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Legal Metrology and International Trade

Contents

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1. WHAT IS METROLOGY?

Metrology is the science of measurement. It should not be confused with "Meteorology", the science of weather and weather forecasting. Metrology includes units of measurement and their standards, measuring instruments and their field of application, and all theoretical and practical problems relating to measurement.

Measurements are essential to nearly all aspects of human activity ranging from production control, measurement of environmental quality, health and safety assessment, conformity assessment of products to consumer protection and fair trade assurance.

Metrology is classified in three main fields: Scientific Metrology, Industrial Metrology and Legal Metrology.

Scientific Metrology is that part of metrology which deals with problems common to all metrological questions irrespective of the quantity measured. It covers general theoretical and practical problems concerning units of measurement, including their realization and dissemination through scientific methods, the problems of errors and uncertainties in measurement and the problems of metrological properties of measuring instruments.

There are different specialist areas of metrology, for example:

- *Mass metrology* dealing with mass measurements;
- *Dimensional metrology* dealing with length and angle measurements;
- *Temperature metrology* dealing with temperature measurements;
- *Electrical metrology* dealing with electrical measurements;
- *Chemical metrology* dealing with measurements in chemistry.

Industrial metrology deals with measurements in production and quality control. It covers calibration procedures, calibration intervals, control of measurement processes and management of measuring instruments in industry to ensure that they are in a state of compliance with requirements for their intended use.

Legal metrology is that part of metrology which is subject to legal/regulatory control. It is defined in the *International Vocabulary of Legal Metrology* as that part of metrology relating to activities which result from statutory requirements and concern measurement, units of measurement, measuring instruments and methods of measurement and which are performed by competent bodies.

It is totally justified to say that the present trend of globalisation of trade is the strongest thrust boosting the current importance of metrology and its rapid development. However, it is also the most important challenge to legal metrology as far as trade agreements based on elimination of technical barriers to trade and mutual recognition agreements of conformity assessment is concerned. Legal metrology is by its regulatory nature, particularly sensitive to the elimination of technical barriers to trade. Government regulations are without exception real and potential technical barriers to trade, unless regionally and ultimately internationally harmonised. The harmonisation of metrological requirements as well as of conformity assessment and verification procedures is therefore becoming most urgent and an important challenge to legal metrology.

2. SCOPE OF LEGAL METROLOGY

The scope of legal metrology depends on national regulations and may be different from country to country. In general, most countries have legislation to control trade measurements. A few countries also regulate measurements in the following areas:

- public health and human safety (e.g. in the medical field and road safety),
- environmental protection and pollution monitoring, and
- resource monitoring and control.

Measurements enter into practically all commercial transactions from the trading of goods such as petroleum, natural gas or metal ores in bulk to the retail sale of goods to the public in the market place. In ordinary commercial transactions, legal metrology ensures that during the sale of any commodity in loose form, the actual delivery to the purchaser is not less than the quantity contracted and paid for. In the case of prepackaged goods, the primary requirement is that the packages intended for retail sale should be marked with the correct statement of net quantity and the name of the packer in such style and form as to be readily seen by the purchaser. In addition, the packing of certain commodities may be in rationalised standard quantities to facilitate quantity and price comparison. Net content inspection of prepackages carried out by the legal metrology authority protects consumers who cannot verify the net quantity of contents. Legal metrology therefore ensures fair trade practices and maintains a competitive marketplace. It also encourages manufacturers, distributors and retailers to follow good manufacturing and distribution practices.

Legal control on the measurements involving public health and human safety is equally important from the consumer protection viewpoint. For example, a clinical thermometer or a blood pressure instrument which is not properly verified may lead to wrong diagnosis and incorrect medication. Chemical metrology monitors food and toxic substances in the human body while the breath analyser and radar speed measurement helps to ensure our safety on the road.

The field of environmental protection and pollution monitoring is heavily regulated and is already one of the most important measurement activities of modern legal metrology. As the planet is threatened to run out of many of its precious resources (water, minerals, oil and gas, fish, etc.), prices tend to increase thereby increasing the need of more accurate measurement. Countries are increasingly regulating resource monitoring and control based on adequately accurate measurement. It is expected that in this 21st century, environmental protection and resource monitoring will become the most important areas of legal metrology at par with trade metrology.

3. UNDERSTANDING THE REQUIREMENTS OF NATIONAL LEGAL METROLOGY LEGISLATION

A national law on metrology usually provides for the following:

- Legal units of measurement;
- Physical representation of legal units;
- Hierarchy of measurement standards – their maintenance and custody;
- Technical regulations of measuring instruments covering metrological, technical and administrative requirements;
- Metrological control on measuring instruments;

- Metrological control on prepackaged commodities;
- Control of manufacture, import, repair and sale of measuring instruments;
- Authority responsible for legal metrology;
- Levy and collection of fees;
- Offences and penalties.

3.1 Legal units of measurement

The legal units of measurement accepted by most countries are the SI units (i.e. the International System of Units), their decimal multiples and submultiples as indicated by the use of SI prefixes and certain non-SI units specified by relevant regulations. The International System of Units is the revised and modern form of the metric system. SI has been recognised and recommended by the General Conference on Weights and Measures (CGPM) and the International Organisation of Legal Metrology (OIML).

The SI system includes:

- base units ; and
- derived units including supplementary units.

The seven base units are listed in table 1.

Table 1 - SI base units

Base quantity	SI base unit	
	Name	Symbol
length	metre	m
mass	kilogram	kg
time	second	s
electric current	ampère	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

Derived units are formed by combining base units according to the algebraic relations linking the corresponding quantities. For example the unit for speed, *metre per second* (m/s) is derived from the base units *metre* and *second* while the unit for volume, *cubic metre* (m^3) is derived from the base unit *metre*. Certain derived units have special names, for example the unit for pressure *Pascal* (Pa) is the special name for *Newton per square metre* (N/m^2).

There are also non-SI units which are allowed to be used for practical reasons. These are given in table 2. The decimal multiples and sub-multiples of SI units are formed by SI prefixes, some of which are given in table 3. As an example of the use of prefixes, 1 kg = 1 000 g = 1 000 000 mg, where the prefix *kilo*, symbol "k", is used for the multiplying factor 1 000 and the prefix *milli*, symbol "m", is used for the multiplying factor 0.001.

Table 2 - Units used with the SI

Quantity	Unit		
	Name	Symbol	Definition
time	minute hour day	min h d	1 min = 60 s 1 h = 60 min 1 d = 24 h
plane angle	degree minute second	° ' "	1° = (π/180) rad 1' = (1/60)° 1" = (1/60)'
volume	litre	l, L [1)]	1 L = 1 dm^3
mass	tonne [2)]	t	1 t = 10^3 kg

1) *The two symbols for litre are on an equal footing*
2) *Also called the metric ton in the English language*

Table 3 – Some SI prefixes

Factor	Prefix	
	Name	Symbol
10^6	mega	M
10^3	kilo	k
10^2	hecto	h
10	deca	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ

The full stop is used as the decimal sign in many English-speaking countries (as in this document also) while the comma is often used as the decimal sign in other countries.

Although the SI is used worldwide, there are also other systems of units used in certain countries, e.g. in the USA units like the pound (1 pound = 0.454 kg), the gallon (1 gallon = 3.785 L), the inch (1 inch = 2.54 cm) and other non-SI units are used. Non-SI units are also used for special applications like in navigation (1 nautical mile = 1 852 m) and in trade with crude oil (1 barrel = 159 L). However, the International System of Units (SI) has been adopted by most countries as it is supported by the Metre Convention.

3.2 Physical representation of legal units

In order to translate the legal units into practice for application in various fields, they have to be physically realised. A measurement standard can be a physical measure, measuring instrument, reference material or measuring system intended to define, realize, conserve or reproduce a unit or one or more values of quantity to serve as a reference. The International Standard (or Prototype) of the kilogram is a cylindrical piece of a platinum-iridium alloy of diameter and height each 39 mm which is kept at the International Bureau of Weights and Measures (BIPM) in Sèvres near Paris. Each member country of the Metre Convention gets a copy of the international prototype duly certified by BIPM. This constitutes the national standard of the kilogram. Primary standards of other units may be realised in certain well equipped national metrology institutes by preparing such objects or reproducing such phenomena as may be necessary for the purpose.

With the exception of the kilogram whose definition is based on a physical artefact, the definitions of all other base units are now based on natural phenomena which can be reproduced more easily at the level of national laboratories. The realisation of these base units is a complex task; however, the advantage is that in principle it can be carried out at any place and at any time.

3.3 Hierarchy of standards

National measurement standards, which are compared at regular intervals to international standards of higher accuracy, serve as the basis for assigning values to other standards of the quantity concerned. The custodian of national measurement standards is usually a laboratory called the national metrology institute, the national bureau of standards or the national bureau of weights and measures.

The national standards are not put into use for day to day work. They are used to calibrate secondary standards of the country, which are themselves normally used to calibrate working standards. Working standards are used by the national legal metrology services or calibration laboratories to verify or calibrate material measures and measuring instruments used in trade and industry.

The standards mentioned above represent a hierarchy, starting with international standards at the apex and going all the way down to working standards. There is no general requirement as far as the accuracy of standards is concerned. A working standard in one location may be good enough to serve as a secondary or even a national standard in another.

The aim of having a hierarchy of standards is to ensure traceability of measurements made in a country. Traceability of a measurement is the assurance that it can be related to a national or international standard. Traceability, as defined in the *International Vocabulary of Basic*

and General Terms of Legal Metrology, is the property of the result of a measurement or the value of a measurement standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties.

3.4 Technical regulations on measuring instruments

Technical regulations for measuring instruments used in areas of public interest such as trade (weighing instruments, weights, measuring systems for liquids, electricity meters, taximeters), health care (clinical thermometers, blood pressure instruments), environmental protection (gas chromatographs, atomic absorption spectrometers), traffic surveillance (evidential breath analysers, instruments for measuring vehicle exhaust emissions) or safety at work (dosimeters) are generally prescribed under subsidiary legislation which covers:

- metrological requirements;
- technical requirements; and
- administrative requirements.

Metrological requirements are intended to set the maximum permissible errors of instruments and the conditions under which they must be met. They may also specify measuring ranges, the indication of measurements, the verification procedures, etc.

Technical requirements are intended to set the essential general design characteristics of instruments without imposing restrictions on technical development in order to ensure that:

- their metrological qualities are maintained in use ;
- measurement results are simple and unambiguous ;
- the risks of fraud are eliminated as far as possible.

Administrative requirements lay down the scope and field of application of the regulations, the power for examination of the instruments for the purpose of ascertaining compliance to the metrological and technical requirements, the obligations of users of measuring instruments, and so on.

3.5 Metrological control of measuring instruments

Metrological control includes:

- type or pattern approval;
- initial verification;
- subsequent verification;
- inspection or supervision of the use of measuring instruments.

In a type or pattern approval scheme, one or more instruments of the same pattern are subjected to rigorous tests prescribed under the law. The objective of all such tests is to ensure that the instruments of the pattern concerned comply with the relevant statutory requirements and are suitable for use in the regulated area in such a way that they are expected to provide reliable measurement results over a defined period of time and under varied conditions of use. Pattern approval is usually the task of the national metrology institute or the legal metrology service, depending on the situation of the country in question. If an OIML Recommendation exists and if it is applied for pattern evaluation, an OIML

certificate may be issued on request from the manufacturer (s*ee clause 5 below for the OIML Certificate Scheme for measuring instruments*).

Initial verification means the verification of a measuring instrument which has not been verified previously. Under the law, every such item to be used in regulated areas has to be verified and stamped before being released for use or even sale to the user. Generally the accuracy requirements for initial verification are more stringent than those for subsequent verification or inspection. Initial verification is normally the responsibility of the legal metrology service or other authorised organisation. In the European Union, the manufacturer is responsible for the initial verification of certain types of instruments e.g. non-automatic weighing instruments.

Subsequent verification means any verification of a measuring instrument after an initial verification. It includes:

- mandatory periodical verification, and
- verification after repair.

The national regulations of several countries provide that measuring instruments used in regulated areas (trade, medical diagnosis, environmental protection and monitoring, etc.) have to be verified periodically at regular intervals of one year, two years or longer depending on the type of instrument to ensure that the individual instruments are still within their prescribed limits of error and satisfy all other metrological and technical requirements prescribed. The law often also provides that any measuring instrument which is repaired has to be re-verified and stamped even if the period of validity of its previous verification has not expired.

Inspection or supervision is the control exercised in respect of the manufacture, import, installation, use, maintenance and repair of measuring instruments, performed in order to check whether the metrology law and regulations are properly complied with. It includes the checking of correctness of quantities indicated on and contained in prepackages (s*ee 3.7*). Inspection is an important element of metrological control from the consumer protection viewpoint. Inspections are carried out without notice and are very often initiated as a result of complaints from the public.

3.6 Control on the manufacture, import, repair and sale of measuring instruments

The manufacture, import, repair and sale of measuring instruments that are used in regulated areas are usually controlled by technical regulations. Appropriate licences and permits have to be obtained from the national authority before manufacture, import, repair and sale of these instruments.

For manufacture or importation of a model of measuring instrument to be used in a regulated area, the instrument has to be pattern approved. Many countries would accept a type approval certificate, e.g. an OIML certificate (*see clause 5*), issued by a recognised competent metrology institution.

3.7 Control of prepackaged commodities

In recent decades, the off-take of prepackaged commodities has received considerable impetus because of the ease and convenience with which they can be transported and marketed. Weighing and measuring in the presence of the purchaser is now tending to be gradually reduced and is expected to be limited to a few selected items in the near future. Requirements for the sale of prepackaged goods are part of national legislation in many countries and they usually provide for the following:

- labelling requirements;
- standardization of pack sizes;
- metrological control; and
- prevention of deceptive packaging.

3.7.1 Labelling requirements

Every package intended for retail sale has to bear the following main information:

- the identity of the product (common or generic name of the commodity contained in the package);
- the name and place of business of the manufacturer, packer, distributor, importer or retailer; and
- the net quantity of the product.

The information has to be conspicuously, legibly and unambiguously displayed on the "principal display panel", that is the part of the package or of its label which is likely to be shown or examined by the customer under normal conditions of sale. There is a minimum size of letters normally prescribed for the declaration of the net quantity established in relationship to either the area of the principal display panel of the package (e.g. in the USA) or the quantity of the packaged contents (e.g. in the European Union). The way of declaring the net quantity, including the symbols for units and the number of decimal places to be used, is usually also regulated.

The International Organisation of Legal Metrology (OIML) has published an international recommendation R 79, considered as an international standard, on *Labelling requirements for prepackaged products.* This document gives the details on the labelling requirements with respect to product identity, name and place of manufacturer/packer/distributor and the net quantity, but does not cover the declaration of ingredients, storage temperature, date limit for sale or use which are normally also regulated and controlled by other authorities in the country and which need to be taken into account by the prospective exporter.

3.7.2 Standardization of pack sizes

To facilitate price comparison and to prevent unfair competition, many countries have provided for prescribed standard pack sizes for certain essential commodities. It can be argued that standardization of pack sizes serves no purpose if the package has the necessary label giving information on the net quantity. This view could only be accepted if all consumers were alert and good in mental arithmetic. Most people would find it much more difficult to compare packages of net quantity 245 g sold at $ 4.50 with 530 g packages sold at $ 9.30 than to compare 250 g for $ 4.60 with 500 g for $ 8.80.

Some countries not opting for standard pack sizes have made it mandatory to declare unit price for goods in order to facilitate price comparison.

3.7.3 Metrological control

In order to ensure the accuracy of the net content of packages, i.e. the quantity of the commodity without the package material, the law may provide for the checking at any level of distribution including the point-of-pack, import, distribution and wholesale transactions, and sale (e.g. where prepackages are offered or exposed for sale or where they are sold).

OIML has prepared a new version of the international recommendation R 87 on the quantity of product in prepackages which lays down the metrological or accuracy requirements for prepackaged goods labelled in predetermined constant nominal quantities of weight, volume, linear measure, area or count. It also specifies sampling plans and procedures for use by legal metrology officials in verifying the quantity of product in prepackages. An examination procedure outline, procedures for determining average tare weight, the drained weight of products in liquid medium and the actual quantity of frozen goods are given in the annex of the recommendation.

It is not always possible for a package to contain exactly the nominal quantity (the quantity stated on the package). Some variations are allowed, provided that:

- the average value of the net contents in an inspection lot is not less than the nominal quantity. When the test is done on a sample, statistical methods are used by applying a special factor, specified in column 3 of table 5 – the average quantity in the sample should not be less than the nominal quantity by a value less than the product of this factor and the estimated standard deviation. This factor takes into account the sample size and ensures that the mean value of the inspection lot is satisfied with a high probability.
- the net quantity of a prepackage shall accurately reflect the nominal quantity within the reasonable limits defined as follows:
  - Not more than 2.5 % of the number of prepackages in an inspection lot or batch may contain less than the tolerable deficiency specified in table 4. Statistically this would require that the number of prepackages in a sample of size established according to the inspection lot size in table 5, deficient by more than the tolerable deficiency shall not exceed the value specified in column 4 of table 5;
  - there is no prepackage deficient by more than twice the tolerable deficiency.

EXAMPLE OF SAMPLE TEST TO CHECK QUANTITY

To illustrate the above, let us consider an example where a lot of 400 prepackages of rice of nominal quantity 1 kg is being inspected for compliance with the accuracy requirements. According to table 5 for a lot size of 400, a random sample of 50 prepackages will have to be tested to determine their individual net quantities and the sample correction factor to be applied is 0.379. Let the standard deviation observed in these net quantities of the sample be 4.5 g. The following three requirements will have to be met to accept the lot:

- the average net quantity of the sample should not be less than [1000 - (0.379 x 4.5)], i.e. 998.29 g;
- not more than 3 packages (from the fourth column of table 5) may be deficient by more than the tolerable deficiency for the nominal quantity of 1000 g, i.e. 15 g (from table 4) - i.e. not more than 3 packages in the sample may have a net quantity less than 985 g.
- no package shall be deficient by more than 30 g (twice the tolerable deficiency) - i.e. no package shall have a net quantity less than 970 g.

Legal metrology authorities may permit reasonable deviations in the quantity of hygroscopic product caused by ordinary and customary exposure to environmental conditions that prevail in storage and distribution.

Table 4 – Tolerable deficiencies in actual content for prepackages recommended by OIML R 87

Nominal Quantity of Product (Q_n) in g or mL	Tolerable Deficiency(T)	
	Percent of Q_n	g or mL
0 to 50	9	-
50 to 100	-	4.5
100 to 200	4.5	-
200 to 300	-	9
300 to 500	3	-
500 to 1000	-	15
1000 to 10 000	1.5	-
10 000 to 15 000	-	150
15 000 to 50 000	1	-
These *T*-values are to be rounded up to the next tenth of g or ml for Q_n less than or equal to 1 000 g or ml and to the next whole g or ml for Q_n higher than 1000 g or ml.		
Nominal Quantity (Q_n) in length	**Percent of Q_n**	
Q_n of 5 m or less	No tolerable deficiency allowed	
Q_n greater than 5 m	2	
Nominal Quantity (Q_n) in area	**Percent of Q_n**	
All Q_n	3	
Nominal Quantity (Q_n) in count	**Percent of Q_n**	
Q_n of 50 items or less	No tolerable deficiency allowed	
Q_n greater than 50 items	1	
T values for count is computed by multiplying the nominal quantity by one percent and rounding the result up to the next whole number because the products are whole items and cannot be divided.		

Table 5 – Sampling Plan for Prepackages recommended by OIML R 87

Inspection lot size	Sample size	Sample correction factor	Number of prepackages in a sample allowed to exceed the tolerable deficiencies
100 to 500	50	0.379	3
501 to 3 200	80	0.295	5
More than 3 200	125	0.234	7

Many countries require the manufacturer or the packer to control the filling process. Verified measuring instruments have to be used and appropriate records have to be kept and presented on request to the legal metrology authorities.

Some requirements on prepackages for the EU, the USA and Japan are given in clause 4.

3.7.4 Deceptive prepackage

A deceptive or misleading prepackage is a package which is so designed as to deliberately give to the consumer an exaggerated or misleading impression about the quantity of the commodity contained therein, except where bigger dimensions of the package can be justified by the manufacturer or the packer on the ground that such dimensions are necessary for:

- the protection to the commodity;
- the requirements of the machine used for filling such packages;
- unavoidable product settling during shipping and handling; or
- the need for the prepackage to perform a specific function (e.g. where packaging plays a role in the preparation or consumption of a food).

Unfilled space in cardboard packages containing materials such as soap, detergents or processed food, and jars and containers with increasingly thick walls for packing cosmetic creams are examples of deceptive packaging.

3.8 Legal metrology authority

The structure of the organisation concerned with legal metrology varies from one country to another. The metrology infrastructure may consist of the following organs:

a) a Scientific Body, which is the national metrology institute responsible for:
   - the safe custody, maintenance and traceability of national standards;
   - the accuracy of standards of the next lower accuracy level for use inside the country by comparison with the national standards;
   - scientific and technical work in all fields of metrology.

b) a Central Coordinating and Directing Body responsible for:
   - the planning and coordination of the enforcement activities of local bodies responsible for metrological control;
   - the preparation of draft technical legislation in the field of legal metrology;
   - supporting the work of other organisations related to legal metrology;
   - organising training in the field of legal metrology;
   - representing the country in international and regional activities related to legal metrology.

c) local bodies responsible for field operation and law enforcement which include the following functions:
   - the supervision and control of the manufacture, sale and repair of measuring instruments;
   - metrological control on measuring instruments;
   - the control of prepackaged commodities.

3.9 Fees

Most legal metrology services in the world charge fees for their verification and pattern evaluation activities to meet part of their costs of operation (equipment, standards, salary, transport, etc.)

3.10 Offences and penalties

Offences under the law of legal metrology include:

- the use of a measuring instrument which is incorrect, tampered or not duly verified and stamped;
- the manufacture, import or sale of measuring instruments which do not comply with the regulations;
- prepacking, distributing, offering for sale or selling prepackaged goods that are short in quantity, not properly labelled or not complying with other requirements of the regulations.

In order to have an effective compliance with the legal metrology legislation, penalties including fine and imprisonment are normally provided.

4 REQUIREMENTS OF A FEW SELECTED MARKETS

4.1 The European Single Market

Since the creation of the EEC (European Economic Community) through the Treaty of Rome back in 1958, one of the main guiding principles has been the removal of barriers to trade whether these are tariff barriers or technical barriers. It was recognised that the harmonisation of technical requirements was one of the key elements to creating the single market. In the field of legal metrology, including pre-packaging, the European Council Directives, listed in table 6 below, have been passed for implementation by Member States.

Table 6 – List of European Council Directives in the field of legal metrology

Area	EEC Directive
Units of measurement	80/181/EEC amended by 85/1/EEC, 89/617/EEC and 1999/103/EC
Common provisions for measuring instruments	71/316/EEC amended by 72/427/EEC, 83/575/EEC, 87/354/EEC, 87/355/EEC and 88/665/EEC
Non-automatic weighing instruments	90/384/EEC amended by 93/68/EEC
Totalizing weighing machines and automatic checkweighing and weight grading machines	
• Totalizing weighing machines	75/410/EEC
• Automatic checkweighing and weight grading machines	78/1031/EEC
Water meters	
• Cold water meters	75/33/EEC
• Hot water meters	79/830/EEC
Measuring systems for liquids other than water	
• Meters for liquids other than water	71/319/EEC
• Ancillary equipment for meters for liquids other than water	71/348/EEC
• Measuring systems for liquids other than water	77/313/EEC
Gas meters	71/318/EEC
Electricity meters	76/891/EEC
Material measures of length	73/362/EEC
Alcohol meters, alcohol hydrometers and alcohol tables	
• Alcohol meters and alcohol hydrometers	76/765/EEC
• Alcohol tables	76/766/EEC
Medium and above medium accuracy weights	
• 5 to 50 kg medium accuracy rectangular bar weights and 1 g to 10 kg medium accuracy cylindrical weights	71/317/EEC
• weights from 1 mg to 50 kg of above medium accuracy	74/148/EEC
Taximeters	77/95/EEC
Tyre pressure gauges for motor vehicles	86/217/EEC
Standard mass of grain	71/347/EEC
Calibration of tanks of vessels (ships' tanks)	71/349/EEC
Pre-packaging	
• Volume of certain pre-packaged liquids	75/106/EEC amended by 79/1005/EEC, 85/10/EEC, 88/316/EEC and 89/676/EEC.
• Bottles used as measuring containers	75//107/EEC
• Weight or volume of certain pre-packaged products	76/211/EEC
• Ranges of nominal quantities and nominal capacities permitted for certain pre-packaged products	80/232/EEC amended by 86/96/EEC and 87/356/EEC

More information can be obtained from Europa, The European Union On-Line, http://www.europa.eu.int, The Council Directives can be downloaded free of charge.

A new arrangement entitled 'A New Approach to Technical Harmonisation and Standards' was formally agreed by Council resolution in May 1985 where instead of detailed technical requirements only essential requirements would be included in the Directives. However, these Directives would have mandatory application in Member States. The latter would be required, subject to transitional arrangements, to revoke both existing national regulations and those regulations implementing 'Old Approach' Directives in relation to new instruments to be placed on the market and put into use. The 'New Approach' provides an alternative way of meeting the essential requirements which can either be met by the direct application of the essential requirements or by the application of agreed harmonised standards. The standards

route provides a greater degree of certainty for the manufacturer that his product design and manufacture will meet the essential requirements.

4.1.1 The e-marking of prepackages

In order to facilitate the free movement of goods, the Member States of the European single market have agreed on common rules for prepackages within the range of 5 g to 10 kg and 5 mL to 10 L. Packages may be marked with an "e" provided they comply with the European Council Directives 76/211/EEC or 75/106/EEC. Packages bearing the e-mark will be checked only in the country of origin, and can be freely marketed within the European Community and in Iceland, Liechtenstein and Norway, signatories of the Agreement of the European Economic Area (EEA). If the country of origin does not belong to these states which form the "Single Market", the packages will be checked at the point of entry into the "Single Market" at the importer's site.

The e-mark acts as a "metrological" passport since it is recognised throughout the common market of about 370 million consumers. The e-mark has a special form as shown on the left and the relative dimensions are given in the European Directives.

The metrological or accuracy requirements for prepackages bearing the e-mark are similar to those recommended by OIML (*see 3.7.3*) i.e.:

- The actual net quantity shall not be less, on average, than the nominal quantity;
- Only a small proportion (not more than 2.5 %) of the number of prepackages in a batch may be deficient by more than the tolerable negative errors, which are the same as the tolerable deficiencies recommended by OIML;
- There shall be no prepackage containing less than twice the tolerable negative error.

However, the European Directives for e-marking cover only prepackages within the range 5 g to 10 kg or 5 mL to 10 L while the international recommendation (OIML R 87) can be applied to prepackages of any predetermined constant nominal quantity up to 50 kg or 50 L. The European Directives also provide for both single and double sampling plans including special sampling plans for destructive testing while OIML R 87 provides for only a single sampling plan.

The packer (or importer, if the prepackages are produced outside the common market) is responsible for ensuring that his prepackages meet the requirements of the European Directives. The measurement or check shall be carried out by means of a legal measuring instrument suitable for the purpose with the total uncertainty of measurement not exceeding one-fifth of the tolerable negative error of the prepackage. In case of imports from non-EEC countries, the importer may instead of measuring and checking provide evidence that he is in possession of all the necessary guarantees enabling him to assume responsibility. The importer must provide a certificate, issued by the competent department of a Member State or an EU accepted competent department in the exporting country, stating the compliance of the packer's quantity control system to the Directive for each type of product.

4.1.2 Measuring instruments

Directive 71/316/EEC, which contains requirements for all categories of measuring instruments, and other Directives covering individual categories of measuring instruments (see list of European Directives above) provide the basis for harmonization. Measuring

instruments, granted an EEC type approval and an EEC initial verification, can be placed on the market and used in all member countries without further tests or pattern approvals.

An important step towards common European requirements on measuring instruments was taken with the recent introduction of the Measuring Instruments Directive (MID). The MID aims at the elimination of technical barriers to trade and will regulate the marketing and use of the following types of measuring instruments:

- water meters
- measuring systems for liquids other than water
- automatic weighing instruments
- gas meters
- electrical energy meters and measurement transformers
- material measures (length and capacity)
- heat meters
- exhaust gas analyzers
- taximeters
- dimensional measuring instruments

The MID is based on the Non automatic Weighing Instrument Directive which is a 'New approach' Directive and which came into force in 1993. With this approach, the instruments mentioned above will have to meet the essential requirements. The manufacturer may refer to harmonized European standards. Where instruments complying with these harmonised standards are concerned, it will be assumed that they meet the requirements of the Directive, meaning that application of the harmonised standards would facilitate access to market.

A two-stage conformity assessment procedure is provided for electronic measuring instruments. In the first stage a type examination is performed by a third-party certification body. In the second stage, initial verification of the individual instruments can be carried out by the manufacturer provided that an approved and supervised quality system is being implemented. The verification of the individual instruments must otherwise be carried out by a recognised third-party certification body. Member States are notified of certification bodies. These notified bodies must possess the technical competence and independence stipulated by the Directive or the appropriate harmonised standard in the EN 45000* series, thus enabling them to perform technical and administrative tasks. They may either be private or governmental organizations. Manufacturers are free to choose among these European bodies.

Measuring instruments complying with the appropriate Directives must carry a CE-mark and the supplementary legal metrology mark before they are marketed in the European Economic Area, provided they have passed an EC conformity assessment procedure.

The binding legal control of measuring instruments, as mentioned in the Directive, is to be left to each member country. Requirements to be met by instruments after they have been put into use have not been harmonized. Re-verifications, inspections and verification validity periods may consequently be laid down by member countries on the basis of their own national legislation. Member States may lay down legal requirements for measuring instruments which are not listed in the Measuring Instruments Directive (MID).

With the implementation of the MID, it means that one approval by one notified body will give the manufacturer or the exporter access to the EU market for a wide variety of instruments.

* EN 45000 series is the set of European standards on the requirements of conformity assessment bodies and accreditation bodies.

4.2 United States of America

In the United States, legal metrology is a responsibility shared among all levels of government: local, State and Federal. The US Constitution reserves to the States the right to regulate commerce and enforce the system of weights and measures within their boundaries and to the Federal Government the power to regulate interstate and foreign trade and to fix standards of weights and measures.

The Office of Weights and Measures of the National Institute of Standards and Technology (NIST) is responsible to promote uniformity among the states in weights and measures standards, laws, and practices to facilitate trade and protect US companies and citizens. NIST provides technical guidance to the National Conference on Weights and Measures (NCWM), an organization of state and local weights and measures officials and representatives of industry, consumer groups, and federal agencies. With the technical assistance of NIST, NCWM develops model requirements and systems published as "Specifications, tolerances and other technical requirements for weighing and measuring instruments" in NIST Handbook 44. Also model weights and measures legislation is published as "Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality" in NIST Handbook 130. These and other NIST publications are intended to serve as the basis for States laws and regulations. It is estimated that these laws and regulations impact US sales of products and services totalling over US $ 4.5 trillion annually. The contents of the main NIST handbooks related to legal metrology are given in table 7 below.

Federal laws and regulations generally govern measurements and measuring instruments applicable to worker and public health and safety and protection of the environment.

In the area of weights and measures, NIST cooperates with NCWM to operate a National Type Evaluation Program. Subsequent verification falls under the purview of the States. In other areas of metrology, metrological control of instruments is shared at the Federal and State level. In many instances, testing laboratories for measurement processes and instruments can be found in Federal, State, and private sector facilities. The competence of such laboratories is often certified by an accreditation body. NIST operates the National Voluntary Laboratory Accreditation Program (NVLAP), which is used by both federal agencies and private organisations for accrediting laboratories in specific areas of testing and calibration.

Although the United States is a signatory of the Metre Convention (1875), non-SI units like yard and pound are used as US customary units. However, they are defined in terms of SI units, for example:
1 yard = 0.9 144 m exactly and 1 pound (avoirdupois) = 0.45 359 237 kg exactly.

The use of the customary system is provided for in federal and state law and the use of the metric system is also authorized. In order to assist conversion to SI units, the federal government now specifies its purchases in SI units and the Federal Fair Packaging and Labelling Act was revised to require metric (SI) units on consumer packages.

Table 7 – Contents of main NIST handbooks related to legal metrology

	NIST Handbook	Subject
1.	NIST Handbook 44 – 2004 Edition adopted by the 88th National Conference on Weights and Measures 2003	Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices, covering the following: ➢ Scales, Belt-Conveyor Scale Systems, Automatic Bulk Weighing Systems, Weights, Automatic Weighing Systems ➢ Liquid-Measuring Devices, Vehicle-Tank Meters, Liquefied Petroleum Gas and Anhydrous Ammonia Liquid-Measuring Devices, Hydrocarbon Gas Vapor-Measuring Devices, Cryogenic Liquid-Measuring Devices, Milk Meters, Water Meters, Mass Flow Meters, Carbon Dioxide Liquid-Measuring Devices ➢ Vehicle Tanks Used as Measures, Liquid Measures, Farm Milk Tanks, Measure-Containers, Graduates, Dry Measures, Berry Baskets and Boxes ➢ Fabric-Measuring Devices, Wire- and Cordage-Measuring Devices, Linear Measure, Odometers, Taximeters, Timing Devices, Grain Moisture Meters, Near-Infrared Grain Analyzers, Multiple Dimension Measuring Devices
2.	NIST Handbook 130 – 2004 Edition, adopted by the 88th National Conference on Weights and Measures 2003	Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality, covering the following: ➢ Uniform Weights and Measures Law, Uniform Weighmaster Law, Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Inspection Law ➢ Uniform Packaging and Labeling Regulations, Uniform Regulation for the Method of Sale of Commodities, Uniform Unit Pricing Regulation, Uniform Regulation for the Voluntary Registration of Servicepersons and Service Agencies for Commercial Weighing and Measuring Devices, Uniform Open Dating Regulation, Uniform Regulation for National Type Evaluation, Uniform Engine Fuels, Petroleum Products, and Automotive Lubricants Regulation.
3.	Handbook 133 (2003), adopted by the 87th National Conference on Weights and Measures 2002	Checking the Net Contents of Packaged Goods. This publication includes procedures for testing packages labelled by weight, volume, measure, and count.

More information can be obtained from the Weights and Measures Office, NIST, 100 Bureau Drive, Stop 2600, Gaithersburg, MD 20899-2600 Phone: (301) 975-4004, Fax: (301) 926-0647, Email: owm@nist.gov web site : http://www.nist.gov/owm. The contents of the handbooks can be downloaded free of charge.

For prepackages, the USA applies unit pricing in several of its states to enable consumers to make price comparisons in retail stores. Unit pricing system is preferred to that of standard pack sizes.

As regards the accuracy requirements of prepackages, the average net quantity of contents of packages in a lot must in general at least equal the nominal quantity declared on the label. The variation of individual package contents from the declared nominal quantity must not be

"unreasonably large". The limit of reasonable variation for an individual package is called a "Maximum Allowable Variation" (MAV) and packages that are under-filled by more than the MAV are considered to have unreasonable shortage and are generally not permitted.

The MAV for packages (excluding those for meat and poultry products) labelled by weight varies from 10% of declared quantity for small quantities (less than 0.08 pound, i.e. 36 g) to 2% of declared quantity for those greater than 54.4 pounds (i.e. 24.7 kg). The MAV for most packages labelled by volume varies from 0.03 cu in (i.e. 0.5 mL) for declared quantity 0.18 cu in or less (i.e. 3 mL or less) to 16.2 cu in (i.e. 266 mL) for declared quantity 1 631 cu in (i.e. 26.734 L). For nominal quantity above 1 631 cu in, the MAV is 1% of the declared quantity. Moisture allowances are provided for some meat and poultry products, flour and pet food.

More detailed information, including sampling plans, are given in the Handbook 133 *Checking the Net Contents of Packaged Goods*, which can be downloaded free of charge from the web site at http://www.nist.gov/owm. Although this handbook is intended for use by testing officials, exporters may find useful information about test procedures and regulations at the Federal level and those recommended by the National Conference on Weights and Measures for State adoption.

4.3 Japan

Japan adopted the SI units in 1966 but the total implementation of the SI was triggered in 1992 by imposing a ban on the use of non-SI units in transaction and certification activities.

The Japanese Measurement Law requires measurements in general "to be made as accurately as possible" and provides for the measurement of certain commodities as specified in the Enforcement Order (specified commodities), like meat, vegetables, sea foods and other similar consumer goods to be weighed and measured within the specified margin of error (tolerable deficiency) specified below:
5 g ~ 50 g ? Up to 4%
50 g ~ 100 g ? Up to 2 g
100 g ~ 500 g ? Up to 2%
500 g ~ 1 kg ? Up to 10 g
1 kg ~ 25 kg ? Up to 1%

Given that some commodities are not amenable to precise measurement due to the characteristics of the commodities (e.g. noodles) specific tolerable deficiencies, given below, are specified for such products.
5 g ~ 50 g ? Up to 6%
50 g ~ 100 g ? Up to 3 g
100 g ~ 500 g ? Up to 3%
500 g ~ 1.5 kg ? Up to 15 g
1.5 kg ~ 10 kg ? Up to 1%

Prepackaged commodities are subject to mandatory net quantity indication.

Regarding measuring instruments, the Japanese Measurement Law provides for the control of measuring instruments used as part of economic or other activities. Certain measuring instruments referred to as "specified measuring instruments" (including taximeters, LPG meters, density hydrometers, illuminometers, water meters, fuel oil meters, gas meters, energy meters, non-automatic scales, weights, leather area measuring instruments, liquid-in-glass thermometers, blood pressure gauges and resistance thermometers) are subject to verification

conducted by the National Institute of Advanced Industrial Science and Technology (AIST), a prefecture of government, the Japan Electric Meters Inspection Corporation or a designated calibration organization to check their conformity to established technical standards.

Although no verification obligation has been specified for household measuring instruments (e.g. health meters, kitchen scales, etc.), such manufactured/imported products must comply with the technical standards set by the Enforcement Regulations. Household measuring instruments should not be sold, or displayed for sale unless they carry a compliance or approval mark.

To ensure the supply of accurate measuring instruments, the Measurement Law requires the manufacturers of specified measuring instruments to file a notification with the Ministry of Economy, Trade and Industry via the prefectures of government (directly with the ministry in the case of electric meters). A notified manufacturer may apply for type approval with regard to a particular model of measuring instrument and in the event of obtaining the approval, the manufacturer will be subject to less rigid inspection. Further, a notified manufacturer with an outstanding quality control capability may be recognised as a "designated manufacturer" for each factory or other business site on application, after a satisfactory screening examination of the quality control practices. A designated manufacturer is exempted from verification for the "type-approved specified measuring instruments" as long as self-inspection, which replaces official initial verification, is conducted. Instruments manufactured by such designated manufacturers are nevertheless subject to periodic inspection or reverification by the prefectures or designated calibration organizations.

Any specified measuring instrument imported from a foreign country must in principle pass a complete domestic verification before being marketed. A measuring instrument manufacturer based in a foreign country may become a designated foreign manufacturer, who is exempted from domestic verification in the same manner as a domestic designated measuring instrument manufacturer.

4.4 Southern African Development Community (SADC)

The Southern African Development Community (SADC) is a regional organization comprising the following Member States: Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. One of the main objectives of SADC is to liberalise intra-regional trade in goods and services and to establish a Free Trade Area in the region. To achieve these objectives, technical barriers to trade (TBTs) have to be removed and this involves the harmonisation of standards and technical regulations.

A legal metrology cooperation forum SADCMEL was created in 1996. The objectives of this forum are the following:

- Harmonization of legal metrology legislation to remove existing technical barriers to trade within the region, and between the region and international trading partners;
- Institutional capacity building and assistance to Member States to enable them to comply with international standards and the requirements of the World Trade Organization Agreement on Technical Barriers to Trade;
- Provision of training to Member States in most fields of legal metrology in order to apply harmonized legislation effectively; and
- Exchange of metrology related information and experience.

Most Member States of SADC have national legal metrology legislation and regulatory control of instruments for mass, length and volume used for commercial transactions. In view of harmonising the national legal metrology legislations of its Member States, SADCMEL has prepared technical documents on labelling of prepackaged goods, including provisions for standard pack sizes, and on weighing instruments like counter scales and beam scales for adoption by its Member States as their technical regulations. The general policy of SADCMEL is to base its technical documents on OIML international recommendations where they exist and are appropriate for the region. The documents incorporate additional requirements to address conditions found in the region.

Information on the above technical documents can be obtained from the SADCMEL Secretariat c/o South African Bureau of Standards
Tel: +27 12 428 7001 Fax: +27 12 428 6116 E-mail: beardbe@sabs.co.za
web site: http://www.sadc-sqam.org/regionalsqam/sadcmel

5 INTERNATIONAL COOPERATION IN THE FIELD OF METROLOGY

5.1 The International Organization of Legal Metrology (OIML)

The International Organization of Legal Metrology (OIML from the French name, Organisation Internationale de Métrologie Légale) was established in 1955 as an intergovernmental treaty organization whose membership includes some sixty Members which participate actively in technical activities, and about fifty Corresponding Members which are observers.

The main objectives of OIML are the following:

- Elaboration of international recommendations and documents in different fields of legal metrology;
- Dissemination of technical information on legal metrology (information on laws and regulations, experience of different technologies and experience on good practices) through the quarterly bulletins and the OIML web site;
- Elimination of technical barriers to trade caused by legal metrology through the harmonisation of laws and regulations concerning measurements, prepackages and measuring instruments and the promotion of mutual recognition of legal metrology conformity assessments; and
- Promotion and development of legal metrology in the world.

The OIML structure comprises an International Conference where OIML Member State delegations and observers from Corresponding Members and liaison international and regional institutions assemble every four years to define general policy and budgetary lines for the organization, and to promote national implementation of OIML metrological guidelines. The International Committee of Legal Metrology (CIML) is the steering committee for OIML. The CIML meets annually to review the organization's technical progress and administrative operations. The Committee is composed of appointed representatives of OIML Member States. The OIML Presidential Council comprising a limited number of Committee Members, appointed by the President, acts as an advisory group for CIML. The Development Council acts as an advisory body to CIML on matters of legal metrology relating to developing countries.

The Bureau International de Métrologie Légale (BIML), based in Paris, with about 10 staff members is the Secretariat and headquarters of OIML, ensuring both the day to day running of activities and the planning of longer term actions.

OIML Draft Recommendations and Documents are developed by Technical Committees or Subcommittees which are formed by the Member States. Certain international and regional institutions also participate on a consultation basis. OIML International Documents are of an informative nature only. They are intended to provide guidance to national legal metrology services and to promote best practice in the use of certain kinds of measuring instruments. OIML International Recommendations, which lay down mainly requirements for measuring instruments and prepackages, are intended to be model international regulations. The OIML Convention places a moral obligation on Member States to implement International Recommendations into their national legislation. These International Recommendations must not prevent technical development, and must be fully compatible with other specifications produced by other international bodies, such as the International Organisation for Standardization (ISO), the International Electrotechnical Commission (IEC), etc. They are normally reviewed every five years.

The OIML Certificate System for Measuring Instruments

The OIML has established a *Certificate System for Measuring Instruments* in 1991 to facilitate administrative procedures and lower costs associated with the international trade of measuring instruments subject to legal control. The System provides the possibility for a manufacturer to obtain an OIML certificate and a test report indicating that a given instrument pattern complies with the requirements of the relevant OIML International Recommendation. Certificates can be delivered by OIML Member States that have established one or several Issuing Authorities responsible for processing applications by manufacturers wishing to have their instrument pattern approved. OIML certificates are accepted by national metrology services on a voluntary basis. The OIML Certificate System leads to a simplification of pattern approval of instruments since instead of repeating tests, the test reports issued by the OIML Certificate System can be used as a basis for the pattern approval thus avoiding the duplication of costly and time-consuming tests. This is a definite advantage for small and medium enterprises.

As at 9 December 2003, 1156 OIML certificates have been issued for thirteen categories of instruments evaluated against the requirements of 15 OIML Recommendations. There are around 25 Issuing Authorities established in more than 20 Member States. A database giving the list of OIML Certificates registered by the BIML, the list of categories of instrument covered by the System, the addresses of Issuing Authorities in OIML Member States and those of recipients of certificates (applicants and manufacturers) is available on the web site of OIML at http://www.oiml.org.

Other information, including the rules and conditions, on the OIML Certificate System for Measuring Instruments is available in the OIML Publication P 1 *OIML Certificate System for Measuring Instruments* (Edition 2003) that may be downloaded in English and French from the OIML web site free of charge.

Other important OIML projects

There are two other important OIML projects which aim to remove technical barriers to trade, namely the Mutual Acceptance Arrangement (MAA) on OIML type evaluation and the establishment of an International Quantity (IQ) mark for prepackaged products.

The MAA project aims to establish a voluntary framework whereby the responsible bodies in OIML Member States could accept and utilize in their relevant national or regional type approval programmes those OIML type evaluation test reports. It covers the means by which an agreement can be established, implemented and amended and the period of its duration. The MAA procedures also provide for appealing and resolving issues and for terminating agreements. The MAA has three main objectives:

- to establish rules and procedures for fostering mutual confidence in the test results of measuring instruments indicating conformity to OIML requirements;
- to promote the global harmonization, uniform interpretation and implementation of legal requirements for measuring instruments; and
- to promote efficiency in time and cost of official type evaluations and approvals of measuring instruments.

The IQ mark project aims to establish an OIML programme for facilitating the international trade of prepackaged products. Under the proposed programme, packers could apply an IQ mark to their prepackaged products that comply with the requirements of OIML recommendation R 87 provided they have in place a quality system and testing laboratory to determine the net content quantity in the prepackaged product. Such packers would have to be authorized and they would be subjected to audits by or on behalf of the national responsible bodies of OIML Member States participating in the OIML programme.

5.2 Other international organisations

There are three other main international organisations active in the field of metrology, namely:

- the International Bureau of Weights and Measures (BIPM);
- the International Measurement Confederation (IMEKO); and
- the International Laboratory Accreditation Cooperation (ILAC).

The International Bureau of Weights and Measures (BIPM)

BIPM (from its French name Bureau international des poids et mesures) was established as a result of the International Metre Convention signed in Paris in 1875 by 17 states. Today there are about 50 countries adhering to the Convention, among which all of the main industrialised nations. The aim of BIPM is to ensure world-wide uniformity of measurements and their traceability to the International System of Units (SI). BIPM operates through a series of Consultative Committees, whose members are representatives of the national metrology laboratories of the Member States of the Convention, and of its own laboratory.

BIPM carries out measurement-related research. It organizes, international comparisons of national measurement standards, and it carries out calibrations for Member States. BIPM operates under the supervision of the International Committee of Weights and Measures (CIPM), which itself comes under the authority of the International Conference of Weights and Measures (CGPM).

A Mutual Recognition Arrangement (MRA) for national measurement standards and for calibration and measurement certificates issued by national metrology institutes (NMIs) was signed in October 1999 by the Directors of NMIs of 38 Member States. The objective of the MRA is to establish the degree of equivalence of national measurement standards maintained by NMIs and to promote the mutual recognition of calibration and measurement certificates issued by NMIs thereby providing the technical foundation for wider agreements related to international trade, commerce and regulatory affairs. More information on BIPM and its activities can be found on its web site at http://www.bipm.fr .

The International Measurement Confederation (IMEKO)

IMEKO is a non-governmental federation of some thirty five member organizations each concerned with the advancement of measurement technology. The objectives of IMEKO are the promotion of international interchange of scientific and technical information in the field of measurement and instrumentation and the enhancement of international cooperation among scientists and engineers from research and industry.

IMEKO was founded in 1958 and has consultative status with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Industrial Organization (UNIDO). The seat of IMEKO is in Budapest, Hungary.

The activities of IMEKO are mainly done through technical committees, which organise conferences, workshops, seminars and symposia on specific fields of metrology. More information on IMEKO and its activities can be found on its web site at http://www.imeko.org

The International Laboratory Accreditation Cooperation (ILAC)

ILAC is an international cooperation between the various laboratory accreditation schemes operated throughout the world. Started as a conference in 1978 with the aim of developing international cooperation for facilitating trade by promotion of the acceptance of accredited test and calibration results, ILAC was formalised as an international cooperation forum in 1996 when a Memorandum of Understanding (MOU) was signed by 44 national bodies in Amsterdam. This MOU provided the basis for further development of ILAC and the eventual establishment of a multilateral recognition agreement among its member bodies. In January 2003, ILAC was incorporated in the Netherlands as a not-for-profit company.

In November 2000, a multi-lateral mutual recognition arrangement was signed by 36 laboratory accreditation bodies, full members of ILAC, from 28 economies worldwide with the aim of promoting the acceptance of technical test and calibration data for exported goods. As at August 2003, 44 laboratory accreditation bodies of ILAC have already signed the above ILAC Arrangement. The latter provides significant technical underpinning to international trade through the development of a global network of accredited testing and calibration laboratories that are assessed and recognised as being competent by ILAC Arrangement signatory accreditation bodies. Hence, goods tested in a laboratory accredited by a signatory to the Arrangement should be accepted by all signatory countries.

ILAC is the main international forum for the development of laboratory accreditation practices and procedures, the promotion of laboratory accreditation as a trade facilitation tool, the assistance of developing accreditation systems, and the recognition of competent test facilities around the world. More information on ILAC and its activities can be found on its web site at http://www.ilac.org .

6 WHERE TO OBTAIN INFORMATION ABOUT LEGAL METROLOGY REQUIREMENTS?

Information about legal metrology requirements can be obtained from the various national legal metrology services, whose addresses are available from the OIML web site at http://www.oiml.org, or from the national enquiry points on Technical Barriers to Trade (TBT). All members of the World Trade Organization (WTO) are required to establish at least one enquiry point to respond to requests for information on national technical regulations, standards and conformity assessment procedures. The list of these national enquiry points can be obtained from the WTO web site at http://www.wto.org.

Information on European Council Directives can be obtained from Europa, the European Union on-line at http://www.europa.eu.int. Information on weights and measures rules and regulations applicable in the USA can be obtained from the US Office of Weights and Measures (National Institute of Standards and Technology) whose web site is at http://www.nist.gov/owm. Information on the Japanese Measurement Law can be obtained from the National Metrology Institute of Japan or from the web site at http://www.jetro.go.jp/se/e/standards_regulation/keiryo2003jan-e.pdf

Information about legal metrology requirements of many countries can also be obtained from the regional legal metrology organisations of which they are members. Some of these regional organisations are:

- European cooperation in legal metrology (WELMEC), which is a cooperation forum among the legal metrology services of the Member States of the European Union and the European Free Trade Association (EFTA) – http://www.welmec.org

- Asia-Pacific Legal Metrology Forum (APLMF) which is a grouping of legal metrology authorities in the Asia-Pacific Economic Cooperation (APEC) economies and other economies on the Pacific Rim – http://www.aplmf.org

- Southern African Development Community Legal Metrology Cooperation Forum (SADCMEL) – http://www.sadc-sqam.org/regionalsqam/sadcmel

The ITC Export Quality Bulletin No. 72, *Information Retrieval on Standards, Technical Regulations and Conformity Assessment Procedures*, provides effective guidance on how exporters can obtain information on current standards, technical regulations and conformity assessment procedures for industrial and agricultural products in export markets.

ANNEX 1

Some Useful Addresses

Asia-Pacific Legal Metrology Forum (APLMF), NMIJ/AIST Tsukuba Central 3-9
1-1-1 Umezono, Tsukuba, Ibaraki, 305-8563 Japan
Tel: + 81 29 861 4362 Fax: +81 29 861 4393 E-mail:e.sec@aplmf.org
web site: http://www.aplmf.org

Bureau International des Poids et Mesures (BIPM), F-92312 Sèvres Cedex, France
Tel: +33 14 50 77 001 Fax: +33 14 53 48 670 web site: http://www.bipm.fr

Euro-Asian Cooperation of State Metrology Institutions (COOMET), Belarus
Tel: +375 17 233 2424 Fax: +375 17 288 0938
E-mail: coomet@coomet.belpak.minsk.by web site: http://www.coomet.org

European cooperation in legal metrology (WELMEC), WELMEC Secretariat,
BEV Arltgasse 35, A-1160 Vienna, Austria
Tel: +43 1 21176 3608 Fax: +43 1 49 20 875 E-mail: welmec@metrologie.at
web site: http://www.welmec.org

International Laboratory Accreditation Cooperation (ILAC), ILAC Secretariat, c/o National Association of Testing Authorities (NATA), 7 Leeds Street, Rhodes NSW 2138, Australia
Tel: +61 2 97 368 374 Fax: +61 2 97 368 373 E-mail: ilac@nata.asn.au
web site: http://www.ilac.org

International Measurement Confederation (IMEKO), P.O.B. 457 H-1371, Budapest, Hungary
Tel/Fax : +36 1 353 1562 E-mail: imeko.ime@mtesz.hu web site: http://www.imeko.org

International Organization for Standardization (ISO), ISO Central Secretariat, Case postale 56, CH-1211 Geneva, Switzerland
Tel: +41 22 749 01 11 Fax: +41 22 733 34 30 web site: http://www.iso.ch

International Organization of Legal Metrology (OIML), International Bureau of Legal Metrology, 11 rue Turgot, 75009 Paris, France
Tel: +3 14 87 81 282 Fax: +33 14 28 52 711 E-mail: biml@oiml.org
web site: http://www.oiml.org

Southern African Development Community Legal Metrology Cooperation Forum (SADCMEL), SADCMEL Secretariat c/o South African Bureau of Standards
Tel: +27 12 428 7001 Fax: +27 12 428 6116 E-mail: beardbe@sabs.co.za
web site: http://www.sadc-sqam.org/regionalsqam/sadcmel

The Inter-American Metrology System (SIM), SIM Secretariat, Instituto Nacional de Metrologia, Normalizaçao e Qualidade Industrial, Brazil
Tel: +55 21 2563 2817 Fax: +55 21 2502 6542 E-mail : sim@inmetro.gov.br
web site: http://www.sim-metrologia.org.br

ANNEX 2

References

1. Publications from the International Organization of Legal Metrology (OIML) - http://www.oiml.org
   - International vocabulary of terms in legal metrology (VIML) 2000
   - OIML R 79 : 1997 – Labelling requirements for prepackaged products
   - OIML R87 : 1989 – Net content in packages
   - 3rd Committee Draft OIML R 87 : Quantity of Product in Prepackages (2002)
   - OIML International Document 1 – Law on Metrology (1975)*
   - OIML International Document 3 – Legal Qualification of Measuring Instruments
   - OIML Publication P 1 *OIML Certificate System for Measuring Instruments* (Edition 2003)
   - Legal Metrology in OIML Member States (1996)

2. Publications from the International Organization for Standardization (ISO) - http://www.iso.ch
   - International Vocabulary of Basic and General Terms in Metrology (VIM)
   - ISO 1000:1992 and Amd 1:1998 – SI units and recommendations for the use of their multiples and certain other units
   - ISO 31:1992 – Quantities and Units

3. Publications from the US National Institute of Standards and Technology (NIST) - http://www.nist.gov/owm
   - NIST Handbook 44 (2004 Edition): Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices)
   - NIST Handbook 130 (2004 Edition): Uniform Laws and Regulations in the Areas of Legal Metrology and Engine Fuel Quality
   - NIST Handbook 133 (2003 Edition): Checking the Net Contents of Packaged Goods
   - Guide for the use of the International System of Units - http://physics.nist.gov/cuu/units/bibligraphy.html

4. Miscellaneous
   - Export Quality Management, an answer book for small and medium-sized exporters, published by the International Trade Centre (ITC) - http://www.intracen.org
   - The International System of Units, published by the Bureau International des Poids et Mesures (BIPM) - http://www.bipm.fr
   - The *Acquis* of the European Union under the management of the Enterprise DG : 31 December 2002 - http://www.europa.eu.int.
   - Guidance for the harmonised implementation of Council Directive 76/211/EEC, published by the European Cooperation in legal metrology (WELMEC) : June 2000 - http://www.welmec.org

* This OIML International Document 1 is being revised and a new version is expected in a near future.

ITC: Your Partner in Trade Development

The International Trade Centre (ITC) is the technical cooperation agency of the United Nations Conference on Trade and Develpoment (UNCTAD) and the World Trade Organization (WTO) for operational, enterprise-oriented aspects of trade development.

ITC supports developing and transition economies, and particularly their business sectors, in their efforts to realize their full potential for developing exports and improving import operations.

ITC works in six areas:

- Product and market development
- Development of trade support services
- Trade information
- Human resource development
- International purchasing and supply management
- Needs assessment, programme design for trade promotion

International Trade Centre
UNCTAD / WTO

ITC: Your partner in trade development

For more information:
Street address: ITC, 54–56, rue de Montbrillant, 1202 Geneva, Switzerland.
Postal address: ITC, Palais des Nations, 1211 Geneva 10, Switzerland.
Telephone: +41 22 730 0111 *fax:* +41 22 733 4439 *e-mail:* itcreg@intracen.org *Internet:* http://www.intracen.org