations. The bottle manufacturer has to ensure that his production meets that standard.

The reference test begins by defining an upper and lower tolerance for bottle capacities. This is the nominal capacity plus and minus an amount which varies depending on the value of the nominal capacity. For small bottles of 50 ml capacity the amount is 3 ml, so the upper tolerance point, called Ts, is 53 ml, and the lower tolerance point, Ti, is 47 ml. For 500 ml bottles the amount is 10 ml so Ts is 510 ml and Ti is 490 ml.

The enforcement officer takes a sample of the bottles at randon from the line and finds their average capacity at the defined fill height and the standard deviation of their capacities. This last operation is done either by calculating the standard deviation directly (in which case the sample size is 35) or by estimating it from the average range of subsamples of 5 (in which case a sample of 40 is used). For simplicity it is assumed that the standard deviation method is being used.

The officer checks that his results satisfy three inequalities :

Mean capacity + 1.57 $s \leqslant = Ts$
Mean capacity — 1.57 $s \geqslant = Ti$
$s \leqslant 0.266(Ts—Ti)$

The effect of these requirements can best be appreciated by examining them in graphical form. The first point to note is that a limitation is placed on the extent to which the bottle capacities are permitted to vary. The second point is that the greater the variation from bottle to bottle the closer the average capacity must be to the nominal capacity. The third point to note is that the average capacity is allowed to be less than the nominal capacity. [Fig. 5].

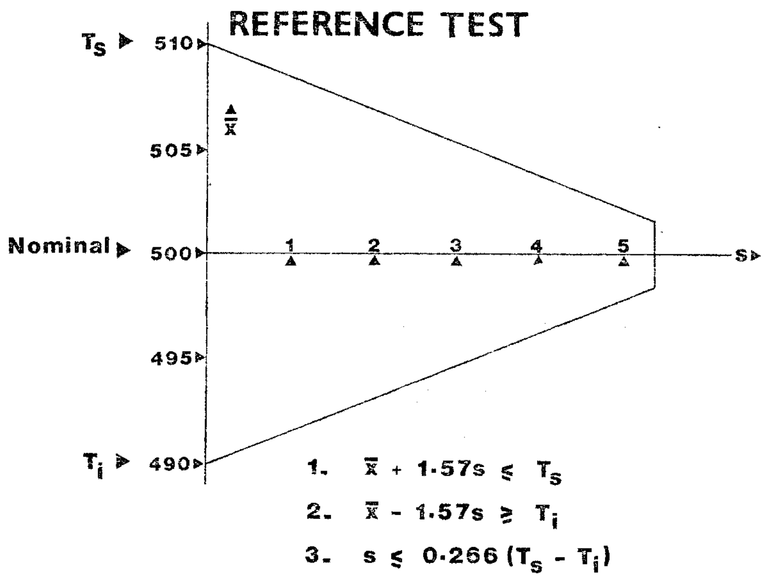

Fig. 5

The significance of these points relates to the quantity of product which will ultimately be packed in these bottles. The difference between the nominal capacity and the *Ts* and *Ti* points is two thirds of the tolerable negative error for packages marked with that quantity. In other words liquids packed into 500 ml bottles, where *Ti* is 490 ml, are not permitted to have more than about one in forty of their number with an actual volume of less than 485 ml. The effect of the limits placed on MCBs is to ensure that the finally packaged liquids do not violate the rules placed on packages regarding extreme variations.

A packer is entitled to rely on the capacity of MCBs. But they are permitted to be smaller than the stated capacity on average, and so a bottler who uses MCBs with a capacity which is below the mean will legitimately pack below the stated quantity on average.

This is obviously a matter of concern, and it has been tackled in various ways. It should be noted that within the EEC Directive the exploitation of the tolerance is forbidden, and so a glass manufacturer who colluded with a packer to make bottles small on purpose could be dealt with.

The reason which is often advanced for the bilateral tolerances for MCBs is that the moulds used to make bottles increase in size as they wear, so that bottles are small at the start of production, but gradually increase in capacity as a long run proceeds. This may, of course, take weeks or months to happen, and cannot be detected in a short period. It has been found that an examination of the results of reference test carried out by enforcement officers over long periods of time does not show any significant bias of the average capacities relative to nominal capacities. Sometimes the bottles are small on average, sometimes large. Overall the results balance out.

Surveys have also been conducted into mixed populations of MCBs where the bottles are returned to packers for refilling after their initial use. Again these surveys have not shown any significant bias in average bottle capacity relative to nominal. It can be said therefore that the MCB system works equitably in the long run.

Imported MCBs

The legal responsibility for the capacity of MCBs produced outside the European Community lies with the importer. This opens up the possibility of requiring checks to be made of incoming batches of bottles. There is still the problem that it is not known that bottles are being imported unless they are stumbled on. It is almost impossible to find consignments of imported bottles to subject to a reference test.

There are two ways of getting over this problem. Manufacturers in countries with whom there are no reciprocal arrangements who seek approval for their marks must be asked where they intend to send their bottles. But this is, at best, a weak approach as the manufacturer is likely to find new customers and may not inform the authority of the fact. Enforcement officers can also be alerted to the possibility that bottlers might be using foreign bottles.

Templets

It is general requirement for all packers that they must check their production and keep records of that check. Approved equipment must be used for the check, and one type of approved equipment is an MCB used in conjunction with a templet.

The templet is simply a gauge for measuring the liquid level (Fig. 6). It is calibrated in relation to the fill height embossed on the bottle and marked with a scale. This may be calibrated in terms of linear distances or of the volume equivalents for an average bottle. The bottler may measure deviations from the intended fill height and check whether he is complying with his legal requirements.

Templets are checked individually by enforcement officers and given a certificate. Templets may be used over the closure of a bottle provided that the thickness of the closure is not too variable, and they may be calibrated for use at temperatures other than 20 °C. This is particularly important for some bottlers - for example milk bottlers.

Quasi-MCBs

MCBs are relatively new to the UK. But standard bottles are not - the dairy trade and beer bottlers have had an industry standard for many years. These are returnable bottles which may circulate between fillers and consumers for years. Naturally enough the trades concerned have started replacing the existing bottles with MCBs, but it is inevitable that a residue of the old bottles will be found for a long period. It was decided that once the proportion of old bottles fell below 10 % the population

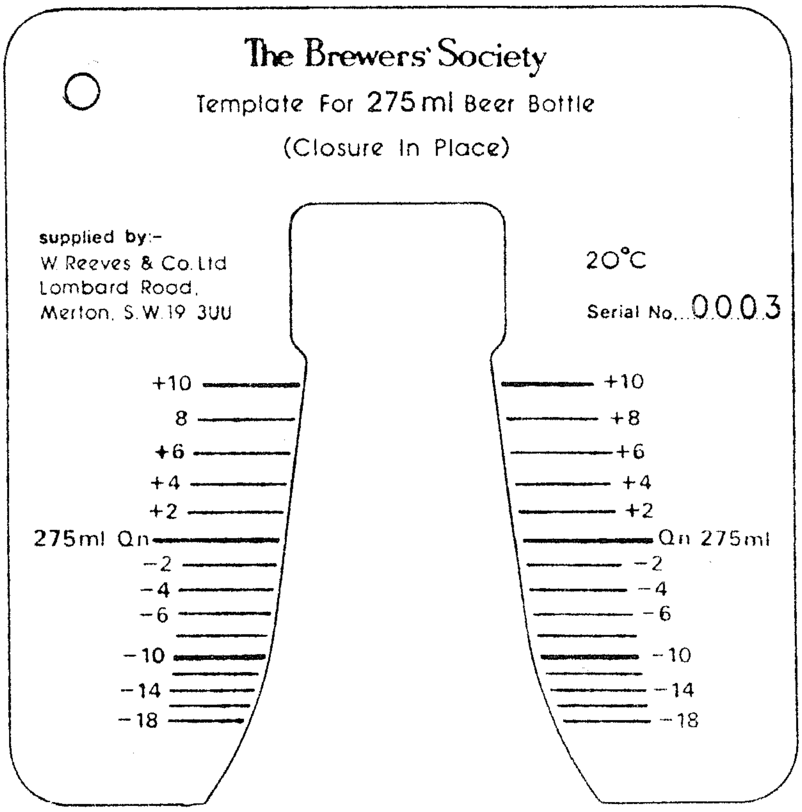

Fig. 6

would be treated as though it consisted entirely of MCBs. Transitional arrangements were also necessary.

A large sample - 500 bottles - is taken from the population as randomly as possible, and the mean and standard deviation of the bottle capacities at the fill height defined for replacement MCBs is found. Criteria essentially similar to the MCB reference test are applied and if the test is passed, the bottle population is treated as quasi-MCBs. This means that templets may be used to measure the bottle contents, but the packer is not provided with the same legal protection as the user of MCBs.

This test is the responsibility of the prospective user, and in many cases it has been carried out through the trade federations concerned. It has been ensured that enforcement officers have supervised all of the stages of the survey - collection of samples, measuring bottle capacities and calculation of results.

Legal Considerations

It is important that legal obligations placed on persons or traders are clearly stated in statutes, regulations and guidelines. Whether or not Governments decide that infringements of the law should attract fines or other penalties, the principle must be the same : it is essential that the individual knows in fairly precise terms what he must or must not do to comply with the law.

Control of Construction of MCBs

The MCB offers a simple and unique means of enabling the packer of liquids to fulfil his legal obligation to certify the quantity he purports to sell with a high degree of confidence. The clear indications embossed on the bottle tell him the nominal capacity which the bottle manufacturer intends it to hold and the circumstances in which it is to be used - either as a fill height container, which is intended to be filled to a measured distance from the top of the bottle, or filled to the brim before the filling tube is withdrawn.

The Council Directive 75/107/EEC is explicit about the controls to be exercised both by the bottle manufacturer throughout the production period and by the control authority : it lays down maximum permissible errors (both positive and negative) for the capacity of the container and provides for the prohibition of systematic exploitation of tolerances.

There is no doubt that a regime which relies on the accuracy or integrity of the MCB imposes a special responsibility on the bottle manufacturer : « a priori » approval to the bottle manufacturer's internal control system is not sufficient. The manufacturer should ideally be required to undertake regular checks on his production, to maintain and keep for at least six months records of those checks, and of any action he has had to take to bring his production under better control, and to make them available to the enforcement officer.

Monitoring of Bottle Production

Continual monitoring of production by the manufacturer is not however itself a sufficient guarantee to the user of the accuracy of the MCB. It would be possible to say to the packer « if you choose to simplify your filling operation by using MCBs you must carry out regular independent checks on each consignment of bottles you receive from the glass manufacturer ». But if, as is the case in the EEC, Governments are prepared to authorise a manufacturer to emboss his bottles with a symbol which signifies that they were manufactured in conformity with a legal specification, Governments must accept a responsibility to exercise continuing supervision over the activities of the bottle manufacturer. Experience of the manufacturer's own control procedures together with practice in recognising undesirable trends shown up by the records of the checks he maintains, will dictate the frequency of detailed checks to be undertaken by the enforcement authority. Nonetheless it is important that the manufacturer's operations are kept under regular supervision - preferably at random intervals. By this means it is possible to ensure that there is no systematic exploitation of tolerances by the manufacturer.

The introduction of the MCB was a significant challenge to glass manufacturers in a period of world recession and increasingly high energy costs. In the UK industry has met the challenge « head on ». Of economic necessity they have had to improve process capabilities and the reputation of their MCBs is now such that the vast majority of new bottles of conventional shapes are being manufactured as MCBs.

Implications for the Packaging Industry

It is important that the packaging industry should be able to reap the maximum benefit from the MCB. High speed filling lines can obviously operate much more efficiently if there is a swift and simple means of checking on the accuracy of the filling operation, particularly where multi-filling heads are an integral part of the equipment. The use of certified templets is undoubtedly a very speedy and accurate method of checking that fill height containers have been filled correctly : it simplifies checking by the filler and precisely the same method can be used by the control authority in place of what would sometimes constitute a destructive test on the actual contents.

It may be argued that the check on the filler by the control authority should be concerned with the actual contents, since both positive and negative tolerances are prescribed for the MCB but only negative tolerances for the contents of the bottle. This would however defeat the whole object of the MCB, and would remove any advantage to the packer in using it.

For this reason it makes sense to exempt from any specific control over the quantity of the contents, a packer who correctly fills approved MCBs. Thus as long as the packer ensures that each container is filled to the correct level he cannot be held responsible in law even if the actual contents are incorrect. The responsible authority must however take appropriate steps to ensure that the production of MCBs in its own territory is properly and effectively controlled.

OIML Initiative

The OIML initiative in circulating a preliminary draft of an International Recommendation for MCBs recognises the considerable advantages such containers have for industry and for control authorities, and the contribution they can make in conserving resources of material and energy by facilitating the use of returnable containers. The need for proper continuing control over the production of MCBs must be accepted however if their integrity as legal measuring instruments and arbiters of fair trade and consumer protection is to be preserved.

SUEDE

CERTIFICATION and INTERNATIONAL TRADE, EXISTING MULTINATIONAL ARRANGEMENTS

by **L. BORG,**
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The following paper, published by the permission of ISO, was presented at the ISO workshop « Certification and the consumer - Present systems and future trends », Geneva, 23 May 1984.

The paper reviews in particular the European systems of certification within the field of electrical products and shows some of the early difficulties.

The author is the Director of the Swedish Institute of control of electrical materials (SEMKO).

When discussing the practical build-up of certification activities one has to ask oneself first of all the purpose of the operation. When first starting a *national certification system* the answer is obvious, i.e. to promote safety and/or quality. The second step will then be to build up a *multinational arrangement.* That could be a system for recognition of test results to be used as a basis for national certification. It could also be a marking system, in the most advanced stage, to replace national marking. Such an operation will, however, have no meaning if one does not save time and money. The purpose to promote safety and quality is already achieved by the national systems.

The audience may now think that I have started my presentation with an awful platitude. That might be true but I will nevertheless come back to this platitude several times during the presentation.

My experience is in the electrical field where we have now developed something of a tradition in multinational certification. The reason for this is simply that we have started early. Already when Thomas Edison made the world's first electrification scheme on Lower Manhattan about 100 year ago it was well-known that electricity could cause fire or electric shock. His competitors, the gas works, made their best to make this fact known to the public. The answer was that the insurance companies required certification and wiring rules, and certification of electrical equipment has then developed steadily, first on national level and during the last 25 years also on international level.

I will try to give some information about the existing systems, not in order to give you directions how to use the systems but rather in order to point out such experience which might be useful when developing multinational certifications schemes in other fields.

It is particularly educational to follow the development of the most important scheme in this field, i.e. the hitherto European CEE * arrangement, also called the

(*) CEE here stands for the International Commission on Rules for the Approval of Electrical Equipment. (It should not be confused with the abbreviation used in French both for the European Economic Community and for the United Nations Economic Commission for Europe).

CB-system. The proposal to start such an operation between certification bodies was made in 1952 and in 1955 the rules of procedure for what was then called the *Reciprocal Licencing Body* was adopted by the CEE. The fathers of the system were anxious to make a watertight system and for that reason no less than three national certification bodies had to test and evaluate the product before a certificate could be issued which said that the product had been found to be in conformity with a certain CEE publication. The other member bodies were supposed to issue their national marks unconditionally on the basis of the certificate.

That system did, however, not work and there are two reasons for this. First of all the procedure was too complicated and costly. As we know today manufacturers using the CEE arrangement want approval in as an average 3.5 countries, mostly including their home country. To have to pay the cost for testing in three countries, sometimes others than the target countries, was, therefore, mostly waste of money. The requirement on unconditional recognition was also a drawback, even if the certificate could enjoy a very high degree of reliability. In some countries such unconditional recognition is against statutes.

The conclusion of this failure was drawn in 1960 when it was decided to start trying to develop a simpler system and the so called *CB system* was started 1963. That system meant that the product had to be tested and found to be in conformity with the relevant international standard by two member bodies, and the requirement on unconditional recognition still remained. That system was workable and the first certificate of conformity was issued on 1st November 1963. The success was, however, modest, up to 1968 only a total of about 100 certificates had been issued, i.e. about 20 certificates a year.

At that time the participants had learnt to know one another and discovered that they could really have some confidence in the integrity and competence of the colleagues. The time was, therefore, considered ripe to introduce a simpler procedure so that a certificate could be issued after the product had been tested and found to be in conformity with the relevant international standard by only one certification body, i.e. the one in the country of the manufacturer. In order to cope with the still remaining doubt about the reliability of the certificate, it was agreed that the country receiving the certificate was entitled to challenge its contents and, if necessary, convince itself by partial retesting. These steps, which were agreed in 1970, were what was needed to make the system useful. The two procedures are referred to as Procedure I (two countries) and Procedure II (one country).

The number of certificates issued within the system per year increased considerably after introduction of procedure II to more than 500 per year.

If we study the statistics produced, it is possible to follow the main lines of traffic from which we can draw the following useful conclusions.

1 The member bodies who go in for the saving of time and money possible with the system, apply it with little waiting time and little or no retesting.

2 In countries where legal and other complications make recognition of test results difficult, the certification bodies can participate less actively without hampering the system for the more active participants.

3 The fact that the decision to recognize the certificate is made independently in each country where it is submitted, eliminates all discussions about signing away authority to certification bodies in other countries.

Having come to this stage. CEE was faced with a dilemma about its future policy. One way would be to take advantage of the increase in mutual confidence to simplify the procedures and thereby make the system more economical and useful. This, however, would have caused problems about acceptance of new and inexperienced members. The other way would be to stick to the present procedures which had proved useful and try to increase the membership by inviting also overseas countries.

This dilemma did never need to be discussed in CEE because events made the right course obvious. There had been discussions within IEC circles for some years about the need for a global certification arrangement or system working with IEC standards. The obviously simplest way would be to let CEE develop into a global IEC certification arrangement. This idea was very soon accepted and at present the IEC Council and the CEE Plenary Assembly have formally decided to make such a merger. An agreement in principle has been made and the operation will probably be completed during the next year. An important point there has been that the system is now working and should remain working without distrurbance during the merger operation.

I am sure that this merger is a very wise decision and I am sure that the new body which will probably be called IECEE will prove itself useful for the future. There will, however, not be any kind of explosion of the number of certificates, because the condition to become a certifying member is that the relevant IEC standard shall have been implemented in the country in question and this will take some time in some of the big countries who are interested to become certifying members.

I have earlier mentioned that the members of these arrangements are the certification bodies. It has sometimes been said that arrangements for recognition of test results are better made between laboratories. That is not my opinion. The certification bodies are normally those who are owners of the mark and have the right to know the origin of test results. This could sometimes be a dilemma, when the certification body and the laboratory are different bodies.

Experience shows, however, that the organization which gives the least problems is when the certification body and the laboratory are the same body. This makes considerable simplification in the routines possible which saves considerable time and money.

The wish to get the largest possible economical advantage from recognition of test results by simplifying the procedures still remained. That could be done between those member bodies who felt ready for a more intimate cooperation, normally in limited areas. Two such systems outside the CEE and IEC which should be mentioned are the Nordic system between the Nordic countries and the CENELEC * Certification Agreement, called CCA. The main point in these agreements is that the certificates should not be challenged and applications submitted to secondary certification bodies should be handled with priority. This is a very important point because if waiting times are too long the manufacturer will prefer to submit his samples to all the target countries instead of waiting and losing momentum.

The right to retest specimens coming in together with the certificates is a very blunt instrument in detecting errors. When the certification bodies know one another well and operate schemes for mutual assessment, this is a more efficient way to reduce the risk of errors than retesting at random. When the risk for errors is not larger in incoming certificates than in one's own test reports, they should be accepted as equivalent in reliability.

ISO/CERTICO has made and is making a great work in developing sound models and guidelines for the development and operation of certification systems. These principles and guidelines of course have to satisfy far reaching requirements for strictness. They are, however, called *guidelines, not rules.* This means that it is possible to dispense with formalities when they are not needed.

Several countries have used this information as a basis to build up national systems and rules for acceptance of laboratories. A less fortunate by-effect has, however, been a tendency to apply strict rules when they are not needed. This has given problems for some countries in accepting systems to be simplified, and this is not what ISO has intended. I am, however, sure that this is a transient phenomenon.

(*) CENELEC stands for the European Committee for Electrical Standardization.

It has been said that regional systems are in contradiction to the GATT Agreement. If that is true or not depends on the purpose of the limitations in membership. I personally would like to say that I do not think it is the purpose of the GATT Agreement to prevent certification bodies to simplify procedures between one another. I would rather hope that such simplification will be practised in more and more groups who could successively join forces.

As some of you know an attempt has been made to produce a European mark for electrical household products, called the *E-mark* *. Statutes for this system were elaborated and accepted by all CEE member countries in 1973 but the system never started operating. The reason is simply that the time is not yet ripe for such a system. There are still too many national deviations and differences in government regulations and national practice to make it possible.

In two cases, however, marking systems within the electrical field have been successful. One of them is the HAR system for cables and cords, with comprises today 11 members among the CENELEC countries. The system is very simple : The product is tested and certified in one member body. This body has also to carry out surveillance inspection. The manufacturer gets a licence to apply the HAR mark on his cable together with the name of the certification body which has issued the licence. The other member bodies have undertaken to recognize HAR mark from any other member as equivalent to their own.

This system has been very successful and today about 1 000 licences are in force. The reasons for the success are mainly the following :

1 Cables and cords are uniform products with few possibilities for variations in design and function.

2 A product practice is since long well established and therefore harmonization of standards is far advanced.

3 The product range is limited and therefore the procedures can be simple.

4 The mark is mainly directed to the professional buyer.

5 A permanent group with representatives from all member bodies meet regularly to supervise the operation of the system and discuss experience.

An entirely different system is the West-European CECC-System for the quality assessment of electronic components. Within this system products are delivered with a certificate of conformity or a mark indicating that the production lot has been found to comply with certain quality requirements. No government regulations or other legislation are involved, but the success of the system relies on the fact that national inspectorates supervise all testing and inspection required by the system and supervise the employment of the mark or certificate of conformity. A similar system under the auspices of the IEC is developing and may in the long run replace the CECC-system.

A similar mark which is, so far as I know, entirely successful is the wool mark for clothes made of pure wool from real sheep. It is up to each purchaser to decide whether he will believe in the mark or not and evidently misuse has been prevented so that the mark has gained such confidence that few people doubt its validity.

What I have said here has only been some examples and I have tried to describe the development in order to point out such factors which constitute success or failure of a system. If some of the listeners have expected practical instructions on how to use the systems etc, I am afraid you are disappointed. Such information can, however, easily be obtained from the national certification bodies who operate the systems. I hope that some of the experience which I have related will be useful in the development of certification for other product areas.

(*) This mark shall not be confused with the various marks used by the European Economic Community (EEC).

MISE en APPLICATION par les ÉTATS MEMBRES des RECOMMANDATIONS de l'OIML

(état à la fin de 1983)

Une des tâches essentielles de l'OIML est l'harmonisation au niveau international des réglementations métrologiques nationales. Cette tâche est remplie par l'élaboration de réglementations modèles appelées « Recommandations Internationales » (RI), qui sont sanctionnées par la Conférence Internationale de Métrologie Légale et que les Etats Membres ont l'obligation morale de mettre en application dans toute la mesure du possible.

Cette obligation découlant de la Convention instituant l'OIML est renforcée, en ce qui concerne beaucoup d'Etats Membres, par l'obligation découlant du « Code des Normes » du GATT.

A la demande de la Conférence, le BIML effectue périodiquement des enquêtes permettant d'apprécier à quel degré les Etats Membres ont pu s'acquitter de cette obligation.

La dernière enquête portant sur les RI N° 1 à 49, avait été présentée à la 6ème Conférence, en 1980. Depuis, huit Recommandations Internationales nouvelles et cinq Recommandations Internationales révisées ont été sanctionnées, de nouveaux Etats ont adhéré à l'OIML et, d'une façon générale, le degré de mise en application a sensiblement progressé dans beaucoup d'Etats Membres.

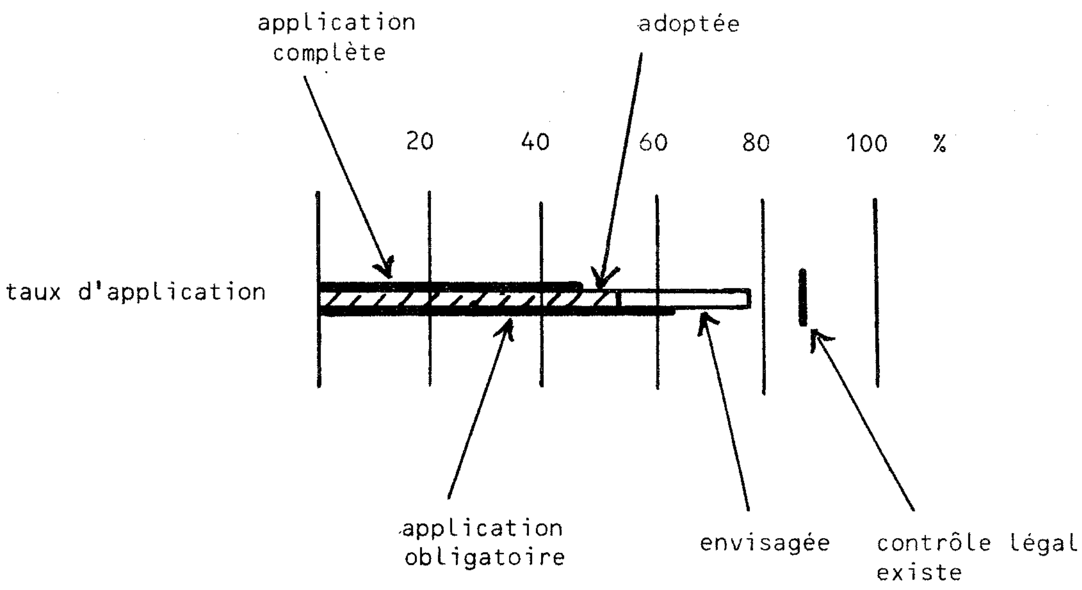
En mars 1983, le BIML a demandé aux Etats Membres de fournir ou de compléter les données sur la mise en application des RI N° 1 à 57. Des renseignements sur ce sujet ont également été demandés aux Correspondants. A la clôture de l'enquête, fin février 1984, les 27 Etats Membres suivants avaient répondu :

République Fédérale d'Allemagne, République Démocratique Allemande, Australie, Autriche, Belgique, Bulgarie, Canada, Danemark, Espagne, Etats-Unis, Finlande, France, Hongrie, Indonésie, Irlande, Japon, Norvège, Pays-Bas, Pologne, Roumanie, Royaume-Uni, Sri Lanka, Suède, Tanzanie, Tchécoslovaquie, URSS, Yougoslavie. (Parmi eux, un Etat Membre récent n'a pas été en mesure de fournir des données concrètes).

Le Bureau a également reçu les réponses de 10 Correspondants : Botswana, Colombie, Equateur, Hong Kong, Luxembourg, Mali, Ile Maurice, Nouvelle Zélande, Portugal, Trinité et Tobago.

Résultats statistiques de l'enquête

Les résultats sont donnés dans les graphiques qui suivent, les taux de mise en application de chaque Recommandation Internationale ayant été calculés en pour cent sur la base des 26 réponses reçues d'Etats Membres, comme le montre l'exemple suivant :



La colonne centrale indique les pourcentages d'Etats Membres ayant déjà mis en application la Recommandation Internationale (« adoptée »), ou ayant l'intention de le faire prochainement ou ultérieurement (« envisagée »).

La ligne épaisse au-dessus de la colonne indique le pourcentage d'Etats Membres chez lesquels la mise en application (déjà faite ou prévue) est ou sera « complète » (c'est-à-dire que toutes les prescriptions contenues dans la Recommandation Internationale sont reprises dans la réglementation nationale). La ligne épaisse au-dessous de la colonne indique le pourcentage d'Etats Membres chez lesquels la mise en application (déjà faite ou prévue) a ou aura un caractère « obligatoire ».

Le trait vertical épais à droite de la colonne indique le pourcentage d'Etats Membres dans lesquels un contrôle légal des instruments en question existe.

Dans les pages de graphiques ci-après, les Recommandations Internationales ont été regroupées suivant les grandeurs à mesurer ou suivant les domaines d'application. Les Recommandations Internationales N° 33, 34 et 42 figurent en dernière place, en raison de leur caractère particulier.

Conclusions

Si l'on tient compte des mises en application envisagées, le taux de mise en application de plusieurs Recommandations Internationales atteint maintenant 100 % (RI n° 2, poids parallélépipédiques ; n° 3 et 28, instruments de pesage à fonctionnement non automatique ; n° 5 et 27, compteurs de liquides autres que l'eau).

Les Recommandations Internationales pour lesquelles le taux de mise en application dépasse 80 % sont : RI n° 1 et 20, poids ; n° 50 et 51, instruments de pesage à fonctionnement automatique ; n° 35, mesures de longueur ; n° 49, compteurs d'eau ; n° 57, ensembles de mesurage ; n° 7, thermomètres médicaux ; n° 21, taximètres (pour ces deux dernières il y a une forte proportion de mise en application envisagée).

En ce qui concerne les Recommandations Internationales pour lesquelles le taux de mise en application est inférieur à 60 %, on note parfois le caractère « régional » de cette mise en application.

Par rapport aux enquêtes antérieures, une question nouvelle a été posée : « Existe-t-il dans votre pays un contrôle légal des instruments (ou partie d'instruments) faisant l'objet de Recommandation Internationale de l'OIML » ? Les réponses (trait vertical à la droite du graphique) montrent qu'en général le pourcentage d'Etats Membres où existe un contrôle est supérieur au taux de mise en application de la Recommandation Internationale en question : cela indique que, dans quelques Etats Membres, il existe une réglementation nationale non encore harmonisée avec la Recommandation Internationale de l'OIML. Dans le cas où le taux de mise en application (y compris envisagée) est plus élevé que le pourcentage d'Etats Membres où existe un contrôle légal, c'est probablement une indication du fait que la mise en application prévue de la Recommandation Internationale accompagnera la promulgation d'une réglementation qui, jusqu'à présent, n'existait pas.

Un document plus complet présentant pour chaque Recommandation les titres et numéros de références des réglementations nationales correspondantes sera diffusé ultérieurement.

R.I. N°

Masse - Mass

1 Poids cylindriques
Cylindrical weights

2 Poids parallélépipédiques
Rectangular bar weights

20 Poids des classes E, F, M
Weights of classes E, F, M

25 Poids pour vérificateurs
Inspector's weights

47 Poids étalons (portée élevée)
Standard weights (high capacity)

52 Poids hexagonaux
Hexagonal weights

3 Régl. métrologique. Pesage
Metrological reg. Weighing

28 Régl. technique. Pesage
Technical reg. Weighing

50 Instruments totalisateurs
Totalising machines

51 Trieuses pondérales
Checkweighers

Longueur - Length

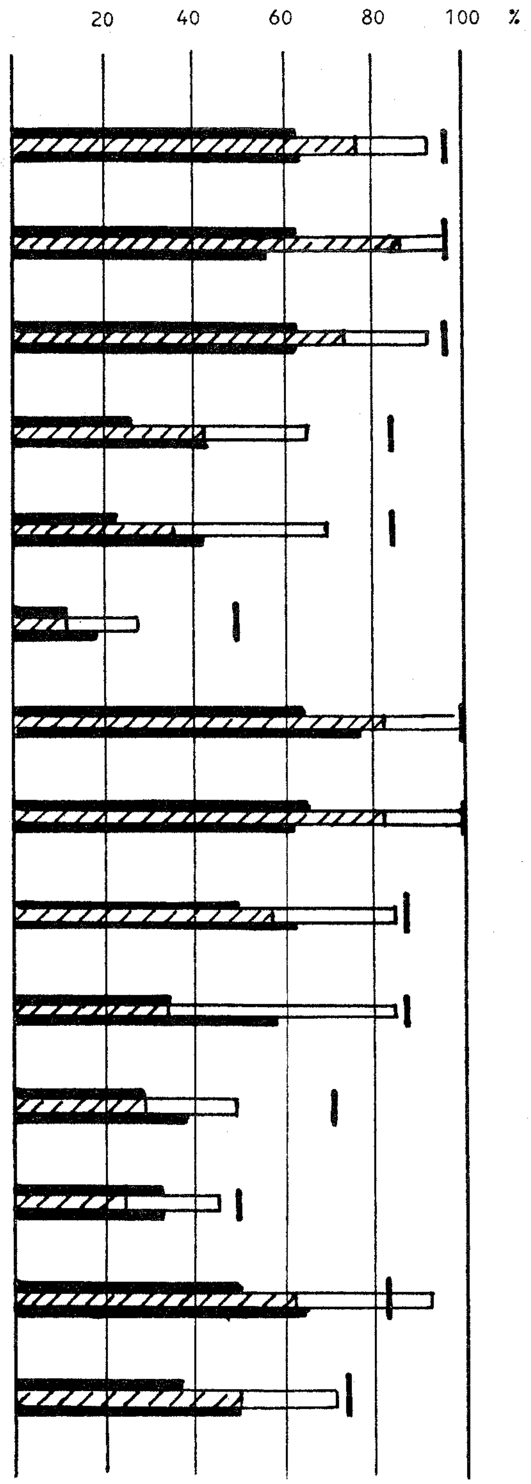
24 Mètre de vérification
Inspector's one meter

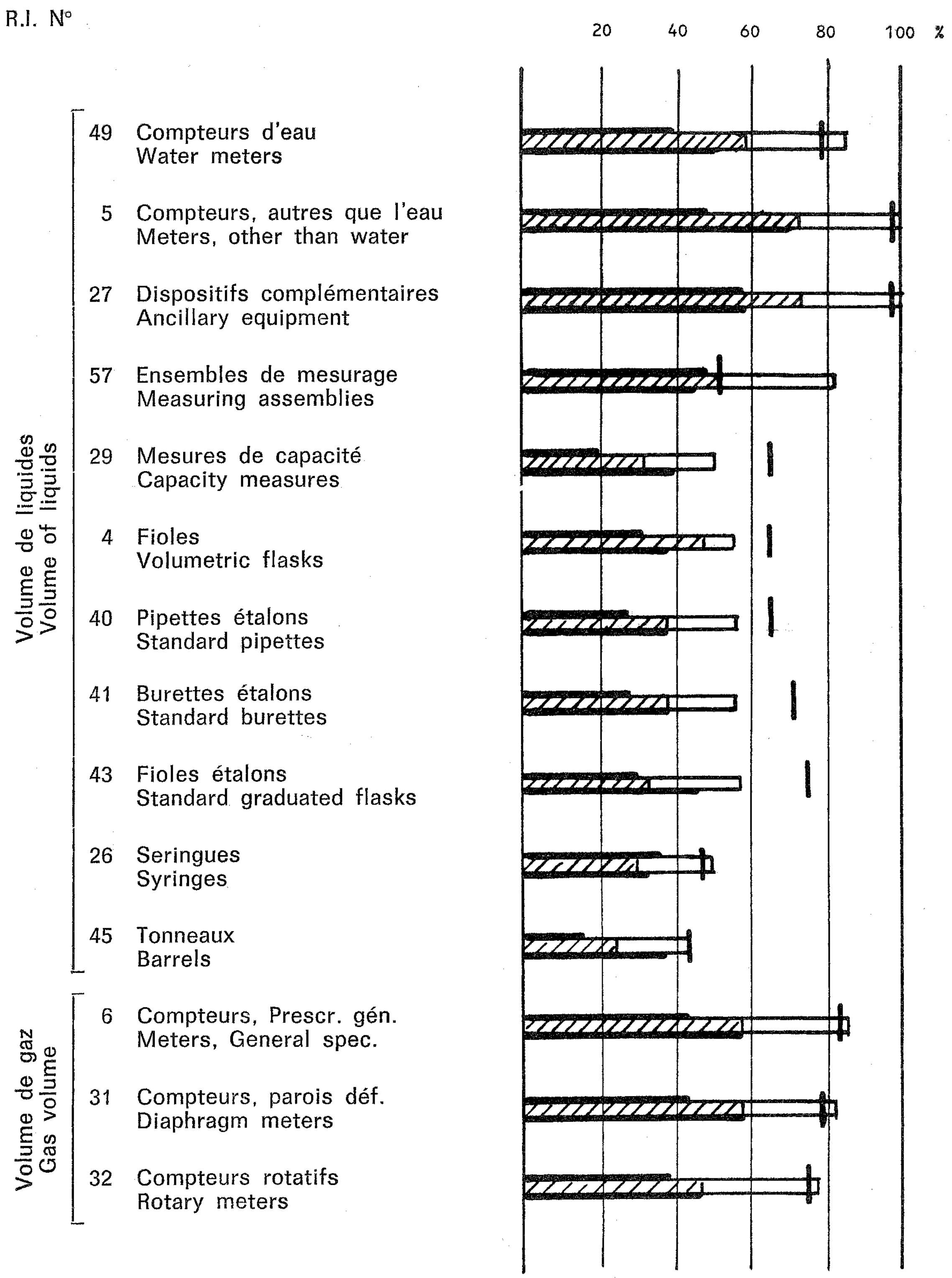
30 Cales étalons
Gage blocks

35 Mesures pour usages généraux
Measures for general use

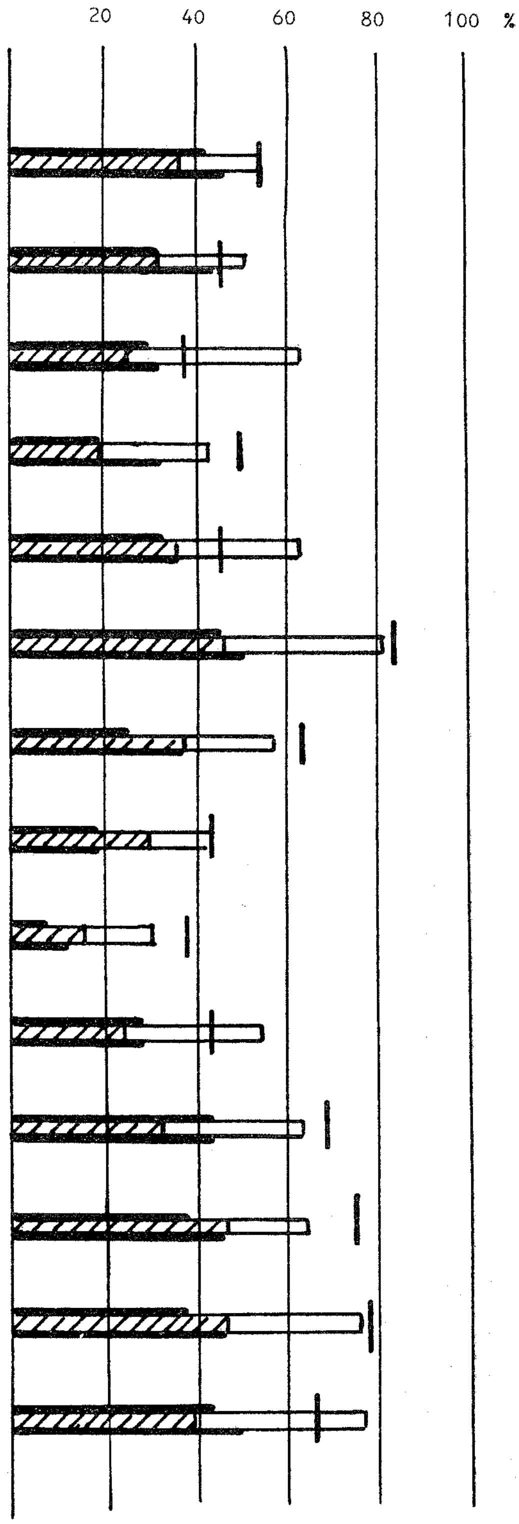
Elec.

46 Compteurs d'énergie électrique
Electrical energy meters




R.I. N°
20
40
60
80
100 %
Volume de liquides
Volume of liquids
49 Compteurs d'eau
Water meters
5 Compteurs, autres que l'eau
Meters, other than water
27 Dispositifs complémentaires
Ancillary equipment
57 Ensembles de mesurage
Measuring assemblies
29 Mesures de capacité
Capacity measures
4 Fioles
Volumetric flasks
40 Pipettes étalons
Standard pipettes
41 Burettes étalons
Standard burettes
43 Fioles étalons
Standard graduated flasks
26 Seringues
Syringes
45 Tonneaux
Barrels
Volume de gaz
Gas volume
6 Compteurs, Prescr. gén.
Meters, General spec.
31 Compteurs, parois déf.
Diaphragm meters
32 Compteurs rotatifs
Rotary meters

R.I. N°



Pression - Pressure

- 17 Manomètres indicateurs / Indicating pressure gauges
- 19 Manomètres enregistreurs / Recording pressure gauges
- 23 Manomètres pour pneus / Tyre pressure gauges
- 53 Eléments élastiques / Elastic sensing elements
- 16 Manomètres, tension artérielle / Blood pressure meters

Véhicules / Vehicles

- 21 Taximètres / Taximeters
- 55 Compteurs de vitesse / Speedometers

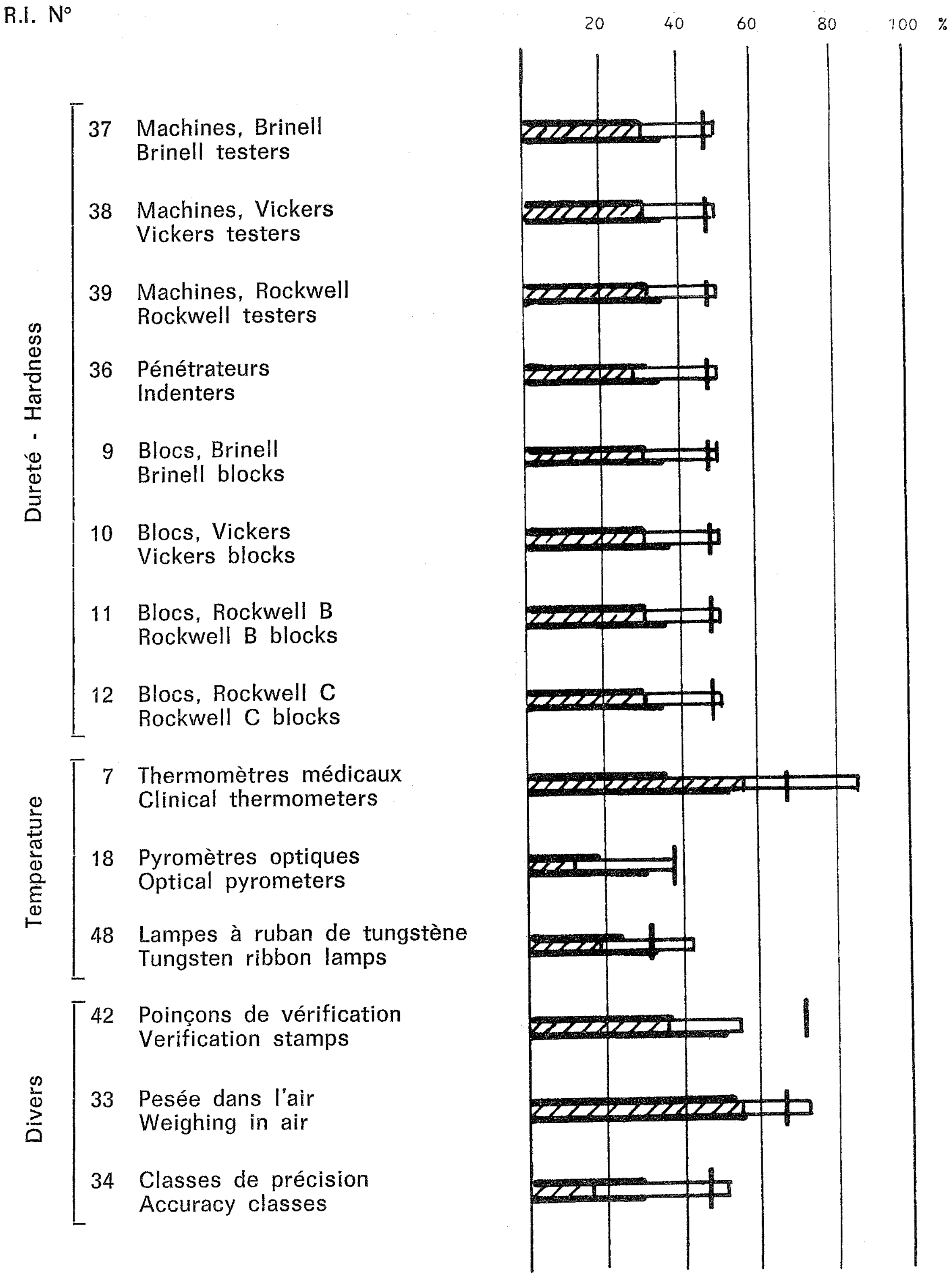
Phys. - Chem.

- 54 Echelle de pH / pH scale
- 56 Solutions conductivité / Conductivity solutions

Produits alimentaires - Food products

- 14 Saccharimètres / Saccharimeters
- 8* Humidimètres pour céréales / Moisture meters for cereals
- 15 Masse à l'hectolitre / Hectolitre mass
- 44 Alcoomètres / Alcoholometers
- 22 Tables alcoométriques / Alcoholometric tables

* Sera remplacée par RI 59
To be replaced by RI 59


R.I. N°
20
40
60
80
100 %
Dureté - Hardness
37 Machines, Brinell
Brinell testers
38 Machines, Vickers
Vickers testers
39 Machines, Rockwell
Rockwell testers
36 Pénétrateurs
Indenters
9 Blocs, Brinell
Brinell blocks
10 Blocs, Vickers
Vickers blocks
11 Blocs, Rockwell B
Rockwell B blocks
12 Blocs, Rockwell C
Rockwell C blocks
Temperature
7 Thermomètres médicaux
Clinical thermometers
18 Pyromètres optiques
Optical pyrometers
48 Lampes à ruban de tungstène
Tungsten ribbon lamps
Divers
42 Poinçons de vérification
Verification stamps
33 Pesée dans l'air
Weighing in air
34 Classes de précision
Accuracy classes

IMPLEMENTATION of OIML RECOMMENDATIONS by the MEMBER STATES

(status as per end 1983)

One of the most important tasks of OIML is the harmonization, at international level, of national metrology regulations. This task is achieved by the elaboration of model regulations, called « International Recommendations » (RI), which are sanctioned by the International Conference of Legal Metrology and which the Member States are morally obliged to implement as far as possible.

This obligation derives from the Convention establishing OIML and is strengthened, as far as many Member States are concerned, by the obligation deriving from the GATT Agreement « Technical Barriers to Trade ».

At the request of the Conference, BIML regularly carries out enquiries which reveal to what extent the Member States were able to fulfil this obligation.

The last enquiry concerning the RI's n° 1 to 49, was submitted to the 6th Conference, in 1980. Since then, eight new International Recommendations and five revised International Recommendations have been sanctioned, new States have acceded to OIML, and in general, the implementation rate has increased noticeably in many Member States.

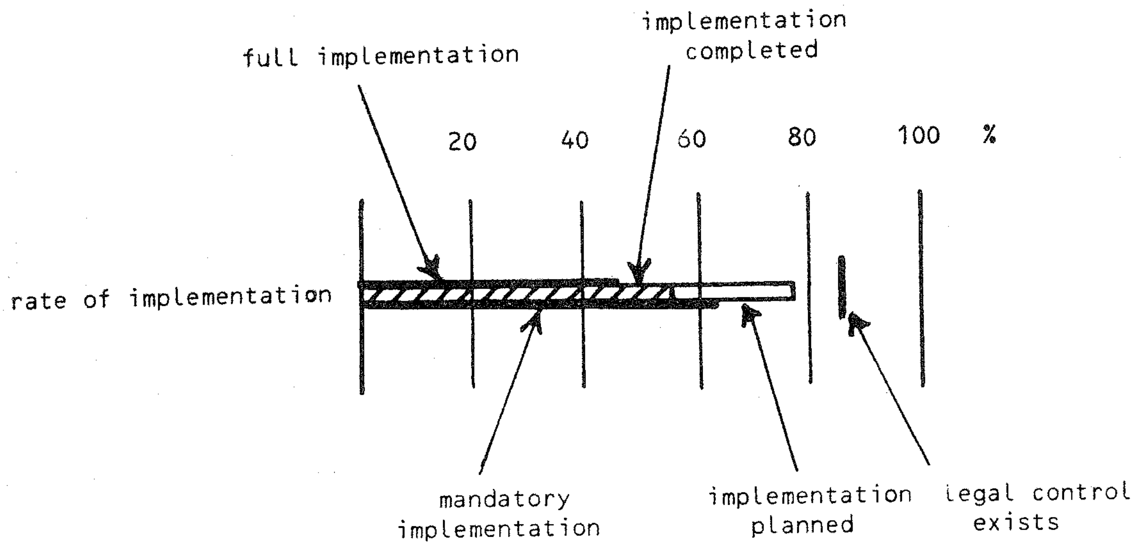
In March 1983, BIML requested the Member States to provide or complement the information regarding the implementation of RI's n° 1 to 57. The Corresponding States were also requested to provide information on this subject. Up to the end of February 1984, the closing date of the enquiry, the following 27 Member States replied :

Federal Republic of Germany, German Democratic Republic, Australia, Austria, Belgium, Bulgaria, Canada, Denmark, Spain, USA, Finland, France, Hungary, Indonesia, Ireland, Japan, Norway, Netherlands, Poland, Rumania, United Kingdom, Sri Lanka, Sweden, Tanzania, Czechoslovakia, USSR, Yugoslavia. (A new Member State among those enumerated was unable to give concrete data).

The Bureau was very pleased to obtain replies also from 10 Corresponding Members : Botswana, Columbia, Ecuador, Hong Kong, Luxembourg, Mali, Mauritius, New Zeland, Portugal, Trinidad and Tobago.

Statistical results of the questionnaires

The results are given in the preceding tables. For each Recommendation, the rate of implementation was calculated in per cent on the basis of the 26 replies received from the Member States, as shown in the following example :



The central horizontal column represents the percentage of Member States which have already implemented the RI (implementation completed) or have the intention to implement it sooner or later (implementation planned).

The length of the line above the column indicates the percentage of Member States for which the implementation (already completed or planned) is or will be « full » (that is to say that all the requirements contained in the RI are included in the national regulation). The length of the line below the column indicates the percentage of Member States for which the implementation (already completed or planned) has or will have a « mandatory » character.

The thick vertical line to the right of the column indicates the percentage of Member States in which there exists a legal control of the given type of measuring instrument. In the preceding pages of tables, the Recommendations are grouped according to the physical quantities to be measured or according to fields of application. The International Recommendations n° 33, 34 and 42 appear last, due to their particular character.

Conclusions

If we take into account the implementations planned, the implementation rate of several International Recommendations has already reached 100 % (this applies to RI n° 2, rectangular bar weights ; n° 3 and n° 28, non automatic weighing machines ; n° 5 and n° 27, meters for liquids other than water).

The International Recommendations for which the implementation rate is more than 80 % are : RI n° 1 and n° 20, weights ; n° 50 and n° 51, automatic weighing machines ; n° 35, measures of length ; n° 49, water meters ; n° 57, measuring assemblies ; n° 7, medical thermometers ; n° 21, taximeters (for the last two, the rate of implementation planned is high).

For the International Recommendations with an implementation rate lower than 60 %, we sometimes note a « regional » character of implementation.

Compared to the preceding inquiries, a new question was included : « Is there, in your State, a legal control of the measuring instruments (or of a part of them) which are the subject of the OIML International Recommendation ? ». The replies (vertical line to the right in the diagrams) show that in general the percentage of Member States in which there is a control is greater than the implementation rate of the International Recommendation in question : this means that, in some Member States, there is a national regulation which is not yet harmonized with the OIML International Recommendation. An implementation rate (including planned) greater than the percentage of Member States in which legal control is applied most probably means that the planned implementation of the International Recommendation will accompany the publication of a regulation which, until now does not exist.

A document giving, for each International Recommendation, the titles and reference numbers of the national regulations corresponding to the OIML International Recommendations will be circulated later.

LITTERATURE

DEBIT DES GAZ

Les mesures de volume des gaz en mouvement sont traitées d'une façon très complète dans un livre récent du Dr Rolf Matschke : Volumenmessungen strömender Gase - Grundlagen und Praxis, VDI-Verlag GmbH, Düsseldorf, Rép. Féd. d'Allemagne, 1983.

Le livre décrit la construction, les caractéristiques et la vérification de différents types de compteurs de gaz qui font l'objet d'approbation de modèle. Nous le recommandons par conséquent comme livre de référence aussi bien que comme manuel d'enseignement pour la formation de personnel de métrologie légale.

Pour ceux qui ne sont pas familiers avec la langue allemande, nous signalons qu'une traduction anglaise est actuellement disponible de PTB Testing Instructions « Gas Volume Meters » qui traite le même sujet mais sous une forme plus condensée.

PESAGE

Les exposés de la Conférence « Weightech 1983 » sont maintenant publiés sous forme d'un livre qui peut être commandé soit au Secrétariat d'IMEKO soit à :

The Institute of Measurement and Control
20 Peel Street
LONDON W 8 7 PD.

Ce livre contient 24 articles présentés à la Conférence dont un certain nombre sont d'un grand intérêt pour les services de métrologie légale et traitent des sujets tels que contrôle métrologique, pesage en mouvement, mesurage de la masse de grandes quantités de liquides (par plongeur cylindrique et capteur gyroscopique), techniques de pesage au laboratoire, capteurs de force et machine d'étalonnage de force, etc.

Nous aimons également attirer l'attention de nos lecteurs sur la revue bimestrielle « Infovrac » qui traite les problèmes de manutention, chargement et mesure des produits en vrac. Parmi les articles publiés jusqu'ici, on note qu'environ 20 % concernent des problèmes de pesage industriel. Cette revue est envoyée gratuitement aux professionnels de l'industrie et aux services nationaux de métrologie par demande à :

INFOVRAC
Editions SOMIA
76, rue de Saussure
F - 75017 PARIS

Nous avons été informés qu'une autre revue dans le domaine du pesage et intitulée « Weighing » est publiée en Grande-Bretagne depuis environ un an. Des informations sur les abonnements peuvent être obtenues en s'adressant à :

Lincoln Publications
Suite 6
Panter House
38 Mount Plaisant
LONDON WC 1 X O1P

MESURAGE DE PRODUITS PETROLIERS

Des conférences sur le mesurage des produits pétroliers sont fréquemment organisées par :

Oyez Scientific and Technical Services Ltd
Bath House
56 Holborn Viaduct
LONDON EC 1 A 2 EX

La prochaine conférence sera consacrée aux compteurs de toutes formes d'hydrocarbures liquides et se tiendra à Londres, du 7 au 8 mars 1985.

Les exposés des conférences précédentes ont été publiés et sont toujours disponibles (voir titres dans la version en anglais ci-après).

COMPTEURS D'ENERGIE THERMIQUE

Nous avons le plaisir de signaler un nouveau livre dans le domaine des mesures d'énergie thermique, écrit par un spécialiste du service de métrologie légale d'Autriche :

Dr Franz Adunka : « Wärmemengenmessungen »
Vulkan-Verlag, Essen, Rép. Féd. d'Allemagne, 1984.

Le livre a 240 pages, de nombreuses illustrations et contient des chapitres sur la théorie de comptage d'énergie thermique, exigences métrologiques, compteurs de débit utilisés, mesures de température, dispositifs calculateurs, essai et vérification de compteurs d'énergie thermique, leur installation, choix et fiabilité, etc.

Il contient également beaucoup de références de littérature récente et est complété par des tables de coefficients calorifiques pour l'eau et pour des mélanges d'eau et de liquides antigel.

La contribution de l'auteur est très précieuse pour les services de métrologie d'autant plus qu'il y a très peu de livres dans ce domaine et le livre peut également être chaleureusement recommandé pour la formation du personnel.

LITERATURE

GAS FLOW

A comprehensive treatment of gas flow measurements is given in the recent book by Dr Rolf Matschke : Volumenmessungen strömender Gase — Grundlagen und Praxis, VDI-Verlag GmbH, Düsseldorf, Fed. Rep. of Germany, 1983.

The book describes the design, characteristics and testing of various types of domestic and bulk gas meters subject to pattern approval. It is thus highly recommended as a source book for current use as well as for teaching of gas metering for legal metrology staff.

For those not familiar with the German language, it should be mentioned that there is now available an English translation of PTB Testing Instructions : « Gas Volume Meters » which treats this subject in a slightly more condensed form.

WEIGHING

The papers from the « Weightech 1983 » conference are now available in a book which may be ordered from IMEKO Secretariat or from :

The Institute of Measurement and Control
20 Peel Street
LONDON W 8 7 PD.

This book contains 24 articles presented at the Conference, many of which are of high interest to legal metrology staff and treat subjects such as metrological control of in-motion weighing machines, direct mass measurement of great quantities of liquids (by cylindrical plunger and gyroscopic weigh cell), laboratory weighing techniques, force transducers and force calibrating machines, etc.

We would also like to draw attention to the review « Infovrac » in French language which is published at the rate of six issues per year and which deals with problems of handling, conveying and measuring bulk materials. Amongst the articles so far published, about 20 % deal with problems of industrial weighing. This review is sent free of charge to professionals and legal metrology authorities upon request to :

INFOVRAC
Editions SOMIA
76, rue de Saussure
F - 75017 PARIS

We have also been informed that another review entitled « Weighing » is published in United-Kingdom since about one year. Information about subscriptions may be obtained from :

Lincoln Publications
Suite 6
Panter House
38 Mount Plaisant
LONDON WC 1 X O1P

METERING OF PETROLEUM PRODUCTS

Conferences on petroleum measurements are frequently organized by :

Oyez Scientific and Technical Services Ltd
Bath House
56 Holborn Viaduct
LONDON EC 1 A 2 EX

The next conference, which will concern metering of all forms of liquid petroleum products, is due to take place in London, 7-8 March 1985.

Papers of previous conferences have been published and are still commercially available as follows :

- Recent Developments in the Custody of Transfer Measurement of Crude Oil, 1983, 204 p.,
- Innovations in Industrial Level Measurement, 1983, 182 p.,
- The Metering of Natural Gas and Liquefied Hydrocarbon Gases, 1984, 300 pages.

HEAT METERS

We are pleased to announce a new book in the field of heat metering written by a specialist of the Austrian legal metrology administration :

Dr Franz Adunka : « Wärmemengenmessungen »
Vulkan-Verlag, Essen, Fed. Rep. of Germany, 1984.

The book has 240 pages, numerous illustrations and contains chapters on the theory of heat metering, metrological requirements, flow meters used, temperature measurements, computing devices, testing of heat meters, their installation, choice, reliability, etc.

It also contains many references to recent literature and is completed by heat coefficient tables for water and water/anti-freeze mixtures.

As there are very few books in this field the author's contribution is very valuable for metrology services and can also be warmly recommended as source material for training of staff.

INFORMATIONS

MEMBRES DU COMITE

La composition du Comité International de Métrologie Légale (CIML) est modifiée ainsi qu'il suit :

REPUBLIQUE POP. DEM. DE COREE — Monsieur KIM HI SANG, nouveau Directeur de l'Institut Central de Métrologie, a été désigné pour représenter son Pays au Comité. Il remplace ainsi Monsieur HO SU GYONG.

CUBA — Monsieur J. GOMEZ ROSELL, Directeur, Metrology Research Institute (INIMET), succède à Monsieur J. OCEGUERA en qualité de Représentant de son Pays au CIML.

DANEMARK — Monsieur Ove E. PETERSEN, National Agency of Technology, succède à Monsieur E. REPSTORFF HOLTVEG pour représenter son Pays au CIML.

FRANCE — Monsieur Ph. BERTRAN, Chef du Service de Métrologie, a été désigné pour représenter la France au CIML. Il remplace ainsi Monsieur P. AUBERT.

Nous adressons nos meilleures salutations de bienvenue aux nouveaux Membres du CIML, et exprimons nos vifs remerciements aux Personnalités qui viennent de quitter le Comité.

MEMBRE CORRESPONDANT

Monsieur le Président du CIML vient d'accueillir l'Etat de BURKINA FASO (naguère HAUTE VOLTA) en tant que nouveau Membre Correspondant. Cette adhésion porte à 73 le nombre des Etats Membres et des Membres Correspondants de notre Institution.

BRESIL

L'Institut National de Métrologie, Normalisation et Contrôle de Qualité (INMETRO) organise un symposium national du 20-22 novembre, qui traite la métrologie et qualité, matériaux de référence et mesures acoustiques. Cette manifestation a lieu conjointement avec l'inauguration des laboratoires d'acoustique d'INMETRO.

IMEKO

En 1983 IMEKO a commencé l'édition d'une nouvelle revue trimestrielle intitulée MEASUREMENT. Cette publication en langue anglaise contient des informations originales sur le progrès dans la science et la technologie des mesurages ainsi que des rapports et des communications de conférences. Des articles de synthèse sont également inclus. Les manuscrits sont reçus sur le plan international et la revue a une diffusion mondiale.

Des jeux complets du volume 1 (1983) et un abonnement au volume 2 et aux suivants peuvent être obtenus auprès des éditeurs, l'organisation membre anglais d'IMEKO :

The Institute of Measurement and Control,
20 Peel Street,
London W8 7PD
England.

Les manifestations suivantes ont été annoncées pour l'année 1985 :

IMEKO '85 - 10th IMEKO World Congress
Prague, Czechoslovakia, April 21-26

TC 9 - Flow Measurement FLOMEKO '85 - 4th International Conference on Flow Measurement, Melbourne, Australia, 20-23 August

TC 11 - Metrological Requirements for Developing Countries
3rd Seminar on maintenance and calibration of instruments in industry,
Zagreb, Yugoslavia, September.

INFORMATION

COMMITTEE MEMBERS

The composition of the International Committee of Legal Metrology (CIML) is modified as follows :

DEM. PEOPLE'S REP. OF KOREA — Mr KIM HI SANG, new Director of the Central Metrological Institute, has been appointed as representative of his Country on the Committee. He replaces Mr HO SU GYONG.

CUBA — Mr J. GOMEZ ROSELL, Director of the Metrology Research Institute (INIMET), replaces Mr J. OCEGUERA as representative of his Country on the CIML.

DENMARK — Mr Ove E. PETERSEN, National Agency of Technology, will succeed Mr E. REPSTORFF HOLTVEG as CIML Member.

FRANCE — Mr Ph. BERTRAN, Head of the Office of Metrology, has been appointed to represent France on the CIML. He thus replaces Mr P. AUBERT.

We express our best wishes of welcome to the new Committee Members, and warmly thank the Personalities who have left the Committee.

CORRESPONDING MEMBER

The President of the CIML has just admitted the State of BURKINA FASO (formerly UPPER VOLTA) as OIML Corresponding Member. This accession brings to 73 the number of Member States and Corresponding Members of our Institution.

BRAZIL

The National Institute of Metrology, Standardization and Quality Control (INMETRO) organizes a national symposium on 20-22 November, dealing with metrology and quality, reference materials and acoustics at the occasion of the inauguration of its new acoustical laboratories.

IMEKO

In 1983 IMEKO launched a new quarterly journal, MEASUREMENT. This English language publication contains original information on advances in the science and technology of measurement as well as reports and communications from conferences. Survey and review papers are also included. Material is received on an international basis, and the journal circulates world-wide.

Complete sets of Volume 1 (1983) and subscription to Volume 2 and future volumes are available from the publishers, the UK Member Organisation of IMEKO :

The Institute of Measurement and Control,
20 Peel Street,
London W8 7PD
England.

The following events have been announced to take place in 1985 :

IMEKO '85 - 10th IMEKO World Congress
Prague, Czechoslovakia, April 21-26

TC 9 - Flow Measurement FLOMEKO '85 - 4th International Conference on Flow Measurement,
Melbourne Australia, 20-23 August

TC 11 - Metrological Requirements for Developing Countries
3rd Seminar on maintenance and calibration of instruments in industry,
Zagreb, Yugoslavia, September.

CENTRE DE DOCUMENTATION

Documents reçus au cours du 3ème trimestre 1984

BUREAU INTERNATIONAL DES POIDS ET MESURES — BIPM

Procès-Verbaux des séances du Comité International des Poids et Mesures, 7ème session, 13-21 octobre 1983 (Tome 51)

ORGANISATION INTERNATIONALE DE NORMALISATION - ISO

Secrétariat
Memento 1984
Catalogue + 1er Supplément 1984

COMMISSION ELECTROTECHNIQUE INTERNATIONALE — CEI

Secrétariat
Catalogue des publications (Normes mondiales pour l'électricité et l'électronique), 1984
Annuaire de la CEI, 1984 (Normes mondiales pour l'électricité et l'électronique)
Première Série de modifications au Répertoire, Mai 1984

ORGANISATION DES NATIONS UNIES POUR L'EDUCATION, LA SCIENCE ET LA CULTURE — UNESCO

Manuel de la Conférence Générale, Ed. 1984

ORGANISATION DES NATIONS UNIES POUR L'EDUCATION, LA SCIENCE ET LA CULTURE/ International Information Centre for Terminology — UNESCO/UNISIST

PGI-84/WS/12 : International Bibliography of Computer-Assisted Terminology

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE/ Organisation Mondiale de la Santé — FAO/OMS

Commission mixte FAO/OMS du Codex Alimentarius
Codex Alimentarius (1ère édition, 1984), Volumes :
XIII - Limites maximales Codex pour les résidus des pesticides
XIV - Dispositions relatives aux additifs alimentaires
XV - Norme générale Codex pour les aliments irradiés
Codes d'usages internationaux recommandés pour les aliments

CONFERENCE DES NATIONS UNIES SUR LE COMMERCE ET LE DEVELOPPEMENT — CNUCED

TD/271/Rev. 1 : Développement et reprise économique : Les réalités de la nouvelle interdépendance, 1984

INTERNATIONAL COMMISSION ON RADIATION UNITS AND MEASUREMENTS — ICRU

ICRU Report 36 : Microdosimetry, Dec. 1983

COMMONWEALTH SCIENCE COUNCIL — CSC

Commonwealth Secretariat
Factbook : Facts and figures about Commonwealth countries, 1983

INTERNATIONAL MEASUREMENT CONFEDERATION — IMEKO

Technical Committee on Metrology — TC 8
Proceedings of 2nd Symposium on Theoretical and Practical Limits of Measurement Accuracy (Budapest, 10-12 May 1983)

Technical Committee on Measurement Theory
Proceeding of 4th International IMEKO Symposium on Measurement and Estimation (Bressanone, 8-12 May 1984)

REPUBLIQUE FEDERALE D'ALLEMAGNE

Physikalisch- Technische Bundesanstalt
PTB-Publications, June 1984
PTB-Prüfregeln Band 17 : Störfestigkeit, von G. Bittner, P. Thoma und W. Eisfelder - 1984
PTB-Prüfregeln (Translation into English) :
Band 4 : Gas volume meters, 1984
Band 12 : Instrument transformers, 1984

Verlag des Vereins Deutscher Ingenieure - Düsseldorf
Volumenmessung strömender Gase - Grundlagen und Praxis, 1983

Vulkan-Verlag - Essen
Wärmemengenmessung (F. Adunka, 1984)

BRESIL

Instituto Nacional de Metrologia, Normalizaçao e Qualidade Industrial — INMETRO
Resoluçao CONMETRO 01/82, du 27-4-1982 : Regulamentaçao metrologica e Quadro geral de unidades de medidas
IND-001 : O Sistema Nacional de Metrologia, Normalizaçao e Qualidade Industrial, 1982
Legislaçao - 1973/79 (Résumé de la législation de 1973 à 1979)
National System of Metrology, Standardization and Industrial Quality, INMETRO 83 (en anglais)

CANADA

Consommation et Corporations
Modifications du 28-2-1984 aux caractéristiques pour l'approbation des types de compteurs d'électricité, transformateurs de mesure et appareils auxiliaires

REPUBLIQUE DE COREE

National Industrial Research Institute
The Report Vol. XXXII, 1982
Brochure in English on National Industrial Research Institute, 1984

CUBA

Comite Estatal de Normalizacion
La Certificacion, 1980
Sistema Internacional de Unidades, SI
Maquinaria Azucarera/Sugar Machinery
INC Catalogo 1983 + Suplemento 1
Clasificador uniforme de Unidades de Medida (CUUM), 1983

ETATS-UNIS D'AMERIQUE

National Council on Radiation Protection and Measurements - NCRP
Proceedings No. 5 : Proceedings of the 9th Annual Meeting of the NCRP (6, 7 April 1983)
NCRP Report No. 72 : Radiation Protection and Measurements for Low Voltage Neutron Generators, Nov. 1983.
NCRP Report No. 73 : Protection in Nuclear Medicine und Ultrasound Diagnostic Procedures in Children, Dec. 1983
NCRP Report No. 74 : Biological Effects of Ultrasound : Mechanisms and Clinical Implications, Dec. 1983
NCRP Report No. 76 : Radiological Assessment : Predicting the Transport, Bio-accumulation and Uptake by Man of Radionuclides Released to the Environment, March 1984
NCRP Report No. 77 : Exposures from the Uranium Series with Emphasis on Radon and its Daughters, March 1984

FINLANDE

Teknillinen Tarkastuskeskus
Teknillinen Tarkastuslaitus : Vuosikertomus 1983

FRANCE

Réglementation métrologique

Arrêté du 7-12-1983 modifiant l'arrêté du 20-6-1975 : Instruments équipant les installations thermiques en vue de réduire la pollution thermique et d'économiser l'énergie

Loi n° 83-1045 du 8-12-1983 : Contrôle de l'état alcoolique

Instruction n° 83.1.02.430.0.0 du 16-12-1983 : Etendue de la plage des débits d'un mesureur turbine utilisé pour le mesurage des liquides autres que l'eau

Instruction n° 83.1.01.610.0.0 du 22-12-1983 : Moyens matériels de vérification sur place des instruments de pesage de moyenne et forte portée

Instruction n° 83.1.01.620.0.0 du 22-12-1983 : Vérification primitive en atelier des instruments de pesage neufs de moyenne et forte portée

Décision n° 83.1.02.490.0.3 du 30-12-1983 : Réparateurs d'ensembles de mesurage routiers pour GPL, liste des agréments pour les années 1984-1985

Procédure d'approbation des modèles d'instruments de pesage industriel munis de capteurs à jauges de contrainte, liste des capteurs de pesage au 31-12-1983

ITALIE

Istituto Elettrotecnico Nazionale Galileo Ferraris

IEN 83 Annual report

ROYAUME-UNI DE GRANDE-BRETAGNE ET D'IRLANDE DU NORD

National Physical Laboratory

NPL Report MOM 38 (March 1979) : Mass, force and weight (by B. Swindells)

Department of the Environment/National Water Council

Gas Chromatography - an Essay Review, 1982

Gas Chromatographic and Associated Methods for the Characterization of Oils, Fats, Waxes and Tars, 1982

British Standards Institution

Manual of British Standards in Engineering Metrology, 1984

SUISSE

Office fédéral de métrologie

Pruef- und Massmoeglichkeiten im Eidg. Amt für Messwesen, März 1982

URSS

Gosudarstvennyi Komitet SSSR po Standartam

Gosudarstvennye Standarty SSSR, Ukazatel' 1984 (1, 2, 3, 4)

RECOMMANDATIONS INTERNATIONALES

R.I. N°

— Vocabulaire de métrologie légale (termes fondamentaux)
Vocabulary of legal metrology (fundamental terms)

1 — Poids cylindriques de 1 g à 10 kg (de la classe de précision moyenne)
Cylindrical weights from 1 g to 10 kg (medium accuracy class)

2 — Poids parallélépipédiques de 5 à 50 kg (de la classe de précision moyenne)
Rectangular bar weights from 5 to 50 kg (medium accuracy class)

3 — Réglementation métrologique des instruments de pesage à fonctionnement non automatique
Metrological regulations for non automatic weighing machines

4 — Fioles jaugées (à un trait) en verre
Volumetric flasks (one mark) in glass

5 — Compteurs de liquides autres que l'eau à chambres mesureuses
Meters for liquids other than water with measuring chambers

6 — Prescriptions générales pour les compteurs de volume de gaz
General specifications for volumetric gas meters

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

8 — Voir RI 59
See RI 59

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

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

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

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

14 — Saccharimètres polarimétriques
Polarimetric saccharimeters

15 — Instruments de mesure de la masse à l'hectolitre des céréales
Instruments for measuring the hectolitre mass of cereals

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

17 — Manomètres, vacuomètres, manovacuomètres indicateurs (instruments usuels)
Indicating pressure gauges, vacuum gauges and pressure-vacuum gauges (ordinary instruments)

18 — Pyromètres optiques à filament disparaissant
Optical pyrometers of the disappearing filament type

19 — Manomètres, vacuomètres, manovacuomètres enregistreurs (instruments usuels)
Recording pressure gauges, vacuum gauges, and pressure-vacuum gauges (ordinary instruments)

20 — Poids des classes de précision E_1 E_2 F_1 F_2 M_1 de 50 kg à 1 mg
Weights of accuracy classes E_1 E_2 F_1 F_2 M_1 from 50 kg to 1 mg

21 — Taximètres
Taximeters

22 — Tables alcoométriques internationales
International alcoholometric tables

23 — Manomètres pour pneumatiques de véhicules automobiles
Tyre pressure gauges for motor vehicles

24 — Mètre étalon rigide pour agents de vérification
Standard one metre bar for verification officers

25 — Poids étalons pour agents de vérification
Standard weights for verification officers

26 — Seringues médicales
Medical syringes

27 — Compteurs de volume de liquides (autres que l'eau). Dispositifs complémentaires
Volume meters for liquids (other than water). Ancillary equipment

28 — Réglementation technique des instruments de pesage à fonctionnement non-automatique
Technical regulations for non-automatic weighing machines

29 — Mesures de capacité de service
Capacity serving measures

30 — Mesures de longueur à bouts plans (Calibres à bouts plans ou cales-étalons)
End standards of length (gauge blocks)

31 — Compteurs de volume de gaz à parois déformables
Diaphragm gas meters

32 — Compteurs de volume de gaz à pistons rotatifs et compteurs de volume de gaz à turbine
Rotary piston gas meters and turbine gas meters

33 — Valeur conventionnelle du résultat des pesées dans l'air
Conventional value of the result of weighing in air

34 — Classes de précision des instruments de mesurage
Accuracy classes of measuring instruments

35 — Mesures matérialisées de longueur pour usages généraux
Material measures of length for general use

36 — Vérification des pénétrateurs des machines d'essai de dureté
Verification of indenters for hardness testing machines

37 — Vérification des machines d'essai de dureté (système Brinell)
Verification of hardness testing machines (Brinell system)

38 — Vérification des machines d'essai de dureté (système Vickers)
Verification of hardness testing machines (Vickers system)

39 — Vérification des machines d'essai de dureté (système Rockwell B, F, T - C, A, N)
Verification of hardness testing machines (Rockwell systems B, F, T - C, A, N)

40 — Pipettes graduées étalons pour agents de vérification
Standard graduated pipettes for verification officers

41 — Burettes étalons pour agents de vérification
Standard burettes for verification officers

42 — Poinçons de métal pour agents de vérification
Metal stamps for verification officers

43 — Fioles étalons graduées en verre pour agents de vérification
Standard graduated glass flasks for verification officers

44 — Alcoomètres et aréomètres pour alcool
Alcoholometers and alcohol hydrometers

45 — Tonneaux et futailles
Casks and barrels

46 — Compteurs d'énergie électrique active à branchement direct (de la classe 2)
Active electrical energy meters for direct connection (class 2)

47 — Poids étalons pour le contrôle des instruments de pesage de portée élevée
Standard weights for testing of high capacity weighing machines

48 — Lampes à ruban de tungstène pour l'étalonnage des pyromètres optiques
Tungsten ribbon lamps for calibration of optical pyrometers

49 — Compteurs d'eau (destinés au mesurage de l'eau froide)
Water meters (intended for the metering of cold water)

50 — Instruments de pesage totalisateurs continus à fonctionnement automatique
Continuous totalising automatic weighing machines

51 — Trieuses pondérales de contrôle et trieuses pondérales de classement
Checkweighing and weight grading machines

52 — Poids hexagonaux. Classe de précision ordinaire de 100 g à 50 kg
Hexagonal weights. Ordinary accuracy class, from 100 g to 50 kg

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

54 — Echelle de pH des solutions aqueuses
pH scale for aqueous solutions

55 — Compteurs de vitesse, compteurs mécaniques de distances et chronotachygraphes des véhicules automobiles - Réglementation métrologique
Speedometers, mechanical odometers and chronotachographs for motor vehicles. Metrological regulations

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

57 — Ensembles de mesurage de liquides autres que l'eau équipés de compteurs de volumes. Dispositions générales
Measuring assemblies for liquids other than water fitted with volume meters. General provisions.

*58 — Sonomètres
Sound level meters

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

* Projet adopté par le CIML - mai 1983. A sanctionner par la Septième Conférence - octobre 1984.
Draft adopted by the CIML - May 1983. To be sanctioned by the Seventh Conference - October 1984.

DOCUMENTS INTERNATIONAUX

D.I. N°

1 — Loi de métrologie
Law on metrology

2 — Unités de mesure légales
Legal units of measurement

3 — Qualification légale des instruments de mesurage
Legal qualification of measuring instruments

4 — Conditions d'installation et de stockage des compteurs d'eau froide
Installation and storage conditions for cold water meters

5 — Principes pour l'établissement des schémas de hiérarchie des instruments de mesure
Principles for the establishment of hierarchy schemes for measuring instruments

6 — Documentation pour les étalons et les dispositifs d'étalonnage
Documentation for measurement standards and calibration devices

7 —

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

9 — Principes de la surveillance métrologique
Principles of metrological supervision

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

Note — Recommandations internationales et Documents internationaux peuvent être acquis au
International Recommendations and International Documents may be purchased from
Bureau International de Métrologie Légale, 11, rue Turgot, 75009 PARIS.

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